FIRST MARITIME BUSINESS TEXTBOOK SERIES



A nutshell explanation of the shipping art

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In memory of our dear colleague, the late

Capt. Mohammad Reza Roshandeli

(d.03/11/2020)

the author of this textbook.

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Few words about LIGHTHOUSE training program

Few words about LIGHTHOUSE training program

From its inception, First Maritime Company is committed to meet the highest professional standards. This hails from the strong belief that working habits and processes, based on mindful and demonstrated standards, generate corporate value and definitely help at reaching business targets.

The LIGHTHOUSE training program is a tool used by First Maritime staff members to enforce "stay on top" standard policy during their operations throughout their carrier path.

By delivering flexible and customized training packages, Lighthouse program is a multi-modal training platform ready to address training needs:

- By creating an online collaborative experience-based community through a permanent digital framework
- By supporting online training schemes including cloud shared space, social network groups, distance learning platforms (Moodle, etc.).
- By archiving and putting at disposal series of training contents and materials available online
- By making possible exchange of views and questions related to maritime business

Derived from the collection of specialized texts by Capt.Roshandeli, this version of the textbook, entitled ***Shipping the life blood of the global economy: a nut shell explanation of the shipping art***, offers a technical overview of shipping operations and business. No doubt it will strengthen our understanding of day-to-day maritime operations.

As the first publication resulting from LIGHTHOUSE program activities, we wish it will not only benefit First Maritime staff members but also prove helpful to a larger audience among its business community environment.

Julien PELISSIER,

CEO of First Maritime Company

First Maritime Lighthouse program team

October 2020

Preface

Preface

The shipping process follows the manufacturing and the packing of goods and is controlled and overseen by a shipping or logistics company. Shipping types require different documentation, handling, arrival times and means of transportation.

There are many different types of ships, and the differences are mostly based upon the type of cargo the ship transports.

Modern seagoing commercial vessels come in all shapes and sizes and are designed to carry a wide variety of cargoes.

The international shipping industry is responsible for the carriage of around 90% of world trade. Shipping is the life blood of the global economy. Without shipping, intercontinental trade, the bulk transport of raw materials, and the import/export of affordable food and manufactured goods would simply not be possible.

Ships are technically sophisticated, high value assets (larger hi-tech vessels can cost over US $200 million to build), and the operation of merchant ships generates an estimated annual income of over half a trillion US Dollars in freight rates. Shipping is the safest and most environmentally benign form of commercial transport. Perhaps uniquely amongst industries involving physical risk, commitment to safety has long pervaded virtually all deep sea shipping operations. Shipping was amongst the very first industries to adopt widely implemented international safety standards. Because of its inherently international nature, the safety of shipping is regulated by various United Nations agencies. The International Maritime Organization (IMO) in particular has developed a comprehensive framework of global maritime safety regulations, which are enforced on a worldwide basis. Shipping is the lowest cost per unit moved of any form of transportation. Demand for oceangoing vessels, as measured in ton miles, has outpaced average global GDP growth of in the past several years. The maritime sector is one of the few asset classes that has not appreciated in the low interest rate environment of the last several years as unlevered yields on maritime assets are higher than other real asset classes. The shipping industry is highly fragmented and includes dry bulk, container, tanker, and offshore vessels. Each category of vessel is then split into multiple sub-segments. Because of this, the maritime industry provides diversification opportunities that are hard to be matched in other transportation sectors.

Ships are expensive and require large amounts of capital to operate and maintain. Container-ships and tankers can cost up to $150 million each, while LNG tankers cost upwards of $225 million per vessel. Second hand ship sales make up a large portion of ship investments. The cost of a new very large crude carrier (VLCC), a ship that is a third of a kilometer in length, and that can carry XXX barrels of crude oil, can be in excess of USD 100 million. That’s a huge figure. But, sometimes ship owners and operators will order these grand ships in bulk, perhaps in a block of seven or more and suddenly the price tag on the deal escalates towards the USD 1 billion mark, making capital costs an owner’s largest expense. Ship cost will continue to rise as demand for larger ships, capable of increased cargo loads, continues. However, shipping differs from other capital-intensive asset classes, such as real estate and aircraft because ships are internationally mobile and their owners can choose their legal

jurisdiction, allowing shipping companies to adopt less formal corporate structures than found in other business. This leads to high levels of risk and volatility playing a large role in maritime finance. To finance a ship purchase, or indeed any asset purchase, today's ship-owner will scour the global finance markets looking for the least expensive and most flexible source of capital. International banks will often be the first port of call, as they provide a full range of specialist banking and finance facilities.

Traditionally, ship finance markets have been centered in Germany, the Nordic countries, New York and London, but with Asia's importance in the shipping and ship building markets, increasingly finance options in China, Singapore and Hong Kong have grown in competitiveness. Traditional sources of finance were owner's equity and bank finance. Given low cost bank financing, owners had little incentive to seek other sources. Between the 1950s the start of the 21st century financial techniques changed dramatically. From self-financing and bank loans in the 50s and 60s to charter backed financing and higher risk asset-backed financing of the 70s and 80s till the evolution of corporate financing and subsidized shipbuilding credit of the 90s, ship financing evolved with the rapid growth of the shipping industry. As the maritime industry continued to grow so did the gradual migration into other forms of financing. Current methods of raising ship finances include private funds, such as private equity and private debt; bank loans, with four types: mortgage loans secured against the ship, corporate loans secured against the company, shipyard credit, and mezzanine financing; and capital markets which can provide equity through an initial public offering (IPO) of shares or debt by issuing [high yield and corporate] bonds. Using public equity through the capital markets has a mixed history. Two particular problems are the small size of shipping companies, which exclude them from public equity finance, and volatility of earnings and asset values.

In a traditional bank loan financing transaction, the bank and the borrower will negotiate a loan agreement in which the parties will assign various forms of collateral (including a mortgage on the vessel, shipbuilding contract, and charter fee receivables) as security for the lender's payment. The borrower then charters the vessel out for a fee determined by the parties. The charter fee will be used to pay off loan and can last as long as fifteen years in some cases. In the private sector, Private equity investments allow small specialized companies who understand the shipping industry and the volatility invest in long term marine financing opportunities. Some private investors use debt financing, in which companies raise money for working capital to invest in the shipping industry. Private debt financing includes senior secured loan, mezzanine loan, and sale and leaseback transactions. Mezzanine financing refers to high-yield debt in which the lender obtains the right to take an ownership or equity interest in the vessel. A sale and leaseback transaction involves the leveraged lease of a vessel with a potential purchase option for the lessee. Today, ship finance is as global and competitive as are the far flung markets which international shipping serves.

The shipping process follows the manufacturing and the packing of goods and is controlled and overseen by a shipping or logistics company. Shipping types require different documentation, handling, arrival times and means of transportation.

There are many different types of ships, and the differences are mostly based upon the type of cargo the ship transports.

Preface

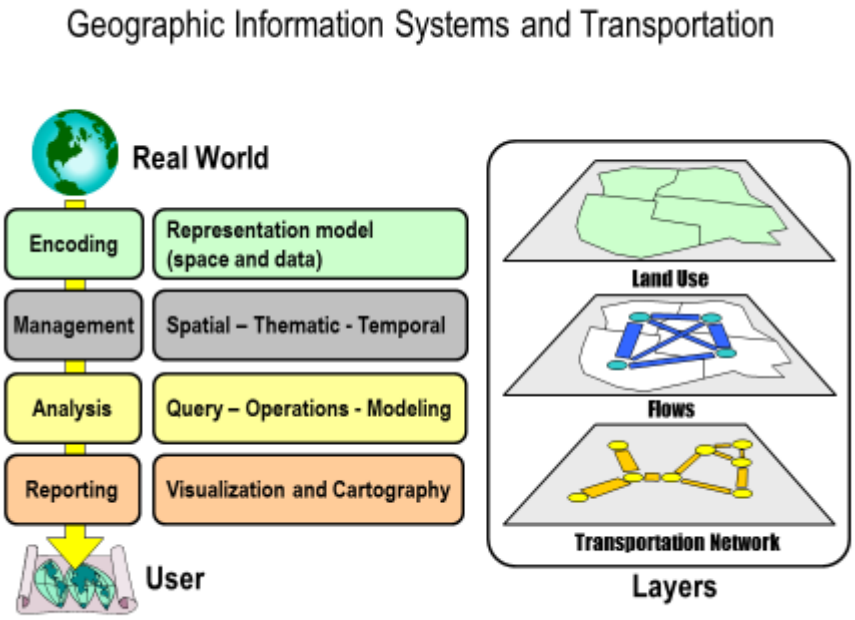
Modern seagoing commercial vessels come in all shapes and sizes and are designed to carry a wide variety of cargoes.

In the pages ahead the reader will become acquainted briefly with the shipping art.

Capt. M.R Roshandeli

Captain of merchant vessels (retd), researcher, collector, editor
on behalf of FIRST MARITIME GENERAL TRADING COMPANY

Chapter One: Transportation and the Geographical Space



Movements of people, freight and information have continuously been fundamental components of human societies. Contemporary economic processes have been accompanied by a significant growth in mobility and higher levels of accessibility. Although this trend can be traced back to the industrial revolution, it significantly accelerated in the second half of the 20th century as trade was liberalized, economic blocs emerged and the comparative advantages of global labor and resources were used more efficiently. However, these conditions are interdependent with the capacity to manage, support and expand movements of passengers and freight as well as their underlying information flows. Societies have been increasingly dependent on their transport systems to support a wide variety of activities ranging, among others, from commuting, supplying energy needs, to distributing parts between factories. Developing transport systems has been a continuous challenge to satisfy mobility needs, to support economic development and to participate in the global economy.

The goal of this introductory chapter is to provide a definition of the nature, role and function of transport geography and where the discipline stands in regard to other disciplines. It also underlines the importance of specific dimensions such as nodes, locations, networks and interactions. An historical perspective on the evolution of transport systems underlines the consequences of technical innovations and how improvements in transportation were interdependent with contemporary economic and social changes. Along with an overview of methods used in transport geography, some basic methods such as accessibility measures and route selection are presented. An overview of Geographic Information Systems for transportation is also provided.

What is Transport Geography?

1. The Purpose of Transportation

"The ideal transport mode would instantaneous, free, have an unlimited capacity and always be available. It would render space obsolete. This is obviously not the case. Space is a constraint for the construction of transport networks. Transportation appears to be an economic activity different from the others. It trades space with time and thus money"

As the above citation underlines, the purpose of transportation is to overcome space, which characterizes a variety of human and physical **constraints** such as distance, time, administrative divisions and topography. Jointly, they confer a friction to any movement, commonly known as the **friction of space**. However, these constraints and the friction they create can only be partially circumscribed. The extent to which this is done has a **cost** that varies greatly according to factors such as the distance involved and the nature of what is being transported. The goal of transportation is thus to transform the **geographical attributes** of freight, people or information, from an origin to a destination, conferring them an **added value** in the process.

Transportability is the convenience at which passengers, freight or information can be moved. It refers to transport costs, but also to the attributes of the what is being transported (fragility, perishable, price). Some institutional factors can also influence transportability such as laws, borders and tariffs. If transportability was optimal, the spatial division of labor and production would be absolute at the global scale. Some goods, such as semiconductors, are almost reaching this condition since they have a high value to weight ratio.

What is also specific to the purpose of transportation is the **fulfillment of a demand for mobility** that is transportation can only exists if it moves people, freight and information around. Otherwise it simply loses its purpose as transportation obeys a derived demand. Consequently, any movement has a spatial consideration which in turn is linked to spatial flows and their patterns. Urbanization, multinational corporations, the globalization of trade and the international division of labor are all forces shaping and taking advantage of transportation at different, but often embedded, scales.

The fundamental purpose of transport is consequently geographic in nature, meaning that it facilitates movement between different locations. Transport thus plays a role in the structure and organization of space and territories. In the 19th century, the objective of transport planners was to cover the surface of the earth with circulation pathways. In the 20th century, this objective shifted to selecting itineraries, choosing transport modes, augmenting the capacity of existing networks and to respond to the mobility needs of goods, people and services.

2. The Importance of Transportation

Transport represents one of the most important human activities worldwide. It is an indispensable component of the economy and plays a major role in spatial relations between geographic nodes. Transport creates valuable links between regions and business, between

population and the rest of the world. Transport is a multidimensional service, which affects several aspects of the economy. Its importance is manifested through several points of view:

- **Historical**. Transport modes have played several different historical roles. In the rise of civilizations (Egypt and China), in the development of political and cultural societies (creation of social structures) and also in national defense (Roman Empire, American road network).
- **Social**. Transport modes facilitate the comings and goings of citizens who wish to have access to healthcare, welfare, and cultural or artistic events. They shape the urban fabric and their respective regions by favoring the mobility of people. Transport has an impact on the whole of society (users, suppliers, entrepreneurs, governments).
- **Political**. Governments play a critical role in transport as investors, decisions makers and actors. Transport's political role is undeniable. While most transport demand relates to economic imperatives, many communication corridors have been constructed for political reasons. Transport thus has an impact on national unity (linking every corner of the land by rail road air and sea).
- **Environmental**. Despite the countless advantages of transport, their respective environmental costs have assumed large proportions (pollution, exploitation of natural resources). The principal environmental consequences of transport include air and water quality, noise level and public health. All decisions relating to transport should be evaluated on account of the corresponding costs and benefits to the people and the environment.
- **Economic**. The evolution of transport (improvement and development) has always been linked to economic development and job creation both indirectly and directly. The construction of transport material has evolved according to current fashions; naval, rail, automobile, and aerospace construction. The transport sector is also an economic factor in the production of goods and services. They contribute to the value-added of goods and services, facilitate economies of scale, influence land (real estate) value and participate in the geographic specialization of given regions. Transport is both a factor and a reflection of economic activity.

The following contemporary trends about the growing importance of transportation can be identified:

- **Growth of the demand**. The twentieth century, more than any other, has seen a considerable growth of the transport demand related to individual as well as freight mobility. Recent trends still underline an ongoing process of growth, which has led to the multiplication of the number of journeys and a wide variety of modes servicing transport demand.
- **Reduction of costs.** Even though several transportation modes are very expensive to own and operate (ships and planes for instance), costs per unit transported have significantly dropped over the last decades. This implies the possibility to overcome larger distances and further exploit the comparative advantages of space. However, this process is far from undermining the role of transportation as lower costs were linked with longer distances. As a result, the share of transport activities in the economy has remained relatively constant in time.
- **Expansion of infrastructures.** The above two trends have obviously extended the requirements for transport infrastructures both quantitatively and qualitatively. Roads, harbors, airports, telecommunication facilities and pipelines have expanded considerably to

service new areas and adding capacity to existing networks. Transportation infrastructures are thus a major component of the land use, notably in developed countries.

Facing these contemporary economic features, an important part of the **spatial differentiation** of the economy is related to where resources (raw materials, capital, people, information etc.) are located and how well they can be distributed. Transport routes are established to distribute resources between places where they are abundant and places where they are scarce, but only if the constraints involved can be afforded.

Consequently, transportation has an important role to play in the new conditions that affect global, national and regional economic entities. It is a service that is so embedded in the socio-economic life of individuals, institutions and corporations that it is often invisible to the consumer, but always **part of all economic functions**. This is paradoxical as the perceived invisibility of transportation is derived from its efficiency. Numerous **fallacies** in the analysis of contemporary geographical processes have resulted from this misrepresentation and understanding the true role of transportation requires a grasp of its underlying concepts and dimensions.

3. Concepts and Dimensions of Transport Geography

Transportation interests geographers for two main reasons. First the industries, infrastructures, equipment and networks occupy an important place in space and constitute the basis of a complex spatial system. Second, since geography seeks to explain the relationships between phenomenon within the spatial environment, networks are of specific interest to geographers.

Transport geography is a sub-discipline of geography concerned about movements of freight, people and information along with their physical and transactional context. It tries to link spatial constraints and attributes with the origin, the destination, the extent, the nature and the purpose of movements.

Transport geography, as a discipline, emerged from economic geography in the second half of the twentieth century. Traditionally, transportation has been an important factor over the economic representations of the geographic space, namely in terms of the location of economic activities and the monetary costs of distance. The growing mobility of passengers and freight justified the emergence of transport geography as a specialized field of investigation. In the 1960s, transport costs were recognized as a key factors in location theories. However, from the 1970s globalization challenged the centrality of transportation in many geographical and regional development investigations. As a result, transportation was under represented in the 1970s and 1980s, even if mobility of people and freight and low transport costs were considered as important factors behind the globalization of trade and production.

Since the 1990s, transport geography has received renewed attention, especially because the issues of mobility, production and distribution are interrelated in a complex geographical setting that can be systematically understood. Consequently, transportation is a **system** that considers the complex relationships between networks, the demand and space. Transport

geography must be systematic as one element of the transport system is linked with numerous others. An approach to transportation thus involves several fields that can be at the core of transport geography or somewhat peripheral depending on the concepts investigated. However, three central concepts to transport systems can be identified:

- **Transportation nodes**. Transportation primarily links locations, often characterized as nodes. They serve as access points to a distribution system or as transshipment / intermediary locations within a transport network, function mainly serviced by transport terminals. Transport geography must consider its places of convergence and transshipment.
- **Transportation networks**. Considers the spatial structure and organization of transport infrastructures and terminals. Transport geography must include in its investigation the infrastructures supporting movements.
- **Transportation demand**. Considers the spatial demand for transport services as well as the modes used to support movements. Once this demand is realized, it becomes an interaction which flows through a transport network. Transport geography must evaluate the factors affecting its derived demand function.

The analysis of these concepts rely on **methodologies** often developed by other disciplines such as economics, mathematics, planning and demography. Each provides a different dimension to transport geography. For instance, the spatial structure of transportation networks can be analyzed with graph theory, which was initially developed for mathematics and computer science to deal with other problems. Further, many models developed for the analysis of movements, such as the gravity model, were inferred from physical sciences. **Multidisciplinary** is consequently an important attribute of transport geography, like geography in general.

Facing these varied dimensions related to fields of investigation, what could be the role of transport geography and of the transport geographer? Basically, the transport geographer tries to draw linkages between several or all of these dimensions in a systematic field of investigation, especially when they have **spatial considerations**. Among these geographical considerations, the most relevant to transport geography are:

- **Location**. As all activities are located somewhere, location will determine the origin, the destination, the distance and even the possibility of a movement to be realized. When a location is linked to a desirable attribute such as a resource, it is likely to generate movements.
- **Scale**. Movements generated by human activities are occurring at different scales, pending the nature of the activity. For instance, home-to-work journeys generally have a local or regional scale while the distribution and supply networks of a multinational corporation are most likely to cover several parts of the world. Different geographical scales are often embedded.
- **Spatial structure**. All locations being different and considering the scale at which these locations are interacting, the outcome is the spatial structure. It represents how transportation systems is established over local, regional and global geographies.
- Consequently, the **transport systems, by their nature, have a strong spatial imprint**. The next concept will deal with this consideration.

Transportation and Space

1. Physical Constraints

• Transport geography is concerned about movements, which are obviously occurring over space. The features of this space impose **major physical constraints on transportation systems** in terms of what mode can be used, the extent of the service, its costs and its capacity. A basic geographical feature of the terrestrial surface is its **sphericity**, which imposes a specific geometry for movements, notably at the international level. Three basic spatial constraints of the terrestrial space can be identified:

• The **physiography** is the geologic surface or landscape features of an area. It includes the topography which is the layout of natural and artificial features on the surface of the earth. Features such as mountains and valleys have strongly influenced the structure of networks, the cost and feasibility of transportation projects. Physical constraints fundamentally act as absolute and relative barriers

• **Absolute and relative barriers to movements**. For instance, a steep gradient forbids the passage of railways and highways (or increase substantially their construction costs) or the construction of an airfield. Transportation infrastructures have thus specific physiographical considerations.

• The **hydrography** is composed of features such as rivers, lakes and oceans and determines the extent of navigation. Continental masses impose a clearly defined maritime space that it is possible to simplify with obligatory passage points, which must be respected or circumscribed when possible (Panama and Suez canals are such achievements). It also imposes constraints on land transportation such as the construction of bridges, tunnels and detours, but can also be a transport infrastructure on its own. Several important elements of the hydrography such as the Mississippi, the St. Lawrence, the Rhine, the Mekong or the Yangtze have seen the accumulation of human activities taking advantage of the offered transport capabilities. Ports are also transportation infrastructures strongly conditioned by the hydrography, mainly by the quality of the site and its depth.

• The **climate** is the general weather pattern affecting a region that includes temperature, wind and precipitation. Its impacts on transportation modes and infrastructure are varied, ranging from negligible to hazardous or impossible operating conditions. Jet streams are also a major physical component that international air carriers must take into consideration. For an aircraft, the speed of wind can affect costs of air travel. When the wind is pushing the airplane towards its destination, it can reduce flight time up to several hours for intercontinental distances.

The sphericity of the earth is also imposing routes minimizing intercontinental distances by using the great circle distance (Great Circle Distance Calculator); the least distance line between two points on a sphere. This distance is particularly useful to explain the paths of maritime and air routes.

2. The Geographical Space and Transportation

Outside the basic physical constraints it creates, the geographical space also involves further considerations. The concept of spatial order is closely linked to transport geography, as with geography in general. It defines six core concepts bounded with transport geography:

- **Geographical location** implies the absolute location according to a system of reference (coordinate system) such as longitude and latitude. From location can be derived the notion of distance.
- **Distance** is a measure of the friction of space when a movement occurs and cannot be evaluated without at least two known locations. The friction of space can be expressed according to several measures such as length, time, cost, effort, energy or even the psychological perception of distance as a deterrent.
- **Fixedness**. Locations are fixed, since they obviously cannot move. This causes disparities, because economic, social and political conditions change in space and time whereas the geographical location remains the same.
- **Geographical attributes**. All locations have different geographical attributes. These attributes are the set of specific characteristics that are proper to a location, notably its resources. Population can also be considered as a resource by its qualification and education levels and labor costs.
- **Geographical relativity**. All locations are relative since they must be considered in a wider context. The importance of a location changes with regards to its importance relative to other locations and to the scale at which the comparison is made. The relative position changes in time and with the development of activities. A location is often located by drawing reference to another.
- **Dynamics** involves three major points. First, all changes at a location affect locations linked to it. Second, if a new link is created, the importance locations bound to this link will change. Third, whatever the nature of change, the effect will be positive or negative.

The concept of dynamics is very important to understand the relationships between space and transportation, mainly through to two major spatial processes:

- Specialization. Linked geographical entities are able to specialize in the production of commodities they have a comparative advantage at, while importing what they do not produce. As a result, efficient transportation systems are generally linked with higher levels of regional specialization. The globalization of production clearly underlines this process as specialization occurs as long as the incurred saving in production costs are higher than the incurred transport costs.
- Segregation. Linked geographical entities may see the reinforcement of one at the expense of others, notably through economies of scale. This outcome often contradicts regional development policies aiming at providing uniform accessibility levels within a region.

Geographical specialization and segregation processes often occur concomitantly.

3. The Permanence of Transportation in the Spatial Structure

Most of today's transportation networks are inherited from the past, notably transport infrastructures. Even if since the industrial revolution a set of new technologies have revolutionized transportation in terms of speed, capacity and efficiency, the **spatial structure of networks has not much changed**. Therefore, the permanence of transportation networks in time and space can be explained by two major factors:

• **Physical attributes**. Natural conditions can be modified and adapted to suit human uses, but they are a very difficult constraint to escape, notably for land transportation. It is thus not surprising to find that most networks follow the easiest (least cost) and most direct path, which generally follows valleys and plains. Considerations that affected road construction a few hundred years ago are still playing today, although they are easier to circumscribe.
• **Historical considerations**. New infrastructures generally reinforce historical patterns of exchange, notably at the regional level. For instance, the current highway network of France has mainly followed the patterns set by the national roads network built early in the 20th century. This network was established over the Royal roads network, itself mainly following roads built by the Romans. At the urban level, the pattern of streets is often inherited from an older pattern, which itself may have been influenced by the pre-existing rural structure (lot pattern and rural roads).

The continuous evolution of transportation technology may not necessarily have expected effects on the spatial structure. A common myth is to believe that transportation is strictly a **decentralizing force**, favoring the spread of activities in space. This is not always the case. In numerous instances, transportation is a **centralizing force**, notably for business activities. Since transport infrastructures are generally expensive to build, they are established first to service the most important centers. Even if the car was a strong factor of decentralization, it has also favored the concentration of several activities at specific places and in large volumes. Shopping centers are a relevant example of this process.

4. Space / Time Relationships

Transportation, notably improvements in transport systems, changes the relationship between time and space. When this relationship involves easier, faster and cheaper access between places, this result is defined as a space / time convergence because the amount of space that can be reached ("purchased") with a similar amount of time increases significantly. The most significant regional and continental gains were achieved during the 18th and 19th centuries, a process which went on into the 20th century. The outcome has been significant differences in space / time relationships, mainly between developed and developing countries.

At the international level, globalization processes have been supported by improvements in transport technology and their spatial accumulation to form transportation systems. The result of more than 200 years of technological improvements has been a space / time collapse of global proportions in addition to the regional and continental processes previously mentioned. This concomitantly shrank the transactional space and enabled an extended exploitation of the comparative advantages of space in terms of resources and labor. Significant reductions in transport and communication costs occurred concomitantly. Four major factors are to be linked with this space / time collapse:

• **Economies of scale**. Being able to transport larger amounts of freight and passengers at lower costs has improved considerably the capacity and efficiency of transport systems. However, this does not necessarily imply that the units being transported will move faster from their origins to their destinations, simply in larger quantities.

- **Expansion of transport infrastructures**. Transport infrastructures have expanded considerably to service areas that were not serviced before or were insufficiently serviced. A drawback to this assertion is that although the expansion of transport infrastructures enabled to expand distribution systems, it also expanded the number of tons-km or passengers-km considerably.
- **Substitution of transportation by telecommunications**. It enabled several economic activities to bypass the spatial constraint in a very significant manner. Electronic mail is an example where the transmission of information does not have a physical form (outside electrons or photons) once the supporting infrastructure is established. There is obviously a limit to this substitution, but several corporations are trying to use the advantages of telecommuting as much as they can because of the important savings involved.
- **Transport terminals efficiency**. Terminals, such as ports and airports have shown a growing capacity to handle large quantities of traffic over a short time period.

However, space / time convergence can also be **inversed** under specific circumstances. For instance, congestion is increasing in many urban areas, implying supplementary delays. Traffic in several urban areas is moving at the same speed that in did one hundred years ago on horse carriages. An express mail package flown from Washington to Boston in about an hour (excluding delays at takeoff and landing due to airport congestion) can have an extra one hour delay as it is carried from Logan Airport to downtown Boston, a distance of only two miles. The relationships between transportation and space has changed considerably over the last 200 years, notably because of technological improvements.

Historical Evolution of Transportation

1. Transportation in the Pre-Industrial Era (pre 1800s)

Efficiently distributing freight and moving people has always been an important factor for maintaining the cohesion economic systems. With technological and economic development, the means to achieve such a goal have considerably evolved. The historical evolution of transportation was very complex and related to the **spatial evolution of economic systems**. It is possible to summarize this evolution, from the pre-industrial era to transportation in the early 21st century, in **five major stages**, each of which is linked with specific technological innovations in the transport sector.

Before the major technical transformations brought forward by the industrial revolution at the end of the 18th century, any forms of **mechanized transportation** did not exist. Transport technology was mainly limited to harnessing animal labor for land transport and to sailing for maritime transport. The transported quantities were very limited and so was the speed at which people and freight were moving. The average overland speed by horse was between 8 to 15 kilometers per hour and maritime speeds were barely above these figures. Waterways were the most efficient transport systems available and cities next to rivers were able to trade over longer distances and maintain political, economic and cultural cohesion over a larger territory. It is not surprising to find that the first civilizations emerged along river systems for agricultural but also for trading purposes.

The efficiency of the land transport system of this era was linked with a specific context of **isolation and limited long distance trade**. Even if the overwhelming majority of trade was local in scope, international trade did exist and was culturally if not economically important, as the example of the Silk Road trade routes can testify. Traded commodities were high-value (luxury) goods such as spices, silk, wine and perfume. From the perspective of regional economic organization, the provision of cities in perishable agricultural commodities was limited to a radius of about fifty kilometers, at most. Under such conditions, it was difficult to speak of an urban system, but rather of a set of relatively self-sufficient economic systems with very limited trade. The preponderance of **city-states** during this period can a priori be explained by transportation, or rather by the difficulties of shipping goods (therefore to trade) from one place to another. Among the most notable exceptions to this were the Roman and Chinese empires, which committed extraordinary efforts at building transportation networks and consequently maintained control over an extensive territory for a long time period.

- The Roman Empire grew around an intricate network of coastal shipping and roads. Its road network supported a set of large cities around the Mediterranean basin. It also traded with India and China.
- The Chinese Empire established an important fluvial transport network with several artificial canals connected together to form the **Grand Canal**. Some parts of it are still being used today.

The economic importance and the geopolitics of transportation were very early recognized, notably for maritime transportation since before the industrial revolution, it was the most convenient way to move freight and passengers around. Great commercial empires were established with maritime transportation. Initially, ships were propelled by rowers and sails were added around 2,500 BC as a complementary form of propulsion. By the 14th century galleys were finally replaced by full-fledged sail ships there were faster and required smaller crews. 1431 marked the beginning of the European expansion with the discovery by the Portuguese of the North Atlantic circular wind pattern, better known as the trade winds. A similar pattern was also found on the Indian and Pacific oceans wind the monsoon winds.

The fall of Constantinople, the capital of the Byzantium Empire (Eastern Roman Empire), to the Turks in 1453 disrupted the traditional land trade route from Europe to Asia. Europe was induced to find alternate maritime routes. One alternative, followed by Columbus in 1492, was to sail to the west and the other alternative, followed by Vasco de Gama in 1497, was to sail to the East. Columbus stumbled upon the American continent, while Gama found a maritime route to India using the Cape of Good Hope. These events were quickly followed by a wave of European exploration and colonization, initially by Spain and Portugal, the early maritime powers, then by Britain, France and the Netherlands. European powers were able to master the seas with larger, better armed and more efficient sailing ships and thus were able to control international trade and colonization. By the early 18th century, most of the world's territories was controlled by Europe, providing wealth and markets to their thriving metropolises through a system of colonial trade.

Prior to the industrial revolution, the quantity of freight transported between nations was **negligible** according to contemporary standards. For instance, during the Middle Ages, French imports via the Saint-Gothard Passage (between Italy and Switzerland) would not fill a freight

train. The total amount of freight transported by the Venetian fleet, which dominated Mediterranean trade for centuries, would not fill a modern cargo ship. The volume, but not the speed of trade improved under mercantilism (15th to 18th century), notably for maritime transportation. In spite of all, distribution capacities were very limited and speeds slow. A stage wagon going through the English countryside in the 16th century would do so at an average speed of two miles per hour. Moving one ton of cargo 30 miles (50 km) inland in the United States by the late 18th century was as costly as moving it across the Atlantic. The inland transportation system was thus very limited, both for passengers and freight. By the late 18th century, canal systems started to emerge in Europe, initially in the Netherlands and England. As their maritime counterparts, they permitted the beginning of large movements of bulk freight and expanded regional trade. Maritime and fluvial transportation were the dominant modes of the pre-industrial era.

2. The Industrial Revolution and Transportation (1800-1870)

It was during the industrial revolution that **massive modifications of transport systems** occurred. This period marked the development of the steam engine that converted thermal energy into mechanical energy, providing an important territorial expansion for maritime and railway transport systems. Much of the credit of developing the first efficient steam engine in 1765 is attributed to the British Engineer Watt, although the first steam engines were used to pump water out of mines. It was then only a matter of time to see the adaptation of the steam engine to locomotion. In 1769, the French engineer could not build the first self-propelled steam vehicle, along with being responsible for the first automobile accident ever recorded. The first mechanically propelled maritime vehicle was tested in 1790 by the American Inventor Fitch as a mode of fluvial transportation on the Delaware River. This marked a new era in the **mechanization of land and maritime transport systems** alike.

From the perspective of land transportation, the industrial revolution was hitting a bottleneck as inland distribution was unable to carry the growing quantities of raw materials and finished goods. Roads were commonly unpaved and could not be used to effectively carry heavy loads. Although improvements were made on road transport systems in the early 17th century, such as the Turnpike Trusts in Britain (1735), this was not sufficient to accommodate the growing demands on freight transportation. The first coach services had speeds of about 5.5 miles per hour in the 1750s. From the 1760s a set of **freight shipping canals** were slowly built in emerging industrial cores such as England (e.g. Bridgewater Canal, 1761) and the United States (e.g. Erie Canal, 1825). These projects relied on a system of locks enabling to overcome changes in elevation and thus linking different segments of fluvial systems into a comprehensive waterway system. Fluvial barges became increasingly used to move goods at a scale and a cost that were not possible before. Economies of scale and specialization, the foundation of modern industrial production systems, became increasingly applicable through fluvial canals. In 1830 there were about 2,000 miles or canals in Britain and by the end of the canal era in 1850, there were 4,250 miles of navigable waterways. The canal era was however short-lived as a new mode would revolutionize and transform inland transportation appeared in the second half of the 19th century.

The first commercial rail line linked Manchester to Liverpool in 1830 (distance of 40 miles) and shortly after rail lines began to be laid throughout developed countries. By the 1850s, the

railroad established the first urban systems and enabled the access of resources and markets of vast territories, particularly from harbors. 6,000 miles of railways were then operating in England and railways were quickly being constructed in Western Europe and North America. Finally, an inland transport system that was at the same time flexible in its spatial coverage and that could carry heavy loads became available. As a result many canals fell into disrepair and were closed as they were no longer able to compete with rail services. In their initial phase of development, railways were a point to point process where major cities were linked one at a time by independent companies. From the 1860s, **integrated railway systems** started to cohesively service whole nations with standard gauges and passenger and freight services. The journey between New York and Chicago was reduced from three weeks by stage coach to 72 hours by train. Many cities thus became closely interconnected. The transcontinental line between New York and San Francisco, completed in 1869, represented a remarkable achievement in territorial integration made only possible by rail. It reduced the journey across the continent (New York to San Francisco) from six months to one week, thus opening for the Eastern part of the United States a vast pool of resources and new agricultural regions.

In terms of international transportation, the beginning of the 19th century saw the establishment of the **first regular maritime routes** linking harbors worldwide, especially over the North Atlantic between Europe and North America. These routes were navigated by fast Clipper ships, which dominated ocean trade until the late 1850s. Ships called composite ships then took over a large portion of the trade until about 1900, but they could not compete with steamships which have been continually improved since they were first introduced a hundred years before. Regarding steamship technology, 1807 marks the first successful use of a steamship, Fulton's *North River* / *Clermont*, on the Hudson servicing New York and Albany. The gradual improvement of steam engine technology slowly but surely permitted longer and safer voyages. In 1820, the *Savannah* was the first steamship (used as auxiliary power) to cross the Atlantic, taking 29 days. The first regular services for transatlantic passengers transport by steamships was inaugurated in 1838, followed-up closely by the usage of the helix, instead of the paddle wheel as a more efficient propeller (1840). Shipbuilding was also revolutionized by the usage of steel armatures (1860), enabling to escape the structural constraints of wood and iron armatures in terms of ship size. Iron armature ships were 30 to 40% lighter and had 15% more cargo capacity.

The main consequence of the industrial revolution was a **specialization of transportation services** and the establishment of **large distribution networks** of raw materials and energy.

3. Emergence of Modern Transportation Systems (1870-1920)

International transportation undertook an important phase of growth towards the end of the 19th century, especially with improvements in **engine propulsion technology** and a gradual shift from coal to oil in the 1870s. Although oil has been known for centuries for its combustion properties, its commercial use was only applied in the early 19th century. Inventors started experimenting with engines that could use the cheap new fuel. Oil increased the speed and the capacity of maritime transport. It also permitted to reduce the energy consumption of ships by a factor of 90% relatively to coal, the main source of energy for steam engines prior to this innovation. At equal size, an oil-powered ship could transport more freight than a coal-powered ship, reducing operation costs considerably and extending range.

Further, global maritime circulation was dramatically improved when infrastructures to reduce intercontinental distances, such as the Suez (1869) and the Panama (1914) canals were constructed. With the Suez canals, the far reaches of Asia and Australia became more accessible.

The increasing size of ships imposed massive investments in port infrastructures such as piers and docks. The harbor, while integrating production and transshipping activities, became an **industrial complex** around which agglomerated activities using ponderous raw materials. From the 1880s, liner services linked major ports of the world, supporting the first regular international passenger transport services, until the 1950s when air transportation became the dominant mode. This period also marked to golden era of the development of the railway transport system as railway networks expanded tremendously and became the dominant land transport mode both for passengers and freight. As the speed and power of locomotives improved and as the market expanded, rail services became increasingly specialized with trains entirely devoted to passengers or freight. Rail systems reached a phase of maturity.

Another significant technological change of this era involved urban transportation, which until then solely relied on walking and carriages. The significant growth of the urban population favored the construction of the first public urban transport systems. **Electric energy** became widely used in the 1880s and considerably changed urban transport systems with the introduction of **tramways** (streetcars), notably in Western Europe and in United States. They enabled the first forms of urban sprawl and the specialization of economic functions, notably by a wider separation between the place of work and residence. In large agglomerations, underground metro systems began to be constructed, London being the first in 1863. The **bicycle** was also an important innovation which changed commuting from the 1870s. Initially, the rich used it as a form of leisure, but it was rapidly adopted by the labor class as a mode of transportation to the workplace. Today, the bicycle is much less used in developed countries (outside for recreational purposes), but it is still a major mode of transportation in developing countries, especially China.

This era also marked the first significant developments in **telecommunications**. The telegraph is considered to be the first efficient telecommunication device. In 1844, Samuel Morse built the first experimental telegraph line in the United States between Washington and Baltimore, opening a new era in the transmission of information. By 1852, more than 40,000 km of telegraph lines were in service in the United States. In 1866, the first successful transatlantic telegraph line marked the inauguration of a global telegraphic network. The growth of telecommunications is thus closely associated with the growth of railways and international shipping. Managing a rail transport system, especially at the continental level became more efficient with telegraphic communication. In fact, continental rail and telegraphic networks were often laid concomitantly. Telecommunications were also a dominant factor behind the creation of **standard times zones** in 1884. From a multiplicity of local times, zones of constant time with Greenwich (England) as the reference were laid. This improved the scheduling of passenger and freight transportation at national levels. By 1895, every continent was linked by telegraphic lines, a precursor of the global information network that would emerge in the late 20th century. Business transactions became more efficient as production, management and consumption centers could interact with delays that were in hours instead of weeks and even months.

Current Issues in Transport Geography

1. Impacts on the Transport System

Obviously, the functioning, the adaptation and growth of markets are influenced by the equilibrium between supply and demand, planning and investment needs of the transport and communication sector. The expansion of trade linked to contemporary developments in transport and communication technologies has entailed a modification of transport and communication means. We can summarize these impacts over six major points.

First, there is a great potential for growth in the car industry. This is the result of both demographics which demonstrate an increasing number of potential inhabitants reaching driving age; and the financial conditions of various countries suggesting a high saving capacity of households. The demand for developing a car industry is also influenced by the complex ramification of the industry both **upstream** (iron and steel, pneumatics...) and **downstream** (fuel, insurance, sale, transport, infrastructures,...) in what is known as the supply / distribution chain. Many countries find in the car industry a solution for absorbing an increasing proportion of labor force. Besides, the emergence of extended metropolitan regions and the related needs for rapid, door-to-door services increase demand for vehicle and network flexibility and thus gives an impetus for the development of urban road transport.

Second, international trade is dominated by maritime transport. This has led to an increase in the size of vessels but mostly to the development of containerization. Indeed, the overwhelming primacy of containers was a prerequisite for the commercial integration of the region given the disparities in commercial flows, discordances in maritime fleet and differences in port infrastructures. Container traffic is essentially concentrated in major **hub** ports. This suggests both a territorial consolidation of economic activities along extended metropolitan regions and a rationalization of operator's services networks, thus giving secondary ports a feeder function for the national load centers.

Third, the policy for rail transport development falls in two categories. On the one hand rail network is being rationalized through the closure of unprofitable lines, while on the other hand, plans are being laid out and implemented through foreign technologies for the development of high speed passenger trains linking major metropolitan areas. The impact of increasing trade on the railway transportation network is scale specific.

- At the **macro scale**, new alternatives are emerging in the form of land bridges between Europe and Asia.
- At the **meso scale**, the railway transportation network is influenced by the pattern of energy consumption. Many countries still rely overwhelmingly on foreign suppliers for their source of fuel. Countries still build major fuel moving transport arteries. A key issue is the concentration of investments in shaping rail corridors.
- At the **micro scale**, recent tendencies notably in extended metropolitan regions reveals a specialization of rail traffic as well as a transfer of certain types of commodities from the rail network to the fluvial and road network systems. Railways servicing ports tend more and more to concentrate on the movement of container traffic. This strategy of the rail transport

authorities allows on the one hand, an increase in the delivery of goods and on the other hand, the establishment of door-to-door services through a better distribution of goods among different transport modes.

Fourth, the traditional dominance of port over their hinterland is being reconsidered. Ports now perform interface functions on behalf of freight consigned or derived thousands of kilometers away from the port. As containerization is leading towards flexible, integrated and **seamless** intermodal services, the nature of the port business environment changes very rapidly. The ability of a port to attract and serve international traffic depends increasingly on:

- The geographical conformity of its site to a shipping line's fleet and market strategy.
- The quality of its intermodal tertiary service notably logistics systems.
- The availability of local cargoes.
- The intermodal links to major production and consumption markets.

Shipping lines are rationalizing their services, adapting to customer's changing needs and modifying the configurations of their itineraries. A new port hierarchy is emerging. Ports are thus under intense pressures to restructure their services and modernize their equipment.

Fifth, the prospect for air traffic growth is excellent. But with **deregulation**, airlines have realized the extraordinary potential of **hub-and-spoke** airports to increase their **catchment area** by adding a single point of call from an existing hub. The attractiveness of an airport thus rests on the capacity to form cooperative transportation alliances; the level of landing fees; the quality of maintenance facilities; and the local growth potential for air transport. Faced with this situation, airport authorities are under heavy pressure to increase runways, scheduling and terminal capacities. There are thus numerous projects for the expansion of existing installations or the construction of new airports. But, the relocation or expansion of existing facilities aggravates the competition among the region's airports and has major implications for airports and their role within the transportation system.

Sixth, the population concentrations in extended metropolitan regions and the pattern of trade flows between them lead to the emergence of gateways. A key spatial feature of the transportation and communication infrastructures in the world is the regional operation centers or **multimodal platforms**. These platforms are marked by their capacity for sea, land, air and telecommunication transfer. Linkages between these gateways are concentrated in intermodal corridors. Trade originates in many regions but as it nears the multimodal transport terminals, flows tends to converge before arrival and as flows move further away from the terminals it disperses to multiple directions. These arterial links leading to and from **gateways**, connect with each country's fluvial, coastal, air and road transportation systems. These systems are not only servicing each country's domestic trade but are paving the way for an integrated global intermodal transportation system. As some of these gateways are now emerging as critical logistics service centers that rationalize distribution systems to fit new trading patterns, their development has far-reaching implications in any transportation and communication policy framework.

2. Investment Needs

Trade and transport needs are expanding rapidly. But the rate of growth and change in the volume and types of traffic as a result of increasing trade and motorization is such that transport and communication infrastructures require more investment than the manufacturing sector. The amount of investments required to build and maintain the networks is estimated at several US$ trillion. All countries of the world have adopted policy of transport infrastructure construction programs. Governments have and are still participating at various degrees and at different stages in the development of the transport sector. But the insertion of the countries in international economic organizations renders many state instruments obsolete. Governments as well as international organizations such as the **World Bank** are thus searching for mechanisms to attract investors. The mechanisms that govern foreign investments are influenced by the hierarchy of effects and duration of international conflicts and the degree of participation of a region to international exchanges. Reports demonstrate that investments of industrialized countries are essentially directed towards other industrialized countries notably the United-States.

The formation of trading blocs (e.g. **NAFTA, ASEAN, EU**) is bringing participating countries to increase interest rates to attract investment flows. It is not possible to have fixed exchange rate, mobility of capital and national monetary policies all together. The monetary policy of many countries are now feeling the effects of these changes as the US$ represents a growing proportion of foreign reserves. This situation influences the functioning of governments that see an erosion of their capacity to define or to realize objectives. The State is rigid and regulated. The situation is especially marked in the transportation sector. There are modal regulations, legislation in pricing structures, policy of environmental control and conflicting jurisdictions in landside access. There is thus increasing pressure to dilute the role of the State and to strengthen regional organizations.

The consolidation of markets and the resulting increase in transborder coastal traffic is encouraging privatization in the transport and communication sector and the adoption by States of the principle of user-pay as a mean to attract investments. The main problem is that investments in infrastructure do not occur evenly. Technological and economic forces are bringing about a concentration of investments in a few load centers that have become attractive investment sites. Changes are being adopted in selected extended metropolitan regions where transport companies are favored by contractual laws that increase their capacity to organize transactions.

An Overview of Methods in Transport Geography

1. Introduction

Transportation planning and analysis are **interdisciplinary by nature**, involving civil engineers, economists, urban planners and geographers (see concept 1). Two common traits of transportation studies, regardless of disciplinary affiliation, are a **heavy reliance on empirical data** and the intensive use of data analytic techniques.

In some respects, transport geography is distinguished from many other parts of human geography by the amount and types of quantitative analysis. In fact, transport geography was **one of the main forces in the quantitative revolution** that helped to redefine geography in the 1960s.

In addition to providing a conceptual background to the analysis of movements of freight, people and information, transport geography is an applied science. The main goal of methods aims to **improve the efficiency of movements** by identifying their spatial constraints. It is consequently possible to identify or test relevant strategies and policies.

2. Overview

Although there are various ways of classifying the methods that are used by transport geographers (e.g. by whether they deal with infrastructure or travel patterns; by whether the technique provides description, explanation or optimization; according to the level of data aggregation, the nature of the assumptions or the complexity of the calculations), the following two-by-two classification scheme has been chosen.

Methods	Used Mainly in Transportation Studies	General Use
Used Mainly in Geographic Studies	• Network Analysis (Graph Theory) • Land Use - Transportation Interactions • Flow/Location Allocation Models	• Maps • Geographic Information Systems • Descriptive Statistics, such as the Gini Coefficient
General Use	• The Four-Stage Urban Transportation Model • Travel/traffic Surveys	• Questionnaires, Interviews • Graphs and Charts • Inferential Statistics • Environmental Impact Assessment • Risk Assessment • Policy Analysis

The top left cell identifies methods that are used mainly in transport geography. The best example of this is **network analysis** (also referred to as **graph theory**), which is used to study transport form and structure, especially over time. For example, one could use network analysis to study the evolution of the hub-and-spoke configuration of airline service in North America.

• Transport geographers also play a key role in studying **land use - transport interactions**. Numerical models have been developed, which, over time, have become increasingly complex.
• Transport geographers are also interested in **flow and location allocation models** that can be used to define such things as school district boundaries or the location for a new retail outlet. These techniques are **optimization procedures** rather than methods for describing or understanding current transport systems.

The top right cell includes methods that are central to the discipline of geography, but are not restricted to the study of transportation systems.

- **Map-making** is the most obvious example of a geographic technique. Indeed, various types of maps are included in this web site. These include land use maps, depictions of transport infrastructure, isocline maps of transportation costs, schematics of transportation activity patterns, and many more.
- Geographic information systems (GIS), which are an outgrowth of digital cartography, provide a set of tools for storing, retrieving, analyzing and displaying spatial data from the real world. GIS technology has been applied to some large-scale transportation planning and engineering applications. More often, however, GIS are applied in a prescriptive way to small-scale problems, for example to plot optimal routes for buses, delivery trucks, or emergency vehicles.
- There are also **various statistics** that have been developed or modified by geographers to describe urban-economic systems. Examples include the Gini coefficient and indexes of concentration and specialization.

The bottom left cell includes various methods that are in general use in transportation studies.

- First, a diverse set of techniques is used in the four-stage **urban transportation modeling** exercise, the purpose of which is to understand and predict spatial patterns of travel in urban areas.
- Second, **traffic surveys** that are used to gather empirical information about movements.

The bottom right cell includes various techniques that are used in many different applications, including transportation analysis. Transportation analysts are not restricted to those techniques that have been developed with transportation in mind. In fact, many methods that were initially developed for other problems have widespread use in transportation studies.

- Some methods are used to collect primary data, e.g. **questionnaires and interviews**, while others are used to analyze data. Some of the analytic techniques are straightforward to implement and interpret; graphs (e.g. scatter grams, distance-decay curves) and tables (e.g. origin-destination matrices) are two examples. Others are more complex, e.g., inferential statistics like the t-test, analysis of variance, regression and chi-square.

Increasingly, transportation studies are concerned with **impacts and public policy issues**. Various types of impacts are considered, including economic (e.g. community development), social

The top right cell includes methods that are central to the discipline of geography, but are not restricted to the study of transportation systems.

- **Map-making** is the most obvious example of a geographic technique. Indeed, various types of maps are included in this web site. These include land use maps, depictions of transport

infrastructure, isoline maps of transportation costs, schematics of transportation activity patterns, and many more.

- Geographic information systems (GIS), which are an outgrowth of digital cartography, provide a set of tools for storing, retrieving, analyzing and displaying spatial data from the real world. GIS technology has been applied to some large-scale transportation planning and engineering applications. More often, however, GIS are applied in a prescriptive way to small-scale problems, for example to plot optimal routes for buses, delivery trucks, or emergency vehicles.
- There are also **various statistics** that have been developed or modified by geographers to describe urban-economic systems. Examples include the Gini coefficient and indexes of concentration and specialization.

The bottom left cell includes various methods that are in general use in transportation studies.

- First, a diverse set of techniques is used in the four-stage **urban transportation modeling** exercise, the purpose of which is to understand and predict spatial patterns of travel in urban areas.
- Second, **traffic surveys** that are used to gather empirical information about movements.

The bottom right cell includes various techniques that are used in many different applications, including transportation analysis. Transportation analysts are not restricted to those techniques that have been developed with transportation in mind. In fact, many methods that were initially developed for other problems have widespread use in transportation studies.

- Some methods are used to collect primary data, e.g. **questionnaires and interviews**, while others are used to analyze data. Some of the analytic techniques are straightforward to implement and interpret; graphs (e.g. scattergrams, distance-decay curves) and tables (e.g. origin-destination matrices) are two examples. Others are more complex, e.g., inferential statistics like the t-test, analysis of variance, regression and chi-square.

Increasingly, transportation studies are concerned with **impacts and public policy issues**. Various types of impacts are considered, including economic (e.g. community development), social (e.g. the equity of access to essential services), environmental (e.g. air or water pollution) and health (e.g. road accidents). The broad fields of environmental impact assessment, risk assessment and policy analysis are relevant to these issues.

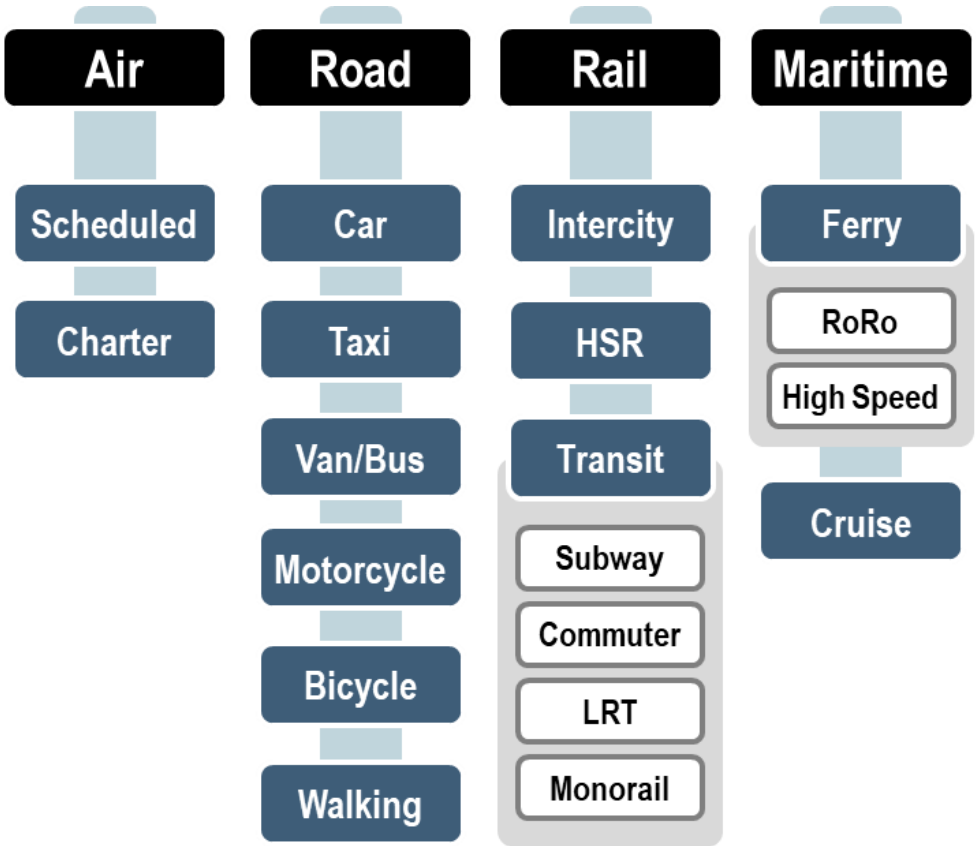
Chapter Two: Transportation Modes, Modal Competition and Modal Shift

Modes are the means by which passengers and freight achieve mobility. They are mobile transport assets and fall into three basic types; land (road, rail and pipelines), water (shipping), and air.

A Diversity of Modes

Transport modes are designed to either carry passengers or freight, but most modes can carry **a combination of both**. For instance, an automobile has a capacity to carry some freight while a passenger plane has a belly hold that is used for luggage and cargo. Each mode is characterized by a set of technical, operational and commercial characteristics. Technical characteristics relate to attributes such as speed, capacity, and motive technology while operational characteristics involve the context in which modes operate, including speed limits, safety conditions or operating hours. The demand for transport and the ownership of modes are dominant commercial characteristics.

Main Passenger Modal Options



Source: adapted from W.J. DeWitt. Freight Transport & Modes in Global Logistics & Supply Chains.

To support their mobility passengers have several modal options depending on the type of movement (e.g. commuting, traveling), the concerned distance and modal availability. They fall into four general categories:

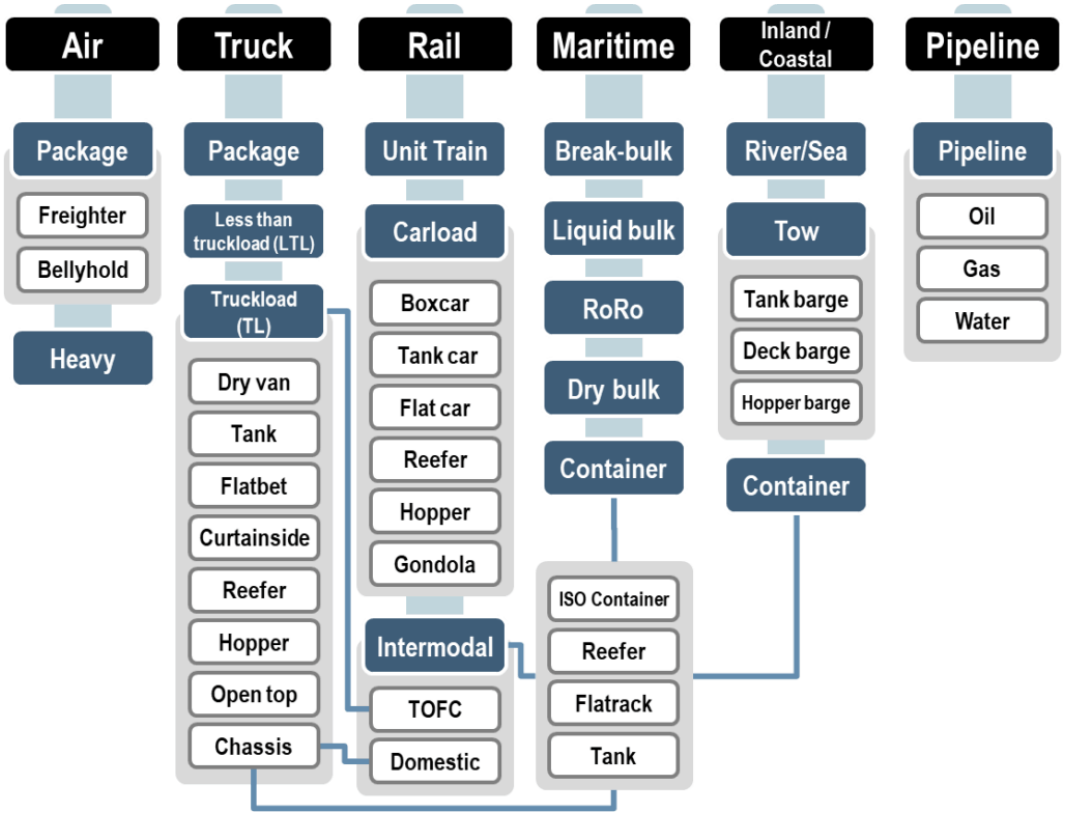
• **Air**. Air transport services usually comes as scheduled services offered by competing air carriers, each within their respective networks. Based upon scheduled services posted several months in advance, a traveler (or someone acting on his/her behalf) will be able to book an itinerary that may include several flight segments. Charter air services are usually offered under specific circumstances such as seasonal flights towards resort areas or private jets servicing the mobility needs of a corporation or an individual. They tend to be point to point services.

• **Road**. Offers a range of motorized and non-motorized options for short distance movements that a user may opt for depending on affordability, convenience, availability and comfort. The automobile has emerged as a preferred form of passenger transportation as it offers flexibility and convenience, but also contributes to congestion, particularly in urban areas.

• **Rail**. Intercity passenger services that have been active in many parts of the world for a century and a half are being expanded by the setting of high-speed rail (HSR) services between high density city-pairs. Another salient form of rail services concern urban transit systems that rely on specific applications of rail technology. Subway systems are those supporting the densest forms of mobility in large metropolitan areas. Such systems are usually supported by commuter rail linking a central station to a network of satellite cities. Light rail transit (LRT) systems are also set in lower density situations.

• **Maritime**. The role of maritime transportation to move passengers has substantially declined but remains important for ferry services. The cruise ship is not used as a form of transportation but as a touristic option between a networks of ports of call.

Main Freight Modal Options



Source: adapted from W.J. DeWitt. Freight Transport & Modes in Global Logistics & Supply Chains.

To support the mobility of freight several modal options are available depending on what is being transported, the concerned distance and modal availability. Freight modal options are more diversified than passengers considering the variety of cargoes which includes raw materials, parts, finished goods and also food (perishable) products. Unlike passengers, different types of cargoes often require different conveyances which precludes uniformity.

- **Air**. Air freight has seen a growth similar to that of passengers, which has been significant. Air packages are generally carried in unit load devices, either on dedicated freight planes (freighters) or in the belly hold of scheduled passenger flights. Heavy loads, such as vehicles, require specialized cargo planes and are commonly used by the military and for emergency deliveries.

- **Truck**. Trucks are highly flexible vehicles able to carry almost every type of cargo over short to medium distances. Package trucks are commonly used in urban freight distribution since they carry a variety of cargo (in boxes or pallets) servicing a fluctuating demand. Less than truckload (LTL) carriers usually consolidate and deconsolidate loads coming from different customers, which is common in the parcel carrying business. Truckload (TL) transportation carries large volumes that have been broken down into the largest possible truck load unit; several truckloads are required to fulfill an order. The variety of modal options is related to the technical requirements to carry specific cargoes such as bulk, liquids or containers. Trucks using chassis are able to carry domestic (usually 53 feet in North America) and ISO containers (20 and 40 feet).

- **Rail**. A unit train carries the same cargo between one origin and one destination, with several carload configurations possible depending what is being carried. There can be unit trains for coal, grain, cars or containers; they carry a single commodity. Trains can also be assembled with different carloads servicing different customers, origins and destinations. This is however more costly and time consuming. Containerization had significant impacts on rail transportation and spurred the development of intermodal rail services. The first concerns trailers on flatcars (TOFC) where a complete truckload is loaded on purposely designed flatcar ("Road Trailers" are an adaptation of this principle). Such modal use has however declined substantially. The second involves carrying domestic containers on well cars that are also designed to carry ISO containers. Unit train are common for the transport of containers between large gateways and inland centers.

- **Maritime**. Through the application of the principle of economies of scale maritime shipping has developed specialized ships to carry break bulk, dry bulk, liquids, vehicles (Roll On Roll Off (Ro-Ro)) and even liquid natural gas (LNG). Container shipping has also become a dominant maritime modal option supporting commercial transactions with multiple origins, destinations and cargo owners. The standard ISO containers of 20 and 40 feet are the main unit sizes, which has been adapted to carry refrigerated goods (reefers) and even liquids (tank containers). Still, the dry maritime container is the most dominant container cargo unit.

- **Inland / Coastal**. Inland (fluvial) or coastal maritime services are prevalent where there are major river systems reaching deep inside a continent (e.g. Mississippi, Rhine/Danube, Changjiang, Amazon), where a country is an archipelago (e.g. Japan, Indonesia, Philippines) or with long coastlines (e.g. Northern Europe / Baltic, Mediterranean, American East, Gulf and West coasts). In some cases river / sea ships have been designed to link fluvial ports that are separated by an oceanic mass, such as in Western Europe (e.g. Germany / England). Barges designed to carry specific commodities (e.g. grain or coal) can be towed along rivers or coasts.

Containerization has also incited the design of specialized container barges that carry container between major coastal ports and inland destinations.

• **Pipelines**. Represent a completely separate system of freight distribution where liquids (particularly oil) and gases can be pumped over long distances. Pipelines can also be used to carry small quantities of freight, namely through pneumatic tubes (e.g. documents). A few systems using pneumatic tubes to collect wastes have also been implemented.

Marine Transportation

Marine transportation is the intentional movement of cargo on the water over large or short distances. There are many **means for marine transport**, including barges, ships, ferries, tug boats, rigs and sailboats. Vessels used for **marine transport** may serve several purposes, but they are primarily used to move people and goods across bodies of **water** such as oceans, lakes, canals and rivers. The cost of operation of **Marine transport** is also relatively very less. It has the largest carrying capacity and is most suitable for carrying bulky goods over long distances. It has played a very significant role in bringing different parts of the world closer and is indispensable to foreign trade. The three main **characteristics of marine transport** are that it is slow, that it can carry large loads, and that it is relatively cheap. Modern ships can carry huge loads of cargo without using very much fuel per unit of cargo. This makes this type of **transport** very cheap.

A Guide to Types of Ships

Cargo ships are classified into various types on the basis of purpose, size, type of cargo etc.

The economic factor is of prime importance in designing a merchant ship. Every owner wants maximum return on their investment which means a ship's construction not only depends on the current economic necessities but the factor of future adaptability also plays a part.

From the preliminary design of a vessel due for construction, the following information can be obtained:

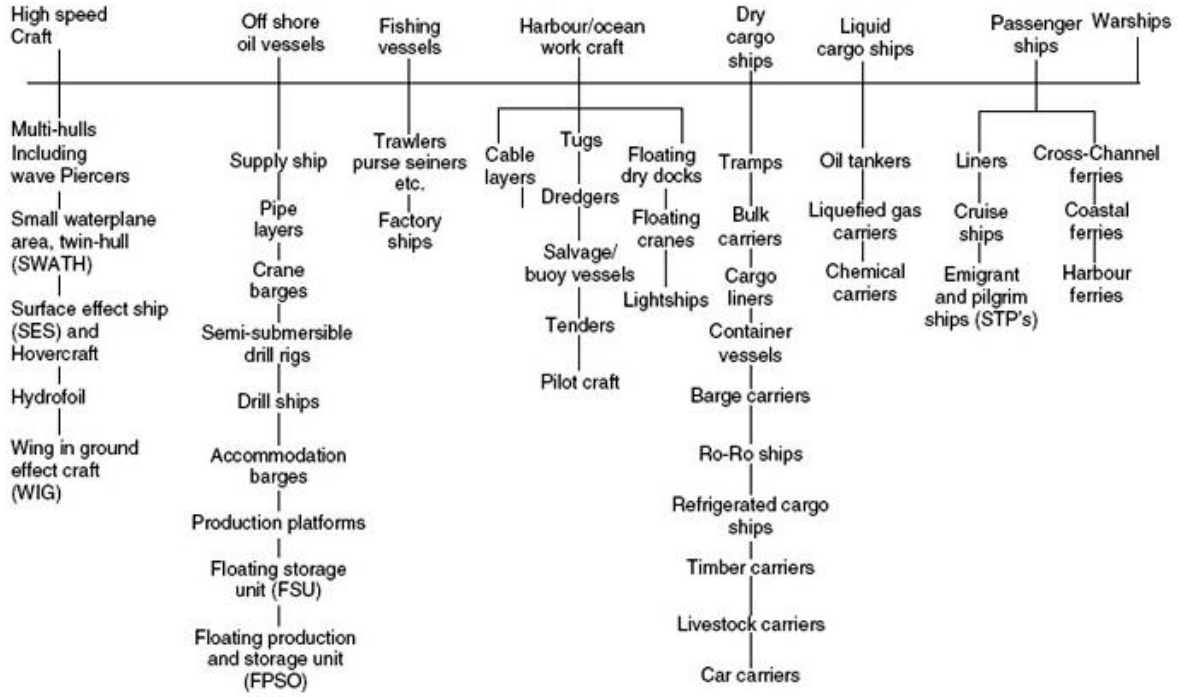
1. Dimensions
2. Displacement
3. Stability
4. Propulsive characteristics and hull form
5. Preliminary general arrangement
6. Principal structural details

A layout of the various ship types and their subdivisions will be listed out, covering a wide range of all vessels in operation.

The type of ship plays an important role in deciding the above mentioned parameters.

Types of Ships

Ships are mainly classified into the following types:
1. Container Ships
2. Bulk Carrier
3. Tanker Ships
4. Passenger Ships
5. Naval Ships
6. Offshore Ships
7. Special Purpose Ships



There are mainly four **different kinds of cargo ships** and they are classified on the basis of the **cargo** that they carry, namely; general **cargo vessels**, multi-purpose **vessels**, dry-bulk carriers and last but not the least, tankers.



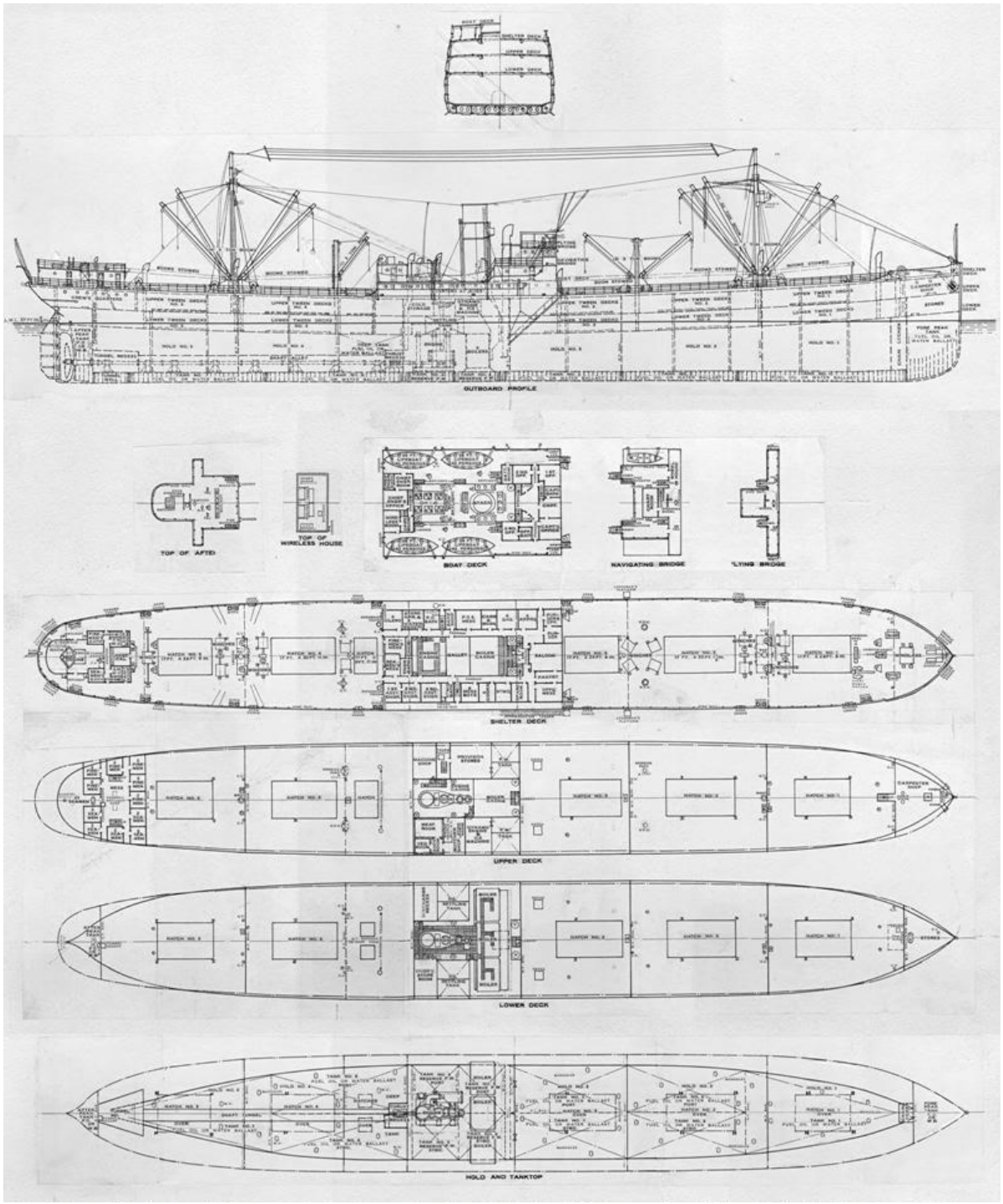


Illustration of a General Cargo ship with five hatch and holds

1. Container Ships

As the name suggests, a vessel structured specifically to hold huge quantities of cargo compacted in different types of containers is referred to as a container vessel (ship).

Types of Container Ships on Basis of Sizes:



- Panamax
- Suezmax
- Post-Panamax
- Post-Suezmax
- Post-Malaccamax
- VLCC
- ULCC

Refrigerated Container Ships: These Vessels carry refrigerated cargo (mainly in refrigerated containers)

There are several key points in the design of modern container ships. The hull, similar to bulk carriers and general cargo ships, is built around a strong keel. Into this frame is set one or more below-deck cargo holds, numerous tanks, and the engine room. The holds are topped by hatch covers, onto which more containers can be stacked. Many container ships have cargo cranes installed on them, and some have specialized systems for securing containers on board.

The hull of a modern cargo ship is a complex arrangement of steel plates and strengthening beams. The hull is built around the keel. Resembling ribs, and fastened at right-angles to the keel are the ship's frames. The ship's main deck, the metal plate work that covers the top of the hull framework, is supported by beams that are attached to the tops of the frames and run the full breadth of the ship. The beams not only support the deck, but along with the deck, frames, and transverse bulkheads, strengthen and reinforce the shell. Another feature of recent hulls is a set of double-bottom tanks, which provide a second watertight shell that runs most of the length of a ship. The double-bottoms generally hold liquids such as fuel oil, ballast water or fresh water.

A ship's engine room houses its main engines and auxiliary machinery such as the fresh water and sewage systems, electrical generators, fire pumps, and air conditioners. In most new ships, the engine room is located in the aft portion.

Size categories

Container ships are distinguished into 7 major size categories: small feeder, feeder, feedermax, Panamax, Post-Panamax, New Panamax and ultra-large. As of December 2012, there were 161 container ships in the VLCS class (Very Large Container Ships, more than 10,000 TEU), and 51 ports in the world can accommodate them.

The size of a Panamax vessel is limited by the original Panama canal's lock chambers, which can accommodate ships with a beam of up to 32.31 m, a length overall of up to 294.13 m, and a draft of up to 12.04 m. The Post-Panamax category has historically been used to describe ships with a molded breadth over 32.31 m, however the Panama Canal expansion project has caused some changes in terminology. The New Panamax category is based on the maximum vessel-size that is able to transit a new third set of locks, which opened in June 2016. The third set of locks were built to accommodate a container ship with a length overall of 366 meters (1,201 ft), a maximum width of 49 meters (161 ft), and tropical fresh-water draft of 15.2 meters (50 ft). Such a vessel, called New Panamax class, is wide enough to carry 19 rows of containers, can have a total capacity of approximately 12,000 TEU and is comparable in size to a capsize bulk carrier or a Suezmax tanker.

Container ships under 3,000 TEU are generally called feeders. Feeders are small ships that typically operate between smaller container ports. Some feeders collect their cargo from small ports, drop it off at large ports for transshipment on larger ships, and distribute containers from the large port to smaller regional ports. This size of vessel is the most likely to carry cargo cranes on board.

<table>
<tr><th colspan="6">Container ship size categories</th></tr>
<tr><th>Name</th><th>Capacity (TEU)</th><th>Length</th><th>Beam</th><th>Draft</th><th>Example</th></tr>
<tr><td>Ultra Large Container Vessel (ULCV)</td><td>14,501 and higher</td><td>1,200 ft (366 m) and longer</td><td>160.7 ft (49 m) and wider</td><td>49.9 ft (15.2 m) and deeper</td><td>
With a length of 400 m, a width of 59 m, draft of 14.5 m, and a capacity of 18,270 TEU, ships of the Maersk Triple E class are able to transit the Suez Canal. (photo: MV Mærsk Mc-Kinney Møller)</td></tr>
<tr><td>New Panamax (or Neopanamax)</td><td>10,000–14,500</td><td rowspan="2">1,200 ft (366 m)</td><td rowspan="2">160.7 ft (49 m)</td><td rowspan="2">49.9 ft (15.2 m)</td><td rowspan="2"></td></tr>
<tr><td>Post-Panamax</td><td>5,101–10,000</td></tr>
</table>

					With a beam of 43 m, ships of the *COSCO Guangzhou* class are much too big to fit through the Panama Canal's old locks, but could easily fit through the new expansion. (photo: The 9,500 TEU MV *COSCO Guangzhou* pier side in Hamburg)
Panamax	3,001–5,100	965 ft (294.13 m)	106 ft (32.31 m)	39.5 ft (12.04 m)	 Ships of the Bay class are at the upper limit of the Panamax class, with an overall length of 292.15 m, beam of 32.2m, and maximum depth of 13.3 m. (photo: The 4,224 TEU MV *Providence Bay* passing through the Panama Canal)
Feedermax	2,001–3,000				 Container ships under 3,000 TEU are typically called feeders. In some areas of the world, they might be outfitted with cargo cranes. (photo: The 384 TEU MV *TransAtlantic* at anchor)
Feeder	1,001–2,000				
Small feeder	Up to 1,000				

Cargo cranes

Cargo cranes on a container ship

A major characteristic of a container ship is whether it has cranes installed for handling its cargo. Those that have cargo cranes are called *geared* and those that don't are called *ungeared* or *gearless*. The earliest purpose-built container ships in the 1970s were all gearless. Since then, the percentage of geared new builds has fluctuated widely, but has been decreasing overall, with only 7.5% of the container ship capacity in 2009 being equipped with cranes.

While geared container ships are more flexible in that they can visit ports that are not equipped with pier side container cranes, they suffer from several drawbacks. To begin with, geared ships will cost more to purchase than a gearless ship. Geared ships also incur greater recurring expenses, such as maintenance and fuel costs. The United Nations Council on Trade and Development characterizes geared ships as a "niche market only appropriate for those ports where low cargo volumes do not justify investment in port cranes or where the public sector does not have the financial resources for such investment".

Instead of the rotary cranes, some geared ships have installed. These cranes, specialized for container work, are able to roll forward and aft on rails. In addition to the additional capital expense and maintenance costs, these cranes generally load and discharge containers much more slowly than their shore side counterparts.

The introduction and improvement of shore side container cranes have been a key to the success of the container ship. The first crane that was specifically designed for container work was built in California's Port of Alameda in 1959. By the 1980s, shore side gantry cranes were capable of moving containers on a 3-minute-cycle, or up to 400 tons per hour. In March 2010, at Port Kelang in Malaysia, a new world record was set when 734 container moves were made in a single hour. The record was achieved using 9 cranes to simultaneously load and unload MV *CSCL Pusan*, a ship with a capacity of 9,600 TEU.

Vessels in the 1,500–2,499 TEU range are the most likely size class to have cranes, with more than 60% of this category being geared ships. Slightly less than a third of the very smallest ships (from 100–499 TEU) are geared, and almost no ships with a capacity of over 4,000 TEU are geared.

Cargo holds

Efficiency has always been key in the design of container ships. While containers may be carried on conventional break-bulk ships, cargo holds for dedicated container ships are specially constructed to speed loading and unloading, and to efficiently keep containers secure while at sea. A key aspect of container ship specialization is the design of the hatches, the openings from the main deck to the cargo holds. The hatch openings stretch the entire breadth of the cargo holds, and are surrounded by a raised steel structure known as the *hatch coaming*. On top of the hatch coamings are the hatch covers. Until the 1950s, hatches were typically secured with wooden boards and tarpaulins held down with battens. Today, some hatch covers can be solid metal plates that are lifted on and off the ship by cranes, while others are articulated mechanisms that are opened and closed using powerful hydraulic rams.

Another key component of dedicated container-ship design is the use of *cell guides*. Cell guides are strong vertical structures constructed of metal installed into a ship's cargo holds. These structures guide containers into well-defined rows during the loading process and provide some support for containers against the ship's rolling at sea. So fundamental to container ship design are cell guides that organizations such as the United Nations Conference on Trade and Development use their presence to distinguish dedicated container ships from general break-bulk cargo ships.

A system of three dimensions is used in cargo plans to describe the position of a container aboard the ship. The first coordinate is the *BAY*, which starts at the front of the ship and increases aft. The second coordinate is the *ROW*. Rows on the starboard side are given odd numbers and those on the port side are given even numbers. The rows nearest the centerline are given low numbers, and the numbers increase for slots further from the centerline. The third coordinate is "TIER", with the first tier at the bottom of the cargo holds, the second tier on top of that, and so forth.

Container ships only take 20 foot, 40 foot, and 45 foot containers. 45 footers only fit above deck. 40 foot containers are the primary container size, making up about 90% of all container shipping and since container shipping moves 90% of the world's freight, over 80% of the world's freight moves via 40 foot containers.

Lashing systems



Twist-locks and lashing rods (*pictured*) are widely used to secure containers aboard ships.

Numerous systems are used to secure containers aboard ships, depending on factors such as the type of ship, the type of container, and the location of the container. Stowage inside the holds of fully cellular (FC) ships is simplest, typically using simple metal forms called container guides, locating cones, and anti-rack spacers to lock the containers together. Above-decks, without the extra support of the cell guides, more complicated equipment is used. Three types of systems are currently in wide use: lashing systems, locking systems, and buttress systems. Lashing systems secure containers to the ship using devices made from wire rope, rigid rods, or chains and devices to tension the lashings, such as turnbuckles. The effectiveness of lashings is increased by securing containers to each other, either by simple metal forms (such as stacking cones) or more complicated devices such as twist-lock stackers A typical twist-lock is inserted into the casting hole of one container and rotated to hold it in place, then another container is lowered on top of it. The two containers are locked together by twisting the device's handle. A typical twist-lock is constructed of forged steel and ductile iron and has a shear strength of 48 tons.

The buttress system, used on some large container ships, uses a system of large towers attached to the ship at both ends of each cargo hold. As the ship is loaded, a rigid, removable stacking frame is added, structurally securing each tier of containers together.

Bridge

Containerships have typically had a single bridge and accommodation unit towards the rear, but to reconcile demand for larger container capacity with SOLAS visibility requirements, several new designs have been developed. As of 2015, some large containerships are being developed with the bridge further forward, separate from the exhaust stack. Some smaller containerships working in European ports and rivers have lift able wheelhouses, which can be lowered to pass under low bridges.

2. Bulk Carrier Ships

Bulk carriers are a type of ship which transports cargoes (generally dry cargo) in bulk quantities. The cargo transported in such ships is loose cargo i.e. without any specific packaging to it and generally contains items like food grains, ores and coals and even cement.



- Conventional bulkers
- Geared bulker
- Gearless bulker
- Self-discharging bulker
- Lakers
- BIBO (Bulk in, Bags out) for sugar loading and discharging.

Vessels that ply loose cargo loads in bulk quantities across oceanic channels are referred to as bulk carriers. The idea of a bulk carrier to transport important food grains, ores and minerals date back to the 1850s. However, there have been several noteworthy advancements in the construction and utilization of the vessel type in the years following.

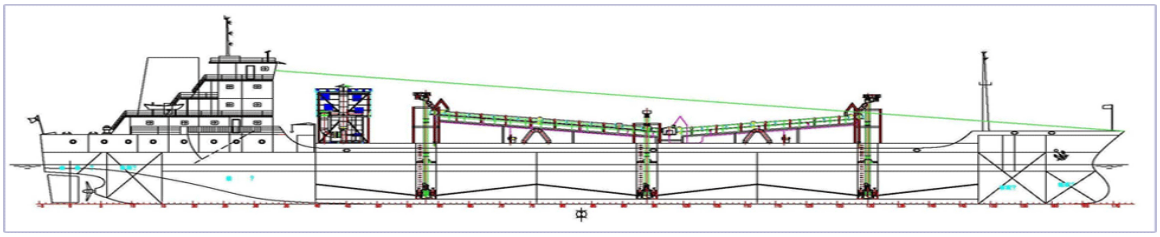
A **bulk carrier, bulker** is a merchant ship specially designed to transport unpackaged bulk cargo, such as grains, coal, ore, steel coils and cement, in its cargo holds. Since the first specialized bulk carrier was built in 1852, economic forces have led to continued development of these ships, resulting in increased size and sophistication. Today's bulk carriers are specially designed to maximize capacity, safety, efficiency, and durability.

Today, bulk carriers make up 21% of the world's merchant fleets and range in size from single-hold mini-bulk carriers to mammoth ore ships able to carry 400,000 metric tons of deadweight (DWT). A number of specialized designs exist: some can unload their own cargo, some depend on port facilities for unloading, and some even package the cargo as it is loaded. Over half of all bulk carriers have Greek, Japanese, or Chinese owners and more than a quarter are registered in Panama. South Korea is the largest single builder of bulk carriers, and 82% of these ships were built in Asia.

On bulk carriers, crew are involved in operation management and maintenance of the vessel taking care of safety, navigation, maintenance and cargo care, in accordance with international maritime legislation. Cargo loading operations vary in complexity and loading and discharging of cargo can take several days. Bulk carriers can be gearless (dependent upon

terminal equipment) or geared (having cranes integral to the vessel). Crews can range in size from three people on the smallest ships to over 30 on the largest.

Bulk cargo can be very dense, corrosive, or abrasive. This can present safety problems: cargo shifting, spontaneous combustion, and cargo saturation can threaten a ship. The use of ships that are old and have corrosion problems has been linked to a spate of bulk carrier sinking in the 1990s, as have the bulk carrier's large hatchways. While important for efficient cargo handling, these allow the entry of large volumes of water in storms or if a ship is endangered by sinking. New international regulations have since been introduced to improve ship design and inspection, and to streamline the process of a crew's abandoning ship.



The term bulk carrier has been defined in varying ways. As of 1999, the International Convention for the Safety of Life at Sea defines a bulk carrier as "a ship constructed with a single deck, top side tanks and hopper side tanks in cargo spaces and intended to primarily carry dry cargo in bulk; an ore carrier; or a combination carrier." Most classification societies use a broader definition, by which a bulk carrier is any ship that carries dry unpackaged goods. Multipurpose cargo ships can carry bulk cargo, but can also carry other cargoes and are not specifically designed for bulk carriage. The term "dry bulk carrier" is used to distinguish bulk carriers from bulk liquid carriers such as oil, chemical, or liquefied petroleum gas carriers. Very small bulk carriers are almost indistinguishable from general cargo ships, and they are often classified based more on the ship's use than its design.

A number of abbreviations are used to describe bulk carriers. "OBO" describes a bulk carrier that carries a combination of ore, bulk, and oil, and "O/O" is used for combination oil and ore carriers. The terms "VLOC", "VLBC", "ULOC", and "ULBC" for very large and ultra-large ore and bulk carriers were adapted from the supertanker designations very large crude carrier and ultra-large crude carrier.

History

Before specialized bulk carriers were developed, shippers had two methods to move bulk goods by ship. In the first method, longshoremen loaded the cargo into sacks, stacked the sacks onto pallets, and put the pallets into the cargo hold with a crane. The second method required the shipper to charter an entire ship and spend time and money to build plywood bins into the holds. Then, to guide the cargo through the small hatches, wooden feeders and shifting boards had to be constructed. These methods were slow and labor-intensive. As with the container ship, the problem of efficient loading and unloading has driven the evolution of the bulk carrier.

Specialized bulk carriers began to appear as steam-powered ships became more popular. The first steam ship recognized as a bulk carrier was the British coal carrier SS *John Bowes* in 1852. She featured a metal hull, a steam engine, and a ballasting system which used seawater

instead of sandbags. These features helped her succeed in the competitive British coal market. The first self-unloader was the lake freighter *Hennepin* in 1902 on the Great Lakes. This greatly decreased the unloading time of bulk carriers by using conveyor belt to move the cargo. The first bulk carriers with diesel propulsion began to appear in 1911.
Before World War II, the international shipping demand for bulk products was low—about 25 million tons for metal ores and most of this trade was coastal. However, on the Great Lakes, bulk carriers hauled vast amounts of ore from the northern mines to the steel mills. In 1929, 73 million tons of iron ore was transported on the Lakes, and an almost equal amount of coal, limestone, and other products were also moved. Two defining characteristics of bulk carriers were already emerging: the double bottom, which was adopted in 1890, and the triangular structure of the ballast tanks, which was introduced in 1905. After World War II, an international bulk trade began to develop among industrialized nations, particularly between the European countries, the United States and Japan. Due to the economics of this trade, ocean bulk carriers became larger and more specialized. In this period, Great Lakes freighters increased in size, to maximize economies of scale, and self-unloaders became more common to cut turnaround time. The thousand-footers of the Great Lakes fleets, built in the 1970s, were among the longest ships afloat and in 1979, a record 214 million ton of bulk cargo were moved on the Great Lakes.

Categories

Size categories



Post-deepening of the Suez Canal, a capsize bulk carrier approaches the Egyptian-Japanese Friendship Bridge

Bulk carriers are segregated into six major size categories: small, handy size, handymax, panamax, capesize, and very large. Very large bulk and ore carriers fall into the capsize category but are often considered separately.

Categories as per regions

Categories occur in regional trade, such as Kamsarmax, Seawaymax, Setouchmax, Dunkirkmax, and Newcastlemax also appear in regional trade.

- "**Kamsarmax":** Maximum length overall 229 meters refers to a new type of ships, larger than panamax, that are suitable for berthing at the Port of Kamsar (Republic of Guinea), where the major loading terminal of bauxite is restricted to vessels not more than 229 meters.
- **"Newcastlemax"**: Maximum beam 50 meters, and maximum length overall of 300 meters Refers to the largest vessel able to enter the port of Newcastle, Australia at about 185,000 DWT.
- **"Setouchmax**": About 203,000 DWT, being the largest vessels able to navigate the Setouchi Sea, Japan.
- **"Seawaymax":** LOA 226 m max / 7.92 m draft. Refers to the largest vessel that can pass through the canal locks of the St. Lawrence Seaway (Great Lakes, Canada).
- **"Malaccamax":** LOA 330 m / 20 m draft / 300,000 DWT, refers to the largest vessel that can pass through the Straits of Malacca.
- **"Dunkirkmax":** Maximum allowable beam = 45 m / LOA 289 m. max (175,000 DWT approx) for the eastern harbor lock in the Port of Dunkirk (France).

Mini-bulk carriers are prevalent in the category of small vessels with a capacity of under 10,000 DWT. Mini-bulk carriers carry from 500 to 2,500 tons, have a single hold, and are designed for river transport. They are often built to be able to pass under bridges and have small crews of three to eight people.

Handysize and **Handymax** ships are general purpose in nature. These two segments represent 71% of all bulk carriers over 10,000 DWT and also have the highest rate of growth. This is partly due to new regulations coming into effect which put greater constraints on the building of larger vessels. Handymax ships are typically 150–200 m in length and 52,000 – 58,000 DWT with five cargo holds and four cranes. These ships are also general purpose in nature.

The size of a **Panamax** vessel is limited by the Panama canal's lock chambers, which can accommodate ships with a beam of up to 32.31 m, a length overall of up to 294.13 m, and a draft of up to 12.04 m.

Capesize ships are too large to traverse the Panama Canal and must round Cape Horn to travel between the Pacific and Atlantic oceans. Earlier, capesize ships could not traverse the Suez and needed to go around the Cape of Good Hope. Recent deepening of the Suez Canal to 66 ft (20 m) permits most capesize ships to pass through it.

Capesize bulk carriers are specialized: 93% of their cargo is iron ore and coal. Some ships on the Great Lakes Waterway exceed Panamax dimensions but they are limited to use on the Great Lakes as they cannot pass through the smaller St. Lawrence Seaway to the ocean. Very large ore carriers and very large bulk carriers are a subset of the capesize category reserved for vessels over 200,000 DWT. Carriers of this size are almost always designed to carry iron ore.

General Bulk Carrier Types	
Illustration	**Description**
	**Geared bulk carriers** are typically in the handysize to handymax size range although there are a small number of geared panamax vessels, like all bulk carriers they feature a series of holds covered by prominent hatch covers. They have cranes, derricks or conveyors that allow them to load or discharge cargo in ports without shore-based equipment. This gives geared bulk carriers flexibility in the cargoes they can carry and the routes they can travel. (Photo: A typical geared handysize bulk carrier.)
	**Combined carriers** are designed to transport both liquid and dry bulk cargoes. If both are carried simultaneously, they are segregated in separate holds and tanks. Combined carriers require special design and are expensive. They were prevalent in the 1970s, but their numbers have dwindled since 1990. (Photo: The oil pipeline and dry bulk hold aboard *Maya*.)
	**Gearless carriers** are bulk carriers without cranes or conveyors. These ships depend on shore-based equipment at their ports of call for loading and discharging. They range across all sizes, the larger bulk carriers (VLOCs) can only dock at the largest ports, some of these are designed with a single port-to-port trade in mind. The use of gearless bulk carriers avoids the costs of installing, operating, and maintaining cranes. (*Berge Athen*, a 225,000 ton gearless bulk carrier.)
	**Self-dischargers** are bulk carriers with conveyor belts, or with the use of an excavator that is fitted on a traverse running over the vessel's entire hatch, and that is able to move sideways as well. This allows them to discharge their cargo quickly and efficiently. (Photo: *John B. Aird* a self-discharging lake freighter.)
	**Lakers** are the bulk carriers prominent on the Great Lakes, often identifiable by having a forward house that helps in transiting locks. Operating in fresh water, these ships suffer much less corrosion damage and have a much longer lifespan than saltwater ships. As of 2005, there were 98 lakers of 10,000 DWT or over. (*Edward L. Ryerson*, a Great Lakes bulk carrier.)

	**BIBO** or **"Bulk In, Bags Out"** bulk carriers are equipped to bag cargo as it is unloaded. *CHL Innovator*, shown in the photo, is a BIBO bulk carrier. In one hour, this ship can unload 300 tons of bulk sugar and package it into 50 kg sacks.

3. Tanker Ships

Tanker ships are specialized vessels for carrying a large amount of liquid cargo. Tankers are further sub-divided into different types on the basis of the cargo they carry. Vessels that facilitate the supplying of mass quantities of liquefied freight are referenced as tanker vessels. Such liquefied freight can include both rock oil excavated from the underwater reservoirs and all other types of liquid freight like alcoholic beverages, hydrogen-based organic compounds, chemicals and even juices. They also carry liquefied gaseous substances.

As mentioned earlier, the vessels designed for a particular purpose of transporting liquefied goods (such as crude oil; Petroleum; LNG; LPG; wine; bitumen etc.) in bulk are termed as tanker ships or tanker vessels or more commonly as TANKERS.



Tanker Turning in Gibraltar

In tanker market, the situation is much more straightforward. The main categories that we meet are: the product tankers and the crude carriers while there are also the more specialized types which consist of the chemical tankers, the gas carriers and the asphalt/bitumen carriers.



Product tankers: When refined, crude oil separates into various oil products. The lightest of them are the clean products such as the gasoline, kerosene, gasoil while the heaviest are the

dirty products known as fuel oils or residual oils. Product tankers are divided into many categories which are related to their size and whether they are suitable to load clean products or dirty products only. It is worth to note that clean product tankers can also load most of the grades of the dirty products (except probably of the heavy ones which require the highest temperature) but it does not exist the opposite with the dirty product tankers – which cannot load clean products. The difference between the clean and dirty product tankers are the following: Clean product tankers require good cleaning before each loading and for this reason, their tanks are coated with special points which can also assist to reduce corrosion. Furthermore, clean product tankers are characterized of higher and more advanced segregation systems and they can load separate grades of cargo without risk of contamination. Dirty product tankers, on the other hand, are not equipped with special coating and they do not accommodate complex segregation systems, however they are usually equipped with heating coils so as to be able to pump the high-density grades of fuel oil. Product tankers vary in size from general purpose tankers up to about 160,000 tons deadweight.

- **Crude Carriers:** Crude Oil cargoes are usually homogenous and even when different grades of crude oil are carried on board the same ship there is no risk of contamination since the oil will be refined before its sale to the end-users. Therefore, crude carriers are used for the carriage of the crude oil from oil producing countries to the refineries and their size ranges from about 50,000 MT deadweight to more than 500,000 MT deadweight which is the size of modern ULCC. These vessels can load one or up to two grades and their pumping and pipeline systems are relatively simple as opposed to the product tankers. In terms of size, product tankers and crude carriers are divided into the following main categories:

- **General Purpose tankers**: They are used to load refined products and their size is between 10,000 MT and 25,000 MT deadweight.

- **Handysize tankers**: Used to load refined products and their deadweight is between 25,000 MT and 40,000 MT

- **MR (Medium Range) tankers**: Used to load refined products and their size is between 40,000 MT and 55,000 MT deadweight

- **LR1 (Long Range 1) tankers:** They are used to load both refined products and crude oil. The ones suitable for dirty products or crude oil are used to be called panamax tankers. LR1 and panamax tankers have a deadweight of between 55,000 MT and 80,000 MT.

- **LR2 (Long Range 2) tankers**: They are suitable for carrying both refined products and crude oil while their size is between 80,000 MT deadweight and 160,000 MT deadweight. It is worth to note that the LR2 vessels suitable to load crude oil are usually called Aframax tankers (from 80,000 MT to 120,000 MT deadweight) and Suezmax tankers (from 120,000 MT to 160,000 MT) instead. Very Large Crude Carriers (VLCC) and Ultra Large Crude Carriers (ULCC) are used to carry crude oil only and their size can reach up to about 320,000 MT for the VLCC and up to about 550,000 MT for the ULCC.

- **Chemical tankers:** They are also called parcel tankers and they are usually of small size from about 5,000 tons dwt to about 25,000 dwt while there are also a few chemical tankers up to about 50,000 tons deadweight. Chemical tankers are mainly used in two trades: For the carriage of oils which are extremely hazardous (IMO I) and the carriage of edible/vegetable oils as well as very clean oil products (IMO II / IMO III). In order to carry hazardous cargoes

with safety these vessels need to be equipped with very high standards a few of which are the following: — The tanks are coated with high-grade materials such as stainless steel, epoxy resin and zinc silicate being the most popular. These coatings are cleaned easier and also prevent the chemical cargoes to react with the vessel's hull and damaging the ship or the cargo. — Each tank has its own deep well pump and pipeline system, therefore, the cargo of each tank is loaded and discharged separately. This way various different grades can be loaded separately while there is absolutely no risk of contamination since there is full segregation.

• **Gas Carriers**: They are highly specialized form of tanker. The two types of gas carriers are known as LNG (Liquefied Natural Gas) and LPG (Liquefied Petroleum Gas). The LNG is the methane product and it is carried in insulated tanks in minus 162 degrees Celsius at atmospheric pressure so as to maintain in liquid condition. The LPG Carriers are used to load mainly propane and butane while they are also used for the carriage of chemical gas and ammonia and there are two different types of LPG Carriers. The fully pressurized vessels which load and maintain the cargo in a high pressure of 10-12 bars and the refrigerated which cool the cargo at temperatures of up to minus 50 degrees Celsius. The size of the Gas Carriers is usually declared basis their cubic capacity in CBM and there are LPG Carriers from small LPGs of about 500 cbm to VLGC of about 85,000 cbm while the LNG Carriers are as large as about 265,000 cbm. Specifically, the Q-Flex design which is about 210,000 - 217,000 cbm and the Q-Max with a capacity of about 261,700-266,000 cbm that make up the Qatari Q-Class offer the largest available capacities and they were accounted for about 18% of the total LNG carrying capacity at the end of 2016.

• **Asphalt Carriers**: Small tankers suitable to carry asphalt/ bitumen most of which not exceed the 7,500 dwt while there are also a few larger bitumen tankers and recently some yards in China are marketing newbuilding designs of up to about 20,000 dwt. The main characteristics of these tankers are that they can achieve and maintain high temperatures of up to about 200 degrees Celsius. These vessels usually are not equipped with Inert Gas system and COW and they cannot load other oil cargoes except, probably, of a few dirty products which do not have risk for contamination and do not require cleaning.

An overview of the types and sizes of dry cargo and tanker ships

The international dry cargo and tanker markets are immense and served by numerous ships of several types and various sizes. Some of the ships follow standard designs and can carry a variety of cargoes while others are more specialized and able to carry particular commodities which the standard vessels cannot. Since we have seen such a big variety of vessels in the Open Sea marketplace and since the vessel designs change rapidly from time to time, we decided to present a brief updated guide of the several types and sizes we may see around the world marketplace.

Dry Cargo Market

The dry cargo market is the one which experiences higher interest since the type of vessels are much more. The basic dry cargo vessels are broadly divided into the following main categories: General cargo vessels, Bulk Carriers, Short Sea (coaster) ships, Containerships and

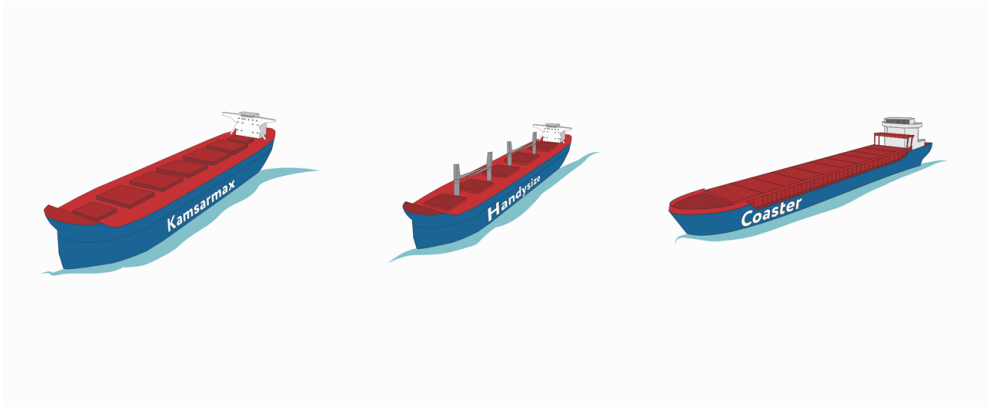
Specialized vessels while each of them consists of several subcategories mainly depending on their technical characteristics and/or sizes.

General cargo vessels

They were first mass-produced during the World War II when the 10,000 tons deadweight (dwt) "Liberty type" ships were very famous. They are built in such way that can carry general cargo, bagged/baled cargo as well as bulk cargo and, some of them, also containers. General cargo vessels are usually built in small sizes of about 5,000 to about 25,000-ton deadweight (dwt). Modern general cargo vessels are nearly always built with two decks and they are known as "tween deckers". In tween deckers, each cargo hold can be split in two different sub-compartments: Between the main deck and the tween deck, there is the tween deck space (or upper cargo hold) while beneath the tween deck there is the main cargo hold (or lower cargo hold). Tween deckers face two main advantages against the single decker vessels:

(a) They are equipped with more individual cargo compartments and thus they can carry several different cargoes, which can be kept separate from each other so as to avoid contamination and

(b) They can accommodate higher tiers of bagged/baled cargoes with sharing their heavy weight in two different decks. At the same time, tween decks can be retractable and fold against the sides of the hold so as to facilitate the load of bulk commodities into single holds. Modern general cargo ships are also equipped with special container fittings and are able to load containers. So nowadays the general cargo vessels are more accurately called "multi-purpose" vessels. General cargo vessels are equipped with gears with sufficient capacity (about 30-40 tons SWL) able to handle containers and other general cargoes.



Bulk Carriers: As their name implies, these vessels mainly carry bulk cargoes (like coal, iron ore, grains, minerals etc.) while it is not uncommon general cargoes (e.g. bagged cargoes and steels) to be loaded also in bulk carriers of smaller size. These vessels are single-deckers and they are not able to load containers. Their hatches have very large openings so as the vessel to be loaded/discharged quickly and the holds are unrestricted and free of obstacles. Due to the bulk nature of the cargo they load, the holds of these vessels have been constructed to be "self-trimming" to allow the easy and rapid stowage and trimming of the bulk cargoes. In contrast to the general cargo vessels which can load several different cargoes, cargo in bulk carriers is usually homogenous. There are several different types of bulk carriers with the

main distinction between each other being their size. Therefore, according to their size, we do have the below categories:

- **Mini Bulkers** with deadweight of up to about 15,000 tons. They are mainly used in short sea trades however most vessels of this size are either general cargo ships or short sea specialized vessels rather than common bulk carriers.

- **Handysize** bulkers have a deadweight from about 15,000 tons to about 39,000 tons and they are usually equipped with 5 cargo holds, while the smaller handies may contain 4 cargo holds as well. Except the conventional handysize, there are also those handysize bulkers of heavier construction which can load logs (along with other conventional cargoes). These vessels, known as "Loggers" and they are additionally equipped with lashing materials, stanchion sockets and stanchions alongside the bulwarks on ship's deck so as the logs to be loaded and securely stowed. These stanchions may be permanent or collapsible. Also, handysize bulkers of between 20,000 and 30,000 MT deadweight designed to transit the St. Lawrence Seaway are commonly known as "Lakers". The design of laker handies is: LOA of 70 meters, beam of about 21.5 meters, draft of 7.92 meters freshwater and airdraft (height above water level) not to exceed 35.6 meters.

- **Handymax** bulkers have a deadweight from about 40,000 tons to about 50,000 tons and they are equipped with 5 cargo holds. However, they are mainly older designs and only a few vessels are nowadays built within this deadweight range.

- **Supramax** bulkers, which have recently replaced handymaxes, have a deadweight from about 50,000 tons to about 60,000 tons. Like handymaxes, supramax bulkers also contain 5 cargo holds.

- **Ultramax** is a new design which has been appeared recently in the market. These vessels, which are usually equipped with "eco main engine", have a deadweight of about 62,000 – 65,000 dwt. Ultramax bulkers are considered as an upgrade of supramax bulkers and they are designed with five cargo holds.

- **Panamax** bulkers are those who have a deadweight of between 70,000 and 80,000 tons, however there are still older panamaxes in the market (mainly built before 2000) with deadweight of between 60,000 and 70,000 tons. Panamaxes usually have 7 cargo holds and their name and dimension characteristics were established according to the maximum allowable dimensions (length and beam) for transiting the Panama Canal. Though, after the recent expansion of the Suez Canal, larger designs appeared so as to take advantage of the max deadweight at current Canal limitations. These vessels are known as **post-panamax** bulkers and their size varies from about 90,000 tons to about 110,000 tons deadweight. **Kamsarmax** bulkers are slightly larger than panamaxes however other than that they are almost the same and they currently share the same sub-market with panamaxes. They have deadweight of between 80,000 and 85,000 tons (with their most common design being about 82,000 tons) and their LOA at 229 meters, which is slightly higher than the 224-225 meters LOA of Panamax, is the maximum permissible LOA to enter the port Kamsar in West Africa, which is one of the largest ports of bauxite in the world.

- **Capesize** have a deadweight of between 160,000 tons and 210,000 tons. In the past, there were also smaller Capesizes known as mini-capes or babe-capes ranging between about 110,000 to about 160,000 tons and despite that there are still a few in the market, this is not

a common design anymore. Capesizes usually have 9 cargo holds. Large Capesizes with a maximum beam of 47 meters are called Newcastlemax and they are the largest vessels which can enter the Newcastle port of Australia. Ultra Large Ore Carriers: These are bulkers which are larger than capesizes and they are mainly used to load iron ore. The largest vessels in this category are the Valemax (or **Chinamax**) vessels which have a deadweight of as high as 400,000 tons. The smaller bulk carriers, from mini-bulkers up to **ultramaxes** usually (but not always) are geared while the larger bulkers from panamax to chinamax are almost always gearless however there are also a few geared (mainly panamax and kamsarmax bulkers). Smaller bulkers can carry all the types of bulk cargoes as well as some general cargoes and usually used in shorter distances. Panamax and capesizes, on the other hand, are used to load mainly grains, coal, iron ore and, in less extent, other minerals. Large Ore Carriers and Valemax are used to carry iron ore. In the below table, we summaries the main characteristics of a typical vessel for each category so as to see their similarities and differences in more detail. Containerships: These vessels are constructed to load containers only. Their holds are cellular, with vertical frames or guides where the containers are slotted. Container vessels range in size from as small as those with capacity of about 500 TEU and as large as those with capacity of about 22,000 TEU. Containerships can load both 20-foot and 40-foot containers and therefore each vessel should explain its maximum capacity for each of the two types of container. The smaller container vessels are used as feeder ships feeding the hinterland around major container terminals and may be geared while the largest containers are usually gearless and they can achieve speeds which exceed the 25 knots so as to be used in long voyages. Containerships operate in a much different manner than other dry vessels; they are usually chartered on period time charters from major liner companies who then offer fixed prices for each container to end clients. For this reason, Open Sea is not active in this specific market.

4. Roll-on Roll-Off Ships

Ro-Ro is an acronym for Roll-on/roll-off. Roll-on/roll-off ships are vessels that are used to carry wheeled cargo.



- Pure Car Carrier (PCC) and Pure Car and Truck Carrier (PCTC) RoRo Ships
- Container Vessel + Ro-Ro (ConRo) Ship
- General Cargo + Ro-Ro Ship (GenRo) Ships

- RoPax
- Complete RoRo Ships

5. Passenger Ships

It is an umbrella term which covers many aspects under itself, but in more or less general form passenger ships are the merchant ships generally employed for transportation of passengers or voyagers. So, these are the merchant ships which carries passengers on national or international voyages. They can be as small as yachts and as big as giant cruise ships.

Merchant vessels that are employed to aid in the transiting of voyagers and passengers through the medium of water transportation are referred to as passenger ships. The terminology, however, covers a lot of aspects under its umbrella, thus rendering a generalized nature to its nominal citation.



Ferries are types of boats which are very commonly found in areas where the main modem of transportation happens through water. In such areas, ferries are used not just to transport passengers from one shore to another but to carry cargo as well. Ferries are native to Greece and over the centuries have made their presence known not just in Greece and Europe but wide across the world.

However, the term “ferry” is a very generic one. There are many different types of ferries that are in existence today. The name by which each ferry is known is unique and is named so because of its major characteristic or feature. Some of the main types of ferries can be listed as follows:

They are mainly classified into:

- **Ferries –** Vessels used for transiting passengers (and vehicles) on short-distance routes are called ferries.

• **Cruise Ships –** Mainly used for recreational activities, cruise ships are like luxurious floating hotels with state-of-the-art facilities.

They are further classified as:

• Liners, Cruise Ships, Pilgrimage Ships

• Cross Channel Ferries, Coastal Ferries, Harbor Ferries

• Arctic and Antarctic Cruises

• **Catamarans:** Catamarans are a famous ferry type. They generally are operated as passenger boats and are exceedingly popular wherever they are used. Speed is the major USP of a catamaran and for this reason alone a catamaran ride is favorite among people – young and old alike. One of the most famous catamaran services are operated in the UK by the shipping company Stena Line.

• **Channel Ferries:** In simple terms, channel ferries are ferries that cross the English Channel as their routine voyage. Channel ferries as a means of transportation were introduced in the early 19th century because of the difficulties posed to ships in the treacherous English Channel waters in both England as well as France. The Channel ferries were small and speedier thus making them a very trustworthy transportation vessel in the English Channel. In today's times, there are many variants of Channel ferries that undertake journey not just between England and France but via the English Channel to other parts of Europe as well.



• **Car Ferries:** Car ferries are basically cargo ferries that help carry cars and other automobile vehicles. Car ferries have two different interpretations. In the United States, car ferries are used to ferry railway carts or cars. These railway cars are loaded into the ferry with the help of tracks that can be attached and detached at will. These attachable and detachable adjustments are also called as Roll-On/Roll-Off ramps. These ramps form the car ferry type in the United Kingdom.



• **Roll-On/Roll-Off Ferries:** These ferries are also known as Ro-Ro ferries. They are a very useful ferry type especially when it comes to cargo hauling in the form of other vehicles. This type of ferry is mainly used in the United Kingdom. There are also certain other ferries that use such Ro-Ro ramps for boarding of vehicles in addition to the ferrying of passengers. Such ferries are called as cruise ferries.

• **Double-Ended Ferries:** The front and the back portion of this type of ferry – known as the prow and the stern – can be alternated. In simple terms, it can be said that while making a journey to a particular port, the prow and the stern remain as the parts mentioned; while the ferry makes a return journey, the prow gets converted into the stern and vice versa.

There are various companies that offer ferry services. But there is no other like the Ferry Crossings. Ferry Crossings' ferry services are widely known throughout Europe and they are exceedingly popular among people who are keenly interested in taking ferry tours and cruises.

In certain places in the world, ferries are a way of life. Without them, normal existence comes to a pause in these areas. In other areas, ferries provide excursion tours and services and thus become a major source of entertainment for the general public. With so many utilities provided, there is no doubt that a ferry is unique and the services provided are completely singular and unlike any other medium of transportation.

6. Offshore Vessels

Offshore vessels mainly help in oil exploration and construction jobs at sea. Offshore vessels are of several types.



Some of the main ones are:

- **Supply Ship:** Vessels that supply to offshore rigs
- **Pipe Layers:** Vessels engages in laying pipes and cables
- **Crane Barges or floating cranes:** A crane vessel, crane ship or floating crane is a ship with a crane specialized in lifting heavy loads
- **Semi-submersible Drill Rigs:** These are Mobile Offshore Drilling Units to make stable platforms for drilling oil and gas
- **Drill Ships:** A drillship is a merchant vessel designed for use in exploratory offshore drilling of new oil and gas wells or for scientific drilling purposes
- **Accommodation Barges:** Could be a stand-alone floating hotel or can include accommodation as well as space for Cargo
- **Production Platforms:** To extract and process oil and natural gas, or to temporarily store product until it can be brought to shore for refining and marketing
- **Floating Storage Unit (FSU) –** Floating vessel mainly used for storage of oil and by-products.
- **Floating Production and Storage Unit (FPSO):** A floating production storage and the offloading unit is a floating vessel used by the offshore oil and gas industry for the production and processing of hydrocarbons, and for the storage of oil
- **Anchor handling vessels** – These are used for offshore construction and installation operations.
- **Diving vessels –** Are vessels used by divers for diving in the ocean for underwater jobs.

7. Fishing Vessels

Ships or boats used for recreational or commercial fishing at sea are called fishing vessels.

Fishing vessels are mainly classified into two types – trawlers and non-trawling vessels.

• **Trawlers, Purse Seiners:** A fishing trawler, also known as a dragger, is a commercial fishing vessel designed to operate fishing trawls. Trawling is a method of fishing that involves actively dragging or pulling a trawl through the water behind one or more trawlers. A purse seine is a large wall of netting deployed around an entire area or school of fish. The seine has floats along the top line with a lead line threaded through rings along the bottom. Once a school of fish is located, a skiff encircles the school with the net.

• **Factory Ships:** A factory ship, also known as a fish processing vessel, is a large ocean-going vessel with extensive on-board facilities for processing and freezing caught fish or whales

8. Specialty Vessels

Specialty vessels are constructed and used for specific purposes.

Ship prefix

A **ship prefix** is a combination of letters, usually abbreviations, used in front of the name of a civilian or naval ship that has historically served numerous purposes, such as identifying the vessel's mode of propulsion, purpose, or ownership/nationality. In the modern environment prefixes are used inconsistently in civilian service, however, in government service the vessels prefix is seldom missing due to government regulations dictating a certain prefix be present. Today the common practice is to use a single prefix for all warships of a nation's navy, and other prefixes for auxiliaries and ships of allied services, such as coast guards. For example, the modern navy of Japan adopts the prefix "JS" – Japanese Ship. However, not all navies used prefixes; this includes the significant navies of China, France and Russia.

Usage

Historically, prefixes for civilian vessels often identified the vessel's mode of propulsion, such as, "SS" (steam-ship), "MV" (motor vessel), or "PS" (paddle steamer).

Alternatively, they might have reflected a vessel's purpose, e.g. "RMS" (Royal Mail Ship), or "RV" (research vessel).

These days, general civilian prefixes are used inconsistently, and frequently not at all. In terms of abbreviations that may reflect a vessel's purpose or function, technology has introduced a broad variety of differently named vessels onto the world's oceans, such as; "LPGC" (liquefied petroleum gas carrier), or "TB" (tug-boat), or "DB" (derrick barge). In many cases though, these abbreviations are used for purely formal, legal identification and are not used colloquially or in the daily working environment.

In terms of vessels used by nations' armed services, prefixes primarily reflect ownership – but may also indicate a vessels type or purpose as a sub-set. Historically, the most significant navy was Britain's Royal Navy, which has usually used the prefix "HMS", standing for "His/Her Majesty's Ship". The Royal Navy also adopted nomenclature that reflected a vessel's type or purpose, e.g. HM Sloop. Commonwealth navies adopted a variation, with, for example, HMAS, HMCS, and HMNZS pertaining to Australia, Canada, and New Zealand respectively.

In the early days of the United States Navy, abbreviations often included the type of vessel, for instance "USF" (United States Frigate), but this method was abandoned by President Theodore Roosevelt's Executive Order No. 549 of 1907 which made "United States Ship" (USS) the standard signifier for USN ships on active commissioned service. In the United States Navy that prefix officially only applies while the ship is in active commission, with only the name used before or after a period of commission and for all vessels "in service" rather than commissioned status.

Today the common practice is to use a single prefix for all warships of a nation's navy, and other prefixes for auxiliaries and ships of allied services, such as coast guards. For example, the modern navy of Japan adopts the prefix "JS" – Japanese Ship.

However, not all navies used prefixes; this includes the significant navies of China, France and Russia.

From the 20th century onwards, most navies identify ships by letters or hull numbers (pennant numbers) or a combination of such. These identification codes were, and still are, painted on the side of the ship. Each navy has its own system: the United States Navy uses hull classification symbols, and the Royal Navy (e.g. 'D35' is destroyer 35 – HMS *Dragon*) and other navies of Europe and the Commonwealth use pennant numbers.

These prefixes are generally used for merchant vessels of any nationality both current and historical prefixes known to have been used.

Prefix	**Meaning**
AE	Ammunition ship
AFS	Combat stores ship
AHT	Anchor handling tug
AHTS	Anchor handling tug supply vessel
AO	United States Navy oiler
AOG	Gasoline tanker
AOR	Auxiliary replenishment oiler
AOT	Transport oiler
ATB	Articulated Tug Barge
CRV	Coastal Research Vessel

C/F	Car ferry
CS	Container ship or Cable ship
DB	Derrick barge
DEPV	Diesel Electric Paddle Vessel
DLB	Derrick Lay Barge
DCV	Deepwater Construction Vessel
DSV	Diving support vessel or deep-submergence vehicle
DV	Dead vessel
ERRV	Emergency Response Rescue Vessel[9]
EV	Exploration Vessel
FPSO	Floating production storage and offloading vessel
FPV	Free Piston Vessel
FPV	Fishery Protection Vessel
FT	Factory Stern Trawler
FV	Fishing Vessel
GTS	Gas Turbine Ship
HLV	Heavy lift vessel
HMT	Hired military transport (not currently in use)
HMHS	Her(/His) Majesty's Hospital Ship
HSC	High Speed Craft
HSF	High Speed Ferry

HTV	Heavy transport vessel
IRV	International Research Vessel
ITB	Integrated Tug barge
LB	Lifeboat
LNG/C	Liquefied natural gas carrier
LPG/C	Liquefied petroleum gas carrier
MF	Motor ferry
MFV	Motor fishing vessel (mainly UK Royal Naval Reserve)
MS (M/S)	Motor ship (interchangeable with MV)
MSV	Multipurpose support/supply vessel
MSY	Motor Sailing Yacht
MT	Motor Tanker
MTS	Marine towage and salvage/tugboat
MV (M/V)	Motor Vessel (interchangeable with MS)
MY (M/Y)	Motor Yacht
NB	Narrowboat
NRV	NATO Research Vessel
NS	Nuclear ship
OSV	Offshore supply vessel
PS	Paddle steamer
PSV	Platform supply vessel
QSMV	Quadruple screw motor vessel
QTEV	Quadruple turbo electric vessel

RMS	Royal Mail Ship or Royal Mail Steamer
RNLB	Royal National Lifeboat
RRS	Royal Research Ship
RV / RSV	Research vessel
SB	Sailing Barge
SS (S/S)	Single-screw steamship (also used as generic term for any steam-powered ship)
SSCV	Semi-submersible crane vessel
SSS	Sea Scout Ship
SSV	Sailing School Vessel, or Submarine and Special Warfare Support Vessel
ST	Steam tug or Steam trawler
STS	Sail training ship
STV	Sail Training Vessel or Steam Turbine Vessel
SV (S/V)	Sailing Vessel
SY	sailing yacht or steam yacht
TB	Tug boat
TEV	Turbine electric vessel
TIV	Turbine Installation Vessel
TrSS	Triple-screw steamship or steamer
TS	Training Ship or turbine steamship or turbine steam ship

Tr.SMV	Triple-Screw Motor Vessel
TSMV	Twin-Screw Motor Vessel
TSS	Twin-screw steamship or steamer
TST	Twin-screw tug
TV	Training vessel
YD	Yard derrick
YT	Yard Tug
YMT	Yard Motor Tug
YTB	Yard Tug Big
YTL	Yard Tug Little
YTM	Yard Tug Medium
YW	Water barge, self-propelled
YWN	Water barge, none propelled
YOS	Concrete vessel



• **Tugs:** A tug (tugboat) is a boat or ship that maneuvers vessels by pushing or towing them.

• **Tenders –** A boat or a larger ship used to service or support other boats or ships, generally by transporting people and/or supplies is called a tender vessel.

- **Pilot Crafts –** Pilot crafts are used for the transportation of harbor pilots.
- **Cable Layers** – Cable laying vessels help in laying cables on to the sea bed.
- **Research Vessels –** They are special types of vessels used for carrying out a variety of researches at sea. Some of the most common types of research vessels are – seismic vessels, hydrographic vessels, oceanographic vessels, polar vessels etc.
- **Salvage Vessels –** Salvage vessels are vessels engaged in salvage operation; recovery of lost property at sea.
- **Lightships:** A light vessel, or lightship, is a ship which acts as a lighthouse. They are used in waters that are too deep or otherwise unsuitable for lighthouse construction.
- **Barge Carriers:** A barge is a flat-bottomed boat, built mainly for river and canal transport of heavy goods.
- **Timber Carriers:** Vessels that carry timber
- **Livestock Carriers:** Vessels that carry livestock/animals
- **Ice breaker ships:** They are used for cutting ice deposits in extremely cold climate conditions to make waters navigational.

There is a very popular saying in the English Language – *when the going gets tough, the tough get going.* An ice breaker ship is an example of how water navigation is possible even in the toughest of situations. An ice ship is used in extremely cold regions where thick layers of ice are formed on the surface of water. The ice makes the waters inaccessible for ships or boats. Ice ship is thus used to break the ice sheet to allow other ships to ply in the region.

9. High-Speed Craft

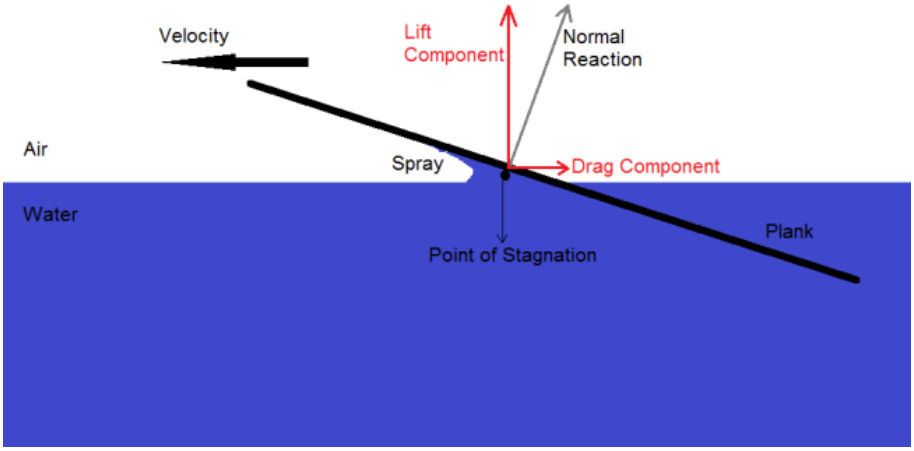
High-speed crafts are a special type of technologically advanced high-performance (typically high speed) marine vehicles. Though most of these technologies are not used in commercial vessels, a few have been successfully implemented and tested in conventional merchant vessels of small scale.

Some of the main types of high-speed crafts are:

- Multihulls including wave piercers
- Small water plane area, twin-hull (SWATH)
- Surface effect ship (SES) and Hovercraft
- Hydrofoil
- Wing in Ground Craft (WIG)

Planing Crafts

Have you ever noticed the phenomenon of a stone skipping on the surface of the water? That occurs due to the planning effect, which was first explained by surging a flat plank along the water surface at a certain angle of attack, as shown below.



Planning action. When a flat plank is slid along the water surface at a particular angle of attack, a stagnation point is formed under the plank. This is the point where the velocity lines of the fluid are perpendicular to the plank, creating a standard reaction as shown. There are two components of this typical reaction. The component in the perpendicular direction tends to lift the plank from the water surface and is called the Lift. The horizontal component is the drag, resisting the motion of the plank. This stagnation point also creates the spray.

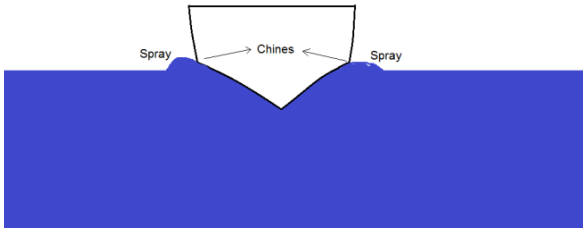
Now, it is due to the lift force that the plank raises above the water surface. The lift reduces to zero when the plank loses contact with the water surface. It would lift from the surface till gravity results in it coming down back onto the surface, thus repeating the same process in a cycle. What is to be noted here is, the lift force is a function of the forward velocity of the plank and the angle of attack. An optimum angle of attack would provide the maximum lift force.

This phenomenon of a planning body being lifted from the water surface is called the porpoising action, and this is why the stone you threw skipped along the surface of the water. It was this principle that was applied in the design of the hulls of planning crafts.



Planning craft.

The above image shows a planning craft in action. One of the most important conditions that are to be met by planning crafts to provide optimum performance is the trim angle, which in turn provides the lift force. Chines are a notable feature in most of the planning hulls because they help in directing the spray away from the hull, as shown in the figure below. Some hulls feature double and triple chines designed for those that generate more spray.



Single chine hull cross section.

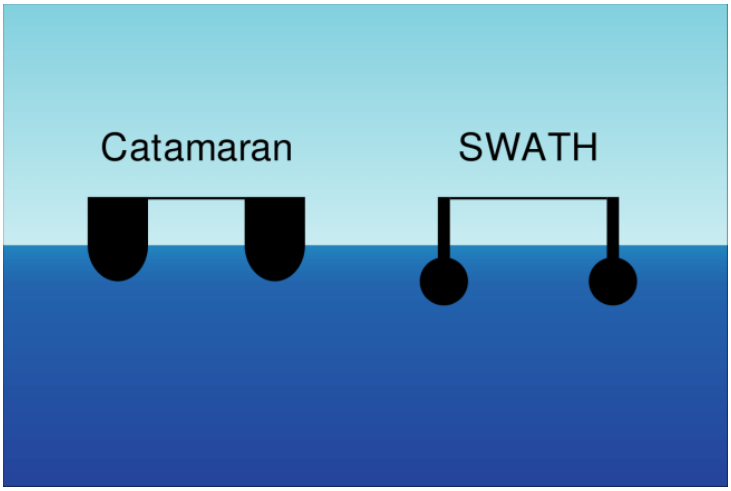
But why is there a need to direct the spray away from the hull? This introduces us to a new term called spray resistance. When the spray travels aftward, it wets the hull, which results in an added drag called the spray drag, and this contributes to almost 10 to 15 percent of the total drag in planning crafts. It is, therefore, a prime focus of the designer of a planning craft hull to minimize the spray resistance as much as possible.

Another way of conceptualizing the spray resistance is to realize that it is the energy spent by the craft in generating the spray. Since the spray is produced due to the forward motion of the craft, which is in turn powered by the craft's propulsion system, spray resistance forms a component of the power used up to overcome the total drag of the craft.

At low speeds planning crafts are less stiff in roll motions, however, the stiffness of roll increases at higher speeds, which means a planning craft cruising at a higher speed in beam seas would be more prone to higher degrees of the roll than at lower speeds. The angle made by the hull to the horizontal, at the keel is called the angle of dead rise. To combat the above effect, the dead rise is kept to a minimum.

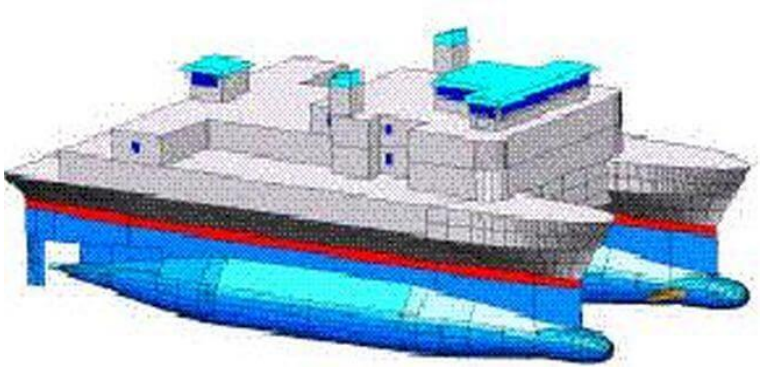
SWATH (Small Water plane Area Twin Hull)

Since catamarans (double hulls) have higher transverse stability than mono-hulls, it sometimes comes across as a problem. Increased transverse stability means reduced seakeeping abilities. In order to combat this in double hulls, SWATHs have been developed to feature low waterplane area. These are also displacement type hulls like typical displacement catamarans, and the lost hull volume due to low water plane is compensated by providing increased cross sections in the part of the hull that is further from the water surface, as shown in the figure below. Each such cylindrical section is commonly called a pod.



Difference between a displacement catamaran and SWATH.

The small water plane significantly reduces the wave drag at higher speed and increases seakeeping abilities of the hull. But it also comes with a con. The small water plane area results in increased sensibility to load changes within the hull. This is compensated by a compensating system that uses ballast water to make up for the load changes to prevent unwanted trim and heel conditions.



SWATH with twin pods.

All SWATH vessels have a propeller each on each pod. The prime movers may be located within the pod, for hulls accommodating larger diameters. However, for hulls with low diameter pods, the engines are generally provided on the tween deck and the power is transmitted to the pods through bevel gears. Some designers even prefer to opt for water jet propulsion for smaller SWATH vessels, where the pump is housed on the tween deck and the tunnels are led to the pods.



SWATH Ocean Research Vessel.



SWATH Stealth Ship. (Source: wikipedia.org)

Hydrofoil Crafts

A hydrofoil craft is one in which the lift force is generated during forward motion due to the presence of hydrofoils under its hull. However, they are to be operated at the optimum speed that corresponds to the maximum lift provided by the hydrofoil sections. Operation at speeds further away from the optimum lift region would result in an increase of power requirement since the lift is proportional to the square of the velocity.



A hydrofoil craft. (Source: wikipedia.org)

Note the hydrofoil sections under the hull in the above image. We will come into this type of hydrofoil crafts a little later, but what is important to understand is the added advantage of hydrofoils. When a hydrofoil craft operates at its optimum speed, there comes a point where the lift force generated by the hydrofoils lift the hull or a significant portion of the hull above the water surface (as you can see in the figures below). This reduces the wetted surface area, therefore reducing the frictional drag significantly.



Lifting of a hull from water due to hydrofoil action..

There are two types of hydrofoil crafts depending on the extent to which the hydrofoils are submerged during operation of the craft:

Surface Piercing Hydrofoil: In these crafts, a particular portion of the hydrofoils pierce out of the surface during full speed operation, and only a portion of the foils remains submerged, as shown in the image below. The principle behind these foils is simple. When the lift generated by the foil is sufficient enough to lift the hull above the water surface, the hull does not contribute to any resistance. After this stage, the lift required from the foils must be constant. Therefore, for an increase in speed, a reduction in submerged area of the hydrofoil is required. The surface piercing hydrofoil does exactly this as the craft rises higher with

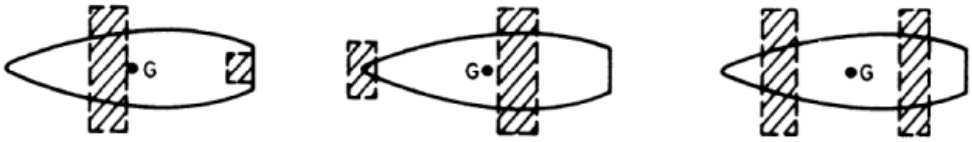
increasing speed. Similarly, when the speed reduces, the vessel comes down to the point where the submerged area of the foils is sufficient enough to keep the lift constant.



Surface piercing hydrofoil craft.

Incidence Controlled or Completely Submerged Hydrofoils: These hydrofoils are completely submerged in all sailing conditions, as the name suggests. They are positioned further under the hull by the use of A- struts. In order to maintain constant lift, the angle of attack of these hydrofoils is changed hydraulically during variation in speed. This is done by providing flaps within the hydrofoils, which give these crafts a self-stabilizing capability.

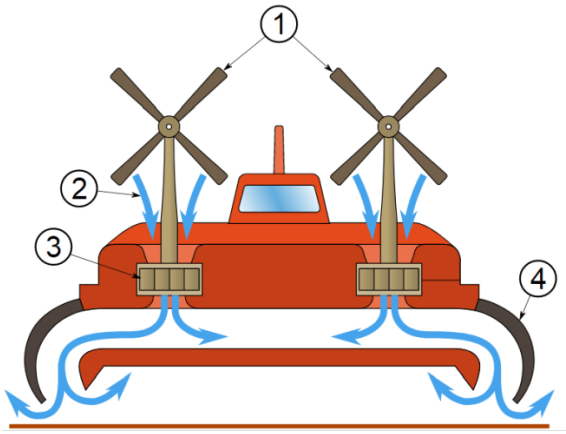
The longitudinal distribution of the hydrofoils can be achieved in three ways, as shown in the figure below. It is preferable to have a larger hydrofoil at the vicinity (just forward or aft) of the center of gravity, and a smaller foil at the far aft for forward. This helps in achieving the optimum trim condition. However, some hydrofoils are arranged in tandem, that is, two large hydrofoils at equal distance aft and forward of the center of gravity.



Different arrangements of hydrofoils.

Air Cushion Vehicles

Air Cushion Vehicles (AIVs) are supported not by upward buoyancy force, but by an aerostatic cushion developed between the inflatable skirt and the water surface. The most common type of air cushion vehicles is a Hovercraft. A schematic diagram below will be used to explain the working of this craft.



Schematic operation of a hovercraft.

An ideal air cushion vehicle will have four major components which help in its propulsion:

1. Propellers.
2. Air.
3. Fan.
4. Flexible or Inflatable Skirt.

The first step in the sequence is drawing of air by the fans placed at the port and starboard sides. The air drawn by these fans are used to inflate the empty space in the skirt. As the air flows into the skirt, it forms a cushion of air between the skirt and the water surface. This chamber of air is also called Phlenum Chamber. This cushion provides a typical reaction which lifts the craft from the surface. Once the required lift has been generated, and the craft is not in contact with the surface, the air propellers are started to induce forward motion. Twin propellers help in easy maneuverability and direction changing abilities.

The skirt may be flexible or rigid, depending on the design of the vessel. However, the primary purpose remains the same. Usually, the side walls of the skirt are rigid to contain the air cushion within the skirt. The upward normal reaction due to the air cushion would act at the center of pressure of the air chamber. Therefore, the displacement between the center of gravity of the craft and the center of pressure of the chamber would produce upsetting forces inducing unwanted trim and heel conditions. This is where the design of the skirt becomes an important part of hovercraft design. One way to combat this is to provide separate cushion compartments in the fore and aft, starboard and port. In such case, when the craft has “heeled” or trimmed to one side, the air in the lower side compartment is compressed, thus creating a righting moment.

Spray resistance, however, forms a significant portion of the total resistance of air cushion vessels. The large air propellers are provided with vectoring capability so as to compensate the effect of wind disturbances. Most of them are also provided with large surface area air rudders for directional control.

An Interesting Fact: While the hovercraft does not operate in contact with the water surface, why do they still generate wave systems when they move through water?

The cushion of air creates a dent on the water surface just under the skirt. Hence, as the craft moves, this dent on the water moves along with the craft. It is this moving indentation that causes a series of transverse and divergent wave systems. This also means that though a hovercraft may have significantly low frictional resistance, it does have a component of wave resistance. However, as the speed of the craft increases, there comes a point where the speed of the indentation cannot keep up with the vessel's speed, therefore suddenly reducing the wave resistance. This is the optimum operating speed of a hovercraft.

Astronomical amounts of research are being conducted in the field of high-performance marine vehicles, especially by countries like US and Russia. Many experimental projects of surface effect ships have turned out to be failures; however, this has not deterred the efforts. The recent development of the Navies in hybrid crafts is one of the biggest examples.

10. Dredgers

Dredging is an excavation activity usually carried out underwater, in shallow seas or freshwater areas with the purpose of gathering up bottom sediments and widening

Dredgers are vessels with excavation tools used for removing sand and other types of deposits from the seabed. Dredgers are used for several purposes such as making shallow coastal areas navigational, deep-sea mining etc.

Chapter Three: The Maritime Economy

The Maritime Economy

The maritime economy is now often referred to as the 'blue economy'. It covers all marketable activities linked to the sea. The link between activities and the sea may be explained by the use of marine resources, maritime areas or regions or by the vicinity of these spatial units. The relationship between the activities and the sea can be more or less direct and maritime sectors cannot be seen as a single sector activity within the NACE classification but rather as a set of activities.

The regions most impacted by the maritime economy are of course the EU's coastal regions which are made up of 446 regions (out of a total of 1 342 NUTS 3 regions — 2010 classification). In 2011, 40.8 % of the EU population lived in coastal regions which covered 40.0 % of the EU-27 territory. From 2012 onwards tourism statistics is based on coastal areas (Local Administrative Units level 2, municipality is used as synonym) aggregates. Around 12% of the municipalities are considered to be coastal according to the corresponding definition.

The analysis shows that the coastal regions in Europe have some comparative advantages in terms of GDP, employment, performance in tourism and such unique economic activities as fishery, extraction of salt and maritime manufacturing. Here we first look primarily at a comparison of the reference years 2005 and 2014 (according to the data availability in different domains). During the period observed, the economic and financial crisis has happened and probably some of the findings are due to the crisis, however there are not arguments for that.

The Purpose of Transportation

"The ideal transport mode would instantaneous, free, have an unlimited capacity and always be available. It would render space obsolete. This is obviously not the case. Space is a constraint for the construction of transport networks. Transportation appears to be an economic activity different from the others. It trades space with time and thus money".

The unique purpose of transportation is to overcome space, which is shaped by a variety of human and physical constraints such as distance, time, administrative divisions and topography. Jointly, they confer a friction to any **movement**, commonly known as the friction of distance (or friction of space).

- **Mobility**

Mobility refers to the movement of people or goods. It assumes that "travel" means person- or ton-miles, "trip" means person- or freight-vehicle trip. It assumes that any increase in travel mileage or speed benefits society.

- **Fulfillment of a demand for mobility**

The Supply and *Demand* for *Transportation*. Each *transport* more shares the common goal of fulfilling a derived *transport demand*, and each *transport* mode thus fills the purpose of

supporting *mobility*. ... *Mobility* takes place using *transport* infrastructures of a fixed capacity, providing a *transport* supply.

- **Derived demand,**

The **demand** for **shipping** is a **derived demand** as the product being consumed is not the **transport** itself (except in passenger **transport**), but the goods that are being transported. ... Therefore, when **demand** for cars increases, **demand** for **transport** increases.

- **Spatial consideration,**

The **Spatial Consideration** of a Movement. The transfer of a unit of **freight** or a passenger between an origin A and a destination B is influenced by the friction of distance, which is the effect that each unit of distance may have on a movement.

- **Spatial flows,**

Hinterland patterns generally occur between a service center (e.g. city or a *transport* terminal such as a port) and it's market area. They are of a regional scale and reflect the organization of markets. ... These *flows* reflect the *spatial* organization of distribution. The main purpose of transportation has a geographical nature, which means that transportation facilitates the movement between the two locations, and therefore transport plays an important role in the structure and organization of space and its areas. During the 19th century, transport designers focused on creating new routes. In the twentieth century, this effort led to the choice of cargo line hubs, increasing existing network capacity and responding to the needs of goods, people and services.

The Importance of Transportation

Transport is considered to be one of the most important human activities and is an integral part of the economy and plays an important role in relation to the space between the geographical nodes of transport. Transportation provides a valuable link between different areas with business centers and between population centers with the rest of the world. Transportation is a multidimensional service that affects different aspects of the economy. The importance of transportation is examined in several respects:

1. The historical importance of transportation

Various modes of transportation have played important historical roles. For example, the effects of transport on the emergence of civilizations (Egypt, Iran, and China), the development of political and cultural communities, as well as on national defense, are undeniable.

2. The social importance of transportation

The modes of transportation provide the facilities necessary for the rise and fall of civilizations, forming the traffic between cities and their suburbs based on the needs of the people. Transportation has a direct impact on the whole of society (users, owners of capital, producers and governments).

3. The political importance of transportation

The role of the state in transport as an investor and the role of transport in politics are undeniable. While transport is more economically oriented, most transport and transport corridors have been created for political reasons. As a result, transportation has a direct effect on the alliance, which means connecting the corners of a country by road, rail, plane and sea.

4. The importance of the transportation environment

In addition to the many positive points that can be counted on the transport, it has a negative impact on the environment, such as pollution of water, air, noise and public health. Any decision about transportation should be made with the cost and its environmental impact on the people.

5. The economic importance of transportation

Improving and expanding transportation always depends on economic development and job creation directly and indirectly. The transportation sector is also an important economic factor in the process of production and service delivery. Transport has a direct influence on the value added of goods and services and facilitates the economics of scale, affecting the value of land. Transportation is a reflection of economic activity.

Growth of the demand

The current **demand** pathway projects that **maritime freight transport** will **grow** at a compound annual **growth** rate of 3.6 percent through 2050. This will lead to a near tripling of **maritime** trade volumes by 2050. ... Approximately one third of all **maritime freight** movements in 2050 will take place in these two regions. Roughly **ninety percent** of the world's goods are transported by sea.

Reduction of costs

Recent literature has emphasized the importance of transport costs and infrastructure in explaining trade, access to markets, and increases in per capita income. For most Latin American countries transport costs are a greater barrier to U.S. markets than import tariffs. Some reliable sources have investigated the determinants of the costs of shipping to the United States using a large database (more than 300,000 observations a year) on shipments of products at the six-digit level of the Harmonized System of classification from different ports around the world. They find that distance and containerization matter. They find that the efficiency of ports is also important. Improving the efficiency of a port from the 25th to the 75th percentile reduces shipping costs by 12 percent. (On average, having bad ports is equivalent to being 60 percent farther away from markets.) Inefficient ports also increase handling costs, which are part of shipping costs. Finally, it is tried to explain variations in port efficiency. They find that the variations are linked to excessive regulation, the prevalence of organized crime, and the general condition of the country's infrastructure.

Expansion of infrastructures

A larger stock of **infrastructure** is thought to fuel **economic** growth by reducing the cost of production and transportation of goods and services; by increasing the productivity of input factors; and by creating indirect positive externalities. The **results** of research shows "that deteriorating **infrastructure**, long known to be a public safety issue, has a cascading **impact** on the nation's economy, negatively affecting business productivity, gross domestic product, employment, personal income, and international competitiveness."

Transportation nodes.

Transport node is a complex of devices in the area for the functioning and interaction of several types of backbones that serve **transit**, local, **freight** and passenger traffic and a set of **transport** processes. Networks are made up of **nodes and links**. A **node** or vertex is the meeting point of two or more routes. A point of origin, a point of destination or any sizeable town along a route, every road that joins two **nodes** is called a **link** or edge. **Links** are wider than the **node** in case of a road network. **How is 'node' different from 'link' in transport system**? **Difference** between a **Node** and a **Link** is: -A **Node** is the meeting point of two or more routes. -A **Link** is a path that joins two **nodes**.

- Transportation primarily links locations, often characterized as nodes. They serve as access points to a distribution system or as transshipment / intermediary locations within a transport network, function mainly serviced by transport terminals. Transport geography must consider its places of convergence and transshipment.
- **Transportation networks**. Considers the spatial structure and organization of transport infrastructures and terminals. Transport geography must include in its investigation the infrastructures supporting movements.
- **Transportation demand**. Considers the spatial demand for transport services as well as the modes used to support movements. Once this demand is realized, it becomes an interaction which flows through a transport network. Transport geography must evaluate the factors affecting its derived demand function.

The analysis of these concepts rely on **methodologies** often developed by other disciplines such as economics, mathematics, planning and demography. Each provides a different dimension to transport geography. For instance, the spatial structure of transportation networks can be analyzed with graph theory, which was initially developed for mathematics and computer science to deal with other problems. Further, many models developed for the analysis of movements, such as the gravity model, were inferred from physical sciences. **Multidisciplinary** is consequently an important attribute of transport geography, like geography in general.

Facing these varied dimensions related to fields of investigation, what could be the role of transport geography and of the transport geographer? Basically, the transport geographer tries to draw linkages between several or all of these dimensions in a systematic field of investigation, especially when they have **spatial considerations**. Among these geographical considerations, the most relevant to transport geography are:

• **Location**. As all activities are located somewhere, location will determine the origin, the destination, the distance and even the possibility of a movement to be realized. When a location is linked to a desirable attribute such as a resource, it is likely to generate movements.
• **Scale**. Movements generated by human activities are occurring at different scales, pending the nature of the activity. For instance, home-to-work journeys generally have a local or regional scale while the distribution and supply networks of a multinational corporation are most likely to cover several parts of the world. Different geographical scales are often embedded.
• **Spatial structure**. All locations being different and considering the scale at which these locations are interacting, the outcome is the spatial structure. It represents how transportation systems is established over local, regional and global geographies.

Consequently, the **transport systems, by their nature, have a strong spatial imprint**.

Current Issues in Transport Geography

1. Impacts on the Transport System

Obviously, the functioning, the adaptation and growth of markets are influenced by the equilibrium between supply and demand, planning and investment needs of the transport and communication sector. The expansion of trade linked to contemporary developments in transport and communication technologies has entailed a modification of transport and communication means. We can summarize these impacts over six major points.

First, there is a great potential for growth in the car industry. This is the result of both demographics which demonstrate an increasing number of potential inhabitants reaching driving age; and the financial conditions of various countries suggesting a high saving capacity of households. The demand for developing a car industry is also influenced by the complex ramification of the industry both **upstream** (iron and steel, pneumatics,...) and **downstream** (fuel, insurance, sale, transport, infrastructures,...) in what is known as the supply / distribution chain. Many countries find in the car industry a solution for absorbing an increasing proportion of labor force. Besides, the emergence of extended metropolitan regions and the related needs for rapid, door-to-door services increase demand for vehicle and network flexibility and thus gives an impetus for the development of urban road transport.

Second, international trade is dominated by maritime transport. This has led to an increase in the size of vessels but mostly to the development of containerization. Indeed, the overwhelming primacy of containers was a prerequisite for the commercial integration of the region given the disparities in commercial flows, discordances in maritime fleet and differences in port infrastructures. Container traffic is essentially concentrated in major **hub** ports. This suggests both a territorial consolidation of economic activities along extended metropolitan regions and a rationalization of operator's services networks, thus giving secondary ports a feeder function for the national load centers.

Third, the policy for rail transport development falls in two categories. On the one hand rail network is being rationalized through the closure of unprofitable lines, while on the other hand, plans are being laid out and implemented through foreign technologies for the development of high speed passenger trains linking major metropolitan areas. The impact of increasing trade on the railway transportation network is scale specific.

- At the **macro scale**, new alternatives are emerging in the form of land bridges between Europe and Asia. A rail **land bridge** refers to the transport of containers by rail between ports on either side of a land mass, such as North America. The experts defined a rail land bridge as having two characteristics: First, a single bill of lading issued by the freight forwarder that covers the entire journey, and second, the freight remains in the same container for the total transit. One example of a rail land bridge is the Eurasian Land Bridge. (Missing connections in Iran and Miyanmar) A transcontinental railroad can be a type of land bridge.
- At the **meso scale**, the railway transportation network is influenced by the pattern of energy consumption. Many countries still rely overwhelmingly on foreign suppliers for their source of fuel. Countries still build major fuel moving transport arteries. A key issue is the concentration of investments in shaping rail corridors.
- At the **micro scale**, recent tendencies notably in extended metropolitan regions reveals a specialization of rail traffic as well as a transfer of certain types of commodities from the rail network to the fluvial and road network systems. Railways servicing ports tend more and more to concentrate on the movement of container traffic. This strategy of the rail transport authorities allows on the one hand, an increase in the delivery of goods and on the other hand, the establishment of door-to-door services through a better distribution of goods among different transport modes.

Fourth, the traditional dominance of port over their hinterland is being reconsidered. Ports now perform interface functions on behalf of freight consigned or derived thousands of kilometers away from the port. As containerization is leading towards flexible, integrated and **seamless** intermodal services, the nature of the port business environment changes very rapidly. The ability of a port to attract and serve international traffic depends increasingly on:

- The geographical conformity of its site to a shipping line's fleet and market strategy.
- The quality of its intermodal tertiary service notably logistics systems.
- The availability of local cargoes.
- The intermodal links to major production and consumption markets.

Shipping lines are rationalizing their services, adapting to customer's changing needs and modifying the configurations of their itineraries. A new port hierarchy is emerging. Ports are thus under intense pressures to restructure their services and modernize their equipment.

Fifth, the prospect for air traffic growth is excellent. But with **deregulation**, airlines have realized the extraordinary potential of **hub-and-spoke** airports to increase their **catchment area** by adding a single point of call from an existing hub. The attractiveness of an airport thus rests on the capacity to form cooperative transportation alliances; the level of landing fees; the quality of maintenance facilities; and the local growth potential for air transport. Faced with this situation, airport authorities are under heavy pressure to increase runways, scheduling and terminal capacities. There are thus numerous projects for the expansion of

existing installations or the construction of new airports. But, the relocation or expansion of existing facilities aggravates the competition among the region's airports and has major implications for airports and their role within the transportation system.

Sixth, the population concentrations in extended metropolitan regions and the pattern of trade flows between them lead to the emergence of gateways. A key spatial feature of the transportation and communication infrastructures in the world is the regional operation centers or **multimodal platforms**. These platforms are marked by their capacity for sea, land, air and telecommunication transfer. Linkages between these gateways are concentrated in intermodal corridors. Trade originates in many regions but as it nears the multimodal transport terminals, flows tends to converge before arrival and as flows move further away from the terminals it disperses to multiple directions. These arterial links leading to and from **gateways**, connect with each country's fluvial, coastal, air and road transportation systems. These systems are not only servicing each country's domestic trade but are paving the way for an integrated global intermodal transportation system. As some of these gateways are now emerging as critical logistics service centers that rationalize distribution systems to fit new trading patterns, their development has far-reaching implications in any transportation and communication policy framework.

2. Investment Needs

Trade and transport needs are expanding rapidly. But the rate of growth and change in the volume and types of traffic as a result of increasing trade and motorization is such that transport and communication infrastructures require more investment than the manufacturing sector. The amount of investments required to build and maintain the networks is estimated at several US$ trillion. All countries of the world have adopted policy of transport infrastructure construction programs. Governments have and are still participating at various degrees and at different stages in the development of the transport sector. But the insertion of the countries in international economic organizations renders many state instruments obsolete. Governments as well as international organizations such as the **World Bank** are thus searching for mechanisms to attract investors. The mechanisms that govern foreign investments are influenced by the hierarchy of effects and duration of international conflicts and the degree of participation of a region to international exchanges. Reports demonstrate that investments of industrialized countries are essentially directed towards other industrialized countries notably the United-States.

The formation of trading blocs (e.g. **NAFTA, ASEAN, EU**) is bringing participating countries to increase interest rates to attract investment flows. It is not possible to have fixed exchange rate, mobility of capital and national monetary policies all together. The monetary policy of many countries are now feeling the effects of these changes as the US$ represents a growing proportion of foreign reserves. This situation influences the functioning of governments that see an erosion of their capacity to define or to realize objectives. The State is rigid and regulated. The situation is especially marked in the transportation sector. There are modal regulations, legislation in pricing structures, policy of environmental control and conflicting jurisdictions in landside access. There is thus increasing pressure to dilute the role of the State and to strengthen regional organizations.

The consolidation of markets and the resulting increase in trans-border coastal traffic is encouraging privatization in the transport and communication sector and the adoption by States of the principle of user-pay as a mean to attract investments. The main problem is that investments in infrastructure do not occur evenly. Technological and economic forces are bringing about a concentration of investments in a few load centers that have become attractive investment sites. Changes are being adopted in selected extended metropolitan regions where transport companies are favored by contractual laws that increase their capacity to organize transactions.

Transport Costs and Transport Networks

1. Transport Costs

The role of transport is to increase the capacity to organize and to reduce the cost of movements. All agents (e.g. individuals, enterprises, institutions, States, etc.) have to negotiate the transfer of goods, people, information and capital because supplies, distribution systems, tariffs, salaries, locations, marketing techniques as well as fuel costs are in constant opposition and thus requires their transfer management.

Transport costs are a monetary measure of what the transport **provider** must pay to produce transportation services. They depend on a variety of conditions related to geography, infrastructure, administrative barriers, and on how passengers and freight are carried.

There are three major components of a transport cost:

- **Friction of space**. Distance is the most basic component of transport costs. The more it is difficult to trade space for a cost, the more the friction of space is important. The friction of space can be expressed in terms of length, time, economic costs or the amount of energy used. It varies greatly according to the type of transportation mode involved and the impacts of technological innovation.
- **Nature of shipments**. Different modes are characterized by different transport costs, since each has its own capacity limitations and operational conditions. Another component of transport costs is related to the **involved economies of scale**, as the larger the quantities transported, the lower the unit cost. For instance, moving a barrel of oil over 4,000 km would cost $1 on a 150,000 deadweight tons tanker ship and $3 on a 50,000 deadweight tons tanker ship.
- **Transaction costs**. Costs required for gathering information, negotiating, and enforcing contracts and transactions. Often referred as the cost of doing business. Exchange processes involve transactions costs that all agents attempt to reduce since the portion of transaction costs going through the market consumes a growing magnitude of the resources of the economy. An increasing percentage of distribution costs are devoted to transacting. In a competitive environment, transport costs are influenced by the respective rates of transport companies.

Transport costs are often expressed as **rates**, which are the negotiated monetary cost of moving a passenger or a unit of freight between a specific origin and destination.

Rates are the price of transportation services paid by the **consumer** of them.

Considering the components of transport costs previously discussed, rate setting is a complex undertaking subject to constant change. For public transit, rates are often fixed and the result of a political decision where a share of the total costs is subsidized by the society. The goal is to provide an affordable mobility to the largest segment possible of the population. For freight transportation and many forms of passenger transportation (e.g. air transportation) rates are subject to a competitive pressure. They either reflect costs directly involved with shipping (cost-of-service) or are determined by the value of the commodity (value-of-service). Common rate structures for freight transportation are **Free-on-Board**, (FOB) and **Costs-Insurance-Freight**.(CIF)

Free on board (FOB). The price of a good is the combination of the factory costs and the shipping costs from the factory to the consumer. The consumer pays for the freight transport costs and loading expenses remains for the shipper. Consequently, the price of a commodity will vary according to transportation cost from factory to port and loading costs to the ship.

Costs-Insurance-Freight (CIF). Price of a good is a uniform delivered price for all customers everywhere, with no spatially variable shipping price, which implies that the average shipping price is built into the price of a good. The CIF cost structure can be expanded to include several rate zones.

The mobility of populations and freight tends to be influenced by transport costs. Empirical evidence for passenger vehicle use underlines the relationships between annual vehicle mileage and fuel costs. At the international level, doubling of transport costs can reduce trade flows by more than 80%. The more affordable mobility is, the more frequent the movements of passengers and freight and the more likely they will be carried over longer distances.

2. Transport Networks

The territorial structure of any region corresponds to a network. In a given area, it is possible to identify networks, sub-spaces and differences in economic activities. The implementation of networks and spatial divisions, however, are rarely premeditated in their complexity. They result from the influence of various strategies. A transport network denotes either a permanent track (e.g. roads, rail and canals) or a scheduled service (e.g. airline, transit, train). It can be extended to cover various types of links between points along which movement can take place. In transport geography, it is common to identify various types of transport structures that are linked with transportation networks. Network structure ranges from centripetal to centrifugal and the recent decades have seen the emergence of transport hubs as a privileged network structure for many types of transport services, notably for air passengers and freight.

The efficiency of a network can be measured through **graph theory** and **network analysis.** These methods rest on the principle that the efficiency of a network depends partially on the lay-out of points and links. Obviously some ordering have a higher degree of accessibility than others, but careful consideration must be given to the basic relationship between the revenue and costs of specific transport networks. Rates thus tend to be influenced by the structure of

transportation networks. Studies have been conducted to demonstrate that inequalities between places can be measured by the quantity of links between points and the related revenues generated by traffic flows. Many locations within a network have better accessibility and higher opportunities. However, economic integration processes tend to change inequalities between regions. This in turn has impacted on the structure and flows of transportation networks at the transnational level.

Today, the most important decisions are taken by transport companies. The role of transport companies that have always been associated with transport activities has sensibly increased in the general context of world commercial geography. The role of transport enterprises is changing as a result of reduction in **bulk trade** and a high degree of competition for space along transport infrastructures. New enterprises located near or adjacent to terminals are reducing their linkages with the main terminals and increasing their links with other urban activities.

Technological changes have weakened the links between port and port industries as well as between heavy industries and rail as new industries more related to the internal structure of the city are emerging. There is less emphasis on heavy industries and more importance given to terminal activities of light manufactured goods and services (e.g. warehousing, distribution function). Indeed, new functions are being grafted to transport terminals that are henceforward facilitating **logistics** and manufacturing processes. Relations between terminal operators and carriers have thus become crucial notably in containerized traffic. **Containerization** - a modern technological device for some manufacturing processes or products - is being intensively used. It surmounts the physical and time constraints of **modal split**, notably at ports.

The requirements of international trade has led to the development of firms providing transport services. The development of the transport service industry does not rest on specific geographical factors but more on the initiatives of **freight forwarders** located in extended metropolitan regions that have developed contacts with firms located in the **hinterland** of various regions of the world. **Freight consignee and handlers** are the firms most closely linked with the terminal activities. The firms providing tertiary services (e.g. customs brokers and freight forwarders) are more susceptible to be linked with financial services (e.g. banks and insurance) located in major centers rather than transport terminals.

The Spatial Dimension of Transportation Networks

1. The Topology and Typology of Networks

One of the key concepts in transport geography is related to **networks and their spatial structures**.

The term **network** refers to the framework of routes within a system of locations, identified as nodes. A **route** is a single link between two nodes that are part of a larger network that can refer to tangible routes such as roads and rails, or less tangible routes such as air and sea corridors.

Transportation networks, like many networks, are generally embodied as set of locations and a set of links representing connections between those locations. The arrangement and connectivity of a network is known as its **topology**. Each transport network has consequently a specific type of topology indicating its structure. The most fundamental elements of such a structure are network geometry and level of connectivity. Transport networks can be classified in specific categories depending on a set of topological attributes that describe them. It is thus possible to establish a basic **typology of transport networks** in three major categories:

- Locational attributes. Refer to the geographic setting of the network such as size, form, location and orientation. The number of nodes and links is also of importance, notably their location.
- Modal attributes. Refer to the modal characteristics of the network both in terms of the infrastructures and the vehicles using them. It includes attributes such as the type of traffic, its volume and direction.
- Structural attributes. Refer to structural characteristics such as patterns and dynamics represented by a network.

Further, three types of spaces on which transport networks are evolving are found. Each of these spaces represents a specific mode of territorial occupation:

- **Clearly defined and delimited**. In this case the space occupied by the transport infrastructure is strictly reserved for its usage and can be identified on a map. Ownership can also be clearly established. Major examples include road, canal and railway networks.
- **Vaguely defined and delimited**. The space of these networks may be shared with other modes and it is not the object of any particular ownership, only rights of passage. Examples include air and maritime transportation networks.
- **Without definition**. The space has no tangible meaning, except for the distance it imposes. Little control and ownership are possible, but agreements must be reached for common usage. Examples are radio, television and cellular networks, which rely on specific frequencies granted by governing agencies.

An optimal network would be a network servicing all the points of a territory and would be very expensive to build. Transport infrastructures are established over discontinuous networks. Therefore, operational networks are not servicing every parts of the territory directly. Some compromise must be found among a set of alternatives.

2. Networks and Space

Transportation networks illustrate the territorial organization of economic activities and the efforts incurred to overcome distance. These efforts can be measured in absolute or relative terms and are proportional to the efficiency and the structure of networks they represent. The relationships transportation networks establish with space are related to their **continuity**, their **topographic space** and the **spatial control** they establish. The territory is a topological space having two or three dimensions, depending on the transport mode considered. However, flows and infrastructures are linear; having one dimension. In order to have a **spatial continuity** of these flows, three conditions are necessary:

- **Ubiquity**. The possibility to reach any location from any other location.
- **Fractionalization**. The possibility for a traveler or a unit of freight to be transported without depending on a group.
- **Instantaneity**. The possibility to undertake transportation at the desired moment.

These three conditions are never perfectly met as **some transport modes fulfill them better than others**. For instance, the automobile is the most flexible mode of passenger transportation, but has important constraints such as low capacity and high levels of space and energy consumption. On the other end, public transit is more limited in the spatial coverage of its service, implies batch movements (bus loads, train loads, etc.) and follow specific schedules (limited instantaneity), but is more efficient. Freight transportation has also a variety of spatial continuity ranging from massive loads of raw materials (oil and ore) that can be handled only in a limited number of ports to highly flexible parcels movements. Containerization has been a remarkable attempt to address the issue of ubiquity (intermodal access), fractionalization (each container is a load unit) and instantaneity. An important cause of discontinuity is linked to the **spatial distribution of economic activities**, notably industrial and urban, which tend to agglomerate. Congestion may also alter those conditions. Road congestion in a metropolitan area may impair ubiquity as some locations may be very difficult to reach since their accessibility is reduced. Fractionalization may also be reduced as people would consider public transit and carpooling would thus move as batches. Further, as commuters cope with increasing congestion, several trips may be delayed or cancelled altogether reducing instantaneity.

The **topographic space** is obviously not a continuous space since the earth's surface has a variety of physical features, which have a level of influence on the structure of transport networks. Land transportation networks are notably influenced by the natural topographical conditions, as highways do not support a grade higher than 3% and railways up to 1%. Under such circumstances, they tend to be of higher density in topographical flat areas. Port sites are also highly influenced by the physical attributes of the site where several natural features (bays, sand dunes, and fjords) are protecting port installations. Since it is at these installations that traffic is transshipped, the location of ports are dominant elements in the structure of maritime networks. Climate is also an influence over transportation networks by modifying construction and maintenance costs and the transport supply.

Transportation networks have always been a **tool for spatial control** and occupation. Roman, Chinese and Persian empires relied on transportation networks to control their respective territories, mainly to collect taxes and move commodities and military forces. During the colonial era, maritime networks became a significant tool of trade, exploitation and political control, which was later on expanded by the development of modern transportation networks within colonies. In the 19th century, transportation networks also became a tool of nation building and strengthening. For instance, the extension of railways in the American hinterland had the purpose to organize the territory, extend settlements and distribute resources to new markets. In the 20th century, road and highways systems (such as the Interstate system in the United States and the autobahn in Germany) were built to reinforce this purpose. For the early 21st century, telecommunications have become a tool of **spatial cohesion and interactions**.

Transport Supply and Demand

1. Context

What are the differences between a Boeing 747, an oil tanker, a car and a bicycle? Extensive indeed, but they share the common goal of **fulfilling a derived transport demand** and they thus all fill the purpose of supporting mobility. Transportation is a service that must be utilized immediately and thus cannot be stored. Mobility must occur over transport infrastructures, providing a **transport supply**. In several instances, transport demand is answered in the simplest means possible, notably by walking. However, in some cases elaborate and expensive infrastructures and modes are required such as for international air transportation, which represents a remarkable technological achievement.

An economic system including numerous activities located in different areas generates movements that must be supported by the transport system. Without movements, infrastructures would be useless and without infrastructures, movements could not occur, or would not occur in a cost efficient manner. This interdependency can be considered according to two concepts, which are transport supply and demand.

Transport supply. Expresses the capacity of infrastructures and transport modes, generally over a geographically defined transport system and for a specific period of time. Therefore, supply is expressed in terms of infrastructures, services and networks. The number of passengers, volume (for liquids or containerized traffic), or mass (for freight) that can be transported per unit of time and space is used to quantify transport supply. For instance, the transport supply of a Boeing 747-400 flight between New York and London would be 426 passengers for 5 hours of transit time over 5,500 kilometers.

Transport demand. Expression of the transport needs of a territory, even if those needs are satisfied, fully, partially or not at all. Similar to transport supply, it is expressed in number of people, volume, or tons per unit of time and space. For instance, there could be a demand for a 450 passenger's flight between New York and London, even if the actual capacity of this flight would be of only 426 passengers (if a Boeing 747-400 is used). In this case the **realized demand** would be 426 passengers over 5,500 kilometers, that is about 2,3 million passenger-km, out of a **potential demand** of 450 passengers.

The demand for transportation is generated by the economy, which is composed persons, institutions and industries and which generates movements of people and freight. When these movements are expressed in space they create a pattern, which reflects mobility and accessibility. The location of resources, factories, distribution centers and markets is obviously related to freight movements.

The **ton-km** (or the ton-mile) is a common measure expressing the realized freight transport demand as it compares a transported quantity with a distance. 500 ton-km could represent anything between the movement of one ton over 500 kilometers or the movement of 500 tons over one kilometer. The **passenger-km** is a common measure expressing realized passenger transport demand.

Geographical considerations and transport costs account for significant variations in the composition of freight transport demand between countries. For the movements of passengers, the location of residential, commercial and industrial areas tells a lot about the generation and attraction of movements.

2. Supply and Demand Functions

Transport supply can be simplified by a set of functions representing what are the main variables influencing the capacity of transport systems. These variables are different for each mode. For road, rail and telecommunications, transport supply is often dependent on the **capacity of the routes and the vehicles**, while for air and maritime transportation transport supply is strongly influenced by the **capacity of the terminals**. For the transport of people and freight, supply is often expressed in number of vehicles, people or tons over a time period. Transport supply can also be expressed over a surface. It is important to underline that for roads, different modes are superposed and somewhat compete for the same infrastructure.

- The supply of one mode influences the supply of others. For instance transport supply for cars is inversely proportional to transport supply for trucks since they share the same road infrastructure.
- Transport supply is also dependent of the capacity of intermodal infrastructures. For instance, the maximum number of planes which can fly each day between Montreal and Toronto cannot be superior to the daily capacity of the airports of Montreal and Toronto, even though the Montreal - Toronto air corridor has potentially a very high capacity.

Transport demand tends to be expressed at specific times that are related to economic and social activity patterns. In many cases transport demand is **stable and recurrent**, which allows a good approximation in planning services. In other cases, transport demand is **unstable and uncertain**, which makes it difficult to offer an adequate level of service. For instance, commuting is a recurring and predictable pattern of movements, while emergency response vehicles such as ambulances are dealing with an unpredictable demand. Transport demand functions vary according to the nature of what is to be transported:

- **Passengers**. For the road and air transport of passengers, demand is a function of demographic attributes of the population such as income, age, standard of living, race and sex, as well as modal preferences.
- **Freight**. For freight transportation, the demand is function of the nature and the importance of economic activities (GDP, commercial surface, number of tons of ore extracted, etc.) and of modal preferences.
- **Information**. For telecommunications, the demand can be a function of several criteria including the population (telephone calls) and the volume of financial activities (stock exchange). The standard of living and education levels are also a factors to be considered.

3. Supply and Demand Relationships

Relationships between transport supply and demand continually change, but they are mutually interrelated. From a conventional economic perspective, transport supply and demand interact until an equilibrium is reached between the quantity of transportation the

market is willing to use at a given price and the quantity being supplied. However, several considerations are specific to the transport sector which complexify supply / demand relationships:

- **Entry costs**. Implies the costs incurred to operate at least one vehicle in a transport system. In some sectors, notably maritime, rail and air transportation, entry costs are very high, while in others such as trucking, they are very low. High entry costs imply that transport companies will consider seriously the demand before adding new modes or new infrastructures (or venturing in a new service). In a situation of low entry costs, the market sees companies coming in or dropping out with fluctuations in demand. Consequently, transport activities with high entry costs tend to be oligopolistic while transport activities with low entry costs tend to have many competitors.
- **Public sector**. Few other sectors of the economy have seen such a high level of public involvement than transportation. The provision of transport infrastructures, especially roads, was massively funded by governments, namely for the sake of national accessibility and equity. Transit systems are also heavily subsidized, namely to provide accessibility to urban populations. As a consequence, transport costs are often considered as partially subsidized. Government control (and direct ownership) was also significant for several modes, such as rail and air transportation in a number of countries. The last two decades were however been characterized by less governmental involvement and deregulation.
- Elasticity. Refers to the variation of demand in response to a variation of cost. For example, an elasticity of -0.5 for vehicle use with respect to vehicle operating costs means that an increase of 1% in operating costs would imply a 0.5% reduction in vehicle mileage or trips. Variations of transport costs have different consequences for different modes, but transport demand has a tendency to be inelastic. While commuting tends to be inelastic in terms of costs, it is elastic in terms of time. For economic sectors where freight costs are a small component of the total production costs, variations in transport costs have limited consequences on the demand. For air transportation, especially tourism, price variations in prices have significant impacts on the demand.

Generally, transport demand is variable in time and space whereas transport supply is fixed. When demand is lower than supply, transit times are stable, since the infrastructures are able to support the demand. When transport demand exceeds supply for a period in time, there is congestion with significant increases in transit times. A growth of the transport demand increases the load factor of a transport network until transport supply is reached. Speed and transit times drop afterwards. The same journey can thus have different durations during the day. This fact is linked with congestion (demand higher than supply).

Graph Theory: Definition and Properties

1. Basic Graph Definition

A graph is a **symbolic representation** of a network. It implies an abstraction of the reality so it can be simplified as a set of linked nodes.

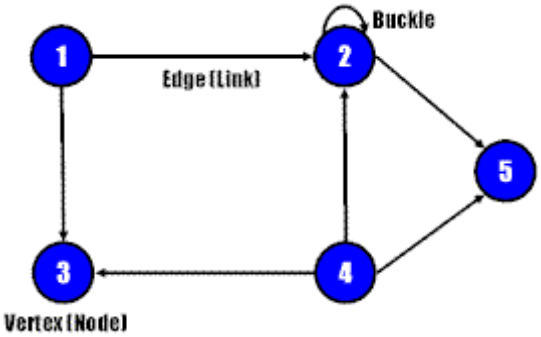
Graph theory is a branch of mathematics concerned about how networks can be encoded and their properties measured.

In transport geography most networks have a obvious spatial foundation, namely road, transit and rail networks, which tend to be defined more by their links than by their nodes. This it is not necessarily the case for all transportation networks. For instance, maritime and air networks tend to be more defined more by their nodes than by their links since links are often not clearly defined. A telecommunication system can also be represented as a network, while its spatial expression can have limited importance and would actually be difficult to represent. Mobile telephone networks or the Internet, possibly to most complex graph to be considered, are relevant cases of networks having a structure that can be difficult to grasp as a graph. However, cellular phones and antennas can be represented as nodes while the links could be individual phone calls. Servers, the core of the Internet, can also be represented as nodes within a graph while the physical infrastructure between them, namely fiber optic cables, can act as links. Consequently, all transport networks can be represented by graph theory in one way or the other.

Graph. A transportation network, like any network, can be represented as a graph. A graph *G* is a set of vertex (nodes) *v* connected by edges (links) *e*. Thus *G=(v , e)*.

Vertex (Node). A node *v* is a terminal point or an intersection point of a graph. It is the abstraction of a location such as a city, an administrative division, a road intersection or a transport terminal (stations, terminuses, harbors and airports).

Edge (Link). An edge *e* is a link between two nodes. The link (*i* , *j*) is of initial extremity *i* and of terminal extremity *j*. A link is the abstraction of a transport infrastructure supporting movements between nodes. It has a direction that is commonly represented as an arrow. When an arrow is not used, it is assumed the link is bi-directional.



This graph has the following definition:

G = (v,e)

v = (1,2,3,4,5)

e = (1,2), (1,3), (2,2), (2,5), (4,2), (4,3), (4,5)

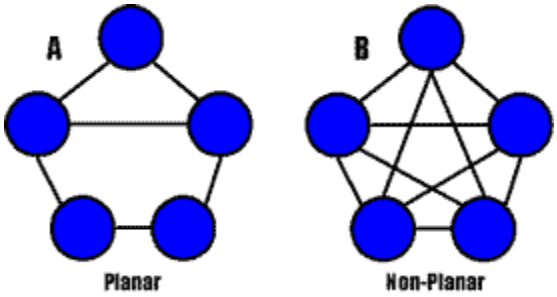
Sub-Graph. A sub-graph is a subset of a graph *G* where *p* is the number of sub-graphs. For instance *G'* = (*v'*, *e'*) can be a distinct sub-graph of *G*. In the previous graph *G*, *p=1*. If links (1,2) and (4,3) were removed, two sub-graphs would be created and *p* would equal 2. Unless the global transport system is considered in its whole, every transport network is in theory a sub-graph of another. For instance, the road transportation network of a city is a sub-graph of a

regional transportation network, which is itself a sub-graph of a national transportation network.

Buckle. A link that makes a node correspond to itself is a buckle. (2,2) is a buckle.

Planar Graph. A graph where all the intersections of two edges are a vertex. Since this graph is located within a plane, its topology is two-dimensional.

Non-planar Graph. A graph where there are no vertex at the intersection of at least two edges. This implies a third dimension in the topology of the graph since there is the possibility of having a movement "passing over" another movement. A non-planar graph has potentially much more links than a planar graph.

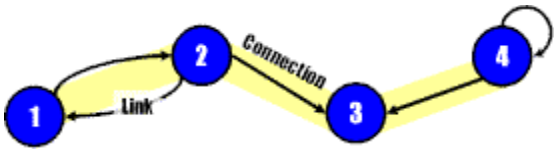


Graph A is planar since no linkage is overlapping with another. Graph B is non-planar since many links are overlapping and cannot be reconfigured in a manner that would make it planar.

2. Links and Attributes

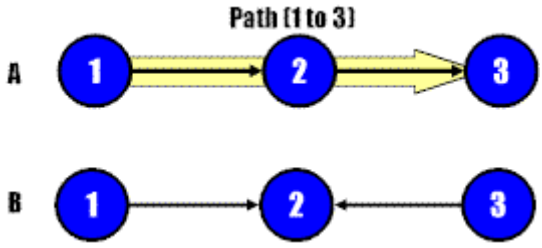
A transportation network enables flows of people, freight or information. Graph theory must thus offer the possibility of representing movements as linkages, which can be considered over several aspects:

Connection. A set of two nodes as every node is linked to the other. Takes accounts of if there is a possibility of movement between two nodes, whatever its direction. Knowing connections enables to establish if it is possible to reach a node within a graph.



On this graph, there are 5 links [(1,2), (2,1), (2,3), (4,3), (4,4)] and 3 connections [(1-2), (2-3), (3-4)].

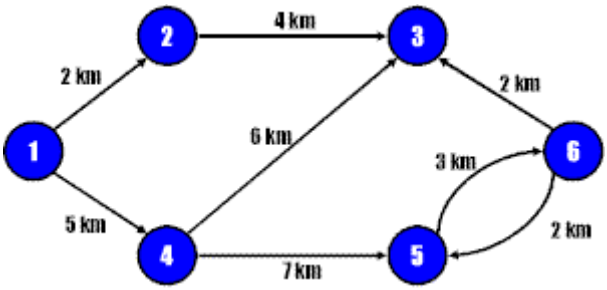
Path. A sequence of links that are traveled in the same direction. For a path to exist between two nodes, it must be possible to travel an uninterrupted sequence of links. Finding all the possible paths in a graph is a fundamental attribute in measuring accessibility and traffic flows in a network, and is at the core of all traffic assignment models.



On graph A, there is a path between 1 and 3, but on graph B there is no path between 1 and 3.

Chain. A sequence of links having a connection in common with the other. Direction does not matter. Both graph A and B are chains.

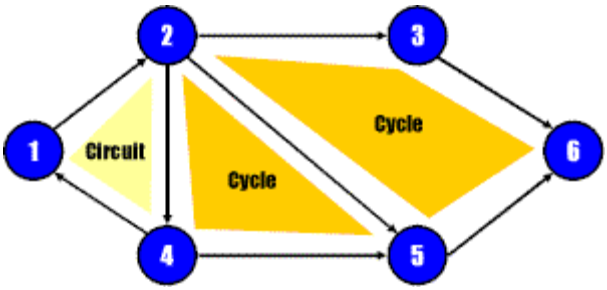
Length of a Link, Connection or Path. This refers to the label associated to a link, a connection or a path. This label can be a distance, the amount of traffic, the capacity or any attribute of that link. The length of a path is the number of links (or connections) in this path.



On this graph, the length of link (2,3) is 4 km and the length of the path between 1 and 6 (1-4-5-6; 3 segments) is 15 km.

Cycle. A chain where the initial and terminal node are the same and that does not use the same link more than once is a cycle.

Circuit. A path in where the initial and terminal node correspond. It is a cycle where all the links are traveled in the same direction. Cycles are very important in transportation because several distribution systems are using cycles to cover as much territory as possible in one direction.



On this graph, 2-3-6-5-2 is a cycle but not a circuit. 1-2-4-1 is a cycle and a circuit.

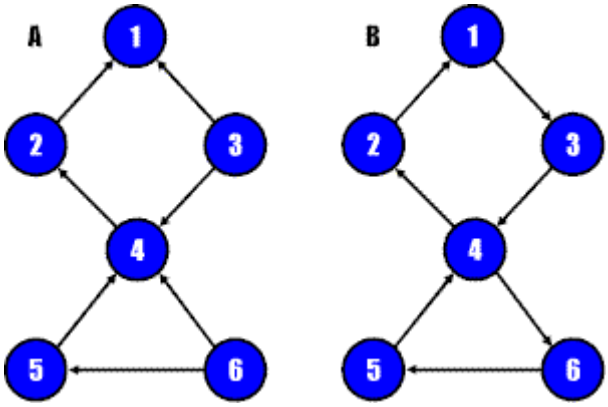
3. Basic Structural Properties

The organization of nodes and links in a graph convey a structure that can be labeled. The basic structural properties of a graph are:

Symmetry and Asymmetry. A graph is symmetrical if each pair of nodes linked in one direction is also linked in the other. By convention, a line without an arrow represents a link where it is possible to move in both directions. However, both directions have to be defined in the graph. Most transport systems are symmetrical but asymmetry can often occur as it is the case for maritime (pendulum) and air services. Asymmetry is rare on road transportation networks, outside one-way streets.

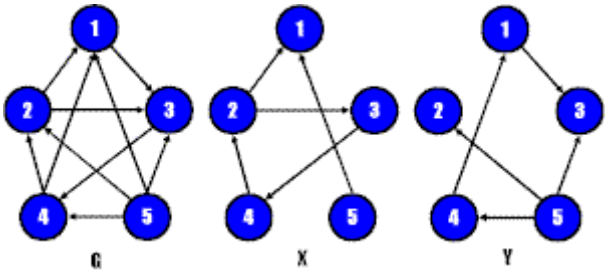
Completeness. A graph is complete if two nodes are linked in at least one direction. A complete graph has no sub-graph.

Connectivity. A complete graph is described as connected if for all its distinct pairs of nodes there exists a linking chain. Direction does not have importance for a graph to be connected, but may be a factor for the *level* of connectivity. If $p>1$ the graph is not connected because it has more than one sub-graph. There exists various degrees of connectivity, depending on the degree at which each pair of nodes is connected.

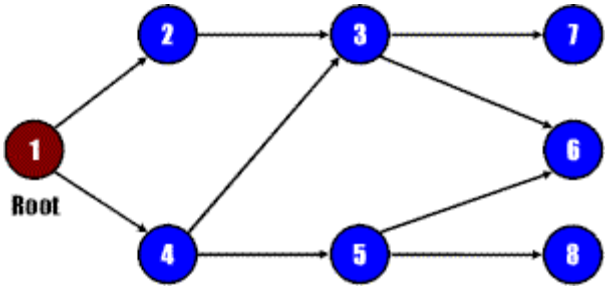


On this figure, the two graphs are connected, but graph B is more connected than graph A since it has two circuits compared with only one for graph A.

Complementarity For a graph G constructed from the graph X, the complementary graph for G is the graph Y if the union of X and Y is equal to G. Complementarity is a distinct attribute of multimodal transportation networks as each sub-graph benefits from the connectivity of other sub-graphs.

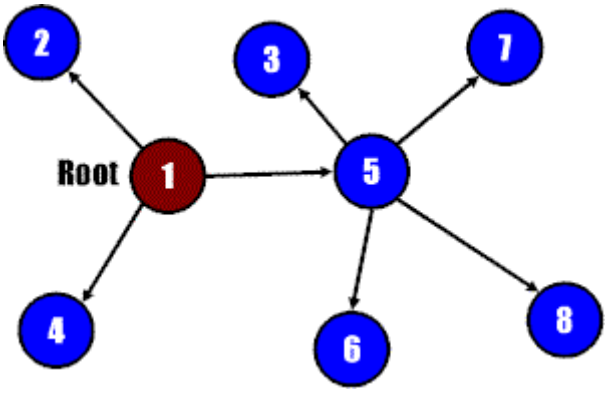


Root. A node *r* where every other node is the extremity of a path coming from *r* is a root. Direction has an importance. A root is generally the starting point of a distribution system, such as a factory or a warehouse.



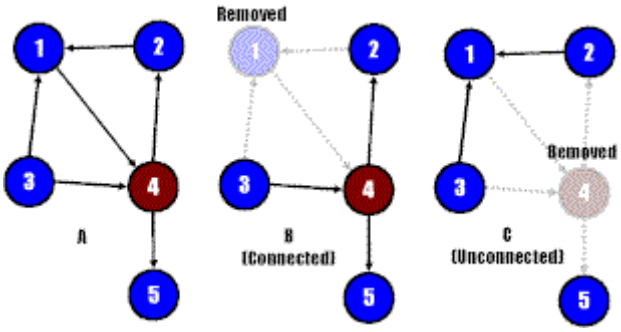
Node 1 is the only root of this graph because every other node is part of a path originating from node 1.

Trees. A connected graph without a cycle is a tree. A tree has the same number of links than nodes plus one. ($e = v-1$). If we remove a link, it ceases to be connected. If we provide a new link between two nodes, a cycle is created. A branch of root *r* is a tree where no link are connecting any node more than once.



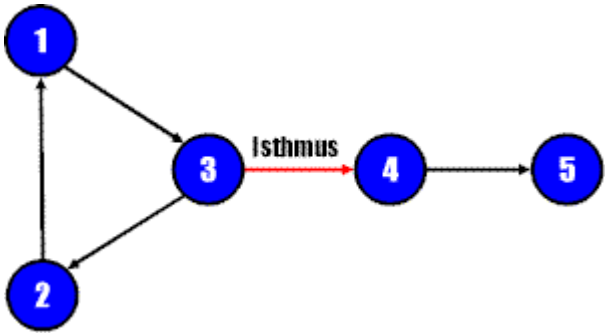
This graph is a tree having node 1 as a root.

Articulation Node. In a connected graph, a node is an articulation node if a sub-graph obtained by removing this node is no longer connected. It therefore contains more than one sub-graph ($p > 1$). An articulation node is generally a port or an airport, or an important hub of a transportation network, which serves as a bottleneck.



By removing node 1 from graph A, we obtain graph B, which is connected. 1 is thus not an articulation node. If we remove node 4 from graph A, the result is an un-connected graph C where *p*=2. Node 4 is thus the only articulation node of graph A.

Isthmus. In a connected graph, an isthmus is a link that is creating, when removed, two sub-graphs having at least a connection.



On this graph, the (3,4) link is an isthmus.

Transportation Modes: An Overview

1. Transportation Modes

Transport modes are the vehicles supporting the mobility of passengers, freight and information and the infrastructures supporting their movements. Each mode is characterized by a set of technical and operational attributes:

• **Road transportation**. Road infrastructures are large consumers of space with the lowest level of physical constraints among transportation modes. However, environmental constrains are significant in road construction. Road transportation has an average operational flexibility as vehicles can serve several purposes but a rarely able to move outside roads. Road transport systems have high maintenance costs, both for the vehicles and infrastructures. They are mainly linked to light industries where rapid movements of freight in small batches are the norm.
• **Rail transportation**. Railways are composed of a traced path on which are bound vehicles. They have an average level of physical constrains linked to the types of locomotives and affected by the gradient. Heavy industries are traditionally linked with rail transport systems, although containerization has improved the flexibility of rail transportation by linking it with road and maritime modes.

- **Maritime transportation**. Main maritime routes are composed of oceans, coasts, seas, lakes, rivers and channels. However, maritime circulation takes place on specific parts of the maritime space. The Atlantic Ocean is very important since it accounts for 78% of the global trade, 68% of its value and for 75% of the maritime trade. The construction of channels, locks and dredging are attempts to facilitate maritime circulation by reducing discontinuity. Comprehensive inland waterway systems include Western Europe, the Volga / Don System, St. Lawrence / Great Lakes system, the Mississippi and its tributaries, the Amazon, the Panama / Paraguay and the interior China. Maritime transportation has high terminal costs, since port infrastructures are among the most expensive to build, maintain and improve. High inventory costs also characterize maritime transportation. More than any other mode, maritime transportation is linked to heavy industries, such as steel and petrochemical facilities adjacent to port sites.
- **Air transportation**. Air routes are practically unlimited, but they are denser over the North Atlantic, inside North America and Europe and over the North Pacific. Air transport constraints are multidimensional and include the site (a commercial plane needs about 3,300 meters of track for landing and take off), the climate, and fog and aerial currents. Air activities are linked to the tertiary and quaternary sectors, notably finance and tourism that require movements of people. More recently, air transportation has been accommodating growing quantities of high value freight.
- **Pipelines**. Pipeline routes are practically unlimited. The longest gas pipeline links Alberta to Sarnia (Canada), which is 2,911 km in length. The longest oil pipeline is the Transiberian, extending over 9,344 km to Western Europe from the Russian arctic oilfields in eastern Siberia. Physical constraints are low and include the landscape and pergelisol in arctic / subarctic environments. Pipeline construction costs vary according to the diameter and increase proportionally with the distance and with the viscosity of fluids (from gas to oil). The Trans Alaskan pipeline, which is 1,300 km long, was built under difficult conditions and has to be above the ground for most of its path. Pipeline terminals are very important since they correspond to refineries and harbors.
- **Telecommunications**. Telecommunication routes are practically unlimited with very low constraints, which may include the physiography and oceanic masses that may impair the setting of cables. They provide for the instantaneous movement of information (speed of light). Wave transmissions, because of their limited coverage, often require substations, such as for cellular phone networks. Satellites are often using a geostationary orbit which is getting crowded. High network costs and low distribution costs characterize many telecommunication networks, which are linked to the tertiary and quaternary sectors (stock markets, business to business information networks, etc). Telecommunications limit the requirement for personal movements in some economic sectors.

2. Modal Competition

A general analysis of transport modes reveals that all modes have their specificities. However, contemporary demand is influenced by **integrated transportation systems** that requires maximum flexibility. As a result, modal competition exists at various degrees and takes several dimensions. **Modes can compete or complement each other** in terms of cost, speed, accessibility, frequency, safety, comfort, etc. Although intermodal transportation has opened many opportunities for complementarity between modes, there is intense competition as

companies are now competing over many modes in the transport chain. Modal competition thus occurs over three dimensions:

- **Modal usage**. Competition that involves the comparative advantage of using a specific or a combination of modes. Distance remains one of the basic determinant of modal usage for passenger's transportation.
- **Infrastructure usage**. Competition resulting from the presence of freight and passenger traffic on the same itineraries linking the same nodes.
- **Market area**. Competition being experienced between transport terminals for allocating new space or capturing new markets.

As transport demand is a **derived demand** from individuals, groups and industries it can be desegregated into series of partial demands fulfilled by the adaptation and evolution of transport techniques, vehicles and infrastructures to changing needs. Moreover, the growing complexity of economies and societies linked with technological changes force the transport industry to constant changes. This lead to growing congestion, a reduction in transport safety, an acceleration in the degradation of transport infrastructures and growing concerns on environmental impacts.

The technological evolution in the transport industry aims at adapting the transport infrastructures to growing needs and requirements. In many cases, this involved a **transition in modal preferences** as incomes went up, such as from collective to individual modes of transportation. For freight, this has implied a shift to faster and more flexible modes when possible and cost effective, namely trucking and air freight.

The **geographical distribution of transport infrastructures and networks varies enormously**. Some regions are characterized by the coexistence of several transport modes, while in other regions, only one mode can provide transport service. The evolution of transportation concerns both the infrastructure and the vehicle. The technological changes in the transport sector has permitted to **increase the performance** of existing transport modes and the **creation of new forms of transportation**, such as intermodal transportation The history of transportation reveals that all modes of transport have surmounted many constraints of the natural environment.

Maritime Transportation

1. Maritime and Fluvial Networks

From its modest origins as Egyptian coastal sail ships around 3,200 BC, maritime transportation has always been the dominant support of global trade. With the development of the steam engine in the mid 19th century, this role expanded considerably as ships were no longer subject to dominant wind patterns. This long term attribute has been reinforced by recent trends where changes in international trade and seaborne trade are interrelated. Maritime transportation, like all transportation, is a derived demand. Indeed, 25,000 billion tons-km of freight are on average transported annually by maritime transportation compared to 7,000 by rail and 3,000 by road. This represents 71% of all freight shipped globally, a figure

similar to the share of the world's surface covered by oceans. In terms of weight, about 96% of the world trade is carried by maritime transportation.

Maritime transport, similar to land and air modes, operates on its own space, which is at the same time **geographical** by its physical attributes, **strategic** by its control and **commercial** by its usage. While geographical considerations tend to be constant in time, strategic and especially commercial considerations are much more dynamic. The physiography of maritime transportation is composed of two major elements, which are rivers and oceans. Although they are connected, each represents a specific domain of maritime circulation. The notion of maritime transportation rests on the existence of **regular itineraries**, better known as maritime routes.

Maritime routes are spaces of a few kilometers in width trying to avoid the discontinuities of land transport by linking ports, the main elements of the maritime / land interface. They are a function of obligatory points of passage, which are strategic places, of physical constraints (coasts, winds, marine currents, depth, reefs, ice) and of political borders.

As a result, maritime routes are corridors of only a few kilometers in width that draw arcs on the earth water surface as intercontinental maritime transportation follows the great circle distance. The most recent technological transformations affecting water transport have concentrated on modifying water canals (such as dredging port channels to higher depths), and on increasing the size, the automation and the specialization of vessels (e.g. container ships, tanker, bulk carrier). These transformations partially explain the development of maritime traffic that has been adapting to increasing energy demand (mainly fossil fuels), the movements of raw materials and the location of major grain markets. This massification of transport into regular flows over long distances is not without consequences when accidents affecting oil tankers can lead to major ecological disasters (e.g. Amoco Cadiz, Exxon Valdez). Despite regular services on selected fluvial arteries, the potential of waterways for passenger transport remains limited to fluvial tourism.

The majority of maritime circulation takes place along coastlines and three continents have limited fluvial trade; Africa, Australia and Asia (except China). There are however significant fluvial waterway systems in North America, Europe and China over which significant fluvial circulation takes place. Most major maritime infrastructures involve maintaining or modifying waterways to establish more direct routes (navigation channels and canals). This strategy is however very expensive and undertaken only when necessary. Significant investments have been made in expanding transshipment capacities of ports, which is also very expensive as ports are heavy consumers of space.

The importance of maritime routes has changed with economic development and technical improvements. For instance, containerization changed the configuration of freight routes with innovative services, such as "round-the-world" routes. Pendulum routes, which tend to be highly flexible in terms of which ports are serviced, have however emerged as the favorite form of containerized maritime circulation. A recent trend has also been the integration and specialization of several routes with feeder ships converging at major maritime hubs. For instance, fluvial-maritime ships enable to go directly from the fluvial to the oceanic maritime network. This is notably the case for Europe (Mediterranean, North Sea and the Baltic).

Not every territory has a direct access to the ocean. Maritime enclaves are such countries that have difficulties to undertake maritime trade since they are not part of an oceanic domain of maritime circulation. This requires agreements with neighboring countries to have access to a port facility through a road, a rail line or through a river. However, being an enclave does not necessarily imply an exclusion from international trade.

2. Maritime Traffic

About 85,000 ships of more than 100 tons are in operation around the world, half of them performing transport functions and the other half performing service functions (e.g. tugs). The last century has seen a growth of the number of ships as well as their average size. Maritime traffic is dominantly focused on freight. Before the era of intercontinental air transportation, transcontinental passenger services were assumed by liner passenger ships, dominantly over the North Atlantic. The dominant segment of oceanic maritime traffic concerns freight, as passengers are now a marginal leisure function solely serviced by cruise shipping. Several oceanic ferry services are also in operation over short distances, namely in Western Europe (Channel; Baltic Sea), Japan and Southeast Asia (Indonesia). The systematic growth of maritime freight traffic has been fueled by:

- **Increase in energy and mineral cargoes** derived from a growing demand from developed economies of North America, Europe and Japan. For instance, coal is mainly used for energy generation and steel-making. Many developing countries, such as China, are also increasingly involved in importing raw materials.
- **Globalization** that went on par with an international division of the production and trade liberalization.
- **Technical improvements** in ship and maritime terminals have facilitated the flows of freight.
- **Economies of scale** permitted maritime transportation to remain a low cost mode, a trend which has been strengthened by containerization.

Maritime traffic is commonly measured in **deadweight tons**, which refers to the amount of cargo that can be loaded on an "empty" ship, without exceeding its operational design limit. This limit is often identified as a load line, which is the maximal draft of the ship. Maritime freight is conventionally considered in two categories:

Bulk cargo. Refers to freight, both dry and liquid, that is not packaged such as minerals (oil, coal, and iron ore) and grains. It often requires the use of specialized ships such as oil tankers as well as specialized transshipment and storage facilities. Conventionally, this cargo has a single origin, destination and client. It is also prone to economies of scale.

Break-bulk cargo. Refers to general cargo that has been packaged in some way with the use of bags, boxes or drums. This cargo tends to have numerous origins, destinations and clients. Before containerization, economies of scale were difficult to achieve with break-bulk cargo.

Maritime shipping is dominated by bulk cargo, which roughly accounted for 72.6% of all the ton-miles shipped in 2000, but the share of break-bulk cargo is increasing steadily, mainly because of containerization. However, technical improvements tend to blur the distinction between bulk and break-bulk cargo, as both can be **unitized** on pallets and increasingly in

containers. For instance, it is possible, and increasingly common, to ship grain and oil, both bulk cargoes, in a container (a specialized tank container for oil). Consequently, the amount of containerized freight has grown substantially, from 23% of all cargo in 1980 to 50% in 1995.

Geographically, maritime traffic has evolved considerably over the last decades especially through growth in transpacific trade. By establishing commercial linkages between continents, maritime transport supports a considerable traffic that covers 90% of the intercontinental transport demand of freight. The strength of maritime transport does not rests on its speed, but on its capacity and on the continuity of its traffic. Railway and road transportation are simply not able to support a traffic at such a geographical scale and intensity. Heavy industrial activities that use bulk raw materials are generally adjacent to port sites, benefiting from load breaks. The average haul length was about 4,200 miles.

Maritime transport has seen several major technical innovations aiming at improving the performance of ships or their access to port facilities, notably in the 20th century. They include:

- **Size**. Size if a common denominator for ships is it expresses type as well as capacity. Each time the size of a ship is doubled, its capacity is cubed. Although the minimum size for cost effective bulk handling is estimated to be around 1,000 deadweight tons, economies of scale have pushed for larger ship sizes to service transportation demand. For ship owners, the rationale for larger ships imply reduced crew, fuel, berthing, insurance and maintenance costs. The largest tankers (ULCC) are around 500,000 dwt (dominant size between 250,000 and 350,000 dwt), while the largest dry bulk carriers are around 350,000 dwt (dominant size between 100,000 and 150,000 dwt). The only remaining constraints in ship size are now the capacity of ports, harbors and canals.
- **Speed**. The average speed of ships is about 15 knots (1 knot = 1 marine mile = 1,853 meters), which is 28 km per hour. Under such circumstances, a ship would travel about 575 km per day. More recent ships can travel at speeds between 25 to 30 knots (45 to 55 km per hour). To cope with speed requirements, the propulsion and engine technology has improved from sailing to steam, to diesel, to gas turbines and to nuclear (only for military ships; civilian attempts were abandoned in the early 1980s). Since the invention of the helix, propulsion has improved considerably, notably by the usage of double helixes, but peaks were reached by the 1970s. Reaching higher maritime speeds remains a challenge which is excessively costly to overcome. As a result, limited improvements in commercial maritime speeds are foreseen.
- **Specialization of ships**. Economies of scales are often linked with specialization. Both processes have considerably modified maritime transportation. In time, ships became increasingly specialized to include general cargo ships, tankers, grain carriers, barges, mineral carriers, bulk carriers, methane carriers, RO-RO ships (roll-on roll off; for vehicles) and container ships.
- **Ship design**. Ship design has significantly improved from wood hulls, to wood hulls with steel armatures, to steel hulls (the first were warships) and to steel, aluminum and composite materials hulls. The hulls of today's ships are the result of considerable efforts to minimize energy consumption, construction costs and improve safety. Depending on its complexity, a ship can take between 4 months (container and crude carriers) and 1 year to build (cruise ship).

• **Automation**. Different automation technologies are possible including self-unloading ships, computer assisted navigation (crew needs are reduced and safety is increased) and global positioning systems. The general outcome of automation has been smaller crews being required to operate larger ships.

3. The Spatial Economy of Maritime Transportation

The main advantage of maritime transportation is obviously its **economies of scale**, making it the cheapest per unit of all transport modes, which fits well for heavy industrial activities. On the other hand, maritime transportation has one of the **highest entry costs** of the transport sector. Typically, a ship has an economic life between 15 and 20 years and thus represents a significant investment that must be amortized. The operation of the maritime transport system requires financing that can come from two sources:

• **Public**. The public sector is commonly responsible for guidance infrastructures (beacons and charts), public piers, dredging and security and in several cases of the administration of ports (under the umbrella of port authorities).
• **Private**. The private sector is mostly concerned about specific facilities such as piers, transshipment infrastructures and ships, which are commonly owned by private maritime companies.

The maritime shipping industry offers two major types of services:

• **Charter services** (also known as Tramp). In this form of service a maritime company rents a ship for a specific purpose, commonly between a specific port of origin and destination. This type of shipping service is notably used in the case of bulk cargo, mainly petroleum, iron ore, grain or coal, often requiring specialized cargo ships.
• **Tramp Shipping**. Irregular **shipping**, mainly over nonstandard routes, with no definite schedule. **Tramp ships are** used to **transport** bulk cargoes and break-bulk cargoes of low value that **do** not require fast delivery. ... Specialized types of dry-cargo, liquid-cargo, and mixed-cargo **ships are** also used in **tramp shipping**.
• **Liner shipping services**. Involves a regular scheduled shipping service often calling several ports along a pendulum route. To insure reliability, frequency and a specific level of service, many ships can be allocated to a single route. These maritime shipping services are available to any freight importer of exporter, implying that the cargo being carried on any given ship belongs to different interests. A growing share of liner services is containerized. **Liner shipping** is the service of transporting goods by means of high-capacity, ocean-going ships that transit regular routes on fixed schedules. ... **Liner** vessels, primarily in the form of containerships and roll-on/roll-off ships, carry about 60 percent of the goods by value moved internationally by sea each year.

Shipping conferences refers to **shipping** companies that have formed an association to agree on and set freight rates and passenger fares over different **shipping** routes. There are different **shipping conferences** for different regions of the world. **Liner conference**. Agreement between two or more shipping companies to provide scheduled cargo and/or passenger service on a particular trade route under uniform rates and common terms. A Liner **Conference System** (also called a "**shipping conference**") is an agreement within the **shipping**

industry in relation to ocean liners. ... However, the Encyclopedia Britannica site states that overall the advantages to the public of Liner **Conferences** outweigh their disadvantages.

In the past, governments have intervened, often massively, in the maritime sector to fulfill different goals such as economic development, national defense, prestige, balance of payments, and the protection of the national industry. To reach those goals, governments relied on methods such as regulations, subsidies, national fleets, preference of cargo and ports of entry. **Cabotage regulations** has been one of the privileged measure to protect the national maritime transportation industry.

Cabotage. Transport between two terminals (a terminal of loading/embankment and a terminal of unloading/ dismemberment) located in the same country irrespective of the country in which the mode providing the service is registered. Cabotage is often subject to restrictions and regulations. Under such circumstances, each nation reserves for its national carriers the right to move domestic freight or passenger's traffic.

Many cabotage laws were implemented, such as the Passenger Services Act of 1886, which placed cabotage restrictions on ocean borne passenger travel in the United States. In the same line, the Merchant Marine (Jones) Act of 1920 implemented cabotage regulations for freight. Since many container shipping services have a pendulum structure, cabotage imposes some restrictions on these services. The maritime industry is now more deregulated than before because of technical changes, mainly containerization, and open registry ships operating under fiscal shelters (flags of convenience). By 1998, about 46% of the ships and about 62% of the global tonnage was registered under a flag of convenience.

Geographically, maritime activities can be divided in two major categories:

- **Interior Waterways**. Fluvial transportation is well suited to transport bulk cargo, has low costs and is the most environmentally friendly. It plays an important role for several industrial countries with large waterway systems such as the Volga, the St. Lawrence / Great Lakes, the Mississippi, and the Rhine. Most waterways are solely justified by bulk cargo requirements. However accelerated integration of large industrial regions to maritime shipping because of fluvial-maritime ships can be noted. A growth and diversification of activities on the Chinese waterways has also been a dominant trend as China integrated the global economy and as the growth of its domestic economy resulted in a growth of freight shipped on its fluvial network.
- **Transcontinental Waterways**. Seaborne trade has experienced very strong growth, especially over the Pacific. This is notably linked to the dependence of developed countries for energy, minerals and agricultural products. There is an increased importance of large maritime companies as well as a division of labor and capital in the maritime industry. Markets, technology and capital are provided by developed countries and labor by developing countries.

Chapter Four: Shipping and Related Subjects

Marine Insurance

Marine insurance covers the loss or damage of ships, cargo, terminals, and any transport by which the property is transferred, acquired, or held between the points of origin and the final destination. Cargo insurance is the sub-branch of marine insurance, though Marine insurance also includes Onshore and Offshore exposed property, (container terminals, ports, oil platforms, pipelines), Hull, Marine Casualty, and Marine Liability. When goods are transported by mail or courier, shipping insurance is used instead.

History

Marine insurance was the earliest well-developed kind of insurance, with origins in the Greek and Roman marine loan. it was the oldest risk hedging instruments our ancestors used to mitigate risk in medieval times were sea/marine (Mutuum) loans, commenda contract, and bill of exchanges. Separate marine insurance contracts were developed in Genoa and other Italian cities in the fourteenth century and spread to northern Europe. Premiums varied with intuitive estimates of the variable risk from seasons and pirates. Modern marine insurance law originated in the Lex mercatoria (law merchant). In 1601, a specialized chamber of assurance separate from the other Courts was established in England. By the end of the seventeenth century, London's growing importance as a center for trade was increasing demand for marine insurance. In the late 1680s, Edward Lloyd opened a coffee house on Tower Street in London. It soon became a popular haunt for ship owners, merchants, and ships' captains, and thereby a reliable source of the latest shipping news.

Lloyd's Coffee House was the first marine insurance market. It became the meeting place for parties in the shipping industry wishing to insure cargoes and ships, and those willing to underwrite such ventures. These informal beginnings led to the establishment of the insurance market Lloyd's of London and several related shipping and insurance businesses. The participating members of the insurance arrangement eventually formed a committee and moved to the Royal Exchange on Cornhill as the Society of Lloyd's. The establishment of insurance companies, a developing infrastructure of specialists (such as shipbrokers, admiralty lawyers, bankers, surveyors, loss adjusters, general average adjusters, *et al.*), and the growth of the British Empire gave English law a prominence in this area which it largely maintains and forms the basis of almost all modern practice. Lord Mansfield, Lord Chief Justice in the mid-eighteenth century, began the merging of law merchant and common law principles. The growth of the London insurance market led to the standardization of policies and judicial precedent further developed marine insurance law. In 1906 the Marine Insurance Act codified the previous common law; it is both an extremely though and concise piece of work. Although the title of the Act refers to marine insurance, the general principles have been applied to all non-life insurance. In the 19th century, Lloyd's and the Institute of London Underwriters (a grouping of London company insurers) developed between them standardized clauses for the use of marine insurance, and these have been maintained since. These are known as the Institute Clauses because the Institute covered the cost of their publication. Out of marine insurance, grew non-marine insurance and reinsurance. Marine insurance traditionally formed the majority of business underwritten at Lloyd's. Nowadays, Marine insurance is often grouped with Aviation and Transit (cargo) risks, and in this form is known by the acronym 'MAT'.

It is common for marine insurance agencies to compete with the offerings provided by local insurers. These specialist agencies often fill market gaps by providing cover for hard-to-place or obscure marine insurance risks that would otherwise be difficult or impossible to find insurance cover for. These agencies can become quite large and eventually become market makers. They operate best when their day to day management is independent of the insurers who provide them with the capital to underwrite risks on their behalf.

Practice

The Marine Insurance Act includes, as a schedule, a standard policy (known as the "SG form"), which parties were at liberty to use if they wished. Because each term in the policy had been tested through at least two centuries of judicial precedent, the policy was extremely thorough. However, it was also expressed in rather archaic terms. In 1991, the London market produced a new standard policy wording known as the MAR 91 form using the Institute Clauses. The MAR form is simply a general statement of insurance; the Institute Clauses are used to set out the detail of the insurance cover. In practice, the policy document usually consists of the MAR form used as a cover, with the Clauses stapled to the inside. Typically, each clause will be stamped, with the stamp overlapping both onto the inside cover and to other clauses; this practice is used to avoid the substitution or removal of clauses. Because marine insurance is typically underwritten on a subscription basis, the MAR form begins: *We, the Underwriters, agree to bind ourselves each for his own part and not one for another [...]*. In legal terms, liability under the policy is **several** and not **joint**, i.e., the underwriters are all liable together, but only for their share or proportion of the risk. If one underwriter should default, the remainder are not liable to pick his share of the claim. Typically, marine insurance is split between the vessels and the cargo. Insurance of the vessels is generally known as "Hull and Machinery" (H&M). A more restricted form of cover is "Total Loss Only" (TLO), generally used as a reinsurance, which only covers the total loss of the vessel and not any partial loss. Cover may be on either a "voyage" or "time" basis. The "voyage" basis covers transit between the ports set out in the policy; the "time" basis covers a period, typically one year, and is more common.

Protection and indemnity

A marine policy typically covered only three-quarter of the insured's liabilities towards third parties (Institute Time Clauses Hulls 1.10.83). The typical liabilities arise in respect of collision with another ship, known as "running down" (collision with a fixed object is an "allision"), and wreck removal (a wreck may serve to block a harbor, for example). In the 19th century, ship-owners banded together in mutual underwriting clubs known as Protection and Indemnity Clubs (P&I), to insure the remaining one-quarter liability amongst themselves. These Clubs are still in existence today and have become the model for other specialized and noncommercial marine and non-marine mutuals, for example in relation to oil pollution and nuclear risks. Clubs work on the basis of agreeing to accept a ship-owner as a member and levying an initial "call" (premium). With the fund accumulated, reinsurance will be purchased; however, if the loss experience is unfavorable one or more "supplementary calls" may be made. Clubs also typically try to build up reserves, but this puts them at odds with their mutual status. Because liability regimes vary throughout the world, insurers are usually careful to limit or exclude American Jones Act liability.

Actual total loss and constructive total loss

These two terms are used to differentiate the degree of proof that a vessel or cargo has been lost. An **actual total loss** occurs when the damages or cost of repair clearly equal or exceed the value of the property. A **constructive total loss** is a situation in which the cost of repairs plus the cost of salvage equal or exceed the value. The use of these terms is contingent on there being property remaining to assess damages, which is not always possible in losses to ships at sea or in total theft situations. In this respect, marine insurance differs from non-marine insurance, with which the insured is required to prove his loss. Traditionally, in law, marine insurance was seen as an insurance of "the adventure", with insurers having a stake and an interest in the vessel and/or the cargo rather than simply an interest in the financial consequences of the subject-matter's survival.

The term "constructive total loss" was also used by the United States Navy during World War II to describe naval vessels that were damaged to such an extent that they were beyond economical repair. This was most often applied to destroyer-type ships in 1945, the last year of the war, many which were damaged by kamikazes. By this time enough ships were available for the war that some could be disposed of if severely damaged.

General averages

Actual total loss and constructive total loss

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Average – is the situation in which the insured has under-insured, i.e., insured an item for less than it is worth. Average will apply to reduce the claim amount payable. An *average adjuster* is a marine claims specialist responsible for adjusting and providing the general average statement. An Average Adjuster in North America is a 'member of the association of Average Adjusters' To insure the fairness of the adjustment a General Average adjuster is appointed by the ship-owners and paid by the insurer.

Excess, deductible, retention, co-insurance, and franchise

An excess is the amount payable by the insured and is usually expressed as the first amount falling due, up to a ceiling, in the event of a loss. An excess may or may not be applied. It may be expressed in either monetary or percentage terms. An excess is typically used to

discourage moral hazard and to remove small claims, which are disproportionately expensive to handle. The term "excess" signifies the "deductible" or "retention".

A co-insurance, which typically governs non-proportional treaty reinsurance, is an excess expressed as a proportion of a claim in percentage terms and applied to the entirety of a claim. Co-insurance is a penalty imposed on the insured by the insurance carrier for under reporting/declaring/insuring the value of tangible property or business income. The penalty is based on a percentage stated within the policy and the amount under reported. As an example: a vessel actually valued at $1,000,000 has an 80% co-insurance clause but is insured for only $750,000. Since its insured value is less than 80% of its actual value, when it suffers a loss, the insurance payout will be subject to the under-reporting penalty, the insured will receive 750000/1000000th (75%) of the claim made less the deductible.

Tonners and chinamen

These are both obsolete forms of early reinsurance. Both are technically unlawful, as not having insurable interest, and so were unenforceable in law. Policies were typically marked P.P.I. (Policy is Proof of Interest). Their use continued into the 1970s before they were banned by Lloyd's, the main market, by which time they had become nothing more than crude bets. A "tonner" was simply a "policy" setting out the global gross tonnage loss for a year. If that loss was reached or exceeded, the policy paid out. A "chinaman" applied the same principle but in reverse: thus, if the limit was not reached, the policy paid out.

Specialist policies

Various specialist policies exist, including:

- **Newbuilding risks:** This covers the risk of damage to the hull while it is under construction.
- **Open Cargo** or **Shipper's Interest Insurance**: This policy may be purchased by a carrier, freight broker, or shipper, as coverage for the shipper's goods. In the event of loss or damage, this type of insurance will pay for the true value of the shipment, rather than only the legal amount that the carrier is liable for.
- **Yacht Insurance:** Insurance of pleasure craft is generally known as "yacht insurance" and includes liability coverage. Smaller vessels such as yachts and fishing vessels are typically underwritten on a "binding authority" or "line slip" basis.
- **War risks:** General Hull insurance does not cover the risks of a vessel sailing into a war zone. A typical example is the risk to a tanker sailing in the Persian Gulf during the Gulf War. The war risks areas are established by the London-based Joint War Committee, which has recently (when?) moved to include the Malacca Straits as a war risks area due to piracy. If an attack is classified as a "riot" then it would be covered by war-risk insurers.
- **Increased Value (IV):** Increased Value cover protects the ship-owners against any difference between the insured value of the vessel and the market value of the vessel.
- **Overdue insurance:** This is a form of insurance now largely obsolete due to advances in communications. It was an early form of reinsurance and was bought by an insurer when a ship was late at arriving at her destination port and there was a risk that she might have been lost (but, equally, might simply have been delayed). The overdue insurance of the *Titanic* was famously underwritten on the doorstep of Lloyd's.

• **Cargo insurance:** Cargo insurance is underwritten on the Institute Cargo Clauses, with coverage on an **A**, **B**, or **C** basis, "**A**" having the widest cover and **"C"** the most restricted. Valuable cargo is known as specie. Institute Clauses also exist for the insurance of specific types of cargo, such as frozen food, frozen meat, and particular commodities such as bulk oil, coal, and jute. Often these insurance conditions are developed for a specific group as is the case with the Institute Federation of Oils, Seeds and Fats Associations (FOFSA) Trades Clauses which have been agreed with the Federation of Oils, Seeds and Fats Associations and Institute Commodity Trades Clauses which are used for the insurance of shipments of cocoa, coffee, cotton, fats and oils, hides and skins, metals, oil seeds, refined sugar, and tea and have been agreed with the Federation of Commodity Associations

Warranties and conditions

A peculiarity of marine insurance, and insurance law generally, is the use of the terms **condition** and **warranty**. In English law, a condition typically describes a part of the contract that is fundamental to the performance of that contract, and, if breached, the non-breaching party is entitled not only to claim damages but to terminate the contract on the basis that it has been repudiated by the party in breach.

By contrast, a warranty is not fundamental to the performance of the contract and breach of a warranty, while giving rise to a claim for damages, does not entitle the non-breaching party to terminate the contract. The meaning of these terms is reversed in insurance law. Indeed, a warranty if not strictly complied with will automatically discharge the insurer from further liability under the contract of insurance. The assured has no defense to his breach, unless he can prove that the insurer, by his conduct, has waived his right to invoke the breach, possibility provided in section 34(3) of the Marine Insurance Act 1906 (MIA). Furthermore, in the absence of express warranties the MIA will imply them, notably a warranty to provide a seaworthy vessel at the commencement of the voyage in a voyage policy (section 39(1)) and a warranty of legality of the insured voyage (section 41).

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Salvage and prizes

The term "salvage" refers to the practice of rendering aid to a vessel in distress. Apart from the consideration that the sea is traditionally "a place of safety", with sailors honor-bound to render assistance as required, it is obviously in underwriters' interests to encourage assistance to vessels in danger of being wrecked. A policy will usually include a "sue and labor" clause which will cover the reasonable costs incurred by a ship-owners in his avoiding a greater loss.

At sea, a ship in distress will typically agree to "Lloyd's Open Form" with any potential salvor. The Lloyd's Open Form (LOF) is the standard contract, although other forms exist. The Lloyd's Open Form is headed "No cure — no pay"; the intention being that if the attempted salvage is unsuccessful, no award will be made. However, this principle has been weakened in recent years, and awards are now permitted in cases where, although the ship might have sunk, pollution has been avoided or mitigated.

In other circumstances the "salvor" may invoke the SCOPIC terms (most recent and commonly used rendition is SCOPIC 2000) in contrast to the LOF these terms mean that the salvor will be paid even if the salvage attempt is unsuccessful. The amount the salvor receives is limited to cover the costs of the salvage attempt and 25% above it. One of the main negative factors in invoking SCOPIC (on the salvor's behalf) is if the salvage attempt is successful the amount at which the salvor can claim under article 13 of LOF is discounted.

The Lloyd's Open Form, once agreed, allows salvage attempts to begin immediately. The extent of any award is determined later; although the standard wording refers to the Chairman of Lloyd's arbitrating any award, in practice the role of arbitrator is passed to specialist admiralty QCs. A ship captured in war is referred to as a prize, and the captors entitled to prize money. Again, this risk is covered by standard policies.

Marine Insurance Act, 1906

The most important sections of this Act include: a policy without insurable interest is void. imposes a duty on the insured of *uberrimae fides* (as opposed to *caveat emptor*), i.e., that questions must be answered honestly and the risk not misrepresented. the proposer of the insurer has a duty to disclose all material facts relevant to the acceptance and rating of the risk. Failure to do so is known as *non-disclosure* or *concealment* (there are minor differences in the two terms) and renders the insurance voidable by the insurer.: *If [a warranty] be not [exactly] complied with, then, subject to any express provision in the policy, the insurer is discharged from liability as from the date of the breach of warranty, but without prejudice to any liability incurred by him before that date.* where a warranty has been broken, it is no defense to the insured that the breach has been remedied, and the warranty complied with, prior to the loss. a breach of warranty may be *waived* (ignored) by the insurer. implied warranty that the vessel must be seaworthy at the start of her voyage and for the purpose of it (*voyage policy* only). no warranty that a vessel shall be seaworthy during the policy period (*time* policy). However, if the assured knowingly allows an unseaworthy vessel to set sail the insurer is not liable for losses caused by unseaworthiness. a policy may be assigned. Typically, a ship-owners might assign the benefit of a policy to the ship-mortgagor. deals with the issues

of a constructive total loss. The insured can, by notice, claim for a constructive total loss with the insurer becoming entitled to the ship or cargo if it should later turn up. (By contrast an *actual total loss* describes the physical destruction of a vessel or cargo.) deals with subrogation, i.e., the rights of the insurer to stand in the shoes of an indemnified insured and recover salvage for his own benefit. Schedule 1 of the Act contains a list of definitions; schedule 2 contains the model policy wording.

Claims Basis & Deductibles

Marine insurance is always written on an occurrence basis, covering claims that arise out of damage or injury that took place during the policy period, regardless when claims are made. Policy features often include extensions of coverage for items typical to a marine business such as liability for container damage and removal of debris.

A deductible is the first amount of a claim that the policy holders bears themselves. There can occasionally be a zero deductible but in most cases a deductible applies to claims made under a policy of marine insurance.

CEFOR

The **Central Union of Marine Underwriters** (CEFOR) was founded August 15, 1911 by Norwegian and foreign insurance companies and is the marine insurance market organization of Norway.

The members of CEFOR engage in hull and machinery insurance (blue water and coastal), protection and indemnity insurance, cargo insurance, legal defense, and war risks.

Classification society

A **classification society** (however called) is a non-governmental organization that establishes and maintains technical standards for the construction and operation of ships and offshore structures. Classification societies certify that the construction of a vessel comply with relevant standards and carry out regular surveys in service to ensure continuing compliance with the standards. Currently, more than 50 organizations describe their activities as including marine classification, twelve of which are members of the International Association of Classification Societies.

A **classification certificate** issued by a classification society recognized by the proposed ship register is required for a ship's owner to be able to register the ship and to obtain marine insurance on the ship, and may be required to be produced before a ship's entry into some ports or waterways, and may be of interest to charterers and potential buyers. To avoid liability, classification societies explicitly disclaim responsibility for the safety, fitness for purpose, or seaworthiness of the ship, but is a verification only that the vessel is in compliance with the classification standards of the society issuing the classification certificate.

Classification societies also issue **International Load Line Certificates** in accordance with the legislation of participating States giving effect to the International Convention on Load Lines (CLL 66/88).

Responsibilities

Classification societies set technical rules based on experience and research, confirm that designs and calculations meet these rules, survey ships and structures during the process of construction and commissioning, and periodically survey vessels to ensure that they continue to meet the rules. Classification societies are also responsible for classing oil platforms, other offshore structures, and submarines. This survey process covers diesel engines, important shipboard pumps and other vital machinery. Since the 1950s, the USSR (now Russian) Register of Shipping has classified nuclear ships, the only classification society to do so.

Classification surveyors inspect ships to make sure that the ship, its components and machinery are built and maintained according to the standards required for their class.

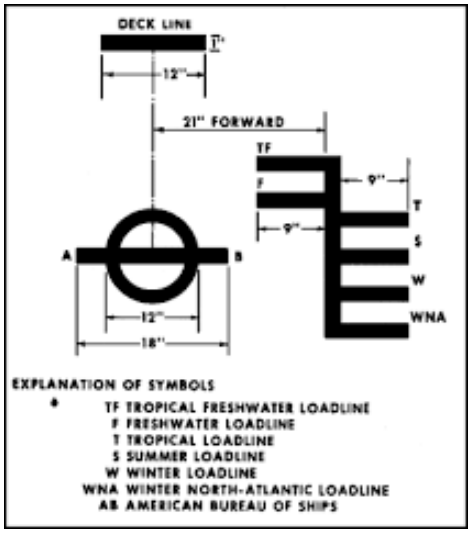
History

In the second half of the 18th century, London merchants, ship-owners, and captains often gathered at Edward Lloyds' coffee house to gossip and make deals including sharing the risks and rewards of individual voyages. This became known as underwriting after the practice of signing one's name to the bottom of a document pledging to make good a portion of the losses if the ship didn't make it in return for a portion of the profits. It did not take long to realize that the underwriters needed a way of assessing the quality of the ships that they were being asked to insure. In 1760, the Register Society was formed — the first classification society and the one which would subsequently become Lloyd's Register — to publish an annual register of ships. This publication attempted to classify the condition of the ship's hull and equipment. At that time, an attempt was made to classify the condition of each ship on an annual basis. The condition of the hull was classified A, E, I, O or U, according to the state of its construction and its adjudged continuing soundness (or lack thereof). Equipment was G, M, or B: simply, good, middling or bad. In time, G, M and B were replaced by 1, 2 and 3, which is the origin of the well-known expression 'A1', meaning 'first or highest class'. The purpose of this system was not to assess safety, fitness for purpose or seaworthiness of the ship. It was to evaluate risk.

Samuel Plimsoll pointed out the obvious downside of insurance:

"The ability of ship-owners to insure themselves against the risks they take not only with their property, but with other peoples' lives, is itself the greatest threat to the safe operation of ships."

What is **Plimsoll** line on **Ships**? **Merchant ships** have a marking on their hulls known as the **Plimsoll** line or the **Plimsoll mark**, which indicates the limit until which **ships** can be loaded with enough **cargo**. Internationally, the **Plimsoll** line on a **ship** is officially referred to as the International load line.



The **waterline** is the line where the hull of a ship meets the surface of the water. Specifically, it is also the name of a special marking, also known as an **international load line**, **Plimsoll line** and **water line** (positioned amidships), that indicates the draft of the ship and the legal limit to which a ship may be loaded for specific water types and temperatures in order to safely maintain buoyancy, particularly with regard to the hazard of waves that may arise. Varying water temperatures will affect a ship's draft, because warm water is less dense than cold water, providing less buoyancy. In the same way, fresh water is less dense than salinated or seawater with the same lessening effect upon buoyancy.

For vessels with displacement hulls, the hull speed is determined by, among other things, the waterline length in a sailing boat, the waterline length can change significantly as the boat heels, and can dynamically affect the speed of the boat.

The waterline can also refer to any line on a ship's hull that is parallel to the water's surface when the ship is afloat in a normal position. Hence, all waterlines are one class of "ships lines" used to denote the shape of a hull in naval architecture plans.

The first official loading regulations are thought to date back to maritime legislation originating with the Kingdom of Crete in 2500 BC when vessels were required to pass loading and maintenance inspections. Roman sea regulations also contained similar regulations.

In the Middle Ages the Venetian Republic, the city of Genoa and the Hanseatic League required ships to show a load line. In the case of Venice this was a cross marked on the side of the ship, and of Genoa three horizontal lines.

The first 19th-century loading recommendations were introduced by Lloyd's Register in 1835, following discussions among ship-owners, shippers and underwriters. Lloyd's recommended freeboards as a function of the depth of the hold (three inches per foot of depth). These recommendations, used extensively until 1880, became known as "Lloyd's Rule".

In the 1860s, after increased loss of ships due to overloading, a British MP, Samuel Plimsoll, took up the load line cause. A Royal Commission on unseaworthy ships was established in

1872, and in 1876 the United Kingdom Merchant Shipping Act made the load line mark compulsory, although the positioning of the mark was not fixed by law until 1894. In 1906, laws were passed requiring foreign ships visiting British ports to be marked with a load line. It was not until 1930 (the 1930 Load Line Convention) that there was international agreement for universal application of load line regulations.

In 1966 the International Convention on Load Lines was concluded in London which re-examined and amended the 1930 rules. The 1966 convention has since seen amendments in 1971, 1975, 1979, 1983, 1995 and 2003, none of which has entered into force

The first edition of the *Register of Ships* was published by Lloyd's Register in 1764 and was for use in the years 1764 to 1766.

Bureau Veritas (BV) was founded in Antwerp in 1828, moving to Paris in 1832. Lloyd's Register reconstituted in 1834 to become 'Lloyd's Register of British and Foreign Shipping'. Where previously surveys had been undertaken by retired sea captains, from this time surveyors started to be employed and Lloyd's Register formed a General Committee for the running of the Society and for the Rules regarding ship construction and maintenance, which began to be published from this time.

In 1834, the Register Society published the first Rules for the survey and classification of vessels, and changed its name to Lloyds Register of Shipping. A full-time bureaucracy of surveyors (inspectors) and support personnel was put in place. Similar developments were taking place in the other major maritime nations.

The adoption of common rules for ship construction by Norwegian insurance societies in the late 1850s led to the establishment of Det Norske Veritas (DNV) in 1864. RINA was founded in Genoa, Italy in 1861 under the name *Registro Italiano Navale*, to meet the needs of Italian maritime operators. *Germanischer Lloyd* (GL) was formed in 1867 and *Nippon Kaiji Kyokai* (ClassNK) in 1899. The Russian Maritime Register of Shipping (RS) was an early offshoot of the River Register of 1913.

As the classification profession evolved, the practice of assigning different classifications has been superseded, with some exceptions. Today a ship either meets the relevant class society's rules or it does not. As a consequence, it is either 'in' or 'out' of 'class'. Classification societies do not issue statements or certifications that a vessel is 'fit to sail' or 'unfit to sail', merely that the vessel is in compliance with the required codes. This is in part related to legal liability of the classification society. However, each of the classification societies has developed a series of notations that may be granted to a vessel to indicate that it is in compliance with some additional criteria that may be either specific to that vessel type or that are in excess of the standard classification requirements. Ice class as an example.

There have always been concerns that competitive pressure might lead to falling standards – as expressed for example by the European Commission. To counteract class hopping, in 2009, the International Association of Classification Societies (IACS) implemented the Transfer of Class Agreement (TOCA), whereby no member would accept a ship that had not carried out improvements demanded by its previous class society.

Today

Currently, more than 50 organizations worldwide describe their activities as including marine classification, some of which are listed below. Twelve of these are members of the International Association of Classification Societies. The largest are DNV GL, the American Bureau of Shipping, Nippon Kaiji Kyokai (ClassNK) and Lloyd's Register. Classification societies employ naval architects, ship surveyors, material engineers, piping engineers, mechanical engineers and electrical engineers, often located at ports and office buildings around the world.

Marine vessels and structures are classified according to the soundness of their structure and design for the purpose of the vessel. The classification rules are designed to ensure an acceptable degree of stability, safety, environmental impact, etc.

In particular, classification societies may be authorized to inspect ships, oil rigs, submarines, and other marine structures and issue certificates on behalf of the flag state.

As well as providing classification and certification services, the larger societies also conduct research at their own research facilities in order to improve the effectiveness of their rules and to investigate the safety of new innovations in shipbuilding.

Membership

As at February 2017, the members of IACS were:

Name	Abbreviation	Formed	Head office
Lloyd's Register	LR	1760	London
Bureau Veritas	BV	1828	Paris
Croatian Register of Shipping/ Austrian Veritas (Hrvatski Registar Brodova)	CRS	1858/ 1949	Split
Registro Italiano Navale	RINA	1861	Genoa
American Bureau of Shipping	ABS	1862	Houston
DNV GL	DNV GL	1864	Oslo
Nippon Kaiji Kyokai (ClassNK)	NKK	1899	Tokyo
Russian Maritime Register of Shipping (Российский морской регистр судоходства)	RS	1913	Saint Petersburg
Polish Register of Shipping (Polski Rejestr Statków)	PRS	1936	Gdańsk
China Classification Society	CCS	1956	Beijing
Korean Register of Shipping	KR	1960	Busan
Indian Register of Shipping	IR Class	1975	Mumbai

Role of Classification Societies in maintaining cargo ships seaworthiness

A cargo shipper and the underwriter requested to insure a maritime risk require some assurance that any particular vessel is structurally fit to undertake a proposed voyage. To enable the shipper and underwriter to distinguish the good risk from the bad a system of classification has been formulated over a period of some two hundred years. During this period reliable organizations have been created for the initial and continuing inspection of ships so that classification may be assessed and maintained. The principal maritime nations have the following classification societies:

- Great Britain—Lloyd's Register of Shipping
- France—Bureau Veritas
- Germany—Germanischer Lloyd
- Norway—Det Norske Veritas
- Italy—Registro Italiano Navale
- United States of America—American Bureau of Shipping
- Russia—Russian Register of Shipping
- Japan—Nippon Kaiji Kyokai.

These classification societies publish rules and regulations which are principally concerned with the strength of the ship, the provision of adequate equipment, and the reliability of the machinery. Ships may be built in any country to a particular classification society's rules, and they are not restricted to classification by the relevant society of the country where they are built. Classification is not compulsory but the ship-owners with an unclassed ship will be required to satisfy governmental regulating bodies that it has sufficient structural strength for assignment of a load line and issue of a safety construction certificate.

Steel ships built in accordance with classification society's rules or equivalent standards, are assigned a class in their Register Book, and continue to be classed so long as they are maintained in accordance with the Rules.

Developing Structural Design Programs for use by shipyards

In recent years the principal classification societies have developed software packages for use by shipyards which incorporate dynamic-based criteria for the scantlings, structural arrangements and details of ship structures. This was a response to a perception that the traditional semi empirical published classification rules based on experience could be inadequate for new and larger vessel trends.

The computer programs made available to shipyards incorporate a realistic representation of the dynamic loads likely to be experienced by the ship and are used to determine the scantlings and investigate the structural responses of critical areas of the ship's structure.

They include a program for fatigue design assessment (FDA) which is commonly used to assess the structural design detail of large container ships, tankers and bulk carriers. Evaluation of the structural design by means of these programs can result in the ship being assigned further relevant notations.

42 Ships Detained Due To Structural Safety, Load Lines Deficiencies

The **Concentrated Inspection Campaign** (CIC) on Structural Safety and the International Convention on Load Lines on Tuesday issued preliminary results carried out in the Paris MoU region between September 1, 2011 and November 30, 2011. The results show - 42 ships were detained as a direct result of the CIC for deficiencies related to structural safety and load lines in the Paris MoU region. Problem areas included stability, strength and loading information, ballast and fuel tanks and water and weather tight conditions.

The CIC questionnaire was completed during 4,386 inspections on 4,250 individual ships. A total of 1,589 CIC-related deficiencies were recorded and 42 ships (1%) were detained for CIC-related deficiencies.

During the campaign most inspections concerned general cargo/multi-purpose ships with 1,563 (36%) inspections, followed by bulk carriers with 795 (18%) inspections, container ships with 495 (11%) inspections, chemical tankers with 433 (10%) inspections and oil tankers with 296 (7%) inspections. 24 (60%) ships, detained for CIC-related deficiencies, were general cargo/multipurpose ships and 5 (12%) were bulk carriers. Among the other detained ships were two container vessels, two offshore supply ships, two passenger ships and two refrigerated cargo ships. 31% of the detained ships were 30 years or older.

Analysis of the recorded deficiencies shows that most deficiencies relate to the freeboard marks (12%), ventilators, air pipes and casings (7%), stability/strength/loading information and instruments (7%) and ballast, fuel and other tanks (5%).

Receiver of Wreck

Countries having a Receiver of Wreck

In the UK, the "Receiver of Wreck", a post defined under the Merchant Shipping Act 1995, is an official of the British Government whose main task is to administer the law in relation to Wreck and Salvage. Operating on behalf of the Department for Transport, the Receiver of Wreck is located within the Maritime and Coastguard Agency. Until 1993, the role was carried out by numerous coastal customs officials. Nowadays, the Receiver is based in Southampton and is helped by local outposts of Her Majesty's Coastguard. The current Receiver of Wreck is Camilla Moore.

Elsewhere in the British Isles, each of the Channel Islands, and the Isle of Man have their own laws of wreck and salvage and their own "Receiver of Wreck".

In the Ireland a "Receiver of Wreck" is a Revenue Official appointed by the Minister for Transport, Tourism and Sport with the consent of the Revenue Commissioners whose duty is to deal with any wreck found in or on the shores of the sea or any tidal water or harbor.

Canada has a "Receiver of Wreck", authorized by Part VI of the Canada Shipping Act. The Navigation Protection Program of Transport Canada is responsible for administering this program.

History

Traditionally, salvage was an important economic source in coastal areas and sometimes exposed the savage and merciless nature of those around the coast. Folklore has it that some coastal dwellers enticed ships to a watery grave by luring them onto the rocks. This was known as Wrecking. So that order could be maintained and local people encouraged to save those in peril and their belongings rather than pillage them, Receivers of Wreck were appointed to keep order and reward those who assisted in a wreck event. Historically, Receivers were given powers which allowed them to "hurt, maim or kill" anyone obstructing them in their duties. Theoretically at least Receivers of Wreck were permitted to carry weapons with which to defend themselves whilst carrying out their duties up until 1997.

The Act of 1995 updates the prior Merchant Shipping Act 1894. The Receiver is an official under Admiralty Jurisdiction.

Role of the Receiver of Wreck

The main task of the Receiver of Wreck is to process reports of wreck, in the interest of both finder and owner. This involves researching ownership and working with the finder, owner, archaeologists, museums, and other interested parties. The process of reporting wreck provides legal owners the opportunity to be reunited with their property and to ensure that law-abiding finders of wreck receive appropriate recognition in the form of a salvage award.

The Maritime and Coastguard Agency administers Section 2 of the Protection of Wrecks Act 1973, which protects wrecks that are deemed dangerous by virtue of their contents. There is a strict no entry policy. This is in the interest of safety of both divers and members of the public. There are two wrecks protected under Section 2 of the Act, the SS *Richard Montgomery* and the SS *Castilian*, wrecks from the Second World War which contain dangerous quantities of explosives.

The Receiver of Wreck also undertakes the task of disposing of "royal fish" in England, Wales and Northern Ireland. "Royal fish" are dead whales, dolphins, porpoises and sturgeon. This is an ancient right dating back to Edward II's reign which falls under the royal prerogative.

What is wreck?

The Receiver of Wreck's remit is set down in the **Merchant Shipping Act 1995, Part IX, Chapters 1-2**. It covers wreck from UK territorial waters (within 12 nautical miles), and wreck landed in the UK from outside UK territorial waters. Wreck material includes any part of a vessel, aircraft or hovercraft including any of its cargo or equipment.

According to section 255 of the Merchant Shipping Act 1995, wreck includes "jetsam, flotsam, lagan or derelict". The Act does not define these terms, but they may be understood as follows:

- **Flotsam** are goods lost from a ship which has sunk or otherwise perished which are recoverable because they have floated.
- **Jetsam** are goods cast overboard (jettisoned) in order to lighten a vessel which is in danger of sinking, even if they ultimately perish.
- **Derelict** is property which has been abandoned and deserted at sea by those who were in charge without any hope of recovering it. This includes vessels and cargo.
- **Lagan** (or ligan) are goods cast overboard from a ship, buoyed so that they can be recovered later.

Boats that have come off their moorings are not normally classified as wreck as they have not been abandoned without hope of recovery. Also, buoys including marker buoys, mooring buoys etc., other than those that are fishing equipment, are not normally classed as wreck.

UK wreck law

It is a legal requirement under the Merchant Shipping Act 1995 that all recovered wreck material landed in the United Kingdom must be reported to the Receiver of Wreck, whether recovered from within or outside UK waters and even if the finder is the owner. All wreck material recovered must be reported, however small or insignificant it may seem.

The Receiver of Wreck will investigate ownership of the recovered items. The owner has one year, after the material has been reported, in which to come forward and prove title to the property. During this period it is common for the finder to hold the wreck on behalf of the Receiver of Wreck while investigations are carried out. Finders should assume that all wreck items have an owner. It is possible for wreck material to be owned by an individual, a company, a dive club, an insurance company, the Ministry of Defence or the Department for Transport.

Wreck from UK waters which is still unclaimed at the end of one year becomes the property of the Crown (or grantee of the Crown such as the Duchy of Cornwall). Any person who believes that they are entitled to unclaimed wreck must provide evidence of entitlement to the satisfaction of the Receiver. If wreck from UK territorial waters is unclaimed at the end of one year, the Receiver will dispose of the find on behalf of the Crown. If wreck from outside UK territorial waters is unclaimed at the end of one year, the Crown makes no claim, and the material is returned to the finder. Often the finder is allowed to keep items of unclaimed wreck in lieu of a salvage award.

Wreck and Salvage in the UK is covered by three main Acts. These are the Merchant Shipping Act 1995, the Protection of Wrecks Act 1973 and the Protection of Military Remains Act 1986. In simple terms, the Protection of Wrecks Act 1973 and the Protection of Military Remains Act 1986 detail what salvors cannot do, and the Merchant Shipping Act 1995 covers what salvors can or must do.

For a complete list of wrecks protected under the Protection of Wrecks Act 1973, see List of designations under the Protection of Wrecks Act.

Wreck can be reported to the Receiver by completing a Report of Wreck and Salvage Form, known as a Droit.

Penalties

There are several penalties associated with wreck and salvage outlined in the Merchant Shipping Act 1995 and the Receiver has a duty to investigate any report of possible offences regarding the treatment of wreck. If the investigation reveals sufficient evidence, the Receiver may prosecute those suspected of having committed an offence. To enable the Receiver of Wreck to enforce the law the Receiver is awarded several powers by the Secretary of State.

In popular culture

- The Receiver of Wreck was mentioned by Hammond Innes in the novel (and film based on the novel) *The Wreck of the Mary Deare*.
- Show of Hands, an English folk band, sing about the Receiver of Wreck in the song "The Napoli". This was inspired by the wreck of the MSC *Napoli* which was grounded in Branscombe Bay and subsequently lost many containers which were washed up on the beach before being rifled through by people flocking to the small village.

Inland marine insurance

Inland marine insurance in the United States indemnifies loss to movable or specialized types of property, historically developing as an outgrowth of ocean marine insurance. This category of insurance includes property coverage for construction equipment, medical diagnostic equipment, fine arts, solar panels and wind turbines, cameras and movie equipment, musical instruments, and a wide variety of other types of property.

The inland marine insurance definition has evolved over time to cover a wide range of property and materials:

- Property in transit
- Property in the custody of a bailee
- Property deemed to be an instrumentality of transportation or communication, such as bridges and radio towers
- Mobile medical equipment
- Contractors equipment

Traditionally, marine insurers such as the underwriters at Lloyd's of London covered cargo in the course of international commercial voyages by sea, providing coverage on an "all risk" basis: physical loss or damage from *any* cause was covered *unless* the policy specifically excluded that cause. Subsequently, a marketplace for fire insurance for buildings on land arose, especially after the Great Fire of London in 1666. Fire insurance companies typically

provided narrower coverage, where the policies specifically listed specifically the only perils covered, and excluded all losses from any other causes.

In the 19th century the course of the Industrial Revolution gave rise to new exposures on land, such as telegraphs, railroad equipment, and other types of property with which fire insurance companies were unfamiliar, and inclined to grant coverage only for "enumerated perils". Marine insurers, accustomed to providing "all risk" coverage to cargo in transit, began competing in the insurance marketplace for these types of equipment and other "instrumentalities of communication and transportation". Despite the word *marine*, most inland marine coverages are for property on land, with property transported by water insured under ocean marine. This led to marine insurers competing in the fire insurance marketplace against fire insurance companies. Ultimately, the National Association of Insurance Commissioners regulated the situation, adopting a Nationwide Marine Definition in 1933 which laid out what types of property were eligible for "inland marine" insurance coverage.

In the United States, inland marine insurance comprises about 2% of total premiums but account for a higher percent of the profit. Like ocean marine insurance, inland marine insurance has been traditionally less regulated in the United States.

Inland marine policies became known as "floaters" since the property to which coverage was originally extended was essentially "floating." The coverage has grown to include property that just involves an element of transportation. The property that is insured under inland marine coverage is typically one of the following:

- Actually in transit
- Held by a bailee
- At a fixed location that is an instrument of transportation
- A movable type of goods that is often at different locations

The following coverages represent a wide range of the types of coverages typically called "inland marine":

- Accounts Receivable
- Bailee Customer's Goods
- Builders' Risk
- Camera and Photographic Equipment
- Communication Towers and Equipment
- Computer Coverage
- Contractors Equipment
- Commercial Floaters
- Dealers
- Exhibitions
- Fine Arts
- Furriers
- Golf Equipment
- Guns
- Installation

- Jewelers
- Leased Property
- Mobile Medical Equipment
- Motor Truck Cargo
- Museums
- Musical Instruments
- Processing Risks
- Rigger's Liability
- Scheduled Property
- Transportation
- Trip Transit
- Valuable Papers
- Warehouse Legal

Seaworthiness (law)

Seaworthiness is a concept that runs through maritime law in at least four contractual relationships. In a marine insurance voyage policy, the assured warrants that the vessel is seaworthy. A carrier of goods by sea owes a duty to a shipper of cargo that the vessel is seaworthy at the start of the voyage. A ship-owner warrants to a charterer that the vessel under charter is seaworthy; and similarly, a shipbuilder warrants that the vessel under construction will be seaworthy.

Statutory seaworthiness – criminal liability

The Merchant Shipping Act 1995 makes it a criminal offence to send or attempt to send an unseaworthy ship to sea. Seaworthiness in this context relates to defective structures, equipment, under-manning, overloading etc. and the vessel may be detained. In every contract of employment at sea there is an implied obligation on the owner to ensure the seaworthiness of the ship and an allegation of unseaworthiness may be brought by the crew, though at least five members of the crew are required to bring the action,

Seaworthiness in Marine Insurance

Under Section 39 of the Marine Insurance Act 1906, in a voyage policy there is an implied warranty that the vessel is "reasonably seaworthy in all respects":

In a voyage policy there is an implied warranty that at the commencement of the voyage the ship shall be seaworthy for the purpose of the particular adventure insured. Where the policy attaches while the ship is in port, there is also an implied warranty that she shall, at the commencement of the risk, be reasonably fit to encounter the ordinary perils of the port. Where the policy relates to a voyage which is performed in different stages, during which the ship requires different kinds of or further preparation or equipment, there is an implied warranty that at the commencement of each stage the ship is seaworthy in respect of such preparation or equipment for the purposes of that stage. A ship is deemed to be seaworthy when she is reasonably fit in all respects to encounter the ordinary perils of the seas of the adventure insured. In a time policy there is no implied warranty that the ship shall be

seaworthy at any stage of the adventure, but where, with the privity of the assured, the ship is sent to sea in an unseaworthy state, the insurer is not liable for any loss attributable to unseaworthiness.

Seaworthiness in Carriage of Goods by Sea

At common law

At common law, when goods are carried by sea by a “common carrier” (a public carrier), then, if the contract of carriage does not contain an exception clause relating to seaworthiness, there is an absolute undertaking that the vessel is seaworthy. Liability is “strict”**, meaning the carrier is liable even in the absence of negligence, as in *Liver Alkali v Johnson*. This does not mean the vessel need be capable of encountering any peril. The test of seaworthiness may be "that the ship should be in a condition to encounter whatever perils of the sea a ship of that kind, and laden in that way, may be fairly expected to encounter in the voyage to be performed". However, the strict liability at common law is invariably modified in contracts of affreightment. In charter parties the shipowner may negotiate an express clause excluding his liability for unseaworthiness or he may, as it more usual, agree to incorporate the provisions of the Carriage of Goods by Sea Act 1971 into the charter.

By statute

Article III Rule 1 of the Hague-Visby Rules provides: "The carrier shall be bound before and at the beginning of the voyage to exercise due diligence to—

a) Make the ship seaworthy.
b) Properly man, equip and supply the ship.
c) Make the holds, refrigerating and cool chambers, and all other parts of the ship in which goods are carried, fit and safe for their reception, carriage and preservation.

Section 3 of the Carriage of Goods by Sea Act 1971 adds: "There shall not be implied in any contract for the carriage of goods by sea to which the Rules apply by virtue of this Act any absolute undertaking by the carrier of the goods to provide a seaworthy ship." This provision makes it clear that there is no strict liability to provide a seaworthy ship.

McFadden v Blue Star Line (1905) provides that: "A vessel must have that degree of fitness which an ordinary careful and prudent owner would require his vessel to have at the commencement of her voyage having regard to all the probable circumstances of it…Would a prudent owner have required that it (i.e. the defect) should be made good before sending his ship to sea, had he known of it? If he would, the ship was not seaworthy…"

Together with the Hague Visby Rules, the common law provides that the concept of "seaworthiness" covers: the ship, its equipment and supplies, the crew, the vessel's suitability for the particular cargo and its suitability for the particular voyage or for particular ports.

The Rotterdam Rules, which are intended to replace The Hague Rules, Hague-Visby Rules and Hamburg Rules, are many years away from ratification. If and when the Rotterdam Rules come into force, the carrier will have to maintain seaworthiness throughout the voyage, not

just at the start. Presumably the standard of seaworthiness at sea would be somewhat lower than when in port (where refit facilities are available).

Seaworthiness in Chartering

A ship-owner will normally owe the following duties to the charterer:

1. To provide a seaworthy ship which complies with the charter party description;
2. To properly and carefully load, handle, stow, carry, keep, care for, discharge and deliver the cargo;
3. To comply with charterers' legitimate employment instructions;
4. To prosecute voyages with reasonable despatch.

In *Hong Kong Fir Shipping Co Ltd v Kawasaki Kisen Kaisha*, the ship's unsatisfactory team of engineers meant that the vessel was unseaworthy, and the consequent delay in delivery amounted to serious deviation. However, in a controversial judgment, the court held that the charterer could not cancel and was entitled only to damages, since neither breach denied the claimant of the main benefit of the contract.

Seaworthiness in Shipbuilding Contracts

Shipbuilding contracts will normally be effected using a standard form contract. However, the common law "business efficacy rule" in *The Moorcock* may require that seaworthiness is an implied term of the contract. Also, sections 13 & 14 of the Sale of Goods Act 1979 require (respectively) that "the goods", (the ship), "comply with description" and shall be of "satisfactory quality".

Transport of goods at sea

The term "general (multipurpose) cargo ships" covers many different ship designs that do not fit into other more specialized cargo ship types. Thus, general cargo ships are not specialized for transport of only dry bulks, only containers or only heavy-lift cargoes, but they have flexibility to carry any of these cargo types.

General cargo ships are the world's most numerous ship types, excepting fishing vessels. Thus, in the year 2002 their share in the overall world merchant fleet amounted to about 37% in numbers and to about 11% in dwt.

Cargo ships lifting appliances & deck work guideline

Bagged cargo handling various technics, Bagged cargo handling various considerations

Bagged cargo

Handling bagged cargo on board need careful considerations. The commodity itself has to be robust to withstand outside pressure and compression, for the bags will only hold the contents in one place and will not provide protection against external damage. Such

commodities might typically be fertilizers, grain (rice, maize, wheat, etc.), seeds, dried fruit, sugar, coconut, coffee, fresh vegetables, frozen offal (meat from carcasses), flour, copra, small items such as shells, raisins, etc., mail, salt, mineral sands and ores, meal (fish, seed, copra, etc.), dried blood, dried milk etc.



Handling bagged cargo

Materials

The material from which a bag is made will depend on a number of factors, i.e. the commodity, its physical composition and its properties, e.g. moisture content, sensitivity to contamination, etc. The commonest materials used are single or multi-ply paper, plastic, woven polypropylene (possibly with a sealed polythene liner), open mesh plastic fibre and, much less commonly today, jute and hessian. Bags may be sown, glued or welded depending on the material.

Commodities

Bagged commodities need to be sufficiently robust to withstand external pressure and compression, as the bag is designed to contain the contents rather than provide any substantial protection against external damage. Such commodities might normally be carried in bulk or mini-bulk operations but for particular markets are shipped bagged in smaller quantities and include fertilizer, grain, seed, dried fruit, sugar, cement, coffee, flour, salt, mineral sand, fish meal, dried milk, etc.

Characteristics

Bag sizes vary although it is standard practice to use a size which, when filled with the particular product, can be readily handled by stevedores, i.e. about 50kgs. A secondary advantage is that this weight allows rapid calculation of the total weight loaded into a cargo space or container. Care must be taken when loading large quantities of bagged cargo to allow in calculations for gross, nett, and tare (bag) weights.

The shape of a bag, and therefore the ease with which it can be stowed, made up into a sling, pallet load, etc., varies with the commodity and the construction of the bag. The bag may be "shaped" (usually those of paper or plastic construction) and form a near rectangle which is stable and has flat surfaces. However, jute bags, for example, are usually sewn flat at each end and tend to have no flat surfaces, although these may be induced by pressure during the storage or stowage cycle. If the contents are powdery (e.g. cement) the package is more likely to conform to outside pressures around it, such as weight on top or pressure on the sides. On the other hand, if the contents are hard and bulky (e.g. frozen offal) then the bag will be of irregular shape and will be unlikely to respond to outside influences.

Commodities in hessian and woven polypropylene bags may be subject to contamination from powder or small granular cargoes stowed beside or above them while the contents, if of a powder or granular nature, may themselves sift through the bags with resultant loss and contamination of other cargo (see Part 4). Recently filled bags tend to settle and spread outwards and this can affect stowage arrangements, e.g. in containers (see "Unitized Cargoes"). Woven polypropylene bags, because of their non-absorbent characteristics, may be more suitable for moisture inherent/sensitive cargoes (e.g. rice, sugar, coffee, etc.) than traditional hessian.

"Jumbo" bags are normally of woven polypropylene with lifting slings sewn into the bag. They vary in size but may weigh several tonnes when full. In `tween deck ships they are most suitable for hatch square stowage where they can be clean lifted upon discharge. In such ships, wing and end stowage is only suitable when there is sufficient headroom for forklifts to operate.

Handling

Different bagging materials and different commodities lend themselves to different handling methods; a jute bag with good "ears" on it may be more easily lifted by the human hand than a heavy fully filled plastic sack with nothing to grip. Thus, there is a great temptation for stevedores to use hand hooks to manhandle bags in and out of their stowage positions in holds, containers, etc. Since most bagged commodities easily spill and some of them are very valuable (e.g. coffee), as a general rule, hand hooks should not be used for bagged cargoes.

Bulging plastic bags may be difficult to make up in a pallet load because of their shape and consequent tendency to slide. Similarly, multi-ply paper sacks may not be safely lifted by rope slings or snotters without the possibility of rupturing the bags. Flat webbed slings of man-made fibres are most suitable for slinging bags, and the "clover leaf" sling arrangement can be used to advantage with bags that are difficult to handle because of shape or material. Such slings are very suitable for pre- slinging requirements and unit loads (see "Unitized Cargoes"). Canvas or heavy-duty plastic hold alls may be required for loading and discharging high-value commodities such as flour, coffee, cocoa, etc., when the nature of the bagging material and the value of the commodity are likely to make any damage the source of a high value claim. Great care is required when handling bagged cargo with mechanical equipment (cranes, winches, fork lift trucks, etc.) so that damage is not caused by swinging or rubbing against obstructions such as beams, hatch coamings, etc.

Stowage

Most bagged cargoes are liable to damage if stowed with moist cargo or cargo liable to sweat and should be well protected against obstructions such as beams, brackets, stringers, etc. Otherwise, as the cargo settles, pressure on an unsupported or projecting part of the bag may result in tearing and spilling of the contents. Bags should be protected by mats, heavy-duty paper, etc., from bare steel work and sources of moisture running down bulkheads, pillars, etc. Such protection also helps to save the bags from discoloration by rusty metal.

If two types of bagged cargo are carried in the same space and there is a risk of one contaminating the other (e.g. plastic granules over rice), then plastic or similar sheeting should be laid between the different commodities. Similarly, sheeting should be laid where sifting or loss of cargo might be expected, particularly with a valuable cargo such as coffee. Any such protective separation must be carefully handled at discharge, with any spillage collected and landed before moving to the cargo below.

Careful tallying is essential and for ease of counting, slings and pallets should always be made up of the same number of bags. Bagged cargo bills of lading should be endorsed "weight and quantity unknown" or at the very least "said to contain..." Slack or damaged bags must be rejected for loading. Damp or stained bags, particularly of sugar, cocoa and coffee, should also be rejected.

Some commodities are liable to rot a natural fiber bag, e.g. some manures and chemicals, and with such cargoes the bill of lading should be claused to protect the ship from having to bear the cost of re-bagging. The ship should also be protected against any claim for loss of contents due to leakage from bags of insufficient strength or quality to prevent such loss.

Bleeding of Bags

A practice largely consigned to the past is that of cutting and bleeding bags into the hold from the edge of the open hatch. If this practice should be encountered there are a number of points that should be monitored by the ship's officers. Care must be taken to see that bags are fully emptied of their contents before being discarded to avoid subsequent claims of short-delivery. Bags may be bled through a wire or rope grill in order to ensure that the bags themselves do not end up in the hold which, in practice, frequently occurs. It is also quite common for foreign or "field matter" to be mixed with the contents. Should the presence of bags and foreign matter be observed in the stow, loading should be stopped and the contamination drawn to the attention of the stevedores and the charterer.

The mates' receipts should be claused accordingly. It will be appreciated that the presence of foreign material and bags in the cargo will cause problems during discharge and may result in claims. The shipper will inevitably want clean bills of lading but if foreign material has been noted every endeavor should be made to have this noted in the bill of lading. The ship should not accept the offer of a letter of indemnity from the shipper as it is the owner who will be sued by the receiver, not the shipper, and the likelihood of recovery from the shipper is remote.

Discharging

Slings of bagged cargo should not be dragged out from wings or ends of holds as this will result in bags tearing on plate butts and landings, rough wooden tank top ceilings or other obstructions. If the cargo warrants, facilities should be available for re-bagging of spilt cargo bags both when loading and discharging. All torn, slack or empty bags and packages should be carefully inspected while discharging is in progress and delivered (against tally) along with the cargo, otherwise a claim for short delivery is likely to follow.

Derricks for cargo lifting

Use of derricks on board General cargo ships - safety procedure

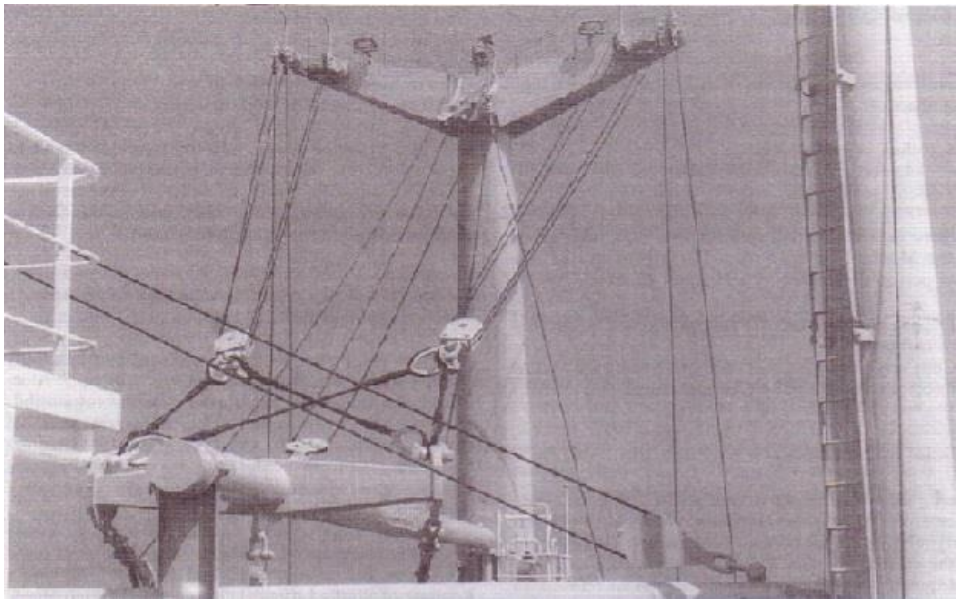
Operation of derricks on board

Derricks for lifting cargo on board is required to be of adequate strength and stability for each load, having regard in particular to the stress induced at its mounting or fixing points , securely anchored, adequately ballasted or counterbalanced and supported by outriggers as necessary to ensure its stability when lifting.

Ships' derricks should be properly rigged and employers and masters should ensure that rigging plans are available containing the following information:

1. position and size of deck eye-plates;
2. position of inboard and outboard booms;
3. maximum headroom (i.e. permissible height of cargo hook above hatch coaming);
4. maximum angle between runners;
5. position, size and safe working load of blocks;
6. length, size and safe working load of runners, topping lifts, guys and preventers;
7. safe working load of shackles;
8. position of derricks producing maximum forces
9. optimum position for guy and preventers to resist maximum forces as at (h);
10. combined load diagrams showing forces for a load of 1 tonne or the safe working load;
11. guidance on the maintenance of the derrick rig.

The operational guidance in the remainder of this section applies generally to the conventional type of ship's derrick. For other types, such as the "Hallen" and "Stulken" derricks, manufacturers' instructions should be followed.



The rigging of Velle derrick with supporting mast

Runner guides should be fitted to all derricks so that when the runner is slack, the bight is not a hazard to persons walking along the decks. Where rollers are fitted to runner guides, they should rotate freely. Before a derrick is raised or lowered, all persons on deck in the vicinity should be warned so that no person stands in, or is in danger from, bights of wire and other ropes. All necessary wires should be flaked out. When a single span derrick is being raised, lowered or adjusted, the hauling part of the topping lift or bull-wire (i.e. winch end whip) should be adequately secured to the drum end. The winch driver should raise or lower the derrick at a speed consistent with the safe handling of the guys. Before a derrick is raised, lowered or adjusted with a topping lift purchase, the hauling part of the span should be flaked out for its entire length in a safe manner. Someone should be available to assist the person controlling the wire on the drum and keeping the wire clear of turns and in making fast to the bitts or cleats. Where the hauling part of a topping lift purchase is led to a derrick span winch, the bull-wire should be handled in the same way. To fasten the derrick in its final position, the topping lift purchase should be secured to bitts or cleats by first putting on three complete turns followed by four crossing turns and finally securing the whole with a lashing to prevent the turns jumping off due to the wire's natural springiness. When a derrick is lowered on a topping lift purchase, someone should be detailed for lifting and holding the pawl bar, ready to release it should the need arise; the pawl should be fully engaged before the topping lift purchase or bull-wire is released. The person employed on this duty should not attempt or be given any other task until this operation is complete; in no circumstances should the pawl bar be wedged or lashed up. A derrick with a topping winch, and particularly one that is self-powered, should not be topped hard against the mast, table or clamp in such a way that the initial heave required to free the pawl bar prior to lowering the derrick cannot be achieved without putting an undue strain on the topping lift purchase and its attachments.

A heel block should be secured additionally by means of a chain or wire so that the block will be pulled into position under load but does not drop when the load is released. The derrick should be lowered to the deck or crutch and properly secured whenever repairs or changes to the rig are to be carried out. If heavy cargo is to be dragged under deck with ship's winches, the runner should be led directly from the heel block to avoid overloading the derrick boom

and rigging. Where a heavy load is to be removed, a snatch block or bull wire should be used to provide a fair-lead for the runner and to keep the load clear of obstructions.

Use of derricks in union purchase

When using union purchase the following precautions should be strictly taken to avoid excessive tensions:-

I. The angle between the married runners should not normally exceed 90° and an angle of 120° should never be exceeded;
II. The cargo sling should be kept as short as possible so as to clear the bulwarks without the angle between the runners exceeding 90° (or 120° in special circumstances);
III. Derricks should be topped as high as practicable consistent with safe working;
IV. (iv) The derricks should not be rigged further apart than is absolutely necessary.

The following examples will show how rapidly loads increase on derricks, runners and attachments as the angle between runners increases:

a. At 60° included angle, the tension in each runner would be just over half the load;
b. At 90° the tension would be nearly three-quarters of the load;
c. At 195° the tension would be nearly 12 times the load.

When using union purchase, winch operators should wind in and pay out in step, otherwise dangerous tensions may develop in the rig.

An adequate preventer guy should always be rigged on the outboard side of each derrick when used in union purchase. The preventer guy should be looped over the head of the derrick, and as close to and parallel with the outboard guy as available fittings permit. Each guy should be secured to individual and adequate deck or other fastenings.

Narrow angles between derricks and outboard guys and between outboard guys and the vertical should be avoided in union purchase as these materially increase the loading on the guys. The angle between the outboard derrick and its outboard guy and preventer should not be too large and may cause the outboard derrick to jack-knife. In general, the inboard derrick guys and preventer should be secured as nearly as possible at an angle of 90° to the derrick.

Use of stoppers

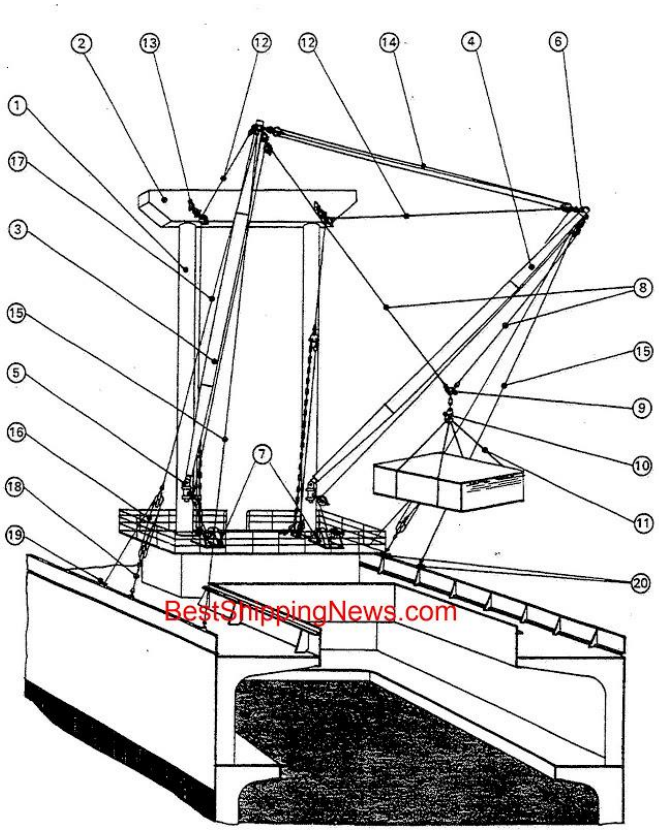
Where fitted, mechanical topping lift stoppers should be used. Where chain stoppers are used, they should ALWAYS be applied by two half-hitches in the form of a cow hitch suitably spaced with the remaining chain and rope tail backed round the wire and held taut to the wire.

A chain stopper should be shackled as near as possible in line with the span downhaul and always to an eye plate, not passed round on a bight which would induce bending stresses similar to those in a knotted chain. No stopper should be shackled to the same eye plate as the lead block for the span downhaul; this is particularly hazardous when the lead block has to be turned to take the downhaul to the winch or secure it to bitts or cleats. The span

downhaul should always be eased to a stopper and the stopper should take the weight before turns are removed from the winch, bitts or cleats.

Cargo gear

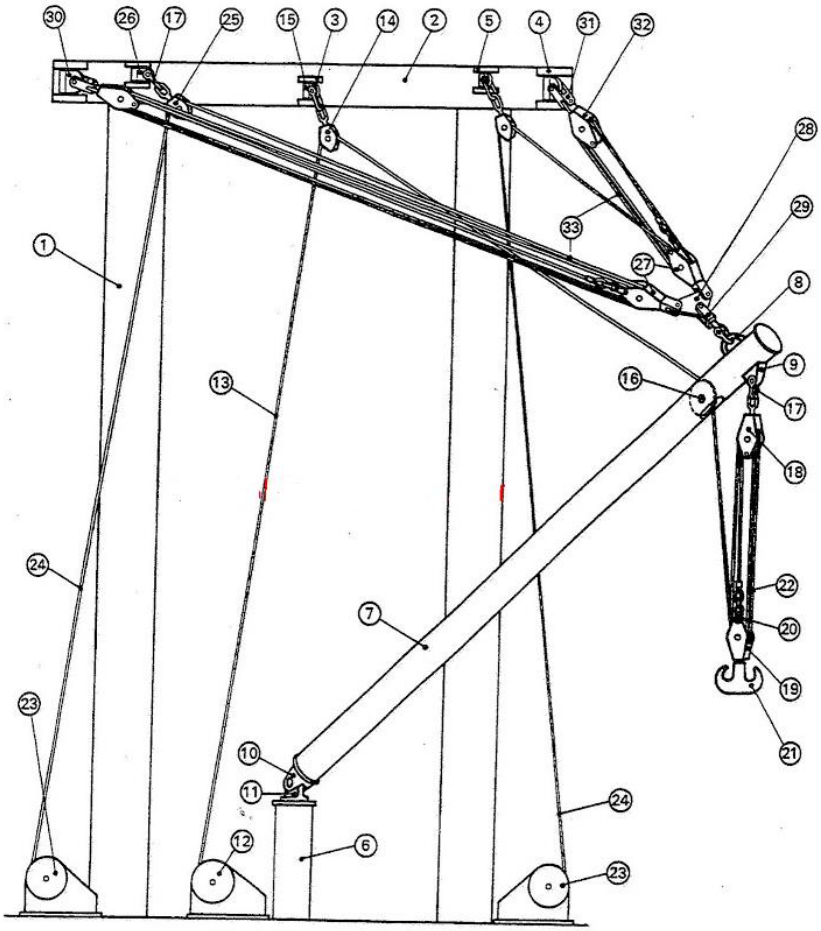
Union purchase rig



1. portal mast (or portal derrick post),
2. cross tree (or upper transverse beam),
3. derrick boom positioned over the hatch (inboard boom),
4. derrick boom positioned outside the ship (outboard boom),
5. derrick heel gooseneck fitting,
6. derrick head fitting,
7. cargo winches,
8. cargo runners (or married falls),
9. cargo triangle plate,
10. cargo hook,
11. slings,
12. fixed (or standing) span ropes,
13. mast head span fitting,
14. schooner guy tackle (or boom head guy tackle),
15. preventer (or standing) guys,
16. slewing guy tackles (or vang tackles),
17. upper slewing guy pendants,
18. lower slewing guy pendants,
19. belaying (or horn) cleat,

20. deck eye plates,

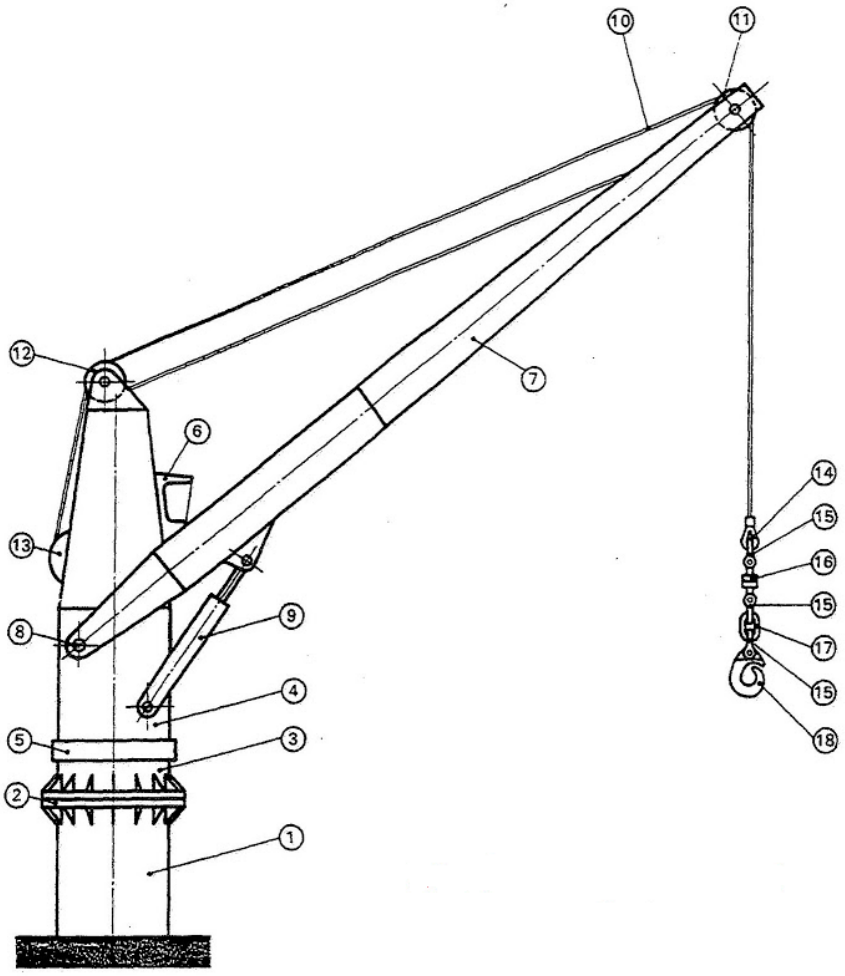
Twin span tackle derrick for heavy loads



5. portal mast (or portal derrick post),
6. cross tree (or upper transverse beam),
7. mast head cargo lead block bearing bracket,
8. mast head span bearing bracket,
9. mast head span lead block bearing bracket,
10. king post,
11. heavy derrick boom
12. derrick head span fitting,
13. derrick head cargo fitting,
14. derrick heel fitting,
15. gooseneck trunnion,
16. cargo winch,
17. cargo runner (or cargo rope, or hoisting rope, lifting rope, or cargo fall),
18. mast head cargo lead block,
19. cargo lead block trunnion,
20. derrick head built-in sheave

21. shackles,
22. upper cargo (purchase) block (or derrick head cargo (purchase) block),
23. lower cargo block (or lower cargo purchase block),
24. becket,
25. ramshorn hook,
26. cargo tackle,
27. span winches (used also for slewing motions),
28. span ropes,
29. mast head span lead block,
30. span lead block trunnion,
31. derrick head span (purchase) block (or lower span (purchase) block),
32. span triangle plate,
33. swivel,
34. span block trunnion,
35. double connecting fork,
36. mast head span (purchase) block (or upper span (purchase) block),
37. span/slewing tackles,

Deck crane



1. crane pedestal (or crane cohimn, or crane post),
2. bolted connection,
3. fixed lower structure,
4. superstructure (or crane body, or revolving super- structure),
5. slewing ring,
6. driving cab,
7. jib (or crane boom),
8. jib heel pin or boom heel pin,
9. luffing (or topping) cylinder,
10. cargo runner (or hoisting rope, or lifting rope),
11. jib head built-in cargo sheaves,
12. crane top built-in cargo sheaves,
13. cargo winch,
14. rope terminal (thimble),
15. shackle,
16. swivel,
17. link,
18. cargo hook (C-hook, or Liverpool hook),

Overhaul of cargo gear

When a cargo block or shackle is replaced, care should be taken to ensure that the replacement is of the correct type, size and safe working load necessary for its intended use.

All shackles should have their pins effectively secured or seized with wire. A special check should be made on completion of the work to ensure that all the split pins in blocks etc. have been replaced and secured. On completion of the gear overhaul, all working places should be cleaned of oil or grease.

Use of ships cargo gear

Typical cargo-handling gear is addressed under particular ship type headings, but some general arrangements can be noted here. General cargo ships are typically fitted with derricks or deck cranes to load or discharge cargo from piers or lighters without assistance. Most tankers discharge cargo with installed pumps and generally carry sufficient cargo hose to connect to receiving terminals; many tankers have small derricks or cranes to handle the cargo hose.

Many ship types are gearless, that is, they are not fitted with cargo gear. Modern container ships rarely have the ability to handle their own containers and can load and discharge cargo only with the aid of specialized port facilities. If installed, container ship cargo gear may consist of conventional derricks or rotating cranes, or traveling overhead gantry cranes. Most bulk carriers are gearless although there are some self-unloaders with installed derrick grabs or conveyor systems for discharging cargo, particularly on the Great Lakes. Roll-on/roll-off (RO/RO) ships load cargo over ramps through stern, bow, or side ports; in the case of trailers, vehicles, and train cars, part of the cargo gear is integral to the cargo itself.

When installed and operable, a vessel's cargo gear can be a great asset to the salvage effort. Lightering is most effective and efficient when accomplished with ship's gear. The large number of derricks or cranes on general cargo ships facilitates loading salvage equipment and placing it in its required location on deck or in holds. Deck mounted gantry cranes are particularly useful for shifting weight longitudinally to adjust trim, weight distribution, or ground reaction; the cranes themselves are large weights that can be shifted.

Deck crane handling

Deck cranes for efficient cargo handling on board cargo ships

Cargo cranes – Shipboard cranes of various types and capacities are still required for multi-purpose cargo vessels, geared bulk carriers, feeders, reefers, heavy lift vessels and some forest product carriers. Manufactures offer crane designs and special handling attachments (container spreaders, rotators and grabs) to suit all dry cargo trades.

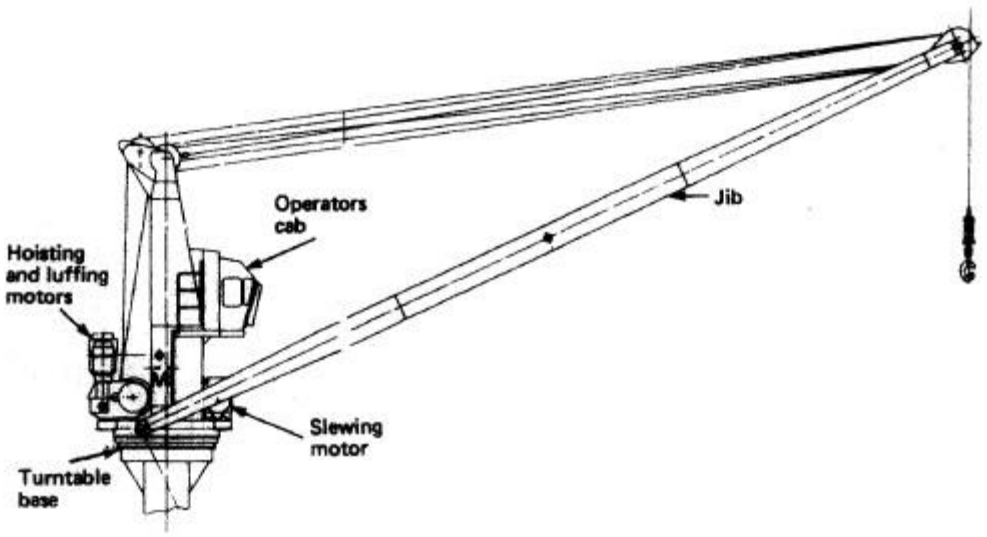
Computer-based cargo spotting systems enable even relatively unskilled operators to cope with the pendulum effects and centrifugal forces. They also help in keeping containers or other cargo units constantly aligned with a given axis, regardless of slewing motion and other external forces. Such electronic aids substantially improve productivity. Some owners report a doubling of the hourly container-handling rate. Other benefits include: reduced operator fatigue, improved safety and lower cargo and ship structure damage.

Cranes have replaced derricks on many modern ships. Generally they are considered as an alternative to the union purchase rig. Deck cranes have a number of advantages, the rigging time being negligible, and the crane is able to pick up and land permitted loads anywhere within its working radius. The safe working loads of cranes is generally of the order of 10 to 15 tonnes and larger cranes are available capable of lifts from 30 to 40 tonnes. As with the union purchase rig the crane is intended for rapid cargo loading and discharging duties with loads which only occasionally exceed, say, 3 tonnes. There is some controversy regarding the merits of cranes as opposed to the union purchase rig, but evidence is available to show that the crane is perhaps less efficient with very light loads.

Cranes may often be positioned on the ship's center line, but this may require an extremely long jib when the ship's beam is large and a reasonable outreach is desired. Transverse positional cranes may then be fitted which, when not under load, can be moved port or starboard and secured to work the hatch and give the desired outreach. Alternatively fixed cranes, one at each end of the hatch, may be placed at opposite corners. This is an arrangement which is useful in discharging to port and starboard simultaneously. There is also a crane which is mounted on a hatch cover section capable of travelling under load along the hatch coaming in the longitudinal direction.

Deck cranes are available from specialist manufacturers and the shipbuilder would be responsible for installation, any local strengthening, and seating. They are normally positioned between the holds, often on a platform which can be rotated through 360°, provides an immediately operational unit requiring only one man to operate it. Double

gearing is a feature of most designs, providing a higher speed at lighter loads. Various types of crane exist for particular duties, for example a general duties crane using a hook and a grabbing crane for use with bulk cargoes.



General Cargo Ship's deck crane

Three separate drives provide the principal movements: a hoisting motor for lifting the load, a luffing motor for raising or lowering the jib, and a slewing motor for rotating the crane. The operator's cab is designed to provide clear views of all the cargo working area so that the crane operator can function alone. The crane is usually mounted on a pedestal to offer adequate visibility to the operator. For occasional heavy loads arrangements for two cranes to work together, i.e. twinning, can be made with a single operator using a master and slave control system in the two cranes. A common revolving platform will be necessary for this arrangement. The operating medium for deck crane motors may be hydraulic or electric, utilizing circuits referred to earlier.

Winches and cranes operation

Winches and cranes fitted for lifting cargo on board is required to be of adequate strength and stability for each load, having regard in particular to the stress induced at its mounting or fixing points , securely anchored, adequately ballasted or counterbalanced and supported by outriggers as necessary to ensure its stability when lifting.



General cargo ship BBC-Kusan mounted with deck cranes

The drum end of wire runners or falls should be secured to winch barrels or crane drums by proper clamps or U-bolts. The runner or fall should be long enough to leave at least three turns on the barrel or drum at maximum normal extension. Slack turns of wire or rope on a barrel or drum should be avoided as they are likely to pull out suddenly under load. When a winch is changed from single to double gear or vice versa, any load should first be released and the clutch should be secured so that it cannot become disengaged when the winch is working.

Steam winches should be so maintained that the operator is not exposed to the risk of scalding by leaks of hot water and steam. Before a steam winch is operated, the cylinders and steam pipes should be cleared of water by opening the appropriate drain cocks. The stop valve between winch and deck steam line should be kept unobstructed. Adequate measures should be taken to prevent steam obscuring the driver's vision in any part of a working area. Nowadays use of steam winches on board merchant ships are out dated.

Ships' cranes should be properly operated and maintained in accordance with manufacturers' instructions. Companies, employers and masters, as appropriate, should ensure that sufficient technical information is available including the following information:-

I. Length, size and safe working load of falls and topping lifts.
II. Safe working load of all fittings;
III. Boom limiting angles;
IV. Manufacturers' instructions for replacing wires, topping up hydraulics and other maintenance as appropriate.

Power operated rail mounted cranes should have the following facilities incorporated in their control systems:-

a) facilities to prevent unauthorized startup;
b) an efficient braking mechanism which will arrest the motion along the rails, and where safety constraints require, emergency facilities operated by readily accessible controls or automatic systems should be available for braking or stopping equipment in the event of failure of the main facility;
c) Guards which reduce as far as possible the risk of the wheels running over persons' feet, and which will remove loose materials from the rails.

When a travelling crane is moved, any necessary holding bolts or clamps should be replaced before operations are resumed. Access to a crane should be always by the proper means provided. Cranes should be stationary while accessing.

Deck crane maintenance

All deck machinery is exposed to the most severe aspects of the elements. Total enclosure of all working parts is usual with splash lubrication for gearing. The various bearings on the shafts will be greased by pressure grease points. Open gears and clutches are lubricated with open gear compound. Particular maintenance tasks will be associated with the type of motor drive employed. On some vessels, it was reported that the ship's staff had carried out unauthorized repairs to crane jibs by cropping and welding inserts over damaged or wasted sections. Crane jibs are subject to heavy, fluctuating loads and must be periodically inspected, surveyed, load-tested and certified. They are often made of high-tensile, for which special procedures have to be observed during repairs. Therefore, repairs must be carried out only in consultation with the manufacturer and classification society concerned. Any damage noticed to crane jibs must be reported to the ship owner/manager and advice sought before carrying out any kind of repair.

Cargo hold access requirement

Cargo holds access arrangement - Merchant ships procedure and guidelines

Hold access - New ships

Where the keel of a ship is laid or the ship is at a similar stage of construction, after 31 December 1988 the following standards of hold access should be provided:

i) The access shall be separate from the hatchway opening, and shall be by a stairway if possible.

ii) A fixed ladder, or a line of fixed rungs, shall have no point where they fill a reverse slope.

iii) The rungs of a fixed ladder shall be at least 300 mm wide, and so shaped or arranged that a person's foot cannot slip off the ends. Rungs shall be evenly spaced at intervals of not more than 300 mm and there shall be at least 150 mm clear space behind each rung.

iv) There shall be space outside the stiles of at least 75 mm to allow a person to grip them.

v) There shall be a space at least 760 mm wide for the user's body, except that at a hatchway this space may be reduced to a clear space of at least 600 mm by 600 mm.

vi) Fixed vertical ladders should be provided with a safe intermediate landing platform at intervals of not more than 9 meters.

vii) Where vertical ladders to lower decks are not in a direct line a safe intermediate landing shall be provided.

viii) Intermediate landings shall be of adequate width and afford a secure footing and extend from beneath the foot of the upper ladder to the point of access to the lower ladder. They shall be provided with guard rails.

ix) Fixed ladders and stairways giving access to holds shall be so placed as to minimize the risk of damage to them from cargo handling operations.

x) Fixed ladders shall, if possible, be so placed or installed as to provide back support for a person using them; but hoops shall be fitted only where they can be protected from damage to them from cargo handling operations.

Hold Access - Existing Ships

Where the keel of a ship was laid or the ship was at a similar stage of construction before 1 January 1989, at least the following standards of hol access should be provided:

i) Access should be provided by steps or ladder, except;

ii) At coamings; and

iii) Where the provision of a ladder on a bulkhead or in a trunk hatchway is clearly not reasonably practicable. In such cases ladder cleats or cups may be used.

iv) All ladders between lower decks should be used in the same line as the ladder from the top deck, unless the position of the lower hatch or hatches prevent this.

v) Cleats or cups should be at least 250 mm wide and so constructed as t prevent a person's foot slipping off the side.

vi) Each cleat, cup, step or rung of a ladder shall provide a foothold, including any space behind the ladder, at least 115 mm deep. Cargo should not be stowed as to produce this foothold.

vii) Ladders which are reached by cleats or cups on a coaming should not be recessed under the deck more than is reasonably necessary to kee the ladder clear of the hatchway.

viii) Shaft tunnels should be equipped with adequate handholds and footholds on each side.

ix) All cleats, cups, steps or rungs of ladders should provide adequate handholds.

Cargo handling

Various cargo handling techniques for seagoing general cargo ships

Planning and control of cargo handling

The techniques of cargo handling have, at least in ocean transport, developed considerably over the last decades. This is particularly due to:

a) Technological advances in ship design and lifting equipment

b) Rapid development and increase in the tonnages of bulk cargo

c) The impact of unitisation, and

d) The new and modern techniques of refrigeration, particularly with container carriage.

e) It is shippers, as a group, which have been influencing these developments. The requirements for efficient transport have led the transport industry, port authorities, ship-owners etc., to develop new concepts for ship technology and cargo handling. It is up to the individual shipper to utilize the available methods of transport and cargo handling, in order to be competitive in the international markets. As a minimum, requirements must be properly defined by shippers so that the most appropriate services may be made available by the carrier. The shipper will have to prepare consignments for transport. The handling and storage of cargo is not his immediate responsibility, but as it will influence the total transport cost and quality, shippers' will have to ascertain that the best available methods are provided and used. While in transit, commodities are represented by documents. It is in the shipper's interest to see to that the paper work is handled efficiently.

Cargo preparations

Some sort of packaging will normally be a prerequisite for carrying commodities as general cargo, especially in break bulk. Packaging has at least three functions:

a) To protect the goods;
b) To keep a consignment together;
c) To prevent the goods from damaging the environment.

Transport usually subjects the cargo to mechanical forces (shocks, vibrations, pressures) and/or climatical forces (temperature, moisture). At least for a conventional shipment, the packaging needs to be strong enough to withstand the rigours of stowage and multiple handling. Goods which are not packed properly may damage other goods in the same transport. In such cases the shipper may be liable. Paper and carton are traditionally mostly used in local transport, where the risk of damage is usually smaller. Plastic and especially jute are used to produce bags. Bags are commonly used to pack traditional bulk commodities in small quantities, like cement, sugar or grain. Wood is still common to make cases or crates. Drums and barrels are made of metal or plastics and are used for transport of liquids in small lots.

The shipper has to follow procedures laid down by public authorities as well as commercial practice with regard to packaging, marking and declarations of contents.

The marking should embrace at least the following:

a) **Destination**: Address of the end receiver, transshipment, order-number.

b) **Handling instructions**: Especially with fragile commodities it is important to mark the package with handling directions to avoid breakage and other damages. To avoid language difficulties a set of internationally recognised signs are developed for cargo marking.

c) **Dangerous goods**: Some goods are classified as dangerous. In general, goods are regarded as dangerous if they have chemical or physical properties which can damage other goods, materials or the environment. Examples are explosives, flammable liquids or gases and poisons. IMO, the International Maritime Organization, has worked out rules for the handling

of dangerous goods at sea in conventions which have been ratified by most member countries. These rules incorporated in the IMDG code contain regulations regarding packaging, marking and labelling, stowage requirements, etc. for various types of explosives, gases, and various types of inflammable materials.

Cargo loading and discharging The rate at which cargo is loaded aboard or discharged from a ship has a significant bearing upon the overall cost of transport. Excessive time in port deprives consignees of the use of their goods, and ship operators of the use of their vessels. Therefore, the improvement of cargo handling methods has been a constant aim of many of those concerned in the operation of ships.

Every cargo handling or transfer system consists of a number of identifiable elements. Goods are moved from one place to another, such as a quayside storage area and a ship's hold. Then there is the commodity itself, which may take many forms, as already described.

Finally, there is the medium by which the cargo is transferred, which may be manual labour, specially designed equipment or some combination of the two. In an efficient system, these four elements must be properly matched. This implies a certain cooperation between the port authority, the ship-owner, the shipper, and the possible stevedoring company engaging the port labor.

The earliest efforts to increase cargo handling rates were concentrated mainly on the transfer medium, and led to the development of a wide range of mechanical equipment, such as cranes, conveyors etc., which has substantially improved loading and discharging rates, especially for bulk cargoes. General cargo handling has, however, not benefited to such a great extent from such developments.

In liner shipping, the principal restriction to high handling rates has always been the large variety of packaging used for general cargo, so that significant improvements have only become possible by reducing the number of different forms in which goods are presented for shipment.

Thus it is only with the adoption of unitization that general cargo carriers have achieved high transfer rates and been able to take advantage of handling techniques similar to those which have been developed for homogeneous cargoes. It is customary to distinguish between vertical and horizontal loading of ships as well as other means of transport. With vertical loading, the cargo must pass over the rail of the ship and into holds through hatches in the deck.

Derricks, cranes and conveyor belts are commonly used for the transfer of dry commodities. Liquids and gases are moved through pipelines. This traditional method is very useful for the handling of bulk cargoes.

Horizontal loading of cargo is done through openings in the bow, side or stern of a ship. These ships are commonly referred to as roll-on/roll-off (Ro/Ro) ships as the cargo can be accepted on wheeled vehicles. Flexibility and fast port turnarounds are the essential feature of Ro-Ro operations, and cargo handling rates can be significantly increased.



Discharging of a train coach via the stern door of a Ro/Ro ship

Not all horizontal loading ships are strictly Ro-Ro ships. Pallet carriers may, for example, have side doors only and the cargo is loaded or discharged by fork-lift trucks operating on the quayside.

Summarized below some more details on general cargo ship cargo handling procedure and operational information:

Cargo handling procedure for heavy indivisible loads

Heavy indivisible loads may be defined as those which, because of their mass and/or shape cannot be handled by the normal gear available on board ship or on the quay alongside. Containers of 20-30 tonnes are handled rapidly and continuously at dedicated terminals where they are no longer considered heavy lifts. However, in ports where specialist gear is not available, they may have to be treated and handled as heavy lifts.



Heavy lift cargo

The techniques for handling and transporting very heavy indivisible loads have changed and become more specialized with the growth of the offshore industry, developments in onshore oil and chemical plant construction and the move to gas-fired power stations. Although the offshore market has the largest indivisible loads because they rarely move on land (other than a few meters to load out onto barges or semi- submersibles) the other markets have taken to modular construction and technical advances have created much heavier and denser loads. The newest gas turbine thermal blocks are over 550 tonnes in a small concentrated area and oil refinery reactors are frequently over 1,400 tonnes in a single tower.

National road limits vary from country to country, but the controlling factors are usually bridges that have to be crossed, elevated highway sections that cannot be shadowed by running underneath, or physical size obstructing movement where just removal of street furniture is insufficient to clear a passage. In extreme cases, buildings have been removed to allow passage and then rebuilt after movement.

Commercially, heavy lifts are divided into four groups for lift on/lift off operation. They are:

a) under 200 tonnes,
b) 200499 tonnes,
c) 5001,600 tonnes, and
d) over 1,600 tonnes.

There is a large fleet of vessels able to handle group (a) including many of the multi-purpose container feeder vessels and some of the remaining traditional liner vessels. A reasonable number of these are able to handle group (b) although many have restricted outreach. Group (c) is where the specialist heavy lift carriers take over as the sole operators. There are presently (2011) heavy lift vessels in service with dual gear capable of lifting 2000 tonnes and new building orders are in place for two ships fitted with 2×1,100 tonnes cranes each and thus able to lift up to 2,200 tonnes. Lifts in excess of 2,000 tonnes are usually handled by roll-on/roll-off specialist vessels, including semi-submersibles being used as deck ships.

The Load

At the time of booking and pre-planning the transport of a heavy load, the following information is vital:

a) the weight, size and construction (plans) of the load;
b) the required (or permitted) support points for the load;
c) the maximum permissible load for each support point;
d) where and how the lifting attachments may be made on the load;
e) the location of securing points on the load;
f) any restrictions relating to the speed of movement of the load;
g) details of additional lifting equipment required to handle the load including the provider, its weight and whether it is to travel with the load;
h) the position of the center of gravity of the load which is crucial for major heavy lifts, particularly when using multiple lifting gear;
i) the heavy load itself should be prominently marked with its weight, center of gravity and correct slinging points on each side and on the top.

Shippers will normally require diagrams showing lifting stresses together with full lashing and securing arrangements. In many cases this will be a charter party/booking note detail to be approved by both parties before booking is concluded. Shippers will often require approval of the drawings by both their own engineers and the warranty surveyor before lifting can proceed. Lashing and securing drawings will often require accompanying calculations showing the anticipated maximum forces the cargo will experience during transit on the vessel.

As wharves often have service ducting along the seaward margin, the authority at both loading and discharge ports must specify the closest permitted point of approach to the edge on the wharf, which will define the outreach needed from the ship. Some wharves will only permit landing of heavy cargo at high tide and also require prompt removal while the tide is still high, to avoid excess stress on the structure.

Preparation

A mast or Sampson post supporting a traditional heavy lift derrick should, unless suitably stiffened, be supported by not less than three stays; one leading in the fore and aft line and the others leading to each side forming an angle of about 45° with the former. Stays and shrouds should be set up taut and stretching screws securely stopped. A slack stay will not commence to function until after the mischief has been done. Careful attention should be given to the ship's plans relating to the rigging and staying of the heavy lift gear.

All leads should be set up to avoid chafing the falls. Avoid slack turns getting on to the winch barrel when winding in slack wire the presence of such is fraught with great danger when the derrick becomes loaded. Where "steam guys" are led to a single winch, care must be taken to ensure that the weight of both remains balanced, and that one does not become slack during any stage of the operation. It is sometimes the practice to overcome this problem by securing the end of the topping lift purchase to a yoke which in turn supports the end of each steam guy. Thus although the derrick may be topped or lowered a weight is maintained on the steam guys no matter at what angle the derrick is operated. In these circumstances care must be taken to ensure that the yoke is so positioned that it will operate correctly.

It is important that the vessel is trimmed to an upright position before heavy lift operations commence. In many instances vessels are fitted with fast-flooding ballast transfer tanks. Additionally, the vessel should not only be upright when lifting commences, but should, if possible, be maintained close to that position throughout the operation by use of ballast tanks. When a vessel is working heavy cargo with its inherent risks, all crew should be on deck and all non-essential shore personnel should be put ashore for their own safety.

The Gear

In the U.K. a heavy derrick, crane or hoisting machine with its gear, has to be tested with a proof load which should exceed the safe working load as follows:

Safe Load Proof Load

- Up to 20 tonnes 25% in excess
- 2050 tonnes 5 tonnes in excess
- Over 50 tonnes 10% in excess

Note: Both “**ton**” and “**tonne**” are units of weight, but a “**ton**” is a British and American measure, while a “**tonne**” is a metric measure. A “**tonne**” is equal to 1,000 kg. ... The North American **ton** (only used **in the** United States and Canada) is equal to 2,000 pounds or 907.1847 kg.

The gear should be adequate for the load, including any extra weight, e.g. for lifting tackle, which itself may well weigh many tons. The heavy lift derrick should not be operated in a depressed condition, i.e. near the horizontal, since if the vertical component of the thrust becomes low, there is danger of the heel springing out of the shoe.

When using container cranes to handle un-containerized heavy indivisible loads, there may be provision for a "rams horn hook" to be installed in place of the container spreader. In some instances the spreader has special lugs to which lifting wires may be shackled and the heavy lift supported directly by the spreader. Where shore gantry cranes are used, it must be ascertained that the port of loading and port of discharge have cranes of suitable capacity, with the necessary distance between the legs (and/or a revolving spreader) to allow the load to be handled. The gear in use should be exactly as indicated in the diagrams that have been approved by the shipper's engineers or warranty surveyors and match the calculations that have been approved.

At all times check the validity of all parts of the lifting gear, including all loose items, before contracting to lift.

Tackle

Slings should be made up of the appropriate wire or chain to provide an adequate safe working load, and of the correct length so that they do not damage the cargo and do not require shortening because of too long a drift. The two ends of slings should be connected to the block of the derrick with the eyes on the bow of the shackle and not on the pin, especially if the drift between lift and shackle is short and the spread large which should be avoided where possible.

Slinging should be set up in such a way that the load remains level. However there may be occasions when, to allow a particular awkwardly shaped load to enter the hatch square, the load will have to be slung at an angle. If this is the case it must be ascertained that the load itself will not be damaged by such treatment, and the slings made up accordingly.

Where goods may be become crushed, or where the length of the load is such that the angle of the sling will create unacceptable bending moments on the load, the use of a spreader, or beam may be required. As mentioned earlier the weight of any such tackle must be included in the calculations for the lifting gear. Full use must be made of all proper lifting points on the load, and those points which are marked as suitable for placing the sling.

Use only the certificated tackle as approved in the lifting and securing diagrams.

If, for any reason, an exact following of the lift and securing diagram is not possible and additional or different tackle is required, err on the side of caution and use higher rated tackle. If new calculations can be approved for lesser tackle then this can naturally be done, but always check all calculations done by others before proceeding.

Vertical and Horizontal Movement

Careful winch driving is essential to avoid the gear being put to undue strain. Too great a speed of operation increases the strain on the hauling part and may be dangerous if for any reason it should become necessary to stop suddenly. When lifting or lowering into or out of the hold, weight should be slowly taken up or lowered down so as not to stress the gear.

When traversing either in or out of the hold from or to the shore the vessel should be maintained as close as possible to upright using ballast water in ballast tanks.

When lifting from or lowering to the wharf, the weight must not be taken up or taken off by use of power alone. If possible, when lowering a heavy load to the ground after just touching, when almost all of the weight is still on the hook, the vessel should be ballasted further down to take the weight from the hook. If this is not possible then a falling tide can do the same as ballasting down, but may be slightly slower. Unwinding the weight too quickly direct from the winch will cause the vessel to heel and possibly drag the heavy lift with it, creating dire consequences. When lifting, a rising tide can be used if de-ballasting is not an option. In a closed dock situation, where moving ballast is not an option, then all movement should be very slow and carefully monitored. When transferring a heavy lift contracted for water/water movement, the calmest conditions possible are needed and the added difficulties involved should be taken into account when contracting. Landing or picking up a floating heavy lift in even a small swell puts excess stress on all parts if the equipment.

Stowage Requirements

The stowage position selected for a heavy lift must be that which can best support its weight. Additionally, there may be a requirement to have the lift in such a position in the ship that the g-forces generated by pitching and scending will not affect the load or its securing.

The load should be positioned so that heavy point loading is not exerted on deck or tank top plating in between frames and beams. When this is not possible, bearers should be provided to spread the load. Usually bearers are laid fore and aft or diagonally to achieve the maximum support from floors and beams. Load spreading should take into account both the transverse frames and the longitudinal strengthening. Heavy lifts should be stowed in a position that can be directly plumbed by the lifting hook so that dragging is not required for either loading or discharge, i.e. in the hatch square of a general cargo ship. Other factors to be considered to expedite the safe loading, carriage and discharge of a heavy lift are:

1. The lift should be prominently marked with its weight, center of gravity and lifting points by the manufacturer prior to arriving alongside the ship. Items marked with conflicting information, particularly regarding weight, should not be shipped until such information has been verified;
2. Individual heavy items should not be consolidated into a single unit using inadequate securing as this will affect the requirements of 1 above and also risk an accident if securing fails;
3. Individual lifts should not be tightly stowed leaving insufficient space for slinging at the discharge port;

4. The use of plenty of bearers and dunnage;
5. Lifts must be handled and stowed in accordance with markings on each piece and/or instructions from the shipper, e.g. "This way up" means exactly what it says.

In container ships (or general cargo ships so-fitted) pads provided for container stowage may be used directly for the support of un-containerized heavy lifts. Another method of supporting the lift is to use flat rack platforms located in container stowage positions with the heavy lift placed on them. However, it should be borne in mind that a heavy lift carried on the tank top of a cellular vessel will likely mean that the container slots vertically above the lift are not available for loading.

Restraint

As mentioned earlier the cargo may have to be restrained during the loading operations particularly if it is on a low friction device such as air or water skids. Once stowed in position lashing, securing and tomming must be carried out to prevent the slightest movement of the load. All lashings must be set up tight and wooden tomming must be secured in such a way that it cannot be dislodged by ship vibration, working or movement. As a rule of thumb, a total lashing on one side of a load should have a combined breaking strain of at least l½ times the total weight of the load to be restrained. Tomming and chocking would be extra to this.

All lashing and tomming should utilize the appropriate and approved points on a load to give the support. Where necessary extra securing points will have to be welded or riveted to ships' frames and decks. Lashing and securing should follow the approved securing diagrams and gear used should be of the specification detailed.

The higher the center of gravity the more the heavy lift will tend to lift in a seaway, so sufficient downward lashings are required. Where possible, weld bracing to the deck to hold the load in position and any additional methods of securing that can be welded direct to the deck/tank ceiling should be used. Always remember safety rules when welding over tanks! Wooden tomming is insufficient on really heavy loads and steel restraints should be used.

After completion of discharge remove all welded securing devices, grind smooth and coat to avoid damage. Remember the underside of tank ceiling /deck plate will also have been damaged and need recoating.

Loading

The ship should be upright when loading (or discharging) a heavy lift and have adequate stability.

The double bottom tanks must be either pressed up or dry. If ship's gear is being used it must be remembered that the effective center of gravity of the load moves to the derrick head as soon as the lift is floated.

Lifting operations should be interrupted to carry out checks on the slinging arrangements:

a) as soon as the weight is taken by the slings.

b) when the load has been lifted a short distance. The whole system should be checked through to ensure that no undue strain is being imposed on gear, equipment, or the load itself.

Clear lines of communication should be established between all those involved in the operation, with one person only in charge. It may be necessary to discontinue other operations close by on ship or shore to allow those involved with the heavy lift to hear and understand the control signals.

Discharging

Similar precautions should be taken to those described under "Loading". Furthermore, it may be that the vessel, being at the end of a voyage or passage, has less bottom weight in the form of fuel and/or water. This will have to be taken into account when considering the stability requirements. It should also be borne in mind that when a heavy lift is hoisted from its place of rest the center of gravity of the weight is transferred to the derrick head. Again it is important that one person only should be in charge of the operation and that all activities are pre-planned with appropriate stops to check equipment and gear. Occasionally heavy lift cargo has to be offloaded straight to the sea. This might be a requirement of semi-submersible vessels or a requirement of the cargo itself e.g. lighters, launches, cylindrical and rectangular tanks, etc. In such cases, provided that the pieces are of sufficiently strong and robust construction to withstand the stresses and falls, they are carried on deck and launched over the side at destination. Cylindrical objects, which must be perfectly watertight and free from small protruding parts, should be mounted on a strong launching structure built of timber, the inboard end of which rests on top of the adjacent hatch and the other on the bulwark, adequately supported at intermediate points. The frame of the structure should incline about 2° in the direction of the ship's side. The discharging is a simple process and is affected by listing the vessel in the desired direction by means of water ballast or fuel oil. Tanks not in use for that purpose should either be empty or pressed up and it should be borne in mind that when the weight drops off, the vessel will roll sharply in the opposite direction.

For lighters, rectangular tanks, etc., a similar structure is built, extending a little beyond the bulwarks.

On top of the main structure a movable cradle-like arrangement is built to the shape of the craft so as to support it at three or four different points, according to its length. This is mounted on launch or slipways formed integral with the main structure with suitable means of locking it into position. The craft is secured by wire lashings to prevent movement during transit and is launched overboard sideways by giving the ship the necessary list.

After Discharge

It sometimes becomes necessary to unship stanchions when stowing heavy lift cargo. All such, forming as they do important parts of the structural strength of the vessel, should be properly restored and secured in their original position before stowing any cargo on the decks above.

When it is not possible or convenient to restore all stanchions into position without seriously embarrassing the stowage, heavy shores of timber laid on stout timber fore and aft bearers should be fitted and tightly wedged into position to carry the weight of the deck above. Neglect to do so will likely result in the deck being set down.

1. Livestock handling brief procedure

The transport of animals is subject to legislation in many countries. Where risk of disease may exist this legislation is rigorously enforced. In most cases the legislation not only covers the importation of animals, but also the transit of animals, through a port.

2. Unitized cargo handling technics for general cargo ship

A grouping together of two or more items (usually of a homogeneous nature) and securing them with banding, glue, shrinkwrap, slings (e.g. clover leaf), to form a unit.

3. Bagged Cargo handling procedure for general cargo ship

Bagged commodities need to be sufficiently robust to withstand external pressure and compression, as the bag is designed to contain the contents rather than provide any substantial protection against external damage.

4. Bales & bundles handling procedure for general cargo ship

Most baled commodities are impervious to damage from rolling or dropping from limited heights. However, it can be dangerous to drop bales of rubber due to their ability to bounce in any direction.

5. Cases, Crates, Cartons, Drums, Barrels, Casks, etc. Handling technics

Cases and crates are usually constructed of plywood or thin low grade timber. Heavier cases may be built up of 150mm×5mm (6×1) planks with strengthening pieces internally and externally while some are built in a skeletal fashion to allow air to permeate through the contents and/or to reduce the weight.

6. DG Cargo handling procedure for general cargo ship

The IMDG Code recognizes nine broad classes of Dangerous Goods. For the correct classification and labelling of Dangerous Goods reference should be made to the IMDG Code.

7. Methods of ventilation used in general cargo ships

Ventilation of cargo may be necessary to remove heat, dissipate gas, and help prevent condensation and/or remove taint. Heat may be generated by live fruit, wet hides, vermin, and commodities liable to spontaneous combustion.

Ventilation requirement

Not every commodity requires or even benefits from ventilation during transport. Cargo loaded in bulk carriers may only benefit from surface ventilation, i.e. a change of air between the underside of the deck or hatch above and the surface of the commodity. It follows that if there is a problem within the stow, such as pockets of moisture, ventilation will have little effect.

Ventilation of cargo may be necessary to remove heat, dissipate gas, and help prevent condensation and/or remove taint. Heat may be generated by live fruit, wet hides, vermin, and commodities liable to spontaneous combustion. Gases which may require dissipation include inflammable and explosive gases such as those emitted by coal, vehicle exhausts in Ro-Ro ships, CO2 and ethylene from ripening fruit and vegetables.

Condensation appears in two basic forms, i.e. ship sweat and cargo sweat. The former appears as beads of moisture condensing on the ship's metalwork and, typically, might occur on the side of the hold when the sea temperature falls and reduces the adjacent metal temperature below the dew point of the surrounding air. Similarly, cargo sweat forms on the surface of the cargo when its temperature is below the dew point of the air adjacent to it.

The removal of existing or residual taint by means of ventilation may be carried out in conjunction with an ozonizing unit and may be required to reduce the probability of sensitive cargo becoming affected by the taint, or to improve working conditions for labor.

The proper ventilation of holds therefore, is indispensable to the correct carriage of some goods, and may assist in the preservation of the ship's structure itself. Sometimes with coal cargoes and those which give off inflammable and explosive gases, or are liable to spontaneous combustion, it may be absolutely necessary for the safety of crew and ship.

A well designed system of ventilation natural or mechanical aims at inducing a constant circulation of air throughout the holds and the mass of cargo by which heat, moisture, fumes, vapors, gases and odors given off by the cargo are discharged into the open air and replaced by air of a dew point suitable to the prevailing conditions. Three systems of ventilation are in general use:

a. The natural ventilation of ordinary cargo compartments, supplemented in certain cases by modified mechanized air circulating systems.
b. The temperature control system of circulating air in insulated compartments, controlling its temperature and the carbon dioxide content given off by certain commodities.
c. Mechanical ventilation in cargo spaces and control of humidity in the compartment.

The principle of most of these types of mechanical ventilation is to reduce the dew point of air in ships' compartments by de-humidification to the point at which ships' sweat and cargo sweat cannot occur. No attempt is made to change the temperature condition in the holds, the whole object being to control the dew point of the air surrounding the cargo.

Correct ventilation can keep cargo in good condition in the great majority of circumstances if properly employed. No system of ventilation can prevent damage if the ship's officers do not

know when to and when not to use it. Also, of course, stowage of the cargo must be correctly planned with regard to the various classes of commodities of which it is composed, together with proper dunnaging and positioning to ensure that the ventilation reaches all the necessary cargo.

Open-top, open-sided and flat rack containers may sometimes be stowed with cargo requiring ventilation while on board, e.g. fruit, vegetables, spices, etc. If stowed on deck then it must be ensured that adequate ventilation can reach the contents while properly protecting them from rain and spray. Additionally, the container should be stowed on deck in such a position that the tilt is protected against damage from wind and waves during the passage. Under deck, the stowage position should be so situated as to take maximum advantage of any mechanical ventilation and care should be exercised against cross-taint, e.g. a container of wet hides might leak strong-smelling brine.

When to Ventilate Some Guidelines

Ventilate if the dew point of the air is lower than the dew point of the cargo space. The changing air will ventilate the cargo space and there should be little danger of condensation.

Restrict ventilation if the dew point of the outside air is higher than the temperature of the cargo. To ventilate under such conditions would cause danger of condensation on cargo as the outside air with higher dew point comes into the cargo space.

When the vessel is fitted with a mechanical ventilation system, the air should be re-circulated within the cargo space when the introduction of external air is restricted. Despite this guidance special attention must, of course, be given to conditions where cargoes are giving off fumes, etc., where according to certain circumstances ventilation may be necessary despite the possibility of condensation. The aim should always be to avoid stowage of cargo requiring different ventilation treatment within the same compartment. Similarly two compartments with different ventilation requirements should effectively be sealed off from each other.

It is often required that cargo normally of a very dry nature, e.g. milk powder, casein, etc., has to be stowed in compartments adjacent to hard frozen chambers. Experience has shown that the most effective method of carrying cargo under these conditions is to restrict the ventilation completely during the passage. In some refrigerated vessels, decks or bulkheads are fitted with thermal injection. The principle of such being to provide a heat input equal and opposite to the heat loss from the refrigerated compartment. The fitting of this equipment is of considerable value in ensuring safe out turn of cargoes stowed under such conditions, but does not warrant departure from the basic principles of ventilation.

The importance of maintaining a dry ship and dry cargo cannot be over emphasized. The cargo should be protected from all unfavorable exposures of temperature and moisture from the point of origin to the delivery and the ship-owner, for his own protection, should know thoroughly the history of the products delivered to his charge and of the condition in which they are received. Typical of this category is the carriage of perishables in open top and open

side containers. It is often the practice for the tilts of these containers to be left open while stowed below decks to improve the ventilation.

These covers should be replaced and secured at time of (or prior to) discharge. Similarly, when loaded, the ship's staff should check the appropriate covers are drawn back to take maximum advantage of under deck ventilation. When terminal staff have adjusted covers for the same purpose during the container dwell time at the terminal, it is important that ship's staff and terminal staff liaise to maintain the weathertight integrity of these containers while at the same time affording the contents maximum ventilation.

The responsibility of the terminal operator includes protection of the cargo on the wharf awaiting loading, in so far as practical conditions permit. Stowage, subject to the same limitations, should provide the most advantageous condition in the ship. Through an understanding of what takes place within a loaded ship, the officers can reduce sweating hazards and provide intelligent operation or sealing of ventilation systems.

There are two options in meeting the problem of cargo sweat: the control of the dew point in all parts of the loaded cargo space or the tempering of the cargo to keep it above the dew point of the air to which it may be exposed while at sea or at warm ports of call or at its destination. As an example, canned condensed milk is sometimes shipped in a warm condition out of temperate latitudes so that cargo sweat has less chance of occurring during the passage through warmer climates.

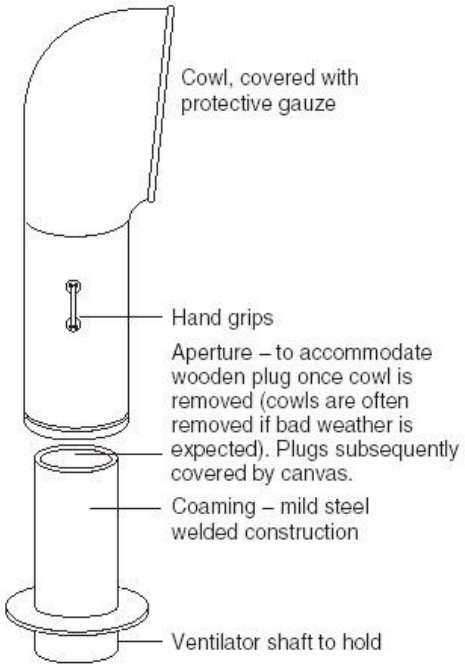
Ship sweat may be prevented by air conditioning systems efficiently designed and efficiently operated. Air conditioning plants are not the panacea for all ills and unless the cargo being served by them is delivered in temperatures above the dew point of the air at the port of delivery, there is no guarantee that condensation will not occur.

The temperature of the air both outside and in different cargo compartments should be regularly taken and recorded. It is of utmost importance that attention to the ventilation of cargo be clearly and regularly recorded in the Deck Log with special mention made of any opening of hatches, etc. The absence of such records may result in large claims for alleged neglect.

In most ships a combination of natural and mechanical ventilation is provided in the accommodation and machinery spaces. Mechanical supply is common, and a natural exhaust may be permitted in a number of compartments; but where fumes, etc., are present, for example from galleys, a mechanical exhaust is required. This is also the case with many public rooms, often crowded and where smoking is permitted. The mechanical supply is by means of light steel sheet trunking, with louvres at each outlet. Fans may be of the quiet running centrifugal type with a separately mounted motor.

The holds of most dry cargo ships are ventilated by a mechanical supply and natural exhaust system. Here the object is to reduce the hold temperatures if necessary and prevent large amounts of condensation accumulating on the hull and cargo. Often the cargo hold fans which are of the axial type are located in the mast houses, although they have been positioned in derrick posts where these posts are used to ventilate the tweens and holds.

Dry cargo ships may also be fitted with de-humidification facilities, controls being provided so that each hold can be supplied with dry air or outside air. If dry air is desired when the weather dew-point approaches or is above the temperature in the hold, the air supply or recirculating air may be drawn through a conditioning plant where it comes into contact with a moisture absorbing solution. A dry air fan then passes this de-humidified air to the cargo hold ventilation system. Air conditioning is a common feature in the accommodation of modern ships. Room temperatures are controlled by a thermostat, heated or chilled air may then be supplied as required and humidity control is also provided.



Cowl ventilators

Natural Ventilation method

In natural ventilation method, cowls are trimmed into the wind to take in outside air, and trimmed back to wind to allow the air circulation an exit from the hold. Fans may be incorporated into this cowl ventilator system especially for the lower hold regions where fans assist delivery and air extractors assist the exhaust system. Cowls may also be fitted with manually operated closure flaps.

Forced Ventilation method

More recent developments in ventilating systems have led to air being pre-dried before entering the hold. In some cases the temperature of the air as well as its humidity may be controlled before entering the compartment .This artificial or forced ventilation, has become

increasingly popular because, when properly used, it can almost prevent any sweat damage to cargo.

The holds of most dry cargo ships are ventilated by a mechanical supply and natural exhaust system.

Methods of stowage used in general cargo ships

The stowage factor of any cargo is the volume which a certain amount in weight of that cargo occupies. It is usually measures in cubic feet per long ton or alternatively in cubic meters per metric ton. If the stowage factor is 20, it indicates a heavy cargo. If it is 100, it indicates that the cargo is light.

Intermediate Bulk Containers (I.B.C.) Handling technics - general cargo ship procedure

An I.B.C. is a disposable or re-usable container designed for the carriage of bulk commodities in parcels of between 0.5 and 3.0 tonnes.

Dunnage requirement for general cargo ships

The traditional reasons for the use of dunnage have been largely superseded with the introduction of containers and general cargo ships with shallower decks and holds.

Methods of refrigeration used in general cargo ships

Refrigeration is essentially the removal of heat through the process of evaporation. We choose to refrigerate commodities such as fruits and vegetables because we want to prolong their “practical shelf life” – the time from harvest until the product loses its commercial value.

Deck Cargo handling procedure for general cargo ship

A large variety of goods, because of their inherent properties (length, height, weight, etc.) may be carried on deck. "On deck" means an uncovered space and includes deck houses having doors which can be continuously open (except in heavy weather).

Guideline for deck officers

It would be normal practice for the Chief Officer to be provided with the cargo manifest by the ship’s agents at the last port of discharge or the next Loading Port. Inspection of this would subsequently provide details on all cargo parcels, inclusive of the tonnages and the destination of said cargo. This would then allow a loading plan to be constructed, preferably prior to arrival. In any event the Chief Officer would note special items on the manifest, in particular:

- Hazardous cargoes;
- Heavy Lift cargo;
- Valuable/special cargoes.

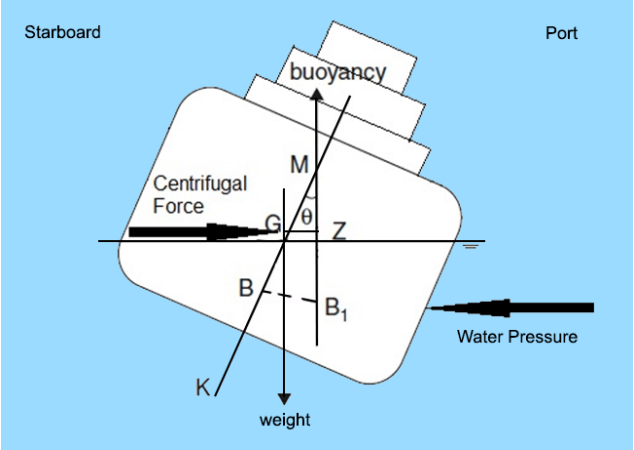
The Chief Officer is responsible for the safe handling, loading and discharge of the ship's cargo, and to achieve this safely and satisfactorily he would carry out the following activities and duties:

1. Having obtained the details of tonnages/capacities of cargo from the manifest, the Chief Officer would develop an appropriate loading plan for the ship, to give a hold distribution of the cargo, to allow multiple hatch discharge.

2. The Chief Officer would carry out a ship stability assessment, taking into account the appropriate tonnages, together with bunker capacity, stores and ballast arrangements. This assessment would be expected to confirm an appropriate 'GM' for the vessel, and ensure that the vessel does not infringe load line regulations while on passage.

What is GM on *merchant* ship stability?

The metacentric height (**GM**) is a measurement of the initial static **stability** of a floating body. It is calculated as the distance between the center of gravity of a **ship** and its metacenter. A larger metacentric height implies greater initial **stability** against overturning.



3. Prior to commencing loading cargo the Mate would order the cleaning of all cargo spaces, the testing of bilges, checks on hold lighting, ventilation, and general hold conditions, inclusive of spar ceiling and dunnage arrangements. (NB. One of the Chief Officer's tasks is to order clean dunnage as for the ship/cargo requirements).

4. The Chief Officer would act in a supervisory role of a junior cargo officer and ensure that the cargo plan was being correctly constructed during any loading period.

5. 5. Where special cargo is to be loaded, the Chief Officer would be expected to take a positive role to ensure adequate loading facilities are provided and correct stowage is available, i.e., heavy lift derricks rigged correctly, tally clerks available if required, etc.

6. Documentation on specific cargoes, such as hazardous parcels, livestock, or valuables would be obtained and administered by the Chief Officer.

7. The Ships Mate would monitor the draught and ensure that the Load line regulations are not infringed causing the marks to be submerged below the summer load line. He/she would

order the density of dock water to be obtained and take into account the Dock Water Allowance.

8. Any damaged cargo received on board would be noted and the Bill of Lading would need to be endorsed. Similarly, on receipt of special cargo the Chief Officer may be called on to issue a 'Mates Receipt' for cargo delivered on board.

9. In conjunction with junior cargo officers the Mate would ensure that all cargo is stowed correctly and secured in the stowed position against all expected ship movement when at sea.

10. His/her duties include the despatch of all the relevant cargo documentation including the cargo plan to the company agents prior to sailing departure.

Suitable safety nets or temporary fencing should be rigged where personnel have to walk or climb across built-up cargo, and are therefore at risk of falling.

When deck cargo is stowed against and above ship's rails or bulwarks, a wire rope pendant or a chain, extending from the ring bolts or other anchorage on the decks to the full height of the deck cargo, should be provided and used to save personnel having to go over side to attach derrick guys and preventers directly to the anchorages on the deck.

Where beams and hatch covers have to be removed at intermediate ports before surrounding deck cargo is unloaded, an access space at least one meter wide should be left adjacent to any part of the hatch or hatchway that is to be opened. If on deck this is impracticable, fencing or lifelines should be used to enable seamen to remove and replace beams and hatch coverings in safety.

In the `tween decks, guidelines should be painted around `tween deck hatchways at a distance of one meter from the coamings.

Personnel undertaking duties in cargo spaces should move with caution over uneven surfaces or over loose dunnage and be alert to protrusions such as nails etc.

Where vessels have been built with corrugated bulkheads precautions such as suitable rails, grids or nets should be erected to prevent cargo handlers or other personnel from falling into the space between the rear of the corrugation and the stowed cargo.

Where work is being undertaken on or near the cargo `face', the `face' should be secured against collapse, especially where bagged cargo may be bleeding from damage. Where it is necessary to mount a `face' a portable ladder should be used, properly secured against slipping or shifting sideways, or held in position by other personnel. When work is undertaken in areas where there is a risk of falling, safety net(s) should be erected. Such nets should not be secured to hatch covers.

Personnel should be aware that cargoes may have been fumigated at other points in the transport chain, and there is a risk of that toxic fumes may build up in enclosed spaces.

Preventing Ship's hull/structure damage during cargo operation

All damages should be reported to the ship's Master. Where hull damage is identified, which may affect the integrity of the hull structure and the seaworthiness of the ship, the ship's owner and classification society must be informed.

A general inspection of the cargo spaces, hatch covers and deck is recommended to identify any physical damage of the hull structure. Any structural damage found is to be reported to the classification society and for major damage, cargo operations are not to be undertaken.

During initial inspection of a vessel's flat bottom in dry-dock, large parts of the duct keel plating were found dented and deformed over almost its entire length. It was later established that overloading of the vessel's keel structure was caused by the owners submitting an outdated docking plan and the yard, unable to use the plan, repositioning the keel blocks without performing additional calculations. There were extensive repair costs, delays and disputes between the owners and yard as to liability. Proper planning of the docking process and a clear contract between the owners and yard are important to help avoid such disputes arising.

Cargo information rules

The MS (Carriage of Cargoes) Regulations 1999 (SI 1999/336) [Regulation 4(1)] specifies that the shipper must provide such information to the operator or master sufficiently in advance of loading to enable them to ensure that: • the different commodities to be carried are compatible with each o:her or suitably separated;.

Cargo packaging - general cargo ships procedure

To achieve compatibility between cargo owners and the owners of the means of transport requires knowledge of the cargo-handling procedures in transport. These procedures are described with reference to major characteristics of commodities and cargoes.

Cargo stowage plan

The copies are forwarded to agents at ports of discharge to allow the booking and reservation of labor, as appropriate. Relevant details of cargoes, i.e. total quantity, description of package, bales, pallets etc., tonnage, port of discharge, identification marks and special features if and when separated.

Shipment procedure for cargoes in different forms

General cargo is a term that covers a great variety of goods. In regard to modern cargo handling it refers to loose cargo that has not been consolidated for handling with mechanical means such as unitized or containerized cargo. It refers to individual items of any type of cargo, bagged or baled items, cases or crates, individual drums or barrels pieces of machinery or small items of steel construction.

Information exchange on cargo stowage and planning

Advance planning, exchange of information, and continuous ship to shore communication are all critical. All cargoes should be stowed and secured in a manner that will avoid exposing the ship and persons on board to unnecessary risk.

Lifting and carriage of deck cargo

The safe securing of all deck cargoes should be checked by a competent person before the vessel proceeds on passage. The master is responsible for ensuring that it is correctly stowed and adequately secured for the intended voyage. Areas on the deck which are not to be used for cargo stowage should be clearly marked or otherwise indicated.

Safe use of pesticides on board cargo ships

Ship's personnel should not handle fumigants and such operations should be carried out only by qualified operators. Fumigation should only be carried out with the agreement of the ship's master.

Types of packaging & stowage methods for break bulk cargo

The rigging time being negligible, and the crane is able to pick up and land permitted loads anywhere within its working radius. .

Various commodities carried by general cargo ships

Cargoes should be stowed and secured in a manner that will avoid exposing the ship and persons on board to unnecessary risk. The safe stowage and securing of cargo depends upon proper planning, execution and supervision by properly qualified and experienced personnel.

Safe lifting, stowage and carriage of containers on cargo ships

System of work for containerized cargo

All cargoes should be stowed and secured in a manner that will avoid exposing the ship and persons on board to unnecessary risk. The safe stowage and securing of cargo depends upon proper planning, execution and supervision by properly qualified and experienced personnel. Advance planning, exchange of information, and continuous ship to shore communication are all critical.

Containers are simply packages of pre-stowed cargo. The equipment used for lifting a container should be suitable for the load, and safely attached to the container. The container should be free to be lifted and should be lifted slowly to guard against the possibility of the container swinging or some part of the lifting appliances failing, should the contents be poorly secured, unevenly loaded and poorly distributed or weight of contents incorrectly declared.

The process of loading and securing of goods into a container should follow the IMO/ILO/UN/ECE Guidelines for Packing of Cargo Transport Units (CTUs). Special care should

be taken when lifting a container the center of gravity of which is mobile, e.g. a tank container, bulk container or a container with contents which are hanging.

Safe means of access to the top of a container should be provided to release lifting gear, and to fix lashings, and personnel so engaged should, where appropriate, be protected from falling by use of a properly secured safety harness or other suitable means. Where containers are stacked account should be taken of the appropriate strength features and stacking induced stress. Containers should be lashed individually.

On ships not specially constructed or adapted for their carriage, containers should, wherever possible, bestowed fore and aft, and should be securely lashed. Containers should not be stowed on decks or hatches unless it is known that the decks or hatches are of adequate overall and point load-bearing strength. Adequate dunnage should be used.



Un-stuffing bagged rice from a container

The system of work should be such as to limit the needs to work on container tops. Where the design for securing of containers and the checking of lashing makes access onto the container tops necessary, it should be achieved by means of the ship's superstructure or by a purpose- designed access platform or personnel cages using a suitable adapted lifting appliance. If this is not possible, an alternative safe system of work should be in place.

To allow access to the tops of over-height, soft top or tank containers where necessary for securing or cargo handling operations, solid top or "closed containers" should be stowed between them whenever practicable.

Where the ship's electrical supply is used for refrigerated containers, the supply cables should be provided with proper connections for the power circuits and for earthing the container. Before use the supply cables and connections should be inspected and any defects repaired and tested by a competent person.

Supply cables should only be handled when the power is switched off. Where there is a need to monitor and repair refrigeration units during the voyage, account should be taken of the need to provide safe access in a seaway when stowing these containers.

Personnel should be aware that containers may have been fumigated at other points in the transport chain, and there may be a residual hazard from the substances used.

It is important to plan in advance, both at the shore terminal and offshore to aid effective cargo securing. The objective of pre-planning is the safe and practical restraint of cargo carried on the deck of offshore support vessels so that personnel, ship and cargo may be reasonably protected at all stages of carriage, and during cargo operations offshore.

The master and the Offshore Liaison Manager or their representatives must establish liaison prior to unloading or back loading of cargo.

The order of loading/discharging and stowage arrangements should be pre-planned in order to avoid wherever possible the "slotting-in" of containers and the necessity for any person to climb on top of the cargo.

The master should ensure he is provided with details of any unusual items of cargo, including dangerous goods, cargoes requiring special sea-fastening arrangements, or heavy lifts before loading.

Working in cargo spaces on board general cargo vessel

Safety arrangements prior to working cargo should ensure that adequate and suitable lifting plant is available, in accordance with the register of lifting appliances and cargo gear, and that all plant and equipment, and any special gear necessary is available and used. Cargo gear should be checked regularly throughout the cargo operation for damage or malfunction.

Repair or maintenance work, such as chipping, spray painting, shot- blasting or welding, should not be undertaken in a space where cargo operations are in progress, if such work could create a hazard to personnel working in the space.

Loads being lowered or hoisted should not pass or remain over any person engaged in any work in the cargo space area, or over means of access. Personnel should take care when using access ladders in hatch squares whilst cargo operations are in progress.

Cargo information for goods should always provide the gross mass of the cargo or of the cargo units. Where loads of significant gross mass are not marked with their weight, the loads should be check-weighed unless accurate information is available as provided by the shipper or packer of the goods.

A signaler should always be employed at a hatchway when cargo is being worked unless the crane driver or winchman has a complete unrestricted view of the load or total working area. The signaler should be in a position where he has a total view of the operation, where this is not possible then additional signalers should be used to assist.

Before giving a signal to hoist, the signalers should receive clearance from the person making up the load that it is secure, and should ascertain that no one else would be endangered by the hoist. Before giving the signal to lower, he should warn personnel in the way and ensure all are clear.

Loads should be raised and lowered smoothly, avoiding sudden jerks or `snatching'. When a load does not ride properly after being hoisted, the signaller should immediately give warning of danger and the load should be lowered and adjusted as necessary.

Hooks, slings and other gear should not be loaded beyond their safe working loads. Strops and slings should be of sufficient size and length to enable them to be used safely and be so applied and pulled sufficiently tight to prevent the load or any part of the load from slipping and falling. Loads (sets) should be properly put together and properly slung before they are hoisted or lowered.

Before any heavy load is swung, it should be given a trial lift in order to test the effectiveness of the slinging.

Except for the purpose of breaking out or making up slings, lifting hooks should not be attached to:

(a) the bands, strops or other fastenings of packages of cargo, unless these fastenings have been specifically provided for lifting purposes;

(b) the rims (chines) of barrels or drums for lifting purposes, unless the construction or condition of the barrels or drums is such as to permit lifting to be done safely with properly designed and constructed can hooks.

Suitable precautions, such as the use of packing or chafing pieces, should be taken to prevent chains, wire and fiber ropes from being damaged by the sharp edges of loads.

When slings are used with barrel hooks or other similar holding devices where the weight of the load holds the hooks in place, the sling should be led down through the egg or eye link and through the eye of each hook in turn so that the horizontal part of the sling draws the hooks together.

The angle between the legs of the slings should not normally exceed 90°, as this reduces the safe working load of the sling. Where this is not reasonably practicable, the angle may be increased up to 120° provided that the slings have been designed to work at the greater angles. However it should be noted that at 120°, each sling leg is taking stress equivalent to the whole mass of the load.

Trays and pallets (unit loads) should be hoisted with four-legged slings and where necessary, nets and other means should be used to prevent any part of the load falling.

Bundles of long metal goods such as tubes, pipes and rails, should be slung with two slings or strops and, where necessary, a spreader. A suitable lanyard should also be attached, where necessary.

Logs should be loaded or discharged using wire rope slings of adequate size; tongs should not be used except to break out loads.

Cargo buckets, tubs and similar appliances should be carefully fitted so that there is no risk of the contents falling out and be securely attached to the hoist (for example, by a shackle) to prevent tipping and displacement during hoisting and lowering.

Shackles should be used for slinging thick sheet metal, if there are suitable holes in the material; otherwise suitable clamps on an endless sling should be used.

Loose goods such as small parcels, carboys, small drums etc should be loaded or discharged in suitable boxes or pallets with sufficiently high sides, and lifted using four-legged slings.

Slings or chains being returned to the loading position should be securely hooked on the cargo hook before the signaler gives the signal to hoist. Hooks or claws should be attached to the egg link or shackle of the cargo hook, not allowed to hang loose. The cargo hook should be kept high enough to keep slings or chains clear of personnel and obstructions.

"One-trip slings", that is, slings which have not been used previously for lifting and are fitted to the load prior to loading, should not be taken back on board ship after the load is discharged at the end of the voyage, but should be left on shore for disposal.

When work is interrupted or has ceased for the time being, the hatch should be left in a safe condition, with either guard rails or the hatch covers in position.

Lighting in cargo spaces

During cargo operations cargo spaces should be adequately lit, avoiding strong contrasts of light and shadow or dazzle. Open or naked lights should not be used. Portable lights should be adequately guarded, suitable for the task, and firmly secured in such a manner that they cannot be accidentally damaged. Portable lights should never be lowered or suspended by their electrical leads, and leads should be run so that they are clear of loads, running gear and moving equipment.

The duties of deck personnel involved would include any or all of the following

1. Prior to commencing cargo, and on the orders of the Chief Officer, the hold spaces would be inspected to ensure that they are ready in every way to receive cargo. They should be cleaned throughout with the bilge pump suctions tested. The hold lighting should be inspected and dunnage correctly laid if required.
2. Hatch covers should be opened (weather permitting) and secured in the correct stowage position.
3. The derricks or the cranes are rigged for correct operation.
4. Tween deck guard rails should be seen to be in place and secure, respective to tween deck vessels.
5. Regular checking of the holds should take place to ensure that holds are being loaded or discharged correctly. Notes should be taken of cargo parcels being loaded to be added to the cargo plan. If discharging, notes being taken of any damaged cargo to be reported to the Chief Officer.
6. All times of cargo work and stoppages are to be recorded in the deck log book.

7. Attention would be given throughout operations to prevent pilferage, smoking in cargo spaces, and damage to the vessel.
8. Where 'general cargo' is being loaded, visits to the shore side warehouse to ensure continuity of flow and special cargoes can be catered for, would be anticipated.
9. Special cargoes which need specific requirements, such as tallying, lock up stow, hazardous goods, port separation or other similar needs should be catered for, and the Chief Officer kept informed on progress.
10. The overall deck security should be monitored throughout, inclusive of gangway and hold access points, fire precautions, ships draught and moorings together with tonnages and capacities loaded per space. Once operations are complete (for the day) the hatches should be secured and locked.

Cargo packaging - general cargo ships procedure

The two principle challenges facing shippers are to satisfy both the customer and the shipper. The customer requires a secure and reliable method of carriage whilst the shipper requires that the space on his vehicle of carriage is fully utilized in order to receive maximum freight.

To achieve compatibility between cargo owners and the owners of the means of transport requires knowledge of the cargo-handling procedures in transport. These procedures are described with reference to major characteristics of commodities and cargoes.

The methods of cargo carriage and packaging must be considered at the very outset of the shipping process.

The size and quality of packages must be compatible with the transport technology contemplated, e.g. utilization of containers depends on positioning packages to avoid empty space. Hence, the considered transformation of commodity to cargo carries significant commercial, operational and economic impact. Space with a container is not just loss of revenue but poses the danger of goods shifting during transit and so sustaining damage.

Basically, packaging performs the following three basic functions, which we may call the three P's of packaging, namely: protection, preservation and presentation. A package should protect and preserve the contents during storage and transit from the harvesting (for agricultural products), manufacturing (for manufactured goods) or mining (for ore or other mineral products), to the consuming center.

Protection is required not only against loss, damage and pilferage, but also, depending on the nature of the contents, against moisture entering or leaving the package, high or low temperatures, light, gases, insect infestation, contamination and other natural hazards. The dry cargoes embrace raw materials, semi-finished or finished goods. They do not require the same containment as gases and liquids.

The number of dry cargo types is almost endless. The type of commodity, the level of finishing, and the transport method will determine the need for packaging and storage requirements. Detailed recommendations of methods of cargo carriage, cargo handling, and transport requirements for various types of goods are found in many literatures.

Storage requirements will tend to determine the choice of transport method. Some commodities have to be kept frozen (e.g. meat) while others need refrigeration (e.g. fruit). Flowers need to reach the customers quickly, while other cargoes need adequate ventilation to avoid combustion (e.g. grain, coal and copra).

The shipper must choose a transport method which secures proper storage and speed of delivery. There are several international conventions as well as common practices shipowners will have to follow to secure proper handling of different cargoes onboard a ships.

Loading of dry bulk cargo at dedicated bulk terminal

Packaging will also have to be considered relative to the transport method chosen. Some raw materials, like ores, need not be packaged at all. If finished goods are moved in containers, the packaging required is much less than if the goods are transported in individual cases.

Shipment procedure for cargoes in different forms - general cargo ships guideline

General cargo is a term that covers a great variety of goods. In regard to modern cargo handling it refers to loose cargo that has not been consolidated for handling with mechanical means such as unitized or containerized cargo. It refers to individual items of any type of cargo, bagged or baled items, cases or crates, individual drums or barrels pieces of machinery or small items of steel construction.

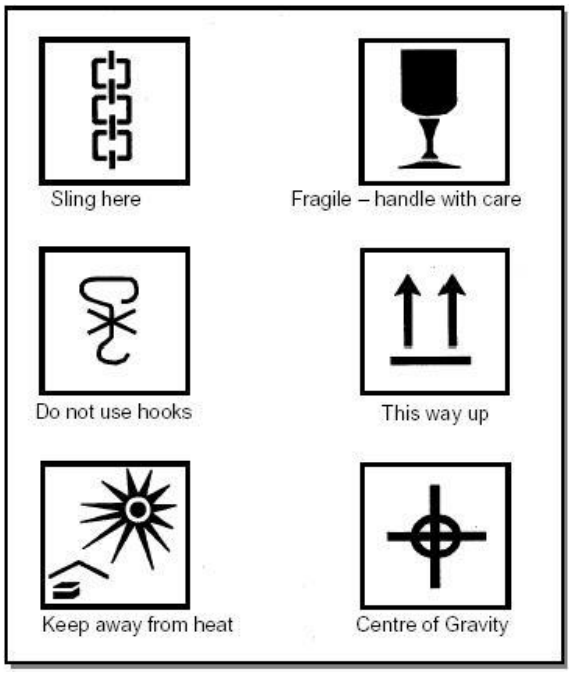
If general cargo is to be loaded on a ship in general stow it is usually man handled into place. Hence the reason why general cargo is rarely seen in developed countries today, the cost of handling such items is prohibitive and the time taken is unacceptable for most maritime operations.

In stow, general cargo is susceptible to crushing damage from other items of cargo or damage from the ship's steel work, general handling damage, sweat damage and from pilferage. Hence cargo stowed in this state must be protected with suitable dunnage depending on the type of cargo and the risk of such cargo in stow.

For example, bagged cargo if susceptible to moisture damage should never be stowed against the steel in the cargo compartment, some type of dunnage or cargo battens must be placed between the cargo and the steel work.

Cargo susceptible to crushing General cargo must be appropriately labelled. Usually with the port of destination and must be placed in top stow. Food stuff can often taint other cargoes so must be stowed apart. Some cargoes need ventilation and must be stowed accordingly.

Cargo that has a value to any individual must be protected from pilferage, examples of this are shoes and clothing, beer and spirits, grocery items and electrical goods. the consignee's identification, this is called the ‘cargo mark’. And it is this mark that is also shown on the Bill of Lading and the Cargo Manifest.



International symbols for cargo stowing

Shipment of ore in a general cargo ship

While it is now very uncommon for ore to be carried in a `tween deck cargo ship, it should be noted that the cargo should be spread between both the hold and the `tween deck(s) and trimmed into the ends and wings of each space to ensure that stresses are kept to a minimum. Great care must be taken to ensure that prescribed tank top and deck loadings are not exceeded.

Should the ore be forming only part of the cargo, it must be levelled off and a substantial separation laid to ensure that any over stowing cargo is completely protected from contact with the ore. Such separation should consist of at least dunnage and plastic sheeting. Great care should be taken in selecting cargo to over stow ore as it is likely to prove impossible to provide complete protection from contamination and/or wet damage. Oils or acids should never be stowed on or over ore.

It is the responsibility of the shipper to ensure that general cargo is presented for shipment suitably packaged to prevent damage in handling. If there is any risk in handling damage then the items should be clearly marked with the international symbols as shown above.

Due to the numerous small parcels making up general cargo, it is usual to tally such cargo onto the vessel while loading and in some instances discharge tallies are also conducted. Cargo quantity on board is confirmed by the ship's officers signing a Mate's Receipt, details from the Mate's Receipt then make up the information on the Bill of Lading.

Tallies, Mates Receipts and thence Bill of Ladings must accurately record the quantity and condition of the cargo. The ship is then obliged to discharge the cargo at its destination in the same quantity and condition as stated on the Bill of Lading. If it does not then the carrier (the ship-owner) is liable.

It is important therefore, that any defects, damage, lack of suitable packaging, or any deterioration whatsoever to general cargo sighted by the ship during or prior to loading is outlined on the Mates Receipt. The Bill of Lading must then be suitably claused prior to signing by the ship's Master or his agent.

Obviously the usual type of ship carrying general cargo are general cargo vessels, although it is not unusual for bulk carriers to carry certain types of general cargo such as forest or steel products. In addition it is fairly common for bulk carriers to also carry large quantities of bagged cargo, although this is often referred to a specialized or particular bulk cargo.



Cargo handling at conventional berth

Carriage of cargo rules for merchant ships

The Merchant Ship (Carriage of Cargoes) Regulations 1999 (SI 1999/336) specifies that the master and terminal representative must agree a loading plan before bulk cargoes are loaded. The plan must be adhered to, and the master may stop loading if the permissible limits are or might be breached.“Cargo” is defined in regulation 2 as any cargo which, owing to its particular hazard to ships or persons on board, may require special precautions, with the exception of liquids carried in bulk and gases carried in bulk. (The Regulations do not, therefore, apply to oil, gas and chemical tankers or ships carrying noxious liquid substances in bulk.)

Cargo stowage plan guideline for general cargo ships

Plans showing the disposition of all cargo loaded should always be prepared. The value of full and accurate plans cannot be over emphasized. Inaccurate plans may cause delay and costly, unproductive employment of stevedores. During the passage cargo plans should be carefully checked with any error likely to affect the intended discharge pattern communicated to agents/stevedores at the discharge port(s).

The plan should be large and whilst not necessarily to scale, should be sufficiently approximate so as to indicate the comparative volume of a stow in any compartment. This may be the only means of conveying to agents and others at discharging ports the proportion and quantity of cargo in any hold destined for that port. Pillars, beams, lockers and positions of doors should be shown and it is good practice to indicate the number and type of

derricks/cranes of each hatch and the length and breadth of each unless the ship is well known to the agent or stevedore. The position of cargo should be shown accurately in relation to these features. Suitable details should be advised: whether cargo is on pallets, whether stowed by forklift trucks, whether or not pre-slung, etc.

Where mechanical handling equipment has been used, indication of the exact flow of traffic used to achieve the stow may be useful to facilitate discharge. Notes on how any particularly awkward cargoes have been loaded can be of considerable assistance during discharge.

With a mixed general cargo it is not possible to show the marks of various packages on the plan, but in the case of substantial consignments the marks, quantities and position should be shown. Where practical, identification of individual Bills of Lading in the stow can be extremely useful. Fuller details, particularly of tonnages, should be given in relation to over stowed cargo, always indicating whether such tonnages are weight or measurement.

To facilitate discharge planning it is essential that a copy of the plan reaches the discharging ports ahead of the ship and modern communications technology makes this easily achievable.

Bulk carrier plans must contain the total tonnage of each commodity loaded into each hatch.

Container plans are drawn up and delivered by the container terminal, usually under the direction of a central authority for a particular service. The number and weight of each container must be recorded together with any specific information need by the Master, e.g. IMDG cargo, temperature controlled, tank, etc.



Container transport

Planning and control of cargo handling

All cargoes should be stowed and secured in a manner that will avoid exposing the ship and persons on board to unnecessary risk. The safe stowage and securing of cargo depends upon proper planning, execution and supervision by properly qualified and experienced personnel. Advance planning, exchange of information, and continuous ship to shore communication are all critical. Key factors will include:

1) Terminal/ cargo data for the ship.

2) Stowage and loading/ unloading plans
3) Communication before and during cargo operations.
4) Monitoring of stevedoring
5) Monitoring the ship's condition and
6) Checking for hull damage

Preparation for cargo handling

Cargo and port information: To plan stowing, loading and discharge, the cargo terminal should provide the ships staff well in advance with.

1) Cargo characteristics, amounts and properties.
2) Availability and any special sequence required.
3) Characteristics of loading/unloading gears, number,
4) Range of movement loading/unloading rates.
5) Depth of water alongside and fairway
6) Water density at berth and any air draft restrictions
7) Maximum sailing draught and minimum draught for safe maneuvering
8) Terminal requirements/ procedures for moving ship.
9) Relevant local port restrictions (bunkering/ de-ballasting etc.)

To minimize cargo shift it is recommended cargo in holds to be trimmed. The ships master should be aware of the possibility of harmful effects from corrosive and high temperature cargoes, and cargoes which may liquefy if the moisture content exceeds a certain limit.

The amount and type of cargo and intended voyage will dictate the proposed cargo and or ballast stowage plan for departure. The officer in charge should always refer to ships approved loading manual to determine a cargo load distribution consistent with the structural loading limits imposed.

If cargo needs to be distributed differently from the loading manual, calculations must always be made to determine, for any part of the voyage, that SWSF, SWBM, block loaded cargo weights and local loading limits are not exceeded.

Ballasting must be considered to ensure correct synchronization with cargo operations; loading rates and imposed structural/ operational limits; simultaneous ballasting/de-ballasting of symmetrical port/starboard tanks.

Stress and displacement calculations must be commensurate with the number of cargo pours and loading sequence to ensure that SWSF/ SWBM, cargo weights and tank top/local loading limits remain within limits.

At all times, hull stress limits should be kept below permissible limits.

For each step of the cargo operation, the cargo loading/unloading plan should give a clear indication of:

1) Cargo quantity and corresponding hold numbers.
2) Amount of water ballast and corresponding tank/hold to be discharged/loaded.
3) Ships draft and trim at completion of each stage.
4) Calculated SWSF and SWBM at completion of each cargo.
5) Estimated time for completion of each cargo.
6) Assumed rates of loading/unloading
7) Assumed rates of ballasting/ de-ballasting
8) Allowances for any necessary cargo operation stoppages

Cargo ships guideline

The MS (Carriage of Cargoes) Regulations 1999 (SI 1999/336) (regulation 6) specifies that the owner and master must ensure that:

- cargo and cargo units carried on or under deck are loaded, stowed and secured so as to prevent as far as practicable, throughout the voyage, damage or hazard to the ship and the persons on board, and loss of cargo overboard;
- Appropriate precautions are taken during loading and transport of heavy cargoes or cargoes with abnormal physical dimensions to ensure that no structural damage to the ship occurs and to maintain adequate stability throughout the voyage;
- appropriate precautions are taken during loading and transport of cargo units on board ro-ro ships, especially with regard to the securing arrangements on board such ships and on the cargo units and with regard to the strength of the securing points and lashings;
- cargo on ships required to carry a Cargo Securing Manual is stowed and secured throughout the voyage in accordance with the Cargo Securing Manual; and
- cargo on board all ships having ro-ro cargo spaces and required to carry a Cargo Securing Manual is stowed and secured in accordance with the Cargo Securing Manual before the ship leaves the berth.

Where packaged goods have been packed into or onto a cargo unit, the shipper or forwarder of the goods must ensure that: • the cargo is packed and secured so as to prevent, throughout any voyage, damage or hazard to the ship and the person on board; and

- If the cargo unit is a container, it is not loaded to more than the maximum gross weight indicated on the Safety Approval Plate attached to the container in accordance with the IMO International Convention for Safe Containers (CSC 1972).

Fuel oil stored in side and double bottom tanks often requires heating to maintain viscosity required for pumping. Heat transfer into adjacent cargo holds can cause problems, the effects ranging from 'toasting' and moisture migration in bulk cargoes to explosion of IMDG cargoes in over-heated containers. Until now, courts have generally regarded the breach as falling within the ship's 'error of management (Hague Visby rules,) so owners could avoid liability.

However, when the Rotterdam Rules are introduced, the error-of-management defense will be removed such that owners can be held liable for over-heating damage to cargo.

Lifting and carriage of deck cargo on board general cargo ships

System of work for deck cargo

All cargoes should be stowed and secured in a manner that will avoid exposing the ship and persons on board to unnecessary risk. The safe stowage and securing of cargo depends upon proper planning, execution and supervision by properly qualified and experienced personnel. Advance planning, exchange of information, and continuous ship to shore communication are all critical.

The safe securing of all deck cargoes should be checked by a competent person before the vessel proceeds on passage. The master is responsible for ensuring that it is correctly stowed and adequately secured for the intended voyage. Areas on the deck which are not to be used for cargo stowage should be clearly marked or otherwise indicated.

To aid unloading at sea to be carried out safely, independent cargo units should, as far as practicable, be individually lashed. Where it is not practical to lash individual pieces of cargo, then groups of lifts intended for the same delivery location should be secured together. Lashings should, where practicable, be of a type that can be easily released and maintained.

All lashings should be checked at least once during each watch whilst at sea. Personnel engaged in the operation should be closely supervised from the bridge, particularly in adverse weather conditions. At night in bad weather, an Aldis lamp or searchlight should be used to aid remote checking of lashings to avoid placing personnel at risk.

Where fitted, pipe posts to restrain the movement of tubulars should be used.

Discarded rope and damaged and unserviceable equipment and cargo should not be jettisoned at sea but retained for disposal ashore. Such materials and articles can foul propellers or cause damage to fishing gear.

Cargo ships law at sea

At common law, the proper place for the stowage of cargo is below deck, since deck cargo is exposed to greater risks (of water damage, loss overboard, lightning, frost, etc.) than under-deck cargo.

Unlawful carriage on deck is usually regarded by courts as being an unjustifiable deviation and is penalized severely. Where a carrier stows goods on deck without express agreement of the shipper, he is breaching his contractual duty. If the wrongly-stowed deck cargo is lost overboard or damaged on passage, the carrier will not be able to rely on any of the exceptions from liability in the contract of carriage, since they can only be relied on whilst he is performing (i.e. not deviating from) the contract .

A court may "set the contract aside", making the carrier revert to common carrier status. As such, the carrier would then be liable for the cargo claim unless he could prove the loss or damage to have been caused by one of the six common law exceptions outlined as below:

(i) act of God, i.e. some unforeseen and unpreventable natural event, e.g. lightning or earthquake;
(ii) act of Queen's enemies, i.e. a State or people with whom the carrier is at war during the carriage of the goods (but excluding robbers, rioters and pirates);
(iii) inherent vice in the goods, i.e. a natural tendency of a commodity to deteriorate without human negligence, e.g. fruit and fish deteriorating, liquids fermenting, loss of weight in hides due to evaporation, severe pitting of steel plates not due to atmospheric rusting.
(iv) negligence of the consignor, e.g. insufficient or defective packing of goods inside containers or cases;
(v) fraud of the owner or consignor of the goods, e.g. where the shipper makes an untrue statement to the carrier as to their nature or value, or their threat to safety as well as (for sea carriers only);
(vi) jettison or other proper General Average sacrifice, i.e. when cargo is intentionally and properly destroyed or damaged during the voyage in order to preserve the ship and other cargo from a danger threatening the entire "adventure".

A sea carrier will not, however, be protected by the common law exceptions when the true cause of the loss or damage to the goods was:

- His negligence, e.g. in not taking reasonable steps to protect cargo from loss or damage;
- His vessel was unseaworthy at the start of the voyage; or• the loss or damage occurred while the vessel was unjustifiably deviating from the contract.

Refrigerated cargoes

Methods of refrigeration used in general cargo ships

Why refrigerate? Refrigeration is essentially the removal of heat through the process of evaporation. We choose to refrigerate commodities such as fruits and vegetables because we want to prolong their "practical shelf life" – the time from harvest until the product loses its commercial value.

Humidity is also a very important factor in the conservation of many fruits and vegetables. By shipping products in our Controlled Atmosphere containers, the humidity inside the containers can be increased, thus minimizing any weight loss in the fresh produce.

Temperature is not the only important part of the equation… but it is the key element to successful refrigerated transport.

Technically speaking, the internal biological and chemical processes of fresh produce, such as respiration, will continue after harvesting. This means that the product absorbs oxygen (O_2) and releases carbon dioxide (CO_2) and ethylene (C_2H_4). This is a process that generates heat.

Lowering the temperature reduces the respiration, and consequently the heat, considerably. Therefore, temperature is the most important factor when prolonging the practical shelf life. As high concentrations of CO2 and ethylene can deteriorate the commodities, these gases must be removed and replaced with fresh air through the ventilation system. Ethylene production is especially high in fresh produce such as apples, peaches, apricots, avocados and pears.

Many perishable cargoes are carried in refrigerated compartments on dry cargo ships, and there are an appreciable number of vessels specifically designed for carrying refrigerated cargo only.

Stowage of refrigerated cargo

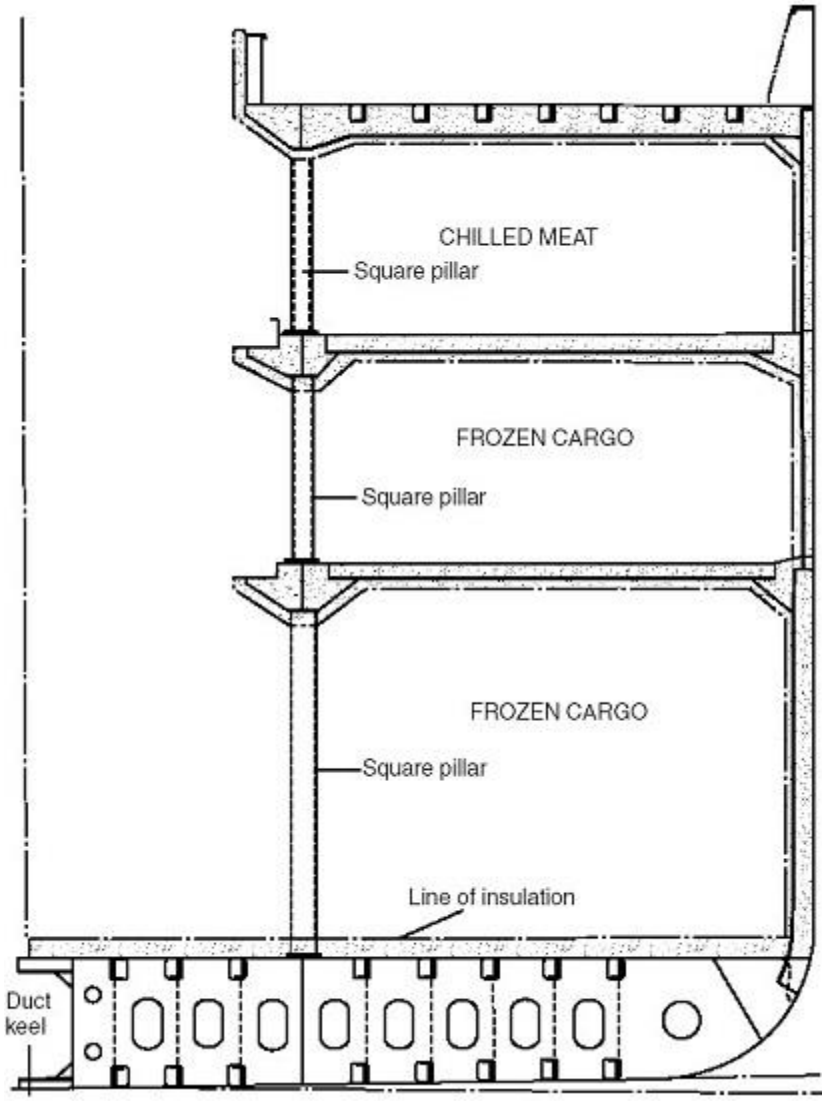
Chilled meat cargo is hung from the strengthened deck stiffening members, and the tween deck height is arranged to provide space below the hung carcasses for the circulation of air. Frozen meat is stacked in the holds of the ship. Fruits and vegetables are stowed in a manner which permits an adequate flow of air to be maintained around the crates, etc.

As a rule the refrigerated rooms in general cargo ships are made rectangular to keep down insulation costs.

Refrigeration systems on board

Brine made by dissolving calcium chloride in fresh water will have a freezing point well below the desired temperatures of the refrigerated compartments. Cold brine may be pumped at controlled rates to give the correct working temperature, and it is led from the evaporator of the refrigerating machine to pipes at the top of the cold compartment. The brine absorbs heat from the compartments and returns to the evaporator where it is again cooled and recirculated.

Air must be continually circulated where fruit is carried to disperse any pockets of carbon dioxide gas given off by the ripening fruit. The brine is then led into grid boxes and air drawn from the bottom of the compartments by fans is blown over the brine grids into the compartments via trunking arranged along the ceiling.



Refrigerated ship mid ship section

Methods of insulation

As the steel hull structure is an excellent conductor of heat, some form of insulation must be provided at the boundaries of the refrigerated compartments if the desired temperatures are to be maintained economically. Cork, glass fiber, and various foam plastics in sheet or granulated form may be used for insulating purposes, also air spaces which are less efficient.

Glass fibre is often used in modern ships as it has a number of advantages over the other materials; for example, it is extremely light, vermin-proof, and fire-resistant, and it will not absorb moisture. On the decks and particularly at the tank top the insulation must often be load-bearing material, and cork might be preferred, but fiberglass can be supported by tongue and grooved board linings and wood bearers.

The thickness of the insulation depends on the type of material used and the temperature to be maintained in the compartment. However the depth of stiffening members often

determines the final depth. Insulating material is retained at the sides by galvanized sheet steel or aluminum alloy sheet screwed to wood grounds on the frames or other stiffening members.

Insulation on the boundaries of oil tanks, e.g. on the tank top above an oil fuel double bottom tank, has an air space of at least 50mm between the insulation and steel. If a coating of approved oil-resisting composition with a thickness of about 5mm is applied the air gap may be dispensed with. Suitable insulated doors are provided to cold rooms in general cargo ships, and in refrigerated cargo ships the hold and tween hatches may be insulated. Patent steel covers or pontoon covers may be filled with a suitable insulating material to prevent heat losses.

A particular problem in insulated spaces is drainage, as ordinary scuppers would nullify the effects of the insulation. To overcome this problem brine traps are provided in drains from the tween deck chambers and insulated holds. The brine in the trap forms an effective seal against ingress of warm air, and it will not freeze, preventing the drain from removing water from the compartment.

General Cargo in Refrigerated Chambers

The most important consideration when stowing general in refrigerated chambers is that of avoiding damage to insulation, air-trunking and gratings. Where practical, soft packages and cases should be stowed in the hatch wings while bulky or unprotected heavy cargo should be stowed in the hatch square. These latter should be clean lift as dragging out from the wings and ends can cause damage to insulation.

Advantage follows if the floor or ceiling in squares of hatchways is protected by means of stout boards or sheathing. Sizeable packages, having flat surfaces (cases in preference to bales), should be selected for stowing against the pipe battens at sides and ends, so as to minimized the risk of cargo protruding into the grids and, by exerting pressure on the piping, cause the same to leak at the joints.

The permanent battens should be in good order or, in the absence of such, battens should be provided for the protection of the piping and cargo, such to be placed vertically, close spaced and "stopped" in position.

When bale, bag or other goods liable to damage from sweat or rust stains are carried, the piping as well as other ironwork should be covered with kraft paper, etc.

Goods or liquids such as creosoted materials, aniline oils, essential oils, cargoes with a phenolic base, chemicals, etc., which leave behind strong odors, which cannot safely be dissipated by ventilation, should not, on any account, bestowed in refrigerated chambers. Some of the most serious claims for damage and consequent costs for getting chambers again fit for refrigerated cargoes have been through phenol taint. All dusty cargoes liable to choke air passages should be avoided. Heavy packages should be stowed on the ceiling with dunnage or bearers in order to avoid damage to ceiling and insulation by evenly distributing the weight over the maximum surface.

Reefer cargo stuffing- Pre-cooling, treatment & handling of a reefer container

Pre-treatment of reefer products prior stuffing:

The condition of reefer products before they are stuffed plays an important role in their condition upon arrival. That is why it is essential that all products are treated correctly prior to stuffing. Even though the temperature, ventilation and humidity are all optimal during the entire voyage, products will only arrive in perfect condition if the pre-treatment has been performed correctly. Successful shipping begins at the product sourcing area.

Pre-cooling of cargo

The proper pre-cooling of products will have a positive effect on both shelf life and out turn, compared to products that have not been pre-cooled. Reefer containers are built primarily to maintain the temperature of the products, therefore, products should always be pre-cooled to the required carriage temperature prior to being loaded into the container.

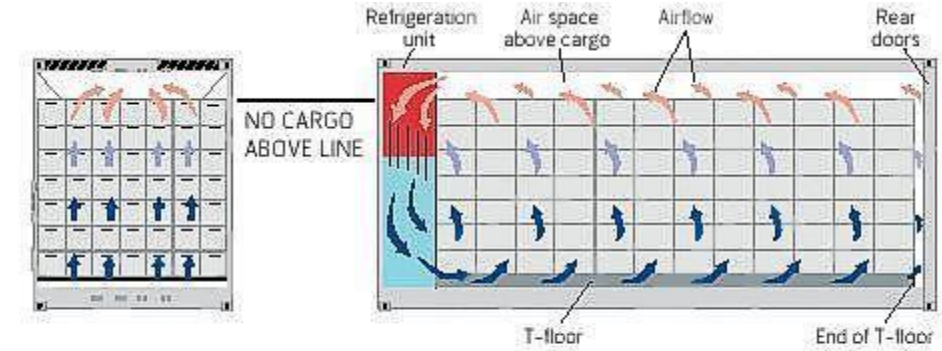
No pre-cooling of reefer container itself

Pre-cooling of the reefer container itself should never take place. Once the doors of a pre-cooled container are opened, hot ambient air will meet internal cold air, resulting in a large amount of condensation on the interior surfaces.

As a result, condensed water may drip from the roof of the container and cause stains and weaken the structure of the boxes. Therefore, condensed water must be removed through the evaporator located inside the reefer machinery. Heat that enters the container during stuffing, combined with heat that is constantly generated by the “respiring” cargo, must also be removed through the evaporator.

As soon as water and heat pass the evaporator, ice is formed and the machinery enters a short defrost mode. Consequently, there will be less capacity available for cooling the cargo. In a tropical climate with excessively hot and humid air, any pre-cooling of the container is likely to cause problems and damage the products.

Pre-cooling of the reefer container is only allowed when the container is connected to the cold store and the temperatures are identical. The connection is achieved by the use of a “Cold Tunnel” – a tight duct between the cold store and the container, which prevents ambient air from entering.

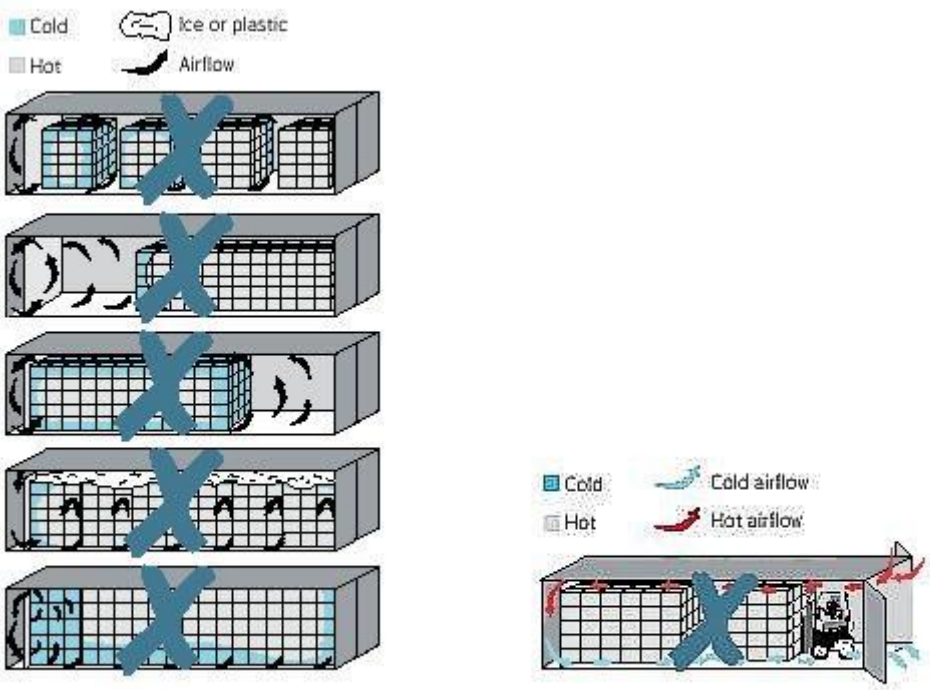


The correct way to staff a bottom air delivery container with chilled or frozen products

Correct way of stuffing chilled cargo

Things to do during stuffing

The stuffing and placement of cargo will directly affect the flow of air. Figure above illustrates the correct way to stuff a bottom-air delivery reefer with chilled or frozen cargo. In the case of chilled cargo, covering the entire floor with cargo forces the cool air to flow through both the cartons as well as the product, throughout the entire load. When frozen cargo is stuffed in this manner, the cold air flows around the cargo – blanketing the cartons and removing any heat that enters the reefer container through the walls.



Improperly stuffed chilled or frozen cargo

Things not to do during stuffing

Air always takes the path of least resistance. Here are a few examples that illustrate reefer cargo which has been stuffed improperly. In the first three examples, air tends to "short circuit" or flow past the cartons/products rather than through them. The last two examples illustrate restricted airflow scenarios.

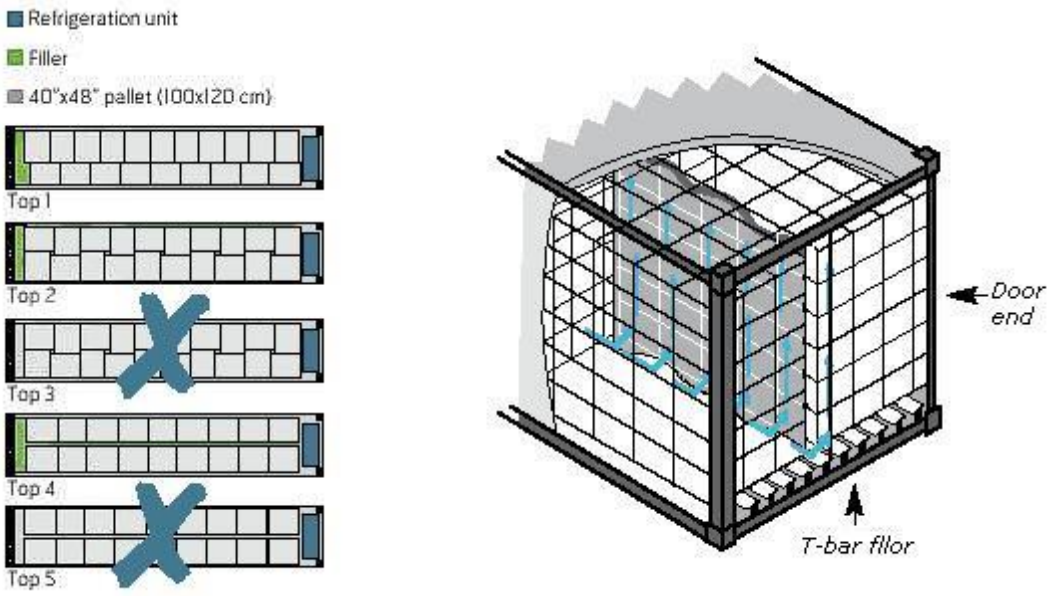
Never run a reefer with doors open

When the ambient temperature is warmer than the cargo, operating the reefer with the rear doors open will not cool down the cargo. Rather, the introduction of hot ambient air will heat up the cargo. When hot humid air enters the reefer, moisture condenses on the cold cooling coil and turns to ice.

Cooled air escapes through the rear door, and the cycle continues. Once stuffing is complete and the doors are closed, the reefer could run for hours with a partially iced-up cooling coil. This would reduce its cooling effect and put the cargo in danger until the unit completes a defrost cycle. Further, the generators set should be stopped during stuffing, due to the risk of exhaust gas reaching the fresh cargo. The correct way to stuff a bottom-air delivery container with chilled or frozen cargo.

To avoid cargo damage

- do not leave any areas open or uncovered on the floor, the front bulkhead or the side walls (if pallets are placed at the front bulkhead, be sure to place cardboard under empty pallets)
- do not run unit with rear doors open
- do not stuff cargo beyond the end of the T-floor
- do not plug channels at the end of the T-floor
- do not stuff cargo above the red load line
- do not put reefer set point at a temperature below what is required for the cargo (this will not expedite the cooling process)



Optimal stuffing of reefer cargo, Reefer container inside

Optimal stuffing – Top View

Covering the floor in a proper manner will improve the flow of air and hence, refrigeration. In order to force air up and through the cargo, the entire floor should be covered. Cover the floor from the front bulkhead to the end of the T-floor. Where the cargo does not cover the floor, some type of filler should be used, such as dunnage or cardboard. Do not stuff past the end of the T-floor with cargo or filler.



Reefer stuffing for blocking or bracing cargo

Blocking and bracing

For blocking and bracing cargo, wood is still the preferred material. Use wood as necessary, but do not nail wood or dunnage to the container. Cover floor with a filler between pallets to help force air through the cargo (as seen in the Top 4 view, fig. 4). Cover the ends of the last two pallets in order to force air up and through the cartons. Do not block off airflow past the end of the T-floor.

Refrigeration on board ships

Today, a new build Panamax containership of 4,600TEU will typically have capacity for 700 reefer plugs, and with a full load will consume 18 tonnes of HFO per day. However, you cannot just load a container, plug it in and play it like a computer component. Questions on requirements of the content and the power consumption demanded are just some of the items that a refrigeration technician must consider.

With a growing global refrigerated trade of 50M tonnes p.a, and with few dedicated reefer ships on order, growth is going to be seen in the available refrigerated capacity on container ships. However, increased reefer cargo claims point to a lack of knowledge by both ship and shore personnel.

Purpose of reefer ships

Many of the container ships operating on trade routes where refrigerated cargoes were carried in conventional refrigerated cargo liners ('reefer ships') have provision for carrying refrigerated containers and have in many cases replaced the latter.

The ISO containers (usually 20 foot size since with most refrigerated cargoes 40 foot size would be too heavy) are insulated, and below decks the end of each hold may be fitted with brine coolers which serve each stack of containers. Air from the brine coolers is ducted to and from each insulated container. Connection of each container to the cold air ducts is by means of an automatic coupling which is remotely controlled and can be engaged when the container is correctly positioned in the cell guides.

The below decks system described with fully insulated containers means that heavy insulation of the hold space is unnecessary. On the ships sides, bulkheads and deck head about 50 mm of foam insulation with a fire retardant coating may be fitted and the tank top covered with 75 mm of cork and bitumastic. If provision is only made for the ship to carry a part load of under deck refrigerated containers these are generally arranged in the after holds adjacent to the machinery space.

On deck refrigerated containers are generally serviced by clip-on air cooled electric motor drive cooling units. The units are plugged into the ships electrical system by way of suitable deck sockets. Similar water cooled units have been used for below deck containers on short haul voyages.

Refrigeration is essentially the removal of heat through the process of evaporation. We choose to refrigerate commodities such as fruits and vegetables because we want to prolong their “practical shelf life” – the time from harvest until the product loses its commercial value.

it is essential that all products are treated correctly prior to stuffing. Even though the temperature, ventilation and humidity are all optimal during the entire voyage, products will only arrive in perfect condition if the pre-treatment has been performed correctly. Successful shipping begins at the product sourcing area.

Proper packaging procedures will help protect frozen cargo during transport. Frozen products do not require air holes in the top and bottom of the cartons. Air flowing around the load is sufficient to remove heat that has penetrated the container. The cartons should be stacked directly on top of each other to take advantage of their strength in the corners.

Packaging plays an important role when it comes to protecting the cargo. The packaging material must be able to support a stacking height of up to 2.4 meters (7’10’’). The material should be able to withstand humidity without collapsing, and should allow the passage of an adequate vertical airflow through the cartons in order to maintain the desired temperature.

Goods should be well stowed within the package, evenly distributed and properly secured. Items completely filling the case or carton contribute to the strength of the whole package. Items which do not completely fill the package must be cushioned against shock or vibration.

Proper ventilation of fresh, chilled products is necessary to remove the heat, carbon dioxide and other gases produced by the cargo. Heat is removed by continuously circulating the internal air, whereas carbon dioxide and other gases are removed by replacing the internal air supply with cooled fresh air.

Refrigerated cargoes include meat carcasses, carton (packed) meat, fruit, cheese, butter, fish and offal. Ships are specifically designed for their carriage, with separate spaces in holds and ’tween decks, each fitted with suitable insulation and individual control of ventilation. Ordinary general cargoes may be carried in the spaces at other times, the temperature being regulated accordingly for the type of cargo being carried.

Frozen products packaging requirement

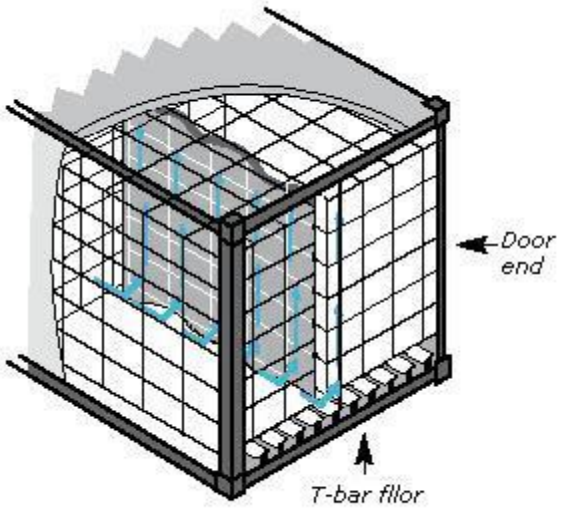
Proper packaging procedures will help protect frozen cargo during transport. Frozen products do not require air holes in the top and bottom of the cartons. Air flowing around the load is sufficient to remove heat that has penetrated the container. The cartons should be stacked directly on top of each other to take advantage of their strength in the corners. If palletized, the corners of each carton should be supported directly by the pallet.

The packaging material must be able to support a stacking height of up to 2.4 meters.

Stowage

The stowage of frozen products is relatively simple. All that is required is solid block stowage, leaving no space between the packages/cartons and no space between the cargo and the walls of the container.

However, it is very important that the cargo is stowed below the red load line, as this allows the refrigerated air to circulate evenly around the cargo, thereby keeping the frozen products at the required temperature.



Reefer container inside

Ventilation

When frozen products are transported, the fresh air ventilators must always be closed and the humidity indicator should be in the OFF position. A pallet size of 00x 0 cm (40x4 inches) is recommended as this enables optimal stowage.

Refrigerated cargo handling checklist

When preparing for a refrigerated shipment always determine:

- The optimal temperature requirement
- The fresh air ventilation requirement (in cbm/hour)
- The humidity requirement
- The transport time
- The practical shelf life of the product
- The volume of cargo
- The packaging materials and cartons used
- The recommended stowage pattern
- The required documentation, including legislative requirements

Before and during stuffing always make sure

• The container is set at the optimal temperature, ventilation and humidity levels
• cargo is never stowed above the red load line
• cargo is stable and evenly stowed (weight should be distributed evenly for maximum stability and the entire floor should be covered)
• The total cargo weight does not exceed the maximum payload of the container
• The total weight of the container (including container, cargo, chassis and generator set) does not exceed the road limitations in any country crossed during transport
• If cargo is palletized, dunnage is placed in the center channel between pallets
• cargo is blocked and braced as necessary
• frozen or chilled cargo requirements are followed

For frozen cargo always

• follow checklist for reefer cargo
• pre-freeze cargo before stuffing
• ensure that fresh-air ventilation is CLOSED

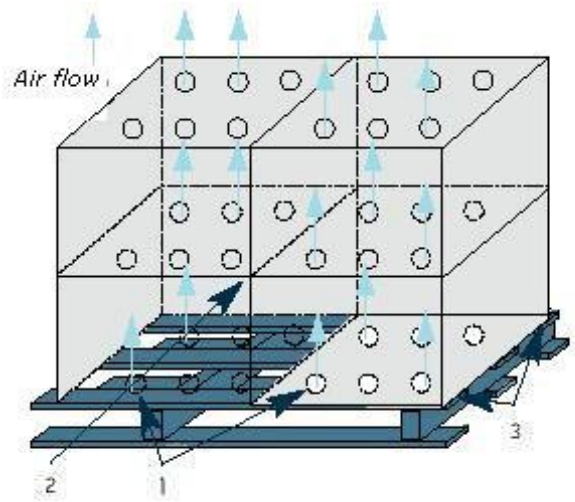
For chilled cargo always

• follow our checklist for reefer cargo
• pre-cool cargo before stuffing
• set unit at carrying temperature, not lower (a lower set point will not expedite the cooling process and may damage cargo)
• set fresh air ventilation as required

Why Packaging?

Packaging plays an important role when it comes to protecting the cargo. The packaging material must be able to support a stacking height of up to 2.4 meters (7’10’’). The material should be able to withstand humidity without collapsing, and should allow the passage of an adequate vertical airflow through the cartons in order to maintain the desired temperature. As the air comes from the bottom of the container, the optimal air circulation can be achieved if each carton has symmetrical holes at both the top and bottom. The number, placement, size and shape of the air holes are determined by the product being packaged (as in fig below.)

Furthermore, the wrapping material used should be sufficiently secure to prevent any blockage of the evaporator fan. If Humidity Control is to be used for transportation, use wax-impregnated cardboard or other materials that will not lose strength in high-humidity environments.



Packaging requirement of frozen cargo

1) Carton alignment for unrestricted airflow
2) Strength of cartons in the corners
3) Corners of cartons supported

Stowage requirements

Stowage should enable the air to circulate properly. Heat, water vapour, carbon dioxide and other gases produced by the respiration process from chilled fresh products may damage the product and should therefore be removed. The stuffing should allow the refrigerated air to circulate through the packaging material and throughout the entire load.

If the cargo cannot cover the entire floor area, heavy cardboard must be placed over the empty space. Cool delivery air will always take the route of least resistance, thus causing a "short circuit" of airflow resulting in insufficient cooling of the cargo.

Cargo must never, under any circumstances, bestowed above the red load line. This is to ensure the proper circulation of refrigerated air. Slip sheets should not be used for fresh, chilled cargo.

For palletized cargo, the following steps are recommended

• The cartons must be stacked squarely on top of one another to ensure that the weight is evenly distributed to the four corners of the cartons.
• The corners of each carton should be supported directly by the pallet.
• Place cartons on the pallets so that air flow up into the cartons is not restricted.
• The ventilation holes, located at the top and bottom of the cartons, must be aligned to allow the air to pass freely through the entire load.
• Shrink-wrapped pallets, slip sheets, foam trays, plastic bags or similar materials that may obstruct and block the air passage should not be used.

• If pallets are wrapped with plastic to provide stability, do not cover the bottom or the top of the cartons.

Reefer chamber temperature control- Respiration and Ventilation technics

"Refrigerated cargo" implies a reduction of the temperature of the cargo below the ambient air temperature. Refrigerated cargoes fall into two distinct groups; those carried under "temperature controlled" conditions, e.g. fresh fruit and vegetables in the zero to 15°C range, and those carried under "frozen" conditions, e.g. meat and fish at a temperature of 18°C or lower. This section deals with general principles of refrigeration as they affect cargoes subject to temperature control.

Increasing volumes of cargo are being carried under temperature control and knowledge of the principles behind this form of carriage is essential. In most instances, the shipper will give specific carriage instructions but there are some general principles that apply to all temperature controlled cargoes.

Temperature Control - Prevention of Damage by Micro-organisms

Almost all organic matter is constantly under attack by micro-organisms such as yeasts, moulds or bacteria which, like all living things, require adequate moisture and an appropriate temperature to enable them to grow. In general, the higher the temperature, the faster the rate of growth. For example, the rate of growth of almost all micro-organisms doubles for every 10°C increase in temperature. Equally, the rate of growth halves for each 10°C reduction in temperature. However, there are upper and lower limits to this effect.

For most micro-organisms, the rate of growth at temperatures below zero is very small while most will not grow at temperatures above about 45°C. Thus, carrying an organic cargo at a lower temperature will tend to slow down the rate at which it can be damaged by micro-organisms because they grow at a much slower rate.

Prevention of Changes in the Cargo

Many temperature controlled cargoes are alive. The best known examples of live cargo are fresh fruit and vegetables, but there are many others, e.g. most cereal grains and some timber. As a part of their life processes living organisms respire, i.e. they take in oxygen and give out carbon dioxide in exactly the same way as animals. This process creates energy to drive the life processes within the organism and produces heat as a side effect.

This is another reason why some cargoes must be refrigerated. For example, if the heat of respiration is not removed from a cargo of fresh fruit, the increased temperature within the cargo will induce chemical changes in the composition of the fruit which, in turn, will permit physical changes that cause the cargo to deteriorate. Thus, pears carried at ambient temperature will warm up, thereby increasing their rate of ripening. As they ripen, they become softer and are more prone to bruising irrespective of how well they have been packed and stowed.

Respiration and Ventilation

Respiration

Many living cargoes absorb oxygen from the air in the hold and give out carbon dioxide as a consequence of their life processes. Undressed timber, i.e. logs from which the bark has not been stripped, also produce carbon dioxide. In unventilated holds, carbon dioxide can reach dangerous levels, and there have been cases of seamen suffocating by entering such holds without breathing apparatus.

Fruits and some vegetables also produce ethylene during ripening. This gas is a natural plant hormone and can induce ripening of other fruits and vegetables stowed in the same hold. If adjacent compartments are interconnected by a common system of air ducts, then the production of ethylene in one compartment can induce ripening in the others.

Ventilation

From the above, it will be apparent that it is essential for refrigerated cargo holds to be properly ventilated in order to replace the cargo space air with fresh air thus sweeping out the ethylene and preventing or delaying the early ripening of the cargo. Ventilation also reduces the level of carbon dioxide within the hold often with beneficial effects on the cargo. It is difficult to measure ethylene directly in the air within a cargo hold, so it is usual to measure the level of carbon dioxide and to use this as a guide to the ethylene level. The carriage instructions for fruit and vegetables should include a value for the maximum acceptable level of carbon dioxide in the hold air.

Some fruits can benefit from an increased level of carbon dioxide within a hold as levels above a certain value actually slow down the respiration of the fruit and delay the onset of ripening. It is the composition of the air that influences the cargo and not just the level of carbon dioxide. The effects of both oxygen and carbon dioxide levels must be considered when deciding how to carry a particular cargo.

In general, a reduction in the amount of oxygen present tends to retard the rate of respiration and hence prolong cargo life. Air contains 21% oxygen and this level needs to be reduced to about 10% before any real effect on the rate of respiration is seen. Since the rate of respiration is dependent on temperature, it follows that the lower the temperature in the cargo the lower the oxygen concentration can fall without causing other problems. Fruit and vegetables may also be sensitive to low oxygen concentrations and to low temperatures which can cause physical disorders, leading to quality deficiencies.

An increase in the carbon dioxide level is beneficial to some fruits since it tends to delay the onset of ripening. Air contains about 0.034% of carbon dioxide, and the addition of only a few percent to the air in the hold can have a marked effect on respiration, leading to prolonged life for the fruit. However, if carbon dioxide levels are permitted to rise too much then damage to the cargo may occur.

In recent years, new developments in refrigeration techniques have led to the introduction of "controlled atmosphere" (C.A.) as a means of prolonging the life and quality of various commodities. The process is now relatively common in both reefer ships and containers.

Refrigeration and Moisture

As air cools, its capacity to hold moisture becomes lower and this is usually seen in refrigeration circuits by ice forming on the cooler coils. In a closed circuit where cooling air is recirculated through holds without any access to the outside, there tends to be a drying effect on the cargo. If fresh fruit is exposed to constant cooling air, e.g. an apple placed in a domestic refrigerator, moisture will be extracted from the fruit by the cooling air. This leads eventually to deterioration of the fruit which becomes dry and wrinkled as it loses moisture. Most cargoes are protected to some extent by their packaging, but even so the drying effect is very real and can be the cause of damage. Ideally, such cargoes should be carried at a controlled humidity as well as a controlled temperature. Modern refrigerated ships are able to cope with this problem and required relative humidity levels are usually specified in carriage instructions.

Stowage and Ventilation

Proper stowage of cargo destined to be refrigerated and hence ventilated is most important. Most commodities are packed in cartons usually with an inner wrapping. While this may protect against drying and physical damage, the packaging tends to restrict the free flow of cooling air. Thus, stowage becomes extremely important in facilitating the flow of air.

The majority of refrigerated cargo offered for shipment in either reefer ship or container is palletised and ensures proper air flow. However, on the rare occasions when a true break-bulk cargo is loaded (i.e. cartons are loaded as individual pieces), it is important to ensure they are placed on dunnage or battens, leaving adequate ventilation channels between adjacent blocks. If cartons have ventilation holes pierced in them, then these must be placed "in register" to allow free entry of air. Stowage should be "box on box" and not in "brick form".

Care should be taken to see that the cargo is stowed in accordance with the air flow within a compartment and this will depend on the way in which cooled air enters the compartment. Different ships use different refrigeration systems and the stowage of a particular cargo will be determined by the design of the individual ship. In general, boxes and cartons should be stowed with their long axes in the same direction. Most reefers have vertical air flow within compartments and it is advisable to place kraft paper or polythene sheeting across the air vents that are not covered by cargo to avoid short circuits of the air flow.

Control of ventilation level

The importance of ventilation should not be underestimated. Proper ventilation of fresh, chilled products is necessary to remove the heat, carbon dioxide and other gases produced by the cargo. Heat is removed by continuously circulating the internal air, whereas carbon dioxide and other gases are removed by replacing the internal air supply with cooled fresh air.

Control of relative humidity level

Controlling the relative humidity level is also important when it comes to controlling the quality of chilled products. The relative humidity level affects many products, particularly the shelf life of fruits and vegetables – and thus their condition upon arrival.

If the humidity is too high, mould and/or fungi may develop. If the humidity is too low, it may result in a higher weight loss causing products to wilt and/or shrivel. For many products, it is therefore important to be able to control the relative humidity level during transport.

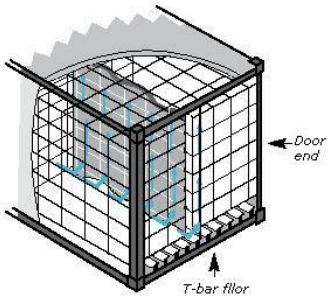
Please note that two different systems are used to either decrease or increase the relative humidity level, depending on the commodities involved.

How to control the atmosphere in a reefer container?

Atmosphere control is another crucial variable in securing the quality of chilled cargo. When fresh perishables are shipped to distant markets, they require a precisely controlled transport environment. It is well known that harvested fruits and vegetables continue to live and breathe until they are consumed or destroyed by decay or desiccation. Under normal circumstances, these factors dictate the life span of individual products.

The life span can, however, be prolonged by keeping the commodities at their optimal temperature, combined with the supply of the most effective blend of oxygen, carbon dioxide and nitrogen.

By transporting products under Controlled Atmosphere, the applied environment will slow down the ripening process and extend the shelf life of the products. For further details please refer to the Equipment section of this brochure.



Reefer container inside

Cold treatment

The purpose of Cold Treatment is to exterminate insects and larvae by maintaining a sufficiently low temperature for a pre-determined period of time. The period of time and temperature required are defined in protocols established by phythosanitary authorities of the importing countries. If the temperature rises above the established requirements, the entire Cold Treatment process will fail and must either be extended or started over again

depending on the protocol. Applying Cold Treatment eliminates the need to fumigate cargo using insecticides, such as methyl bromide, which is illegal in many countries.

Cold Treatment is primarily applied to various types of citrus fruits, such as oranges, grapefruit and clementines. However, kiwi fruit, apples, pears, grapes, lychees, loquats, etc. can also be carried under Cold Treatment.

In order to reap the maximum benefits from the Cold Treatment process, several factors are absolutely essential. These factors include the correct pre-treatment, proper pre-cooling of the products, optimal packaging and stowage, as well as the constant monitoring at the terminals and on board the vessels.

Loading precautions for refrigerated cargoes

Handling refrigerated cargoes- Fresh Produce (Fruit and Vegetables) & Frozen Cargo**:**

Refrigerated cargoes include meat carcasses, carton (packed) meat, fruit, cheese, butter, fish and offal. Ships are specifically designed for their carriage, with separate spaces in holds and 'tween decks, each fitted with suitable insulation and individual control of ventilation.



Refrigerated fruits

Fresh Produce (Fruit and Vegetables)

In general, fresh produce is carried under temperature control. It is customary for shippers to produce written carriage instructions, lays down general guidelines for background and emphasizes some of the essential characteristics of fresh produce.

Fruit and vegetables are living and so respire, taking in oxygen from the air and producing carbon dioxide. As noted in the section on temperature control, this process involves the production of heat, hence the need for temperature control.

For short voyages of no more than three or four days, fruit picked at the right time, i.e. not already ripe, can be carried without refrigeration. In general, all fruit and vegetables must be properly ventilated even if carried at ambient temperatures. Fruit should not be stowed with any other cargo that might pick up taint, e.g. flour, tea, coffee, etc.

Carriage temperatures for fresh produce fall into two clearly defined categories. Produce that is tolerant of low temperatures is carried in the temperature range between 5°C and +0.05°C. Most vegetables consist largely of water and thus have a freezing point closer to zero than most fruits. Consequently, the carriage temperature for vegetables must not fall below zero. Carriage is effected at temperatures near to the freezing point of the produce, taking into account the sensitivity of the temperature control equipment to avoid freezing part of the cargo. Typical examples are apples, pears, cherries and kiwifruit, and most vegetables.

However, some produce is more sensitive to low temperatures, so must be carried at higher temperatures which represent a compromise between the harmful effects of low temperature (chill damage), and the beneficial effect of low temperatures in retarding ripening and alleviating microbiological damage. Typical examples are bananas, avocado, pineapple, melons, aubergines, ginger, marrow and squashes. Produce that may be very sensitive to lower temperatures will always have written carriage instructions from the shipper and, indeed, such cargo should not be accepted without such instructions. Examples are bananas, plantains and pineapples.

Some vegetables can be carried without refrigeration, but with special ventilation requirements. Examples are onions and potatoes. The method adopted will depend on the length of the intended voyage, ambient conditions and the required shelf life.



Frozen-fish

Frozen Cargo

This is cargo that has been deep frozen prior to loading and should be at a temperature of minus 18°C or lower with the task of the ship to maintain the deep frozen condition. In some instances there are legal requirements to carry particular commodities at a temperature below a certain value. Deep frozen cargoes are not living, and do not respire or produce heat, so the task of the refrigeration system is much simpler.

Most frozen cargo is shipped in cartons on pallets in reefer ships or refrigerated containers. However, on the rare occasion when a breakbulk cargo is loaded, extra checks may be necessary, particularly if the commodity is carcass meat.

Carcasses with soft flanks must be returned for re-freezing before stowage in the ship otherwise badly distorted carcasses will result on discharge with consequent claims against the ship. Particular care should be taken to see that soft carcasses represented for shipment have not just received a cold blast to freeze the outside flank which will now appear in a good

hard condition whilst the inside is still warm. Thus it may be necessary to drill into the frozen meat and use a spear thermometer to ascertain the actual bone temperature. Blood-stained shirts will indicate that a carcass has at least partially thawed since initial freezing and should be considered with suspicion.

Again, if soft or wet carcasses are stowed in this condition they may well distort, nesting one into another and blocking the airflow. If wet from partial thawing (or rain) they may freeze together, resulting in considerable damage when prised apart on discharge. Similar problems can arise with cartons of frozen produce which must be clean, dry and free from frost at time of loading.

Insulation and refrigerants

Ordinary general cargoes may be carried in the spaces at other times, the temperature being regulated accordingly for the type of cargo being carried.



Dedicated reefer ship

Insulation around a compartment consists of either a fiberglass or polystyrene type of packing over the steelwork of the vessel, with an aluminum alloy facing. This insulation is comparatively fragile and requires regular inspection and maintenance.

Cooling a compartment on modern vessels is achieved by circulating pre-cooled air by means of fans. The air is cooled by an ordinary refrigeration plant employing a refrigerant with the most practical qualities, namely, a high thermal dynamic efficiency, low costs, low working pressure, low volume non-toxicity, non-inflammability, non-explosivity and ready availability from numerous sources.

Typical Refrigerants

Carbon dioxide (CO2). Non-poisonous, odorless, with no corrosive action on metal. It has a low boiling point but a high saturated pressure. Ammonia (NH3). Poisonous vapor, and therefore requires a separate compartment of its own. It will corrode certain metals, e.g. copper. Has a lower saturated pressure than CO2.

Freon (CCl2F2). Non-poisonous, non-corrosive, and has a low saturated pressure. By far the most popular in modern tonnage.

Loading precautions

Absolute cleanliness is required during the loading of refrigerated cargo, and the following points should be observed:

1. The compartment should be cleaned of all debris and previous cargo.
2. The deck should be scrubbed and the bulkheads and deck wiped with a light disinfectant.
3. All bilges must be cleaned and bilge suctions tested.
4. Tween deck scuppers must be tested, together with all 'U' brine traps.
5. Bilge plugs should be inspected and sealed. Cover plug over bilge suction may be left off for the purpose of survey.
6. Fans must be checked for direction of air flow.
7. Bare steelwork must be insulated.
8. All odors must be cleared from the compartment.
9. All outside ventilation must be shut down.
10. Pre-cooling of the compartment must take place before the cargo is received, times being noted in the cargo log or deck log book.
11. Before loading, the compartment should be surveyed. The surveyors' comments together with the opening temperature of the chamber should be recorded in the mate's deck log book.

Any dunnage required for the cargo should be of a similar standard of cleanliness as that of the compartment. All slings, chains etc. should also be clean and pre-cooled in advance of cargo reception.

Preparation of Spaces to Receive Cargo

The generally sensitive nature of refrigerated cargo requires very careful preparation of the space to receive it. Cleanliness is obviously of great importance particularly with foodstuffs. The space must be free of odours and micro-organisms and may require fumigation. The introduction of ozone will deal with airborne smells but, in extreme cases, lingering ones which have been absorbed by the insulation may require the removal and renewal of the affected portions. Fans should be run in both directions to clear smells and dust, etc., from the air trunking.

Bilges and scuppers must be clean, tested and U-bend vapor traps sealed with brine to prevent cross taint between compartments. Thermometers, gas sampling points, fire detection and extinguishing equipment should be carefully checked and inspected. Inspection should also be made of any pipes passing through the space, particularly their joints, for signs of leakage. Traditional timber dunnage is no longer used and reefer ships are fitted with large gratings bolted to the deck and folding `tween deck hatch covers. The gratings can be of timber, bamboo or aluminum construction while trials of plastic gratings have recently taken place. The gratings are of sufficient strength to support a forklift truck with a loaded pallet and damaged pieces should be replaced before loading begins.

Closing arrangements (weather and `tween deck covers) and access hatch plugs should also receive careful examination. The space can then be cooled down to slightly below the carrying

temperature and held there for at least 24 hours to ensure that all the residual heat is removed from insulation and other fittings within the space. The air temperature will quickly rise when the compartment is opened for loading and every opportunity should be taken to run the fans during breaks in the loading operation.

Receiving Cargo

Cargo presented for carriage under refrigeration should be pre-cooled to the carrying temperature since normally the vessel or container is only provided with sufficient power to deal with heat leakage and the modest amount of heat generated by living cargoes. Thus, the prime consideration when receiving refrigerated cargo for carriage is to see that it is at the correct temperature. There is always the possibility of a slight rise in the temperature of the surface during transit which the ship can well take care of provided the internal bulk of the packages is at the correct temperature. Spear thermometers are available to determine this.Chilled cargoes are of less concern in this respect, but owing to their more sensitive nature great care and inspection is called for during receiving and stowage.

Most fruit and vegetable cargoes will be presented pre-cooled but must be carefully examined for any warm or over-ripe fruit which should be rejected. The general condition should be noted and each space sealed as loading is completed and the carrying environment reached as soon as possible. If, as sometimes occurs, a fruit cargo is presented for loading at orchard temperature, the ship may have to undertake cooling to the carrying temperature. This must be requested by the shipper in writing, or the bill of lading claused accordingly. Once agreed, cooling must be carried out as quickly as possible although very rapid cooling cannot be carried out since the incoming cool air must not be at or below the freezing temperature of the fruit.

Maximum air circulation must be possible throughout the stow (with adequate intermediate dunnage and battens if required) to assist the cooling process. If the stow does not cover the whole deck, the air delivery outlets not covered must be temporarily blocked off to prevent short circuiting of the air flow.

Taint

Odor, either pleasant or obnoxious, is closely associated with taste and it is undesirable that even a pleasant smell should intrude into the one expected from a food or even completely overpower its own delicate flavor. It is in this connection with foodstuffs that taint is principally a problem. Some products produce strong odors in themselves others may be particularly susceptible to and readily absorb foreign smells. Individual commodities should not be stowed together, even though they may require the same considerations of temperature and humidity. The separation of odious and sensitive cargoes into separate airtight compartments will, in most instances, solve this problem.

However, badly fitting access hatch plugs and fan spaces might allow for a certain degree of cross taint as indeed would common scupper systems not sealed with U-bends or traps filled with brine. Pipes passing through a cargo space present a particular hazard as a leaking oil pipe or tank sounding pipe may result in obnoxious fumes entering the space. Special care is

required with living cargo when air changes are necessary to ensure that fresh air introduced is completely free of taint, similarly that the vented air expelled from a space is not drawn into a space where it might cause contamination. An odious cargo may well leave a tainted atmosphere behind after discharge, and a sensitive cargo should not be loaded or discharged through such a space until it has been fully ventilated and the odors removed.

Bill of lading

Outline of bill of lading functions for cargo ships employment in time charter agreement

A bill of lading is a receipt for goods either received (before shipment) or shipped on board. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.)

A bill of lading is not a true contract, since it is usually signed by only one of the parties. It is a document of title, signifying that the holder has the legal right to possession of the goods it describes. (The right to possession should not be confused with the right to ownership, which will usually be determined by the terms of the sales contract.)

A bill of lading may, depending on how it is made out, be negotiable, i.e. transferable to a third party so as to effect transfer of title to the goods it describes.

The bill of lading as a receipt for goods

The bill of lading's prime function is as a receipt issued for:

• Goods received for shipment either by a carrier or a freight forwarder, etc. pending shipment on a vessel; or
• Goods shipped on board the carrying vessel, depending on the wording or endorsements on the bill.

A bill of lading states the quantity and apparent order and condition of the goods when received into the carrier's care and is normally printed with wording such as "Received in good order and condition unless otherwise stated..." or "shipped in good order and condition unless otherwise stated....". If this statement is not true, appropriate remarks should be made on the face of the bill of lading. Any shortage or damage to the goods occurring before acceptance by the carrier should therefore be stated on the face of the bill of lading.

If there is no clausing of the bill of lading showing a defective condition or quantity of the goods on receipt by the carrier, the consignee may reasonably expect to receive his goods in good order and condition. Any loss or damage found on delivery will be assumed to be caused by the carrier's negligence unless he can prove it to be attributable to one of the excepted perils listed in his contract of carriage (e.g. Act of God, inherent vice, etc.).

Where a mate's receipt is issued, the bill of lading's description of the quantity/condition of the goods is copied from the description in the mate's receipt. It is most important, therefore, that the mate's receipt states the actual quantity/condition of the goods at the time of loading

where this is other than “in good order or condition” or differs in quantity from that stated in the shipping note.

Delivery of the goods

The carrier, carrier’s agent or master is legally obliged to deliver the goods to the first person presenting a signed original bill of lading at the discharge port, together with proof of his identity and proof that freight and any other charges due have been paid. (A negotiable bill of lading is effectively, therefore, a cloakroom ticket for cargo: whoever has the bill of lading can collect the cargo.)

Once the goods are released to a receiver (i.e. legally delivered), any carrier’s lien for unpaid freight, etc. will be lost.

If the bill of lading has been transferred by the original consignee, the endorsements on it should be checked before delivery.

If the presented bill of lading appears to be in order, the master or the agent should sign it and date it (known as “sighting the bill”). It is then said to be “accomplished” and is usually stamped “ACCOMPLISHED”. The goods can then be released to the receiver. A delivery order may be issued by the agent to the receiver.

Delivery may be (and in practice is often) made without presentation of a bill of lading, but only when certain precautions have been taken.

For a better understanding of the main functions of a bill of lading it is useful to know the basic documentary procedures used in tramp and liner shipping operations, as outlined below.

Bill of lading freight clause

“Freight” is the remuneration payable by the charterers to the owners for the performance of the contract. It may be called charter party freight in the contract. Freight clause specifies the freight rate, how freight will be calculated, when it must be paid, and the arrangements for payment. Details of bank accounts may be in a separate document annexed to the charter party.

Bill of lading freight is calculated on shipped or intaken weights, as stated in a bill of lading. Is used in trades wherein taken and outturn weights are likely to differ, e.g. where:

- Oil evaporates during the voyage;
- There is “clingage”
- There is sedimentation;
- Logs loaded from the water dry out on the voyage;
- Ice melts on timber after loading;
- Grabs cannot discharge all of a cargo.

Bill of lading freight is the usual type of freight stipulated in tanker charter parties. It may be payable in advance or at destination. Or may be payable, where outstanding, by any endorsee of a bill of lading.

Outline of clean and dirty (Foaled or Claused) bill of ladings in cargo ships agreement

A bill of lading is a receipt for goods either received (before shipment) or shipped on board. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.)

A clean bill of lading is a bill of lading bearing no superimposed clauses stating a defective condition or shortage of the goods. It states that the goods have been received "in apparent good order and condition..." without further remarks as to their condition.

A **dirty bill of lading**, also known as a "claused" or "foul" bill, is one claused with remarks such as "torn bags", "rusty drums", "three (3) more c/s in dispute - if on board to be delivered", etc.

A full set of "clean on board bills of lading" is normally demanded as a condition of a bank's letter of credit, and if not issued will prevent early payment of the exporter by the bank. Pressure may therefore be exerted by a shipper for clean bills to be issued, even where these would not be justified by the actual condition or quantity of the goods.

A Letter of Indemnity (or "back letter") may be offered by the shipper, promising to indemnify the master or carrier against any loss or liability as a consequence of signing a clean bill of lading. However, acceptance of a Letter of Indemnity of this type in return for clean bills makes the master a party to an act of deception or fraud on banks, consignee/buyer, and insurers, since it is an attempt to obtain payment for goods knowing them to be unsound. There may be personal criminal liability for fraud on the part of the carrier and the master, and a heavy financial liability on the shipowner. This type of Letter of Indemnity has no legal standing in English law and cannot be sued on if the shipper goes back on his promise of indemnity.

A master should consult his owners and their P&I club's correspondent if he is in any doubt, but should never accept a Letter of Indemnity of this sort without the written orders of his owners.

Signing bills of lading

Where a shipmaster has to sign and issue original bills of lading, great care must be taken to see that all potential contractual pitfalls are covered. In such cases it would be advisable to consult the P&I club correspondent beforehand.

"Shipped" bills of lading are signed on behalf of the carrier by or for the master of the carrying ship. A full set of original bills will be signed, then returned (via the agent) to the shipper. Freight may be payable before signing bills, depending on the carrier's terms.

Where a mate's receipt was issued to the shipper on shipment of cargo, this may be required to be surrendered in exchange for the "shipped" bills of lading.

The master or his authorized deputy should always check the following when signing a bill of lading:

1. That the goods have actually been shipped (which may be determined from the ship's copy of any mate's receipt issued; this should be identical to the original mate's receipt issued to the shipper, which should be presented by the shipper when requesting his bills of lading);
2. That the date of shipment is correct, i.e. as stated on the mate's receipt or standard shipping note;
3. That the bill of lading is not marked "freight paid" or "freight prepaid" if not true;
4. That any clausing of the corresponding mate's receipt is also contained in the bill of lading;
5. That reference is made to the charter party where one exists;
6. That any charter party terms do not conflict with the bill of lading terms; and
7. That the number of original bills in the set is stated.

Every original in the set must be signed.

Types of Bill of lading forms

A bill of lading is a receipt for goods either received (before shipment) or shipped on board. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.)

Bill of lading forms are produced in many styles by shipping companies, shippers, charterers, freight forwarders and organizations such as BIMCO. Several types are used for different purposes.

A "long-form" bill of lading has spaces or boxes on its front for typed details and numerous printed conditions of carriage on its back. Most liner shipping companies print their own long-form bills of lading with their company conditions of carriage on the back.

A "short form" bill of lading has only a few standard terms printed on it, avoiding the need for shippers to hold stocks of bills of lading for every carrier they use, so that they can prepare the bill of lading with the required details before presentation for signature. A short form bill of lading made out for cargo loaded aboard a voyage-chartered ship will usually indicate that the terms and conditions of the relevant charter party are deemed to be incorporated in the bill of lading. This allows any party to whom the bill of lading is transferred to see where the contract of carriage actually is.

A "direct" bill of lading is issued when the goods are for carriage from one port to another. Transshipment is not anticipated although there may be a clause giving the carrier liberty to transship (in which case the goods may lie at the merchant's risk whilst in the transshipment port). This type of bill of lading has printed clauses on the reverse and is used in liner services.

A "combined transport" bill of lading covers carriage from door-to-door by several modes of transport, which is common in many liner services. The "combined transport operator" (CTO)

takes responsibility for the goods throughout the entire journey and issues the CT bill of lading at its start.

A “through” bill of lading is issued when the carriage will involve both sea and other transport modes, but different carriers will be involved at each stage, e.g. a railway company, a shipping company, a road haulier. The bill of lading is issued by the sea carrier but he states on it that he only accepts responsibility for the goods during the sea passage.

Function of a bill of lading in cargo ships agreement

Bills of Lading are internationally respected documents on which banks and other institutions rely when advancing large sums of money. If a Master or agent signs a bill of lading knowing or suspecting that the cargo description is incorrect, or if a false date is deliberately inserted in the bill, a court will probably consider that a fraud has been committed. This will render worthless any guarantees or letters of indemnity that may have been tendered by the shipper and expose the ship to liability for any loss that has been suffered.

The Master should be aware of the condition of cargo loaded to the extent that he can reasonably be expected to have inspected it. If it is impossible for him to properly inspect the cargo, the Bill of Lading should be qualified accordingly. Additionally, the Master will often be under a duty to state the quantity or weight or number of pieces of cargo shipped, and once he has signed bills to that effect it will be very difficult to claim that a different quantity was shipped. As it seldom, if indeed it ever, happens that the Master or his officers are in a position to check or vouch for the quantity of cargo shipped, mate's receipts and bills should always be claused "...shipper's weight, quantity and quality unknown..." or, in the case of bagged cargo "...xxxx bags said to contain... weight, quantity and quality unknown..."

The intrinsic value represented by a Bill of Lading tends to give rise to many disputes and accordingly, if there is any doubt about how a bill should be claused, advice of the owners or the P&I Club should be sought.

The bill of lading in the hands of a third party

At common law, a bill of lading is only prima facie evidence as to the quantity, weight and condition of goods shipped, i.e. if a bill is signed for a greater quantity of cargo than is actually shipped, it may be possible, provided the bill is not endorsed to a third party, for the carrier to refute the statements on it. Once the bill is endorsed to a third party, however, it becomes conclusive evidence of the shipment, i.e. the carrier will be bound by the bill of lading’s terms and conditions, whether the goods were shipped or not. (Since liner bills of lading are usually made out in a shore office and not on board, it is quite possible for bills to be issued for cargo that was not shipped for some reason.)

Section 4 of the Carriage of Goods by Sea Act 1992 (COGSA 92) underlines the common law position in the UK by providing that: “A bill of lading which

(a) Represents goods to have been shipped on board a vessel or to have been received for shipment on board a vessel; and

(b) has been signed by the master of the vessel or by a person who was not the master but had the express, implied or apparent authority of the carrier to sign bills of lading, shall, in favor of a person who has become the lawful holder of the bill, be conclusive evidence against the carrier of the shipment of the goods or, as the case may be, of their receipt for shipment. Every bill of lading in the hands of a consignee or indorsee for valuable consideration becomes conclusive evidence of the shipment as against the master or person signing the bill of lading, notwithstanding that such goods or part of them may not have been shipped."

A Conclusive Evidence Clause is inserted in some bills of lading stating that the contents of the bill will be conclusive evidence against the contracting parties. It is very important, therefore, for the master to ensure, before signing a bill containing such a clause, that an accurate tally has been made of the goods received on board. (If there has been fraud on the part of the shipper, however, the clause will not be binding on the carrier.)

The bill of lading as a receipt for freight

If the bill of lading is endorsed with words such as "FREIGHT PAID or "FREIGHT PREPAID", then once it is signed it becomes prima facie a receipt for the freight.

If the freight has not actually been paid, but the receipted bill of lading is endorsed to a third party, the carrier will probably lose his right to recover the freight, i.e. the statement becomes conclusive evidence that freight has been paid. It is important, therefore, to verify before signing such a bill of lading that freight has in fact been paid. (In practice the agent will normally do this.)

The bill of lading as a document of title

"Title", in the context of carriage of goods, means the right to possession, as distinct from the right to ownership.

A "document of title" is a document embodying the undertaking of a person holding goods (who is called a "bailee") to hold the goods for whoever is the current holder of the document and to deliver them to that person in exchange for the document16.

Possession of an original bill of lading is equivalent in law to the right to possession of the goods described in the bill, i.e. it gives title or "constructive possession" to the goods it represents. In other words, an original bill of lading, being a "bearer document", is good evidence that its holder is the rightful possessor of the goods. This enables any holder to obtain delivery of the goods at the discharge port by production of an original bill of lading.

Title to the goods may be transferred after shipment to a third party, such as a bank under a Letter of Credit arrangement, by "negotiation" (i.e. transfer) of the full set of original bills of lading by the shipper, subject to the bills being made out in a way that permits this in law. A bill of lading made out so as to enable its negotiation is a "negotiable document of title". Bills which are not made out in a way that permits negotiation are termed "nonnegotiable", and are often endorsed to clearly indicate this.

To make the original bills of lading negotiable they must either be made out with the words "to order" in the space allocated for the consignee's name, or "to (XYZ CONSIGNEE LTD.) or his order" in the same space, which allows the original consignee to transfer title to a third party, such as another buyer of the goods, if required.

Transfer of title from the shipper may be made by any one of three methods, as follows:

i) By means of a "blank endorsement", whereby the shipper stamps the back of each original bill with his company's stamp and adds his signature, but without inserting any transferee's name, before passing the set of bills to the transferee. A blank-endorsed "order" bill of lading (i.e. one made out "to order") is a bearer document, like a postal order or a cheque made out to "Cash", and the carrier must deliver the goods to whoever presents any one of the originals (unless he has reason to suspect fraud). Like a bearer cheque, a blank-endorsed bill of lading is a dangerous document but due to the requirements of banks which are asked by international traders to advance money against documents it is commonly used.

ii) By "specific endorsement" on the back of the bill of lading, e.g. "deliver to ABC Receivers Ltd", with the stamp and signature of the shipper. The person to whom title is thus transferred may be termed the "endorsee".

iii) By attaching authorized delivery instructions on the shipper's stationery, e.g. a Delivery Order from the shipper to the consignee.

Once a bill of lading has been negotiated, the endorsee or transferee becomes subject to the same liabilities and has the same rights against the carrier as if the contract of carriage had originally been made with the endorsee. This means that if freight or demurrage is payable before delivery of the cargo, the endorsee may be liable for the payment. To protect the endorsee the contract terms must be clear and unambiguous, and where some term in the original contract is not included in the bill of lading terms, it will not be binding on the endorsee.

The reason for making out a set of original bills of lading is that, if a single bill of lading were to be lost, the consignment of goods would have to be warehoused, a duplicate obtained (which would cause delay), or an indemnity given to the carrier, before the goods could be released. Since this would be time-consuming and costly, bills of lading are normally issued in sets of two or more "originals", the most common number of originals being three.

It is unwise to enclose a full set of bills of lading in one envelope, because of the danger of all the bills being lost together. Banks will therefore split a set into two envelopes, one being posted immediately and the second being held for 2, 3 or 4 days and then posted, to avoid the possibility of both envelopes being in transit in the same bag.

Several non-negotiable, "copy" bills of lading will normally be made for filing and other purposes, and one of them is usually marked "CAPTAIN'S COPY" and travels on the ship in the master's custody.

Outline of bill of lading contents

A bill of lading is a receipt for goods either received (before shipment) or shipped on board. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.)

Long form bills of lading, as issued by carriers operating liner services, typically contain about 30 printed and numbered clauses. The majority of clauses are common to the bills of most major carriers, although the wording may differ. Additional clauses are added by carriers to address the special features of their particular trades.

A long form liner bill of lading will usually, when issued, contain the following details:

• a reference number;
• name and address of the shipper or his agent;
• name and address of the consignee, or "to order", or "to the order of (consignee's name inserted)";
• name and address of any notify party (e.g. a receiver taking delivery of the goods for the consignee);
• ports of loading and discharge;
• name of the carrying vessel;
• any leading marks for identification of the goods (as stated by the shipper);
• the number and kind of packages or pieces (as stated by the shipper);
• description of the goods (as stated by the shipper);
• gross weight or measurement (as stated by the shipper);
• the order and condition of the goods if not in "apparent good order and condition" on receipt;
• the place where freight is payable, if freight has not been paid;
• the number of original bills of lading forming the "set" (so that the consignee or any transferee, such as a bank, can determine whether all original documents in the set have been delivered, in case of fraud or mistake);
• the date of receipt of the goods for shipment or, on a "shipped" bill of lading, the date of shipment;
• the place and date of issue;
• the signature of the carrier, master or carrier's agent; and
• the carrier's standard terms and conditions (on the back).

P&O Nedlloyd's bill of lading includes clauses numbered and named as follows:

1. Definitions;
2. Carrier's tariff;
3. Warranty;
4. Sub-contracting and indemnity;
5. Carrier's responsibility – port-to-port shipment;
6. Carrier's responsibility – combined transport;
7. Sundry liability provisions;
8. Shipper-packed containers;

9. Inspection of goods;
10. Carriage affected by condition of goods;
11. Description of goods;
12. Shipper's/merchant's responsibilities;
13. Freight;
14. Lien;
15. Optional stowage and deck cargo;
16. Live animals;
17. Methods and routes of carriage;
18. Matters affecting performance;
19. Dangerous goods;
20. Notification and delivery;
21. FCL multiple bills of lading;
22. General average and salvage;
23. Variations of the contract;
24. Law and jurisdiction;
25. Validity;
26. Limitation of liability;
27. USA clause paramount.

A charter party bill of lading will usually contain a clause to the effect that all terms and conditions of the charter party identified in the bill of lading are incorporated in the bill.

The "CONGENBILL" charter party bill of lading (1994 edition) includes clauses numbered and named as follows:

1. Unnamed;
2. General Paramount Clause;
3. General Average;
4. New Jason Clause; 5. Both to- Blame Collision Clause.

"CONGENBILL" Clause 1 states as follows:

"All terms and conditions, liberties and exceptions of the Charter Party, dated as overleaf, are herewith incorporated. The Carrier shall in no case be responsible for loss of or damage to cargo arisen prior to loading and after discharging."

The carrier's exceptions from liability are contained in the Hague or Hague-Visby Rules, which are normally applied to the contract by the Clause Paramount.

Stamped or hand-written clauses, e.g. "CLEAN ON BOARD" and "FREIGHT PREPAID", may be endorsed on a bill of lading, and will override any printed clauses. A bill of lading that has been surrendered at the discharge port may be endorsed by the carrier's agent with the word "ACCOMPLISHED".

Bill of lading related problems & handling guideline for ship master

- A bill of lading is a receipt for goods either received (before shipment) or shipped on board cargo ship. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.) Problems may arise handling a bill of lading. Summarized below some basic procedures need to be followed by ship master.

If damaged or otherwise defective cargo is presented for loading

Where shippers offer damaged or defective goods for shipment, i.e. cargo which is not in the "apparent good order and condition" as stated in the printed terms on most bills of lading, the master's duty is either:

i) To reject the goods (with the advice/assistance of an independent cargo surveyor where necessary); or
ii) To accept the goods for carriage on condition that he will issue a claused bill of lading stating the nature of the deficiency.

The master is entitled, as the carrier's agent, to enter remarks on the bill of lading as to the apparent order and condition of the goods. Since some remarks may not be effective in protecting the carrier against claims by third parties, the master should contact the owner's P&I club correspondent before making any remarks of which he is uncertain; certain remarks may have adverse consequences for the shipper when he presents a "shipped" bill of lading to his bank in compliance with the terms of a Letter of Credit.

Where the damaged or defective cargo is steel in any form, the P&I club correspondent should always be consulted before any remarks are made on the bill of lading. Where rusty steel is shipped, as is often the case, claims will inevitably arise. The master is fully justified in clausing a bill of lading relating to a steel cargo on which rust is apparent. However, to simply write "rusty" on the bills of lading is not recommended by the P&I clubs, since it may not be effective in protecting the carrier's position and it may have adverse consequences for the shipper when he presents the bills of lading to his bank and demands payment for the goods.

The P&I clubs advise that remarks on the degree of rusting, e.g. "extremely rusty" or "superficially rusty" should never be made.

In every case where steel is being loaded and rust is apparent, the master should contact the P&I club correspondent before making any remarks on the bill of lading. Certain clauses will be recommended by the club, while the use of others will not be approved of.

If master is asked to sign "clean" bills of lading when these are not justified

A clean bill of lading is a bill of lading bearing no superimposed clauses stating a defective condition or shortage of the goods. It states that the goods have been received "in apparent good order and condition...", without further remarks as to their condition.

A **dirty bill of lading**, also known as a "claused" or "foul" bill, is one claused with remarks such as "torn bags", "rusty drums", etc.

A Letter of Indemnity (or "back letter") may be offered by the shipper, promising to indemnify the master or carrier against any loss or liability as a consequence of signing a clean bill of lading. However, acceptance of a Letter of Indemnity of this type in return for clean bills makes the master a party to an act of deception or fraud on banks, consignee/buyer, and insurers, since it is an attempt to obtain payment for goods knowing them to be unsound. There may be personal criminal liability for fraud on the part of the carrier and the master, and a heavy financial liability on the ship-owner. This type of Letter of Indemnity has no legal standing in English law and cannot be sued on if the shipper goes back on his promise of indemnity.

A master should consult his owners and their P&I club's correspondent if he is in any doubt, but should never accept a Letter of Indemnity of this sort without the written orders of his owners.

If ship and shore loading figures differ

Where the ship's cargo quantity measurements show less cargo loaded than the quantity stated by the shipper, the master should generally enter the ship's figures on the face of the bill of lading.

Some ship-owners require their masters to endorse a bill of lading which does not provide space for the ship's figures in the following terms: "Vessel's measurements are stated below and this Bill of Lading only acknowledges the shipment of the weight or quantity given in the vessel's measurements on completion of loading".

Where the shipper refuses to accept such an endorsement the master should write a Letter of Protest to the shipper, pointing out the discrepancy in the figures and stating that the bill of lading will be signed under protest. A copy of the Letter of Protest should be stapled to each negotiable copy of the bill of lading (i.e. each bill of lading in the set of "originals").

If the ship's measurements show more cargo loaded than advised by the shipper, the shipper's figures should be entered on the bill of lading. No Letter of Protest will be necessary.

If a charterer's bill of lading has to be used

Where a charter party requires the master to sign bills of lading as presented by the charterer, the master should first verify that the bills of lading incorporate the terms of The Hague or Hague-Visby Rules. (This will generally be stated in the Clause Paramount or Paramount Clause.)

P&I clubs usually restrict cover to contracts incorporating terms at least as favorable as those given by the Hague Rules or Hague-Visby Rules. Where there is no reference in the charterer's bill of lading to the incorporation of these Rules, the P&I club correspondent should be contacted.

Where the master is required to sign "clean" bills of lading as presented by the charterer, "clean" has been held by a court to mean only that the bill of lading should not be claused to the effect that demurrage was due at the loading port, without affecting the master's right to clause the bill of lading as to the apparent order and condition of the goods where necessary.

Where a contractual lien for demurrage is given by the charter party terms, and demurrage is due at the loading port but not paid, the master should clause the bill of lading to that effect so that the lien can be exercised if necessary at the discharge port.

If the number of original bills of lading shown on the face of the bill is not the same as the number of negotiable bills of lading

The number of original bills of lading in the set should, before signing, be entered in a space provided on the face of each bill. (In addition to these "originals", there may be several other "non-negotiable copy" bills, each of which should be clearly marked as such.)

Where the master is asked to sign bills of lading and the number of "original" bills presented for signature is not the same as the number indicated on the face of the bill, the master should:

- Attempt to ascertain the reason for the discrepancy;
- Call the P&I club correspondent;
- Refuse to sign the bills until the correct number is inserted.

If two or more sets of bills of lading are requested by the shipper

Two or more sets of original bills of lading may have to be issued in the following circumstances:

- where cargo is shipped by more than one shipper (e.g. at multiple loading ports);
- where cargo is consigned to more than one consignee; or
- where more than one type, grade or specification of cargo is shipped by one shipper.

In the tanker trades it may happen that two or more consignments of cargo, shipped by different shippers, are intentionally loaded into one tank, so that it becomes impossible to determine the respective shippers' quantities on completion of loading. In such cases the master should endorse and sign separate bills of lading to the effect that the shipments are part cargoes, or are part of a bulk cargo.

Where multiple consignments are loaded, but only one total figure is given, the master should consult the shipper as to the apportionment of quantities on the bills of lading for each consignment. Where no instructions are obtainable, the total quantity loaded should generally be divided between the bills of lading in proportion to the original split of the nominated consignments. For example, where the consignments were nominated as 40,000 tons consigned to Party A and 60,000 tons to Party B, but only 99,400 tons are loaded, the apportionment on the bills of lading should be 39,760 tons and 59,640 tons respectively.

If a bill of lading presented for signing is written in an incomprehensible foreign language or alphabet

Bills of lading are, in some countries (e.g. Libya), presented for signing in a foreign language or alphabet which may not be known to the master. In such case the master should arrange for the bill of lading to be translated by an independent third party (i.e. someone other than an agent of either the carrier or charterer). If in doubt, the P&I club correspondent or British consul should be asked whom to employ.

If a translator cannot be found, the master should make out his own bill of lading in English (using another bill of lading form as a model), and issue this to the shipper for completion of the shipment details before signing. Only appropriate clauses should be incorporated.

If the master is asked to sign blank or partially completed bills of lading

Except where the Early Departure Procedure is being properly used in the tanker trades, blank or partially-completed bills of lading should never be signed and issued by the master, for obvious reasons.

In all cases where the master is asked to sign blank or partially-completed bills of lading, the P&I club correspondent should be advised.

If Early Departure Procedure is used

Some oil terminals and tanker companies use an "Early Departure Procedure" ("EDP") to allow tankers to sail on completion of cargo operations without having to wait for cargo figures to be prepared and documents produced. The practice is more commonly used when the ship's time is at a premium, but at other times is discouraged.

In the EDP system

1. Bills of lading are prepared before completion of loading, but without any loaded cargo quantity as advised by the shipper.
2. The agent presents the bills of lading for the master's signature before completion of loading.
3. The master returns the originals of the bills of lading to the agent but retains the non-negotiable "captain's copies" together with "copy" bills for consignees, and other completed cargo documents.
4. The master writes any necessary Letter of Protest regarding the order or condition of the cargo, and allows any investigation to be completed before departure.
5. After departure of the ship, the agent communicates the shipper's final loading figures to the master as soon as they are available.
6. If the master agrees the communicated figures, he enters them on his "captain's copies" of the bill of lading and on the consignee's copies, while the agent completes the original bills of lading and signs them on behalf of the master.
7. If the master does not agree with the shipper's figures he informs the agent, who writes a Letter of Protest to the shipper on the master's behalf and completes and signs the bills of lading under protest.

8. The agent releases all original documents to the shipper, who sends them to the consignee.

At some ports the practice may be to present bills of lading to the master for signature either blank or only partially completed, but the master should never sign such documents, and should instead call the P&I club correspondent. Agents should be authorized to sign bills of lading on behalf of the master only after the master has been made aware of, and has agreed to, any details (including loading figures) to be entered.

If bills of lading have to be re-issued or amended

The master may be asked to re-issue or amend a previously issued bill of lading. He should never agree to this without the consent of the P&I club correspondent.

The P&I club correspondent will normally ensure that before a second set is issued, all bills of lading in the first set are returned and cancelled or destroyed. (The number of original bills returned should, of course, tally with the number of originals issued, as stated on the face of each bill.)

Each bill of lading in the new set should be claused as follows:

This is a replacement Bill of Lading issued at…… on the …… day of …… (month/year) on cancellation of an original Bill issued at …… on the …… day of ……..(month/year) to show (reason for re-issuing bills of lading).

If the master is asked to pre-date or post-date bills of lading

Under the terms of a Letter of Credit, payment to the seller of the goods will normally depend on the goods being shipped on a particular date, or between particular dates, and banks will generally refuse to pay the seller if the actual date of loading does not correspond with the date stipulated in the Letter of Credit. Cases therefore arise where the incorrect loading date is inserted in bills of lading in an attempt to evade a delay in obtaining payment.

A “shipped” bill of lading should always be dated for the actual date of loading, or the date of completion of loading. Although the master may be requested to sign pre-dated or post-dated bills of lading, he should never do so.

If delivery of cargo is requested without presentation of the relevant bill of lading

In the tanker trades, cargoes are commonly bought and sold many times during a voyage, causing delays in the arrival of the bills of lading, and the problem commonly arises that the cargo arrives at the discharge port before a copy of an original bill of lading can be produced.

In other cases, the bill of lading may be missing for a variety of reasons. The receiver may claim that the bills have been lost, stolen or delayed. In such cases, there is there is the possibility of misdelivery and a serious risk of fraud.

If the master negligently delivers cargo to the wrong party without first requiring production of an original bill of lading, the carrier will be held wholly liable for the consequences and will

receive no backing from his P&I club or sympathy from the courts. Wrongful delivery may even result in the arrest and sale of the ship to recover the cargo's value for the rightful owner.

I fit is likely that the bill of lading has merely been delayed, the goods may be delivered - with the ship owner's and the P&I club's agreement - after the receiver signs an acceptable Letter of Indemnity. An "acceptable" Letter of Indemnity is one that:

• promises to indemnify the ship owner against all consequences and liabilities of delivery to the wrong person;
• is phrased in terms acceptable to the owner's P&I club; and
• is countersigned by a first class bank or cargo insurance underwriter, i.e. one able to meet any claim. Some P&I clubs print the text of their standard Letter of Indemnity in their club handbook or rulebook, which should be carried on board. This does not imply, however, that the club will always give cover for claims arising under such Letters of Indemnity.

If an acceptable Letter of Indemnity cannot be offered, the cargo should not be delivered.

If cargo delivery is requested against presentation of an original bill of lading carried on board

In some cases an original bill of lading may be sent to the consignee on board the carrying vessel. The master should issue a receipt to the shipper or his representative (e.g. the freight forwarder). The master should not accept for carriage original bills of lading made out "to order", or where there is no named destination or where the destination is qualified, e.g. "Lands End for orders/intention Le Havre".

The master should not accept original bills of lading for carriage if the shipper refuses to sign the receipt, or if no party is named as receiver in the bill of lading.

The master should not discharge against an original bill of lading carried on board if the discharge port is different from the destination shown in the bill of lading. In this case he should consult the owner and the P&I club correspondent.

On arrival at the discharge port the master should hand the bill of lading to the party named in the receipt, if his identity can be confirmed.

If two parties present "original" bills of lading

The master should immediately contact the P&I Club correspondent. The bills of lading may be left with a court of law to settle the dispute. In the meantime, the goods should be landed to a warehouse/tank, etc., where they should be held until the dispute has been settled and freight and charges have been paid.

If goods are unclaimed at the discharge port

The master is not obliged to deliver goods to a receiver until one original bill of lading is presented, but neither is he obliged to retain unclaimed goods on board. At common law, if

goods are not claimed within a reasonable time, the master may land and warehouse them. The master has a duty to do this, in fact, rather than detain his ship in port beyond her laytime and make the charterer liable for demurrage. The warehouseman becomes a common agent of both carrier and consignee and should be instructed to release the goods only on payment of all outstanding charges (e.g. freight and demurrage). Warehousing expenses will be for account of the receiver of the goods.

If the goods remain unclaimed, they may usually be sold by the carrier after a reasonable time (depending on local law) and after advertising for the consignee in the national press. Carriers often insert a clause known as a London Clause in their bills of lading giving them the right to land goods on arrival; this clause overrides the common law position.

Hague-Visby Rules defining cargo ships obligations and liability

Hague-Visby Rules (HVRs) are properly called the Hague Rules as Amended by the Brussels Protocol 1968 and apply to every bill of lading or any similar document of title relating to the carriage of goods between ports in two different States if:

i) the bill of lading or document is issued in a contracting State; or
ii) the carriage is from a port in a contracting State; or
iii) the contract contained in or evidenced by the bill of lading provides that the Hague-Visby Rules or the legislation of any State giving effect to them (e.g. the UK's Carriage of Goods by Sea Act 1971) are to govern the contract.

Under Article V, the Rules will not be applicable to charter-parties, but if bills of lading are issued in the case of a ship under a charter-party, they must comply with the Rules.

Many States, such as the UK, have legislation incorporating the Hague-Visby Rules into national law. Where no such national law applies, the Hague-Visby Rules may still apply to the carriage by agreement of the contracting parties. (See Clause Paramount in bill of lading, waybill or charter party.)

Article II provides that, subject to the provisions of Article VI, under every contract of carriage of goods by sea, the carrier, in relation to the loading, handling, stowage, carriage, custody, care and discharge of such goods, will be subject to the responsibilities and liabilities, and entitled to the rights and immunities, set out in the Rules.

"Goods" is defined in Article I as including goods, wares, merchandise, and articles of every kind whatsoever except live animals and cargo which by the contract of carriage is stated as being carried on deck and is so carried.

Carrier's responsibilities under the Hague-Visby Rules

The carrier has three basic obligations:

i) to ensure the vessel's seaworthiness;
ii) to care for the cargo; and
iii) to issue a bill of lading where the shipper requests one.

Obligation in respect of seaworthiness

Article III paragraph 1 provides that the carrier must, before and at the beginning of the voyage (i.e. up to the moment of sailing), exercise due diligence to:

- make the ship seaworthy;
- properly man, equip and supply the ship; and
- make the holds, refrigerating and cool chambers, and all other parts of the ship in which goods are carried, fit and safe for their reception, carriage and preservation.

"Exercising due diligence" means taking all reasonable precautions to see that the vessel is fit for the voyage contemplated. The carrier is not obliged to give an absolute guarantee of seaworthiness. The carrier may delegate his duty to exercise due diligence (e.g. to surveyors or repairers) but he will be responsible if his servants or contractors, etc. fail to exercise due diligence in carrying out their work.

"Seaworthy" in this context means that the hull must be in sound condition, the vessel must be mechanically sound, equipped with charts, etc., and crewed by a properly trained crew. She need only be seaworthy at the commencement of the voyage, which usually means when she leaves the berth, whether under her own motive power or with the aid of tugs.

If a cargo owner can show that his loss was caused by a failure of the carrier to exercise due diligence to make the vessel seaworthy, the carrier will not be able to rely on any other clauses in the Rules which reduce his liability (i.e. the exceptions from liability).

The holds must be fit and safe for the reception, carriage and preservation of the cargo and, in particular, the hatch covers must be tight and there must be no instability of the vessel through improper stowage. It has been held that the neglect to protect a water pipe in a hold from frost which could have been expected at the time of year showed lack of due diligence to make the vessel seaworthy.

Carrier's obligation in respect of the cargo

Article III paragraph 2 provides that, subject to the provisions of Article IV, the carrier must "properly and carefully load, handle, stow, carry, keep, care for and discharge any goods carried". Unlike seaworthiness, this duty extends throughout the voyage and implies a greater degree of care than exercising "due diligence". The courts do not expect perfection from the carrier, but it has been held that stowage was improper where –

- contamination of other goods occurred;
- there was inadequate or no ventilation;
- dry cargo was damaged by liquid goods; and
- vehicles were secured only by their own brakes.

The carrier must have a proper system for looking after the cargo when stowed. He has a duty to use all reasonable means to ascertain the nature and characteristics of the cargo and to care for it accordingly, although the shipper should give special instructions where special

care is required. (Where water in tractor radiators froze, it was held that the carrier should have been told of the risks.)

Obligation to issue a bill of lading

Article III paragraph 3 provides that after receiving the goods into his charge, the carrier, the master or the carrier's agent must, if the shipper demands, issue a bill of lading to the shipper showing, amongst other things:

- all leading marks for identification of the goods, as stated by the shipper before loading (in his shipping note), provided these are visible on the goods or their coverings;
- either the number of packages or pieces, or the quantity, or weight, as stated by the shipper (in his shipping note); and
- the apparent order and condition of the goods.

The carrier, master or agent need not insert any inaccurate statements on the bill of lading or give any details which he cannot reasonably check. (Hence the practice for statements to be made such as "said to weigh...." and "shipper's load and count".)

Any bill of lading thus issued will be prima facie evidence of receipt of the goods by the carrier as described, but proof to the contrary will not be admissible if the bill of lading is transferred to a third party acting in good faith (Article III paragraph 4).

Any bill of lading issued after loading must be a "shipped" bill of lading if the shipper demands, provided he surrenders any previously issued document of title (e.g. a "received" bill of lading issued when the goods arrived at a warehouse or depot before shipment) (Article III paragraph 7).

Carrier's rights and immunities

- the carrier's exceptions from liability;
- the carrier's right to deviate; and
- the carrier's rights in respect of dangerous goods.

Article IV paragraph 2 grants seventeen exceptions from liability to the carrier (compared with six under English common law). Neither the carrier or ship will be responsible for loss or damage arising or resulting from:

- act, neglect or default of the master, mariner, pilot, or the servants of the carrier in the navigation or management of the ship;
- fire, unless caused by actual fault or privity of the carrier;
- perils, dangers and accidents of the sea or other navigable waters;
- act of God;
- act of war;
- act of public enemies;
- arrest or restraint of princes, rulers or people, or seizure under legal process;
- quarantine regulations;
- act or omission of the shipper or owner of the goods, his agent or representatives;

• strikes, lockouts, stoppage or restraint of labour;
• riots and civil commotions;
• saving or attempting to safe life or property at sea;
• wastage in bulk or weight or any other loss or damage arising from inherent defect, quality or vice of the goods;
• insufficiency of packing;
• insufficiency or inadequacy of marks;
• latent defects not discoverable by due diligence;
• any other cause arising without the actual fault or privity of the carrier, or without the fault or neglect of the agents or servants of the carrier (but the burden of proof will be on the carrier to show that his fault or privity or the fault or neglect of his agents or servants did not contribute to the loss or damage).

Article IV paragraph 4 provides that any deviation in saving or attempting to save life or property at sea, or any reasonable deviation, will not be an infringement or breach of the Hague-Visby Rules or of the contract of carriage, and the carrier will therefore not be liable for any resulting loss or damage.

Article IV paragraph 6 provides that goods of an inflammable, explosive or dangerous nature, if not properly marked, or if shipped without the knowledge or consent of the carrier, may be landed, destroyed, jettisoned or rendered innocuous at any time before discharge. Such goods, even when shipped with the carrier's knowledge and consent, may be dealt with in this way without liability to the carrier, should they become dangerous.

General Average under the Hague-Visby Rules

Under Article V, nothing in the Rules may be held to prevent the insertion in a bill of lading of any lawful provision regarding General Average. (Most bills of lading have a clause making the merchant or shipper aware that he may become liable for a contribution in General Average.)

Exclusion of deck cargo and live animals from Hague-Visby Rules cover

Article I(c) excludes from the items defined as "goods" live animals and cargo which by the contract of carriage is stated as being carried on deck and is so carried. Live animals are excluded from cover at all times. Cargo which is carried on deck without being stated as such in the contract will, therefore, be subject to the Rules, as will cargo which is stated as being carried on deck but which is, in fact, carried below deck.

Where the carrier's terms and conditions of carriage incorporate the Hague-Visby Rules, then in the absence of any term expressly providing to the contrary those terms will not cover live animals or deck cargo. A shipper of live animals or deck cargo should therefore make a special contract with the carrier, and should specifically state "FOR DECK CARRIAGE" on his shipping note.

Hamburg Rules defining sea carrier's obligations and liability

International contracts of sea carriage

Hamburg Rules are properly called the United Nations Convention on the Carriage of Goods by Sea 1978, were drafted under the auspices of the UN agency UNCITRAL and introduced in 1992 in response to shippers' complaints that the Hague and Hague-Visby Rules were unfavorably weighted in favor of the carrier.

The Hamburg Rules are supported by very few States with any significant maritime trade. The main features of the Hamburg Rules of interest to a shipmaster are:

• The carrier is liable from the time he accepts the goods at the port of loading until he delivers them at the port of discharge. (Under the other rules the carrier is liable from "tackle to tackle".)
• The carrier is liable for loss, damage or delay to the goods occurring whilst in his charge unless he proves that "he, his servants or agents took all measures that could reasonably be required to avoid the occurrence and its consequences".
• The Hamburg Rules do not give the carrier so many exceptions from liability as The Hague and Hague-Visby Rules. In particular, the carrier is not exonerated from liability arising from negligence in navigation or management of the ship.
• The Hamburg Rules govern both inward and outward bills of lading, whereas the Hague and Hague-Visby Rules govern only outward bills of lading.
• The Hamburg Rules cover live animals, unlike The Hague and Hague-Visby Rules, but the carrier is not liable for loss, damage or delay in delivery resulting from any special risks inherent in their carriage.
• The carrier can only carry cargo on deck if there is a custom of the trade to do so or by an agreement with the shipper. If such an agreement exists the carrier must insert a statement to this effect on the bill of lading. Where goods are carried on deck without a custom of the trade or an agreement with the shipper, the carrier is liable for loss, damage or delay.

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Outline of a mate's receipt for cargo ships employment

A mate's receipt is a receipt, issued and signed by the carrying ship's chief mate (or the ship's agent on his behalf), for goods received on board.

It may be encountered in virtually any conventional trade (general cargo, dry bulk or tanker), but has been replaced in the liner trades (i.e. container and ro-ro shipping) by a more modern document, the Standard Shipping Note.

It is the document on which the details entered on the bill of lading are based; the information on both mate's receipt and bill of lading should therefore be identical. The mate's receipt should not be copied directly from the shipping note presented when the goods are brought alongside, but should be compiled from a ship's tally or measurement and show the actual quantity and condition of the goods as received. should, when the condition or quantity of the cargo justifies it, be endorsed with remarks such as "torn bags", "stained bales", "rusty drums", etc. and should, where the ship's and shipper's tallies disagree, be made out for the smaller figure, with the clause "X more (drums) in dispute; if onboard to be delivered", "X" being the difference between the tallies.

It will normally be on the ship owner's form, in a triplicate pad or book kept on board. The original should be given to the person delivering the goods to the ship, a copy should go to the agent, and a second copy should be retained in the pad on the ship for comparing with bills of lading before signature, and for use in compiling the cargo plan.

It is not a document of title to the goods shipped and does not pass any title by its endorsement or transfer.

In ports and trades where mate's receipts are used, the shipper must usually present the signed mate's receipt to the agent in order to be issue with the signed set of original bills of lading before the vessel sails.

Function of Mate's receipt defending claims

Goods or packages received in unsound condition clearly cannot be delivered in a sound condition. Therefore, it is essential to maintain a careful watch during loading for any packages which may have been tampered with, which are improperly or inadequately protected, broken, leaking, damaged, repaired, spilled, torn or stained. Such packages should be rejected unless reconditioning is an option. Care should, of course, be taken to see that any packages for which Mate's receipts (see below) have been issued but for some reason have been returned ashore and then reloaded, are still in good condition.

The Mate's receipt is given for goods actually received on board and is given up to the agent or broker authorized to issue the Bill of Lading.

The Mate's receipts are often the ship owner's first line of defense in defending a cargo claim for damage or shortage. It is essential that the receipts are accurate and correctly reflect the quantity and condition of the cargo received on board.

Where it is practical for the ship's staff to carry out a tally, the total received on board may differ from charterers' or shippers' tallies. The lower quantity should be stated on the receipt and claused, for example, "23,850 bags received on board. 150 bags in dispute, to be delivered if found on board at discharge".

It is more difficult to verify the quantity of cargo on board a bulk carrier, particularly as it may be impossible for the Master to carry out a draft survey to compare with the shippers' figures. For example, the ship may be loading at a roadstead, where the weather and sea conditions would render the survey inaccurate. The only practical remedy is to endorse the Mate's receipts showing shippers' figures, "weight, measure, quantity, quality, conditions, contents and value unknown to the vessel and owners". A partial, practical remedy may be for the ship's hatches and cargo accesses to be sealed and certified by an independent surveyor appointed by the owners P&I Club.

A surveyor should be appointed at the discharge port to certify that seals are intact before breaking bulk with receivers/charterers invited to attend the verification, although it may be found that the charterers' representative seldom appears. The Master should keep a written sequence of events at load ports and make annotations in the deck log book. His letter of authority to agents to sign bills of lading on his behalf must state that they are to be issued in strict conformity with remarks on the Mate's receipts. Charterers' attempt to word the authority "Mate's receipts or tallies" should be resisted as they may attempt to use the tallies issued clean rather than the claused Mate's receipts.

Cargo arriving at shipside in a damaged condition should be rejected. It is fraud to sign Mate's receipts that do not reflect the true condition of the cargo. The rejection of bagged cargo or packaged goods for mould, wet damage or leakage, is relatively straightforward. However, this may not always be practical with limited ship's staff and six hatches being loaded with bagged commodities.

Often, it is not possible to verify the condition of the contents within the packaging; rice may be infested, and coffee may be mouldy, for example. The best the ship's staff can do, is to be vigilant and exercise due diligence. If there is a problem, this should be drawn to the attention of the shipper or charterer. The Mate's receipts should be signed in good faith and endorsed, "... quality, condition, contents and value unknown..."

Cargo tallying

It is impossible for ship's staff to efficiently tally loading and/or discharge of cargo except in circumstances involving small parcels such as mail or bullion. In some ports it will be sensible for the ship to employ tally clerks independent of any employed by the shipper or receiver to ensure that the ship has figures to defend any shortage claim. Even this may not be sufficient in some jurisdictions and the Master should consult his P&I Club to ensure that the best course of action is followed in a particular port.

If tally clerks are employed jointly by shipper and owner, the clerk's receipt may be accepted in place of the Mate's receipt and spot checks by ship's staff on the accuracy of the tally are a sensible precaution. The ship's tally should be taken on board both for loading and discharge and not ashore or in a lighter as the ship's liability usually commences and ceases when the cargo passes over the ship's rail. Tally records should be retained on board for defence in the event of a claim against the ship.

Transport of goods at sea and cargo ships employment

Goods are most often carried by sea as a result of a sales contract (or sale of goods contract) made between the seller and buyer. The contract of carriage, which is separate, comes about as a result of this sales contract. The contract of sale between the seller and the buyer of the goods is separate from the contract of carriage which one party or the other, or a third party (such as a freight forwarder), will make with the carrier.

Seagoing cargo ship various employment methods

Charter party forms

A charter party (sometimes charter-party) is a maritime contract between a ship-owner and a "charterer" for the hire of either a ship for the carriage of passengers or cargo, or a yacht for pleasure purposes. Charter party is a contract of carriage of goods in the case of employment of a tramp. It means that the charter party will clearly and unambiguously set out the rights and responsibilities of the ship owner and the charterers and any subsequent dispute between them will be settled in the court of law or any agreed forum with reference to the agreed terms and conditions as embodied in the charter party. The name "charter party" is an Anglicization of the French *charte partie*, or "split paper", i.e. a document written in duplicate so that each party retains half. Defines the obligations, rights and liabilities of the ship-owner and charterer. Recognized standard form (e.g. GENCON, BALTIME, NYPE)

Defining a charter party

A charter party (commonly abbreviated to “C/P”):

i) is a document containing the written terms of a charter agreement between a ship-owner and a charterer, who are usually respectively referred to in the text in the plural, i.e. as "Owners" and "Charterers".
ii) Defines the obligations, rights and liabilities of the ship-owner and charterer.
iii) Is usually drawn up by the broker representing the charterers following negotiation and agreement of terms between both parties.
iv) Is usually based on a particular edition of a recognized standard form (e.g. GENCON, BALTIME, NYPE).
v) Is sometimes based on a specified charter party already performed by another vessel at an earlier date, in order to save effort and time in negotiating many of the terms.
vi) Usually comprises a set of standard clauses on a printed form, with additional typed rider clauses appended if the standard clauses fail to cover all aspects of the parties' agreement. Where there is a conflict between standard and rider terms, the rider clauses override the standard clauses.
vii) May have many amendments to the standard clauses, as agreed by the parties. Generally, the more amendments there are, the more scope for legal disputes, and it is preferable to have as few amendments as possible.
viii) May be in a modern "boxed" layout, with plain wording of clauses (as with BIMCO-designed forms), or in a more traditional style with (sometimes) rather archaic wording.
ix) May contain annexes dealing with special arrangements (as with CRUISEVOY, which has five annexes).
x) May have sensitive clauses in an addendum and/or side letter. Side letters are legally not so important as addenda.**xi)** Should be signed by a broker representing each party to the contract, unless their principals sign instead.
xi) Should ideally be balanced so that it does not favor one party to the disadvantage of the other. (Some charter parties, such as SUGAR CHARTER 1999, are sometimes accused of being biased.)

Numerous charter party forms are in use for different trades and purposes. The use of an "off-the-shelf" form which has been carefully drafted, amended and improved over the years to avoid legal pitfalls is generally preferred by brokers and shipping practitioners to creating a totally new document for an individual charter.

Many forms have more than one edition, having been amended and improved over the years. Brokers may still use an older version, however, in preference to a newer version that has not gained their confidence.

Modern charter party forms drafted by BIMCO9 generally have boxed layouts, whereas older forms are in "conventional" layout. In a BIMCO boxed layout form, variable information is contained in boxes in Part I, while standard terms are contained in printed terms in Part II. Legally, the contract is generally contained in the Part I details, and in any other variable details in rider clauses, etc.

Types of charter party

There are three main types of charter party: **time, voyage** and **demise and another**:

- In a **demise (or bareboat) charter**, the charterer takes responsibility for the crewing and maintenance of the ship during the time of the charter. He assumes the legal responsibilities of the owner, and is known as a despondent owner.
- In a **time charter**, the vessel is hired for a specific amount of time. The ship-owner manages the vessel but the charterer gives orders for the employment of the vessel, and may sub-charter the vessel on a time charter or voyage charter basis.
- In a **voyage charter**, the charterer hires the vessel for a single voyage, but the shipowner provides the master, crew, bunkers and supplies.

A demise charter operates as a long lease of the vessel, with the charterer completely in charge. In time and voyage charters, the ship-owner still runs the ship, but when in port the charterer becomes responsible for loading and unloading the ship within the agreed period of laytime. If the charterer exceeds the allowed laytime, demurrage becomes payable.

In a voyage charter, the route is pre-arranged and the charterer has little scope to interfere with the programme. By contrast, the time charter is almost a halfway-house between a demise charter and a voyage charter, in that the charterer decides on the voyages and the ports, and instructs the ship owner's crew to comply. This can lead to issues of indemnity: whereas the ship-owner in a voyage charter takes responsibility for the ship, in a time charter the ship-owner may need to be indemnified against losses or liabilities proximately caused by the charterer.

Voyage charter party forms

Examples of voyage charter party forms used in various trades are as follows:

Codename	**Trade**	**Remarks**
AFRICANPHOS	Moroccan phosphates	Charterers' form
AMWELSH	Coal Americanized Welsh coal	C/P. Widely used
ASBATANKVOY	Tanker American	form
AUSTWHEAT wheat	Australian Wheat Board	Australian form.
BEEPEEVOY	Tanker	BP form, used by many companies
CHEMTANKVOY	Chemicals	BIMCO form. Boxed layout
CRUISEVOY	Cruising	BIMCO form for cruise ship charter
C"ORE"7	Iron ore	Full name: Mediterranean Iron Ore C/P
FERTIVOY	Fertilizers	Unknown origin
GENCON	General purpose	BIMCO form. 1922, 1976 and 1994 revisions
GRAINVOY	Grain	BIMCO form
INTERTANKVOY	Tanker Intertanko form	used by independent owners
NORGRAIN	North American grain	American form

NUBALTWOOD	Timber	Used in Baltic trade
OREVOY	Iron ore	BIMCO form with boxed layout
PANSTONE	Stone (UK/Eire and N Continent trade)	BIMCO form last amended 1995 but retaining traditional layout
SHELLVOY	Tanker	Shell form, used by many companies. Various editions

Time charter party forms

Examples of time charter party forms in use are as follows:

Codename	**Trade**	**Remarks**
ASBATIME	Dry cargo tramp or liner	American form.
BALTIME	Dry cargo tramp or liner	BIMCO form. Boxed layout. Popular in short sea trades
BEEPEESUPPLYTIME	Offshore service	BP form
BEEPEETIME	Tanker	Widely used BP form with various versions
GENTIME 1999	Dry cargo tramp or container	Designed to replace BALTIME 1939 and LINERTIME, and as an alternative to NYPE
INTERTANKTIME	Tanker	Intertanko form. Used by independent owners
LINERTIME	Dry cargo	liner BIMCO form. Boxed layout
NEW YORK PRODUCE EXCHANGE (NYPE)	Dry cargo tramp or liner	Most commonly used time C/P form. 1946 version more popular than 1993 version.
SHELL VESSEL TIME	Offshore service	Shell form. 1986 revision of SHELL SUPPLY
SHELLTIME	Tanker	Shell form, but widely used. Various versions
SUPPLYTIME	Offshore supply	BIMCO form.
TEXACOTIME	Tanker	Texaco form. Various versions

Defining a sub charter

It is common for the terms of both time and voyage charters to permit the charterers to sub-let the vessel in whole or in part, on condition that the head charterer remains responsible to the ship-owner for the performance of the original charter. It would be possible, therefore, for a vessel to be:

1. Owned by a bank or finance house;
2. Leased or bareboat chartered to Company A;
3. Time-chartered from Company A by Company B;
4. Voyage-chartered from Company B by Company C;
5. Employed by Company C in its own liner service, or even sub-chartered from Company C by Company D.

* Any reference in a charter party to a "disponent owner" refers to the time or bareboat charterer of a sub-let vessel, who assumes, in relation to the sub-charterer, the responsibilities of a real owner.

Nature of a time charter

Defining a time charter

A time charter - is a contract for the hire of a named vessel for a specified period of time. - may be thought of as equivalent to the hire of a chauffeur-driven car (the ship's crew being "the chauffeur").

i) The charterers agree to hire from the ship-owner a named vessel, of specified technical characteristics, for an agreed period of time, for the charterer's purposes subject to agreed restrictions. The hire period may be the duration of one voyage (a "trip charter") or anything up to several years ("period charter").

ii) The ship-owner is responsible for vessel's running expenses, i.e. manning, repairs and maintenance, stores, master's and crew's wages, hull and machinery insurance, etc. He operates the vessel technically, but not commercially. The owners bear no cargo-handling expenses and do not normally appoint stevedores.

iii) The charterers are responsible for the commercial employment of the vessel, bunker fuel purchase and insurance, port and canal dues (including pilotage, towage, linesmen, etc.), and all loading/stowing/trimming/discharging arrangements and costs. They direct the ship's commercial operations, but not her daily running and maintenance. The charterers normally appoint stevedores and nominate agents.

iv) There may be an agreement between the parties for an extra payment (of perhaps several hundred US$) to be made by the charterers each time the ship's crew sweep and/or wash down the holds of a dry cargo ship.

v) A Directions and Logs Clause requires the charterers to provide the master with all instructions and sailing directions, and the master and chief engineer to keep full and correct logs accessible to the charterers or their agents, so that they can monitor the vessel's efficiency. Stevedoring damage notification forms, and log extracts (or "abstracts") will usually be required to be sent to the charterers.

vi) Time charterers are normally allowed to fly their own house flag and, at their own expense, paint their own colours on the funnel and/or sides.

Cargo ships employment for time charter

A time charter party usually incorporates a clause defining the ship's permitted employment or trade limits. Typically, the charterers may employ the vessel only in lawful trades, carrying lawful merchandise, using only "good and safe ports or berths" and sometimes safe anchorages where the vessel can lie always safely afloat within the agreed trading limits.

The charter party should always be checked for trade limits. Some countries, areas and ports (e.g. Israel, Persian/Arabian Gulf, Cuba, Vietnam, Kampuchea, North Korea, Lebanon, Angola, Namibia, Syria, Libya, Somalia, Ethiopia and South Africa) may be excluded from the permitted trading area. "Worldwide within Institute Warranty Limits" is a common term describing agreed trading areas (the "Institute" being the Institute of London Underwriters). "Institute Warranty Limits" is sometimes abbreviated as "IWLs".

Guarantees may be required from owners that the vessel has not traded to certain countries since a particular date, since the discovery of a past visit to a particular country may cause problems for the ship in another country.

The charter party should be checked for cargo exclusions. At common law, the charterers are under an implied obligation not to load any dangerous cargoes, but most charter parties state that the charterers may load certain dangerous goods if various statutes and regulations (e.g. the IMDG Code) are complied with. Usually, the vessel will be allowed by her owner to carry any "lawful merchandise" with the exception of certain excluded commodities which may be injurious to the ship, e.g. "bulk asphalt, pitch or tar, livestock, logs, acids, scrap, sulphur, petroleum coke, explosives, fishmeal and nuclear materials".

Lightening at sea is not normally allowed without permission of underwriters (since this is usually outside terms of the Hull and Machinery policy).

The charterers are responsible for the vessel's commercial employment and direct her commercial operations, e.g. by giving instructions as to the sailing itinerary and cargo to be loaded.

The Master shall perform the voyages with due despatch, and shall render all customary assistance with the Vessel's crew and equipment. The Master shall be conversant with the English language and (although appointed by the Owners) shall be under the orders and directions of the charterers as regards employment and agency but the Master shall have the right to reject charterers' orders and/or directions as to the employment of the vessel where, in his sole discretion, he considers that these may compromise the safety and/or seaworthiness of the vessel, such right of the Master to be exercised in good faith; and the charterers shall perform all cargo handling, including but not limited to loading, stowing, trimming, lashing, securing, dunnaging, unlashing, discharging, and tallying, at their risk and expense, under the supervision of the Master.

Although he is a servant of the owners, the master is always under the time charterer's orders as far as the employment of the vessel and agency matters are concerned. He must

accordingly prosecute the voyage with utmost despatch and give the charterers "customary and reasonable assistance" with the crew and ship's equipment.

The charter party may require the owners to investigate complaints by the charterers regarding the master or officers, and replace them if requested.

Defining a voyage charter

A voyage charter - is a contract for the carriage by a named vessel of a specified quantity of cargo between named ports or places.

It may be thought of as equivalent to the hire of a taxi for a single journey, or for a series of several consecutive journeys in the case of a consecutive voyage charter.

i) The ship-owner basically agrees that he will present the named vessel for loading at the agreed place within an agreed period of time and, following loading (responsibility for which will be as agreed between the parties), will carry the cargo to the agreed place, where he will deliver the cargo.

ii) The charterer, who may be the cargo owner or may be chartering for the account of another party such as the shipper or the receiver, agrees to provide for loading, within the agreed period of time, the agreed quantity of the agreed commodity, to pay the agreed amount of freight, and to take delivery of the cargo at the destination place.

iii) In effect the charterers hire the cargo capacity of the vessel, and not the entire vessel, and to this extent a voyage charter agreement can be considered as the maritime equivalent of a taxi hire agreement. (Control of the ship's operations remains with the shipowner.)

iv) In some trades, e.g. chemical tankers, several cargo parcels carried on one voyage may have been fixed with several different charterers.

v) The ship-owner must provide the master and crew, act as carrier and pay all running and voyage costs, unless the charter party specifically provides otherwise.

On the loaded voyage

During a loaded voyage a vessel must normally proceed to the destination port or place with "due despatch" (but sometimes "utmost despatch") and always without deviation from the contracted voyage, which includes ports of loading and discharge (and their rotation), dates of loading and discharge where stipulated, voyage route and other agreed elements.

If the vessel deviates in any respect (e.g. by discharging at a port other than that originally agreed, unless with the charterer's consent, or in the wrong rotation of ports) there is a serious breach of contract and the owners will not be able to rely on any of the exceptions in the contract. The owners will be reduced to the status of "common carrier" and will be have no protection against liability for loss of or damage to the goods carried other than the "common law exceptions".

The owners would also have to prove that the loss/damage would inevitably have occurred even if the contract had not been breached; this applies whether the loss/damage occurred before, during or after the deviation.

Contract for the carriage by a named vessel of a specified quantity of cargo between named ports or places.

Nature of a bareboat charter and lease arrangement- cargo ships employment procedure

A bareboat charter (sometimes called a charter by demise or demise charter, particularly by lawyers)

i) Is a contract for the hire of a vessel for an agreed period during which the charterers acquire most of the rights of the owners?
ii) May be thought of as the marine equivalent of a long-term vehicle lease contract.
iii) Is most usually on the BARECON 89 charter party form.
iv) Is used by owners such as banks and finance houses who are not prepared to operate or manage ships themselves.
v) Is often hinged to a management agreement. (e.g. where an oil company bareboat charters a tanker from an independent tanker owner but agrees that the owners will manage the ship on the oil company's behalf during the charter period).
vi) May be hinged to a purchase option after expiry of the charter or during the hire period. (Hire payments may include instalments of the purchase price, and transfer of ownership may follow the final instalment. Many permutations are possible.)

In essence the vessel owners put the vessel (without any crew) at the complete disposal of the charterers and pay the capital costs, but (usually) no other costs. The charterers have commercial and technical responsibility for the vessel, and pay all costs except capital costs.

The "**BARECON A**" form, under which the owners bear responsibility for insurance premiums, was designed by BIMCO for short-period chartering (e.g. the summer hire of a passenger vessel).

The "**BARECON B**" form was designed as a long-period, financial type of contract, mainly for new buildings although it can be modified for second-hand tonnage. The charterers are responsible for insurance premiums.

"**BARECON 89**" is an amalgamation of the "BARECON A" and "B" forms designed to reflect the growing use of bareboat charter registration. Part I contains the familiar BIMCO-style boxed details. Part II contains the standard clauses. Part III contains provisions applicable to newbuilding vessels. Part IV contains a hire-purchase agreement. Part V contains provisions to apply for vessels registered in a bareboat charter registry.

Benefits of lease arrangement in cargo ships employment

A lease arrangement is a means of financing the acquisition of a vessel that utilises a bareboat charter party as the vehicle for the loan repayment agreement. It is used as an alternative to

a traditional ship mortgaging arrangement. The "sharing" of tax benefits available to the owner and charterer is sometimes the main purpose of a lease arrangement.

In a typical lease arrangement, the lessee or borrower already owns a vessel or has contracted a newbuilding from a shipyard. On entering into the lease agreement, ownership of the vessel is formally transferred to the lessor or lender, who then becomes the registered owner. The lessor then charters the vessel to the borrower on the terms of a bareboat charter party. The lessor retains ownership of the vessel for a (usually) lengthy period, following which ownership may pass to the lessee/charterer. The charter hire payments cover the instalments of a loan that represents the finance required to acquire the vessel. The lender's tax benefits, which stem from ownership of the vessel, are passed on to the lessee/charterer by way of reduced charter hire payments. A vast set of financial documents is required in addition to the bareboat charter party.

Some of the terms of the bareboat charter party are designed to protect the lessor/charterer against the risks and liabilities normally associated with ownership of a vessel.

The vessel owners put the vessel (without any crew) at the complete disposal of the charterers and pay the capital costs, but (usually) no other costs.

Seaworthiness of cargo ship - time charter party clause

A vessel must be fit to encounter the "ordinary perils of the sea" (e.g. bad weather) and other incidental risks to which she will be exposed on the voyage. The obligation to provide a seaworthy vessel is absolute, i.e. there are no exceptions from the rule. At the time the contract is made the vessel must be fit to encounter the "ordinary perils of the sea" (e.g. bad weather) and other incidental risks to which she will be exposed on the voyage. However, the common law recognises that owners cannot guarantee their vessels' seaworthiness once they have left port, so the obligation is only imposed at the start of the voyage, i.e. when the vessel leaves the berth either under her own power or under tow.

Seaworthiness has three aspects

1. Technical seaworthiness, relating to the vessel's design, condition of her hull and machinery, and her stability, etc.

2. "cargo worthiness", relating to her suitability for the intended cargo and the condition of her cargo spaces; and

3. Fittedness for the intended voyage, relating to her equipment (including charts), manning, bunkering and stores for the voyage.

The ship may be held to be unseaworthy, therefore, if she sails without:

- Statutory certificates in force;
- Certificate (or interim certificate) of class in force;
- holds properly fitted for the cargo (e.g. ventilation system working, dunnage, fire-fighting agent);

- Cargo properly stowed or secured;
- A properly qualified master or officers;
- Appropriate (and corrected) charts for the voyage; or
- Sufficient bunkers for the voyage.

Under the doctrine of stages, seaworthiness at each stage of the voyage, e.g. in dock, in a river, in an estuary, must be considered separately.

Warranty of seaworthiness

A general purpose dry cargo voyage charter party will usually incorporate clauses covering warranty of seaworthiness. The provisions may be expressed in different charter parties by clauses bearing different names, or by numbered clauses with no names.

Unless a contract of carriage by sea has an express provision concerning seaworthiness, the absolute (common law) obligation, known as the warranty of seaworthiness, is implied in the contract.

In a charter party the absolute warranty of seaworthiness is usually moderated, however, to an undertaking that the ship-owner or carrier will only exercise due diligence to make the vessel seaworthy before sailing.

For a ship-owner or carrier to exercise due diligence he must

1. Make a reasonable and careful inspection and perform maintenance of the vessel in accordance with the custom of the trade; and

2. Do this before the commencement of the voyage.

Exercising due diligence to ensure that a vessel is seaworthy would therefore mean, for example, ensuring that:

- class surveys and statutory safety construction, equipment and load line surveys are carried out and passed in accordance with current requirements (i.e. the vessel is technically seaworthy);
- the cargo spaces are fit for the reception and carriage of the cargo and that the cargo is properly loaded and stowed taking into account the expected perils of the voyage (the vessel is “cargo worthy”);
- the vessel is properly equipped and supplied for the expected duration of the voyage in terms of sufficient competent crew, navigational equipment and supplies, stores, provisions and spares, bunker fuel, fresh water, etc. (“fittedness for the voyage”).

“In all respects ready to load”

Means the vessel is seaworthy and in every way fit to carry the particular cargo on the voyage contemplated by the charterer. The vessel must be fully at the charterer’s disposal, i.e. with derricks or cranes ready for operation, holds or tanks cleaned, prepared and surveyed, free

pratique and customs clearance granted, etc. - unless the charter party allows otherwise, which it may do by the inclusion of a protecting phrase as outlined above.

At common law the duty to provide a seaworthy ship on presentation was absolute, i.e. no exceptions were allowed. However, most modern charter party forms have reduced the absolute obligation to a duty of "exercising due diligence", i.e. doing everything which a prudent ship-owner can reasonably do to make the vessel seaworthy without actually guaranteeing her seaworthiness.

International trade terms (INCOTERMS) in sea transportation of goods -Rights and liabilities for parties involved

Forming links in the transport chain

It is important for the seller and buyer of goods, as well as their bankers, cargo insurers and the various carriers who may be involved in the total journey to know precisely when the right to ownership and risk of loss or damage passes from seller to buyer, so that the respective obligations, rights and liabilities of each party can be determined and disputes avoided. The obligations of the seller and buyer with respect to delivery of the goods and the division of functions, costs and risks related to the delivery should be contained in trade terms incorporated in the contract of sale.

Misinterpretation of trade terms and uncertainties may result where there are different trading practices in the respective countries of the buyer and seller which are not known to each other. The trade term "FOB", for example, has a different meaning to a merchant in the USA than to a UK merchant. Language differences between buyer and seller, or lack of a common language, may also cause misinterpretation of contract terms.

What are International trade terms (INCOTERMS)

* INCOTERMS is a set of rules, published by the International Chamber of Commerce, for the uniform interpretation of the most commonly used trade terms used in international trade contracts. The main purpose of INCOTERMS is to clearly set out the obligations of the seller and buyer with respect to the delivery of the goods and the division of functions, costs and risks associated with delivery. By the use of INCOTERMS misinterpretations or uncertainties described above may be avoided or reduced.

* INCOTERMS are published in various languages used by the chief trading nations. The latest edition is INCOTERMS 2000. A sales contract should contain an express reference to the edition used.

* Thirteen INCOTERMS are defined, which can be arranged in four groups: E, F, C and D according to the seller's basic obligations, as follows:

• Group E – where the goods are to be made available to the buyer at the seller's premises;
• Group F – where the seller and buyer must deliver the goods to a carrier appointed by the buyer;

• Group C – where the seller must contract for the carriage of the goods without bearing the risk of loss of or damage to the goods or additional costs following shipment; and
• Group D – where the seller has to bear all costs and risks required to bring the goods to their destination.

* INCOTERMS can be further grouped into two basic categories: terms suitable for use in contracts involving water transport, and terms suitable for all transport modes.

An outline meaning of commonly used INCOTERMs are shown in the following paragraphs:

EXW [Ex Works (named place)]: Seller to place goods at disposal of buyer at seller's premises or another named place, not cleared for export and not loaded onto any collecting vehicle. Title and risk pass to buyer at seller's door.

FCA [Free Carrier (named place)]:Seller to deliver goods, cleared for export, to carrier nominated by buyer at named place. Title and risk pass to buyer on delivery to carrier.

FAS [Free Alongside Ship (named port of shipment)]: Seller to place goods, cleared for export, alongside vessel at named port of shipment. Title and risk pass to buyer alongside ship.

FOB [Free On Board (named port of shipment)]: Seller delivers goods, cleared for export, when they pass ship's rail at named loading port. Title and risk pass to buyer as goods pass ship's rail.

CFR [Cost and Freight (named port of destination)]: Seller delivers goods when they pass ship's rail at named loading port and must pay costs and freight necessary to bring goods to named port of destination. Buyer bears all additional costs and risks after goods have been delivered over ship's rail at loading port. Title and risk pass to buyer when goods delivered on board ship.

CIF [Cost, Insurance and Freight (named port of destination)]: Seller's obligations same as under CFR with addition that seller must obtain insurance against buyer's risk of loss/damage during sea carriage. Title and risk pass to buyer when goods delivered on board ship.

CPT [Carriage Paid To (named place of destination)]: Seller delivers goods to nominated carrier and pays cost of carriage to named destination. Buyer bears all additional costs and risks after goods delivered to carrier. Title, risk and insurance cost pass to buyer when goods delivered to carrier.

CIP [Carriage and Insurance Paid To (named place of destination)]: Obligations same as under CPT with addition that seller procures insurance against buyer's risk of loss/damage to goods during carriage. Title and risk pass to buyer when goods delivered to carrier.

DAF [Delivered at Frontier (named place)]: Seller to place goods at disposal of buyer on arriving means of transport, not unloaded, cleared for export but uncleared for import, at named border point. Title, risk and responsibility for import clearance pass to buyer when delivered to named border point by seller.

DES [Delivered Ex Ship (named of destination)]: Seller delivers when goods are placed at buyer's disposal on board ship, not cleared for import, at named port of destination. Title, risk and responsibility for vessel discharge and import clearance pass to buyer when seller delivers goods on ship at destination port.

DEQ [Delivered Ex Quay (named port of destination)]: Seller delivers when goods are placed at disposal of buyer, not cleared for import, on quay at named port of destination. Title and risk pass to buyer when delivered on board ship at destination point by seller who delivers goods on dock at destination point cleared for import.

DDU [Delivered Duty Unpaid (named place of destination)]: Seller must deliver the goods to the buyer, not cleared for import, and not unloaded, at the named place of destination. Title, risk and responsibility of import clearance pass to buyer when seller delivers goods to named destination point. Buyer is obligated for import clearance.

DDP [Delivered Duty Paid (named place of destination)]: Seller must deliver goods to buyer, cleared for import, and not unloaded, at named place of destination. Title and risk pass to buyer when seller delivers goods to named destination point cleared for import.

Parties involved in sea transportation of goods -buyer, seller, carrier, freight forwarder, shipper, consignee, agent & banks

Forming links in the transport chain

The transport of goods by sea from seller to buyer usually involves several parties whose roles may be unclear to those on board ship. The following notes are intended to outline the basic functions of the most prominent players forming links in the transport chain.

The seller and the buyer are the parties contracting with each other for the delivery of the goods. The seller may be the producer or manufacturer of the goods, or may be a party acting as the producer/manufacturer's agent. Both parties agree on the trade terms which will influence the type and terms of shipping documents (e.g. bill of lading or sea waybill).

As far as the ship-owner is concerned, the shipper is the party who contracts for the carriage of the goods by sea and delivers the goods into his care, whether this party is the seller or an agent of the seller. The seller, however, may be employing the services of a freight forwarder to perform the various functions involved in exporting the goods, and it may be the freight forwarder who contracts for carriage of the goods with the ship-owner, making the freight forwarder the legal shipper. Another possibility is that a certain amount of cargo space on board the ship has been contracted to a non-vessel owning carrier (NVOC) , and the seller or his agent has contracted with the NVOC to transport the goods; in that case, the NVOC will be the legal shipper in the contract with the ship-owner. Whoever the shipper is in law, however, the document evidencing receipt of the goods by the carrier (e.g. a bill of lading or sea waybill) will be issued by the carrier to that party, and that party will be giving employment to the ship. In some countries, including the USA, the shipper may be called the consignor.

A freight forwarder is a transport intermediary, operating in the liner trades, who arranges the export of another party's goods (by land, sea or air) and "forwards" the goods into the care of the sea carrier. Freight forwarders can advise on routeing, can arrange carriage with a carrier (booking space, paying freight, etc.), can prepare or assist in preparting customs documents, can make customs entry (clearance) of goods, can arrange packaging and warehousing of goods before shipment, can arrange goods transit insurance, and can in many cases arrange "groupage" or "consolidation", meaning the more cost-effective shipment in one transport unit of several small parcels sent by different shippers, where they are all destined for the same delivery port or place)

A carrier is a party who contracts with a shipper for the transport of goods by sea. In the liner trades, where non vessel owning carriers(NVOCC) offer shipping services , the carrier with whom the seller or the seller's agent makes his carriage contract is not necessarily the carrier actually performing the sea carriage. Furthermore, where a ship is chartered and is being operated commercially by the charterer (such as a time charterer), the identity of the legal carrier may depend on the information stated on the bill of lading or sea waybill.

The consignee is the party to whom the goods are consigned or sent by the shipper. The consignee may be the buyer of the goods, or a party acting as import agent for the buyer.

The receiver is the party who takes receipt of the goods from the sea carrier at the port or place of delivery. Some consignees will take direct delivery of goods from carriers, but many consignees in the liner trades employ an agent such as **a freight forwarder** to act as a "clearing agent" in the customs and other formalities of importing the goods, and for transportation of goods to their ultimate destination. When loss or damage to goods is discovered on discharge, it is often the receiver who notifies the carrier.

The notify party (a term found in most bills of lading and sea waybills) is the party who must be informed by the carrier of the ship's arrival, so that collection of the goods can be arranged. The notify party may be the consignee or a receiver.

Banks will form links in the transport document chain when payment for the goods is being made by means of a Letter of Credit. For notes on the documentary credit system. For notes on the bill of lading in the documentary credit system.

Depending on the trade terms, either the seller or the buyer will usually take out goods transit insurance with a cargo insurer.

Charterers agent: Since time charterers require their cargo operations in each port to be overseen by reliable port agents, particularly in specialized trades, the charterers will normally reserve the right to nominate agents, although these "charterers' agents" will usually be appointed and have their fees paid by the owners. (The owners will therefore be the principal in the legal relationship.)

As well as expediting cargo operations, charterer's agents should attend to the ship's (i.e. owner's) business, e.g. crew reliefs and repatriation, subs, etc., and a Disbursements Clause

may provide that they will be paid for this work by a commission on the actual cost of the disbursements.

As in a voyage charter on free in and out terms, a protecting agent may be appointed by the owners where there is any conflict of interest between owner's and charterer's requirements.

Since the master is normally under the charterer's orders regarding employment and agency, charterer's agents have the right to sign bills of lading on behalf of the master, although the master will usually be required to sign a form or letter authorizing them to do this.

Forming links in the transport chain- Sea carrier, Freight forwarder, shipper, consignee, agent & banks.

International Shipbroking marketplace - The Baltic Exchange & special purpose charters

The Baltic Exchange

London is the hub of the international shipbroking community, and many individual brokers and broking firms are members of the Baltic Exchange, which is a self-regulated shipbroking marketplace. The activities of its members, who are mostly ship-owners, cargo interests and shipbrokers, include the matching of bulk ships and bulk cargoes, and the sale and purchase of ships. Baltic Exchange members undertake to abide by a strict code of business practice, enshrined in the famous Baltic motto "Our Word Our Bond".

The Baltic's membership includes shipbrokers of all types as well as non-trading individuals such as maritime lawyers, insurers, financiers, classification societies and consultants who wish to mix with key players in the bulk shipping market and take advantage of the Baltic's facilities. Many operators in the dry and wet bulk trades are members of the Baltic, particularly international commodity traders in grain, oils, seeds and fats.

Market information in various forms published by the Baltic Exchange is internationally recognized and serves as "barometers" of the cost of transporting dry and wet cargoes. Brokers working at the Baltic collect market data from a number of major broking houses around the world, from which five daily indices are built up and published:

- Baltic Panamax Index (BPI);
- Baltic Capesize Index (BCI);
- Baltic Handymax Index (BHMI);
- Baltic Tanker Dirty Index;
- Baltic Tanker Clean Index;

The indices are built up from specifically defined international bulk routes for the particular trades and ship sizes. The three "dry" indices (BPI, BCI and BHMI) are combined to produce the Baltic Dry Index.

About half of the world's sale and purchase of ships is estimated to be dealt with through firms represented at the Baltic Exchange. Altogether, this international business generates around $2½ billion a year in freight commissions which comprise 5% of the UK's total invisible

earnings. In addition, tens of billions of dollars in chartering costs go through London's banking system.

For more details visit Baltic Exchange Website: www.balticexchange.co.uk

Nature of special purpose charters in a sales contract between ship-owner and charterer

A special service vessel, such as a heavy lift ship, could be chartered on a general purpose charter party form, e.g. "GENCON", suitably adapted by the parties, but this would necessitate a large number of amendments and rider clauses. It would therefore be preferable to charter the vessel on a form specific to the type of operation concerned, e.g. BIMCO's "HEAVYCON" form - the standard transportation contract for heavy and voluminous cargoes.

"SLOTHIRE" is a BIMCO form on which a slot charterer hires a number of container bays on a containership's sailings, but not the entire cargo capacity.

"TOWCON" is an international ocean towage agreement for a lump sum, used in the professional towage industry.

"TOWHIRE" is an ocean towage agreement for a daily hire rate.

Baltic Exchange members undertake to abide by a strict code of business practice, enshrined in the famous Baltic motto "Our Word Our Bond".

Most ships employed in the charter markets are dry bulk carriers, tankers, combination carriers (e.g. OBOs), or reefer vessels, although there is also a charter market for container ships and for vessels of various special purpose types.

Cargo ships employment in the charter markets

Defining charter markets

Where a ship is employed in the charter markets (sometimes known as the "tramp trades"), the owner generally intends that she will be "fixed" by shipbrokers on a succession of charters. The ship may be employed in the voyage charter market (also called the "spot market") or in the time charter market, and in both cases may be sub-chartered by the "head charterer" to another charterer. The ship may simultaneously be employed under a contract of affreightment. As a "tramp", the ship will not normally operate on a fixed route to an advertised schedule, except when time-chartered to a liner operator.

Most ships employed in the charter markets are dry bulk carriers, tankers, combination carriers (e.g. OBOs), or reefer vessels, although there is also a charter market for container ships and for vessels of various special purpose types.

A chartered ship's charterers may be time charterers or voyage charterers, and will normally employ the services of a shipbroker to fix the ship. The charterers may in some cases be the legal carrier, in which case they may order the ship to issue bills of lading on their behalf to

shippers of goods loaded. The charterers may be carrying their own goods in an "in house" shipment, or the goods of another party. In other cases the charterers may only be hired to fix the ship and load the cargo.

Dry bulk carrier market categories

For charter marketing purposes, dry bulk carriers are categorized by owners, charterers and brokers, and in market reports, as outlined below.

i) Handysize bulk carriers are vessels in the range10,000-29,999 dwt.
ii) Handymax bulk carriers are vessels in the range 30,000-49,999 dwt.
iii) Panamax bulk carriers are vessels in the range 50,000-79,999 dwt.
iv) Capesize bulk carriers are vessels of 80,000 dwt or more.

A good example of a dry bulk shipping market report can be seen on the website of E.A.Gibson Shipbrokers Ltd

Tanker market categories

* For charter marketing purposes, tankers are categorized (by owners, charterers and brokers, and in market reports) as outlined below.

i) Handysize tankers are vessels in the range 27,000-36,999 dwt.
ii) Handymax tankers are vessels in the range 37,000-49,999 dwt.
iii) Panamax tankers are vessels in the range 50,000-74,999 dwt.

The London Tanker Brokers' Panel determine market rates under a freight billing system called "Average Freight Rate Assessment" or "AFRA". This allows an assessment to be made of a freight scale for tankers of various sizes,

Aframax tankers are vessels large enough to carry "Aframax"-size cargoes of between 80,000 tonnes and 119,000 tonnes. The average size of Aframax cargoes varies from one world region to another, resulting in different tanker market practitioners quoting different sizes for an "Aframax" tanker.

* A Suezmax tanker is a vessel of such a size (around 150,000-200,000 dwt, depending on dimensions and draught) that she can sail through the Suez Canal when fully loaded. Some brokers categorize "Suezmax" tankers as vessels in the range 120,000-199,999 dwt.

Fixing of cargo ships on charter - Role of shipbrokers -Who are shipbrokers?

Ships are normally "fixed" on charters arranged between the shipowner and charterer by shipbrokers acting as negotiators for the two parties. Shipbrokers include:

• owners' brokers, who find and arrange employment for their principals' ships;
• charterers' brokers (or "chartering brokers") who find ships to carry out their principals' requirements;
• tanker brokers, who arrange oil cargo fixtures in the specialist tanker market;

• liner brokers and liner agents, who find cargoes for liner owners and operators;
• coasting brokers, who work in the short sea market and often combine the functions of owners' and charterers' brokers;
• Ships' agents, who are employed by ship-owners and charterers to service their vessels' needs in ports; and
• Sale and purchase brokers, who buy and sell ships and can, if required, arrange newbuilding contracts for their principals.

Many shipbrokers are self-employed, while others work in large firms active in several of the above disciplines. The chief stages in the fixing process include:

1. Circulation by the charterers' broker of "cargo orders", outlining charterers' forthcoming cargo transportation requirements.
2. Circulation by the owners' broker of "position lists" or "tonnage lists", detailing expected "open" dates and positions of available ships.
3. Study of market reports by brokers.
4. Negotiations on main terms between brokers on behalf of their respective principals, with offers and counteroffers by either side; if main terms cannot be resolved, there is little or no point in negotiating further details.
5. Negotiations "on subjects", e.g. "subject stem", "subject receiver's approval", etc., where the main terms have been agreed, but final agreement is subject to various secondary conditions being agreed.
6. Fixture, i.e. the full and final agreement, with all "subjects" removed.

Following fixture is a "post-fixture" or follow-up period during which the broker may undertake various administrative functions on behalf of his principal, such as (in some cases) collection of freight or hire.

Shipbrokers are remunerated by commission, called "brokerage", payable by the ship-owner to each broker involved in arranging a contract. In voyage or time charters the brokerage payable is stipulated in a Brokerage Clause and is normally 1.25% of the ship owner's gross receipts from hire, freight, dead freight and demurrage, payable to each broker involved. (It is not uncommon to see a total brokerage figure of 3.75% or 5% in a charter party.)

The professional body for shipbrokers world-wide is the London-based Institute of Chartered Shipbrokers, whose motto is "Our Word, Our Bond". The Institute sets and monitors professional standards for shipbrokers through annual examinations. Its Tutorship correspondence courses enable shipbroking students (including serving mariners) to study for the Institute's annual exams (from which qualified mariners are usually granted some exemptions)

Institute of Chartered Shipbrokers

3 St Helen's Place, London EC3A 6EJ.

Tel. 020 7628 5559. Fax. 020 7628 5445.

TutorShip e-mail: tutorship@ics.org.uk

Institute of Chartered Shipbrokers website www.ics.org.uk

Common Chartering abbreviations used in cargo ships employment

Defining Chartering abbreviations

We have summarized below, many terms commonly used by shipbrokers and others involved in ship chartering, mainly to save time and effort in communications. Shipmasters may come across many of the acronyms and abbreviations in documents relating to charters, e.g. in telexed voyage orders and market reports.

Defining Chartering abbreviations

Term: Meaning

- AA: always afloat
- ABT: about
- PG: Persian Gulf
- APS: arrival pilot station
- B: ballast
- B/Ls or Bs/L: bills of lading
- BB: below bridges; ballast bonus
- BBB: before breaking bulk
- BENDS: both ends (load and discharge ports)
- BWAD: brackish water arrival draft
- C/P: charter party
- CD: customary despatch
- CFR: cost and freight
- CHOPT: charterers' option
- CIF: cost, insurance and freight
- COA: contract of affreightment
- COMBO: combination port
- CONT: Continent
- COP: custom of port
- CQD: customary quick despatch
- CVS: consecutive voyages
- DELY: delivery
- DFD: demurrage/free despatch
- DHD: demurrage/half despatch
- DLRS: US dollars DOP: dropping outward pilot
- DWAT: deadweight all told
- DWCC: deadweight cargo capacity
- ECSA: East Coast South America
- EIU: even if used
- ETA: estimated/expected time of arrival
- ETC: estimated/expected time of commencement/completion
- ETD: estimated/expected time of departure

- ETS: estimated/expected time of sailing
- FAC: fast as can
- FAS: free alongside
- FCL: full container load
- FDESP: free of despatch
- FEAST: Far East
- FHEX: Fridays and holidays excepted
- FHINC: Fridays and holidays included
- FILO: free in, liner out
- FIO: free in and out
- FIOS: free in, out and stowed
- FIOSPT: free in, out and spout-trimmed
- FIOST: free in, out, stowed and trimmed
- FIOT: free in, out and trimmed
- FIT: free in and trimmed
- FLT: full liner terms
- FOB: free on board
- FOQ: free on quay
- FOW: free on wharf
- FP: free pratique
- FWAD: fresh water arrival draft
- Gross terms: carrier arranges/pays for cargo-handling, but laytime will probably apply
- GSB: good and safe berth
- GSP: good and safe port
- HAT: highest astronomical tide
- HSS: heavy grain, sorghums, soyabeans
- HWOST: high water, ordinary spring tides
- IWL: Institute Warranty Limits
- K: knots

Liner terms: carrier arranges/pays for cargo-handling at load

and discharge ports as well as carriage

- L/C: letter of credit
- LT: long ton (1LT = 2240lb = 1.016MT)
- L: laden
- LAT: lowest astronomical tide
- LO/LO: lift-on/lift-off
- LWOST: low water, ordinary spring tides
- MHWN: mean high water neaps
- LCL: less than container load
- MT: metric tonne (1 MT = 1000kg = 0.9842LT)
- Min/max: minimum/maximum (i.e. exact quantity)
- MHWS: mean high water springs
- MLWN: mean low water neaps
- MLWS: mean low water springs

- MOL: more or less
- MOLCO: more or less at charterers' option
- MOLOO: more or less at owners' option
- NAABSA: not always afloat but safe aground
- Nett terms: cargo-handling is arranged/paid for by charterers or shipper
- NOR: Notice of Readiness
- NVOC(C): non-vessel-owning (common) carrier
- PCT: percent
- PPT: prompt (cargo or ship available promptly)
- RO/RO: roll-on/roll-off
- ROB: remaining on board
- SA: safe anchorage
- SATPMSHEX ; Saturday afternoons, Sundays & holidays excluded
- SB: safe berth
- SC: scale
- SCALE LOAD: load rate according to C/P scale
- SHEX: Sundays and holidays excluded
- SHINC: Sundays and holidays included
- Sous ; palan under hook (i.e. barge cargo)
- SP: safe port
- Spot: cargo or ship available immediately
- Stem: readiness of cargo
- SWAD: salt water arrival draft
- SWL: safe working load
- T/C: time charter
- TIP: taking inward pilot
- USNH: US East Coast north of Cape Hatteras
- W/M: weight or measure
- WCCON: whether customs cleared or not
- WIBON: whether in berth or not
- WIFPON: whether in free pratique or not
- WIPON: whether in port or not
- WP: weather permitting
- WW: weather working
- WWReady: when and where ready

Many terms commonly used by shipbrokers and others involved in ship chartering, mainly to save time and effort in communications. Shipmasters may come across many of the acronyms and abbreviations in documents relating to charters, e.g. in telexed voyage orders and market reports.

Worldwide Tanker Nominal Freight Scale - "Worldscale"

What is world scale

"Freight" is the remuneration payable by the charterers to the owners for the performance of the contract. It may be called charter party freight in the contract.

"World scale" is the code name for the “New Worldwide Tanker Nominal Freight Scale”, published by the Worldscale Association (London) Limited and the World scale Association (NYC) Inc., which are controlled by panels of leading tanker brokers in London and New York City respectively.

Because an oil cargo may be bought and sold many times whilst aboard a tanker at sea, the cargo owner requires great flexibility in his choice of discharge options. If tanker fixtures were priced in the same way as dry cargo fixtures the ship-owner would have to calculate a different freight rate for each discharge port that the charterers may opt for. World scale avoids this problem in that it provides a set of nominal rates designed to provide roughly the same daily income irrespective of the place of discharge.

Worldscale is a schedule of nominal tanker freight rates used as a standard of reference by means of which rates for all voyages and market levels in the crude and oil products tanker trades can be readily compared and judged. This is aimed at making the business of fixing tankers simpler, quicker and more flexible.

World scale is based on an average vessel with average costs earning an average rate. It works on the basis that, using the realistic costs of operating an imaginary standard tanker of “average” size on an “average” 15,000- mile round voyage, the break-even freight rate for that ship on that route can be calculated. This “World scale Flat” rate is calculated in US dollars per metric ton of cargo carried on a standard loaded voyage between a loading port and a discharge port with a ballasted return voyage.

The freight rate actually negotiated in a fixture, using the World scale Flat rate as a basis for negotiation, is called the “world scale Freight Rate”. This negotiated rate will depend on the strength of the market and will be quoted in market reports in world scale points in the way outlined above.

Pumping Clause

Tanker charter parties often contain a clause under which the owner warrants that the vessel will discharge her full cargo within 24 hours, or will maintain a specified manifold pressure (e.g. 188 psi), provided that the shore facility is capable of receiving at the stated rate.

The clause further provides that if the vessel fails to comply with the stated warranty, the charterer will have the right to order the vessel to be withdrawn from the berth at the owner’s time and expense until such time as the berth again becomes available for discharging the balance of cargo remaining on board. "world scale" is the code name for the “New Worldwide Tanker Nominal Freight Scale”, published by the Worldscale Association (London) Limited and the world scale Association (NYC) Inc.

Strength and stability of the Lifting appliances and gears on board General cargo ships

Cargo gear is designed for speed and flexibility for handling breakbulk, palletized, or container cargo. Various combinations of derricks, winches, and deck cranes are used for the handling of cargo. Cranes are fitted on many vessels to reduce manpower requirements. Some ships

have special heavy-lift derricks that may serve one or more holds. Booms are rigged for either yard and stay (burton) or swinging-boom operation.

Various combinations of derricks, winches and deck cranes are used for the Handling of cargo.

Defining Lifting equipment

Lifting equipment on board is required to be of adequate strength and stability for each load, having regard in particular to the stress induced at its mounting or fixing points , securely anchored, adequately ballasted or counterbalanced and supported by outriggers as necessary to ensure its stability when lifting.

Lifting equipment should be of steel or other acceptable material and securely fastened to the vessel's structure. The maximum Safe Working Load (SWL) and maximum radius of operation of all derricks and lifting appliances are required to be part of the specification on all new constructions with associated ropes, wires and guys, eye-plates, shackles and blocks designed to meet these loads.

The vessel's structure, crane, derrick or other lifting device and the supporting structure should be of sufficient strength to withstand the loads that will be imposed when operating at its maximum load moment.

In addition to the strength and stability of the lifting equipment, consideration should also be given to the stability, angle of heel and potential down-flooding of any vessel as a result of the use of a crane, derrick or other lifting device fitted on it. This is especially important where a crane is to be fitted on a work boat or other small vessel and it is recommended that advice should be sought from the crane manufacturer in such cases prior to the crane being fitted. Similarly it is recommended that a check of the vessel's stability should be carried out by a suitably qualified person, prior to installation of a crane to ensure that the vessel is capable of operating safely with the crane fitted and in use. Failure to do this could have serious consequences for the safety of the vessel and the workers on it.

Any welding of material should be to an approved, acceptable standard as any fitting is only as strong as the weld that connects it to the vessel's structure.

If counterbalance weights are moveable, effective precautions should be taken to ensure that the lifting appliance is not used for lifting in an unstable condition. In particular all weights should be correctly installed and positioned.

Lifting equipment with pneumatic tyres should not be used unless the tyres are in a safe condition and inflated to the correct pressures. Means to check this should be provided.

The operator should check safety devices fitted to lifting appliances before work starts and at regular intervals thereafter to ensure that they are working properly. Accessories for Lifting etc.

Every part of a load that is used in lifting it, as well as anything attached to the load and used for that purpose should be of good construction, of adequate strength for the purpose for which it is to be used and free from defects.

When selecting accessories for lifting, the following should be taken into account:-

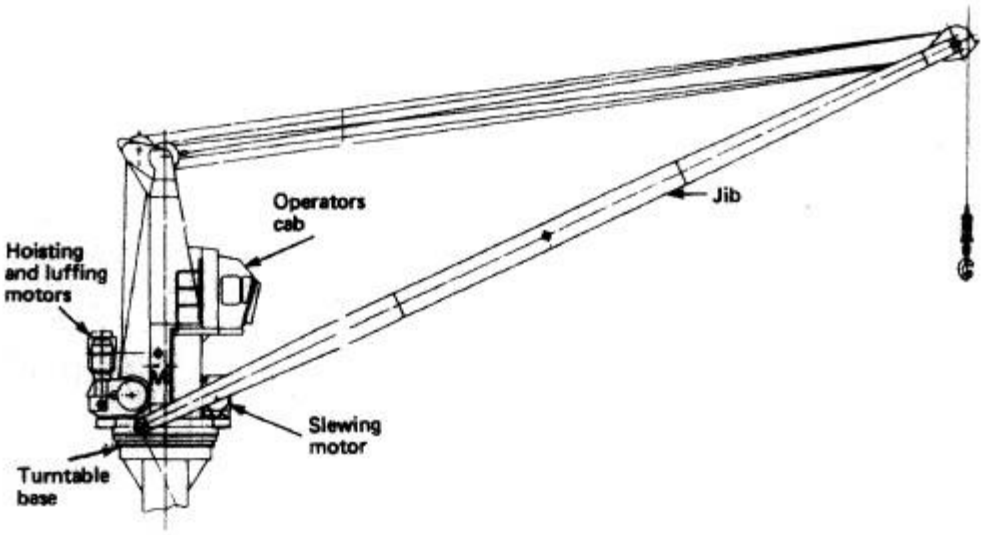
i) the loads to be handled;
ii) the gripping points;
iii) the loose gear for attaching the load, and for attaching the accessories to the lifting equipment;
iv) the atmospheric conditions;
v) the mode and configuration of slinging.

Accessories for lifting should be stored in conditions which will not result in damage or degradation.

Register of Lifting Appliances

All vessels are required to maintain a register of lifting appliances and loose gear in a form based on the model recommended by the International Labour Organization

Cargo ships lifting gear - Inspection and testing



General Cargo Ships deck crane

There is a legal requirement for lifting plant to be tested every five years. This article provides advice to the competent person carrying out the test.

The requirements for testing a lifting plant will be met if before use one of the following appropriate tests is carried out:-

a) proof loading the plant concerned; or
b) in appropriate cases by testing a sample to destruction; or
c) in the case of re-testing after repairs or modifications, such a test that satisfies the competent person who subsequently examines the plant (the re-testing of ships' lifting appliances may be effected by means of a static test eg by dynamometer where appropriate; or
d) in the case of a lift truck, the test should be a functional test to verify that the truck is able to perform the task for which it was designed. This test should include a check to ensure that all controls function correctly and that all identification and capacity plates are fitted and contain correct information. A dynamic test should include travelling and maneuvering, stacking, a lowering speed check and tilt leakage test with the rated load including relevant attachments where appropriate. Following the test the truck should be examined to ensure that it has no defects which would render it unsuitable for use.

Any defect found in any lifting plant, including plant provided by a shore authority, should be reported immediately to the master or to another responsible person who should take appropriate action.

Similar principles apply to cargo securing devices as to lifting equipment. The crew and persons employed for the securing of cargoes should be instructed in the correct application and use of the cargo securing gear on board the ship. For guidance on the securing of cargoes and handling of security devices refer to the ship's approved Cargo Securing Manual.

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https://www.oceanindependence.com/

The above company is a broker for sale and purchase.

https://camperandnicholsons.com

https://camperandnicholsons.com/crew

https://www.approvedboats.com/boats-for-sale-spain/

https://www.charterworld.com/index.html?sub=mediterranean-yacht-charter

https://www.azimutyachts.com/

https://neffyachtsales.com

You can find products of well-known yacht manufacturer in the Mediterranean by referring to the above indicated sights.

Chapter Five: Important Contracts in the Shipping Business



Introduction

The world economy is running through the transactions and trading occurring by modes of oceans, air, railways, and freight.

These transactions shall be done in compliance with rules and regulations laid down by the authorized regulatory in the world. Every company involved international trading has to be sure that they have highly complied are with these regulatory.

More particularly, the shipping industries follow the rules and regulations passed by the International Maritime Organization (IMO) and laws of respective countries, whilst performing any International transaction through maritime.

The Shipping Industry is the oldest industry in existence and hence, becomes the crucial part of the world economy. In earlier days all the trading, transactions, travelling and transportations were mostly achieved through shipping. There is no denial that it plays a vital role in present economy also.

It is found that Greece and Japan own two largest ships by capacity and China now owns the large numbers of ships.

What is the shipping industry?

International trading usually happens via four major modes of transportations. Shipping Industries being part of the transportation have a vital role to play in the growth of the world economy. Shipping Industry provides facilities of transportation of goods and commodities to domestic and global companies to enter into transaction i.e., sale and purchase and trading. It also provides domestic and international delivery facilities directly to customers.

In recent times, direct customer demands have been raised by electronic commerce businesses. E-commerce is the activity of sale and purchase on the internet. The potential e-commerce companies like Amazon, ebay and many more, providing international trading facilities for customers and seller or importer and exporter, whereby expanding the business of shipping.

How shipping business is significant to Economy?

The shipping Industry has a huge impact on the development of the any country economy as well. In maritime countries, a major part of trading and transportation of goods and commodities is done through shipping.

The shipping sector in any maritime country is mostly involved in external trade. The growth of shipping industry is so prominent that the Governments have tried on developing policy for shipping by targeting to establish port with very high capacity.

The shipping sector is playing vital role in sustaining growth of trade and commerce. Further, in some countries the relevant authorities have declared to do a massive investment in ports and roads sectors, which is aiming at more development of the Economy.

What are the regulatory frameworks involved in the shipping business?

Since, shipping industry has played a vital part in the growth of some country's' economy. Every big industry comes with their own set of risk and drawbacks which might result in more loss than good to the country. Thus, the shipping industry is managed and regulated by the concerned Ministry of Shipping and mainly governed by the Acts passed by the parliament:

Apart from these acts, shipping industry is also regulated by the rules and regulations framed by International Maritime Organization (IMO).

What are the 10 most important contracts in the shipping industry?

The shipping industry has a significant role in the development of the economy. The shipping businesses are carried out on cargo ships, container ships, bulk carriers and tankers. For a smooth transition of the business, companies need to be complied with rules and regulations and shall ensure that trading are under the purview of law and not involved in act which is forbidden by the law.

Here, the parties can approach to the attorney, to negotiate and draft agreements in manner that it will serve the purpose of the parties and have legal binding. These are the shipping contracts.

The following are the top 10 important contracts in the shipping industry:

1) Ship or Vessel Sale and Purchase Agreements

The sale and purchase of ship or vessel is one of the important tasks in the shipping industry.

A Ship or Vessel sale and purchase agreements are entering between the seller and buyer of ship or vessel.

To perform such a kind of transactions the parties need to have huge capital, knowledge of a particular kind of ship, legal knowledge and negotiation skills.

In order to minimize the future disputes and have smooth transaction, the parties need to negotiate every term relating to Ship Sale and Purchase Agreement. This means having number of conversations between the parties before finalizing the contracts' clauses.

The agreement should discuss important clauses like protection of buyer and seller, obligations of buyer and seller, payment terms, termination clause and what are the remedies provided to buyer and seller in case of breach. Through numerous communications during negotiation process, the parties can finalize the pricing and terms of the contract for sale and purchase of ship.

2) Transportation Services Agreements or Logistic Services Agreement

Transportation Services Agreements are entering between the goods provider and those who offer transportation for those goods. In these types of agreement, the goods provider will agree to pay some amount to the service provider and in return, the service provider will agree to deliver the goods to the vendors or distributors or customers. This agreement between the parties shall agree on the delivery date and time, quality standards, obligations of each parties, rights of the parties, terminations and compensation in case of breach. The parties shall also discuss the insurance clause. What will happen if shipped goods get destroyed in the event of force majeure? What are the consequences for delay in delivery of goods because of the event which is uncontrollable? In case of breach of contract, what is the agreed compensation? Who will stand responsible for making well to the loss occurred to the other party?

3) Ship Management Agreements

When the parties enter into a contract to supply the goods and commodities through maritime, they also think about managing the ship for such transactions.

In earlier days, the ship-owners used to look at several functions like financial management of vessel, employment of personnel, maintaining the vessel, technical supervision, operation etc. But now, the ship-owners usually hire resources to manage the operations carried on ship while supplying goods.

A ship may cost as much as cost of buying a factory. Thus, it is always better to employ professionals to manage the operations of the ship.

Thus, ship-owners nowadays delegated their functions in various areas to ship management companies, chartering companies etc.

When ship manager enters into contract with a third party for purchase of goods or services and transport, become obligated as contracting party towards third party.

4) Vessel Lease Agreement or Ship Charter Agreement

A lease agreement is between the ship-owner and lessee or charterer. Under this agreement charter party put the vessel on rent, either in full or part, for stipulated period of time.

The terms of this agreement are formed on the basis of ship-owner, charterer and the market. The parties will also comply with the laws applicable to the transaction to keep the trading from any legal interference.

There are two types of charter viz., time charter parties and voyage charter parties. In case of voyage charter, the parties can make their own terms of the contract and if possible, make changes in the standard terms to be align with the requirement of the parties and same should be accepted by them.

In time charter, the vessel can be on lease for specified period of time and the time which have been agreed by both the parties. In this kind the charterer controls the ship's commercial activities. Thus, the terms of contract should explain about fuel consumption, loading capacity, speed of the ship and most importantly the time for usage of the ship should be mentioned clearly in the agreement.

5) Import and Export Contracts

Import and export contract is a contract between importer and exporter of various countries for selling and purchasing of goods and commodities. The contract is useful for the international trading of certain products like industrial supplies, raw supplies, manufactured goods or e-commerce delivery. These contracts will include the requirements such as quantity order, price per unit, delivery conditions, payment terms, documents and retention of title, etc.

6) Contract of Affreightment

A contract of affreightment is a contract between a ship owner and another person whereby agreeing to transport the goods in a stipulated period of time.

This contract is popular with small coasters employed in short voyages and it is cost effective also.

Contracts of Affreightment are also used by government authorities for international trading.

7) Marine Insurance Contracts

Since ages merchants are engaged in maritime commerce ways to minimize the impact of threats of their trade presented by natural and man-made perils.

Marine insurance covers the loss or damages of ships, cargo, terminals, and other transport by which goods and commodities are transferred, acquired, or held between the points of origin till delivery point.

This is important to protect parties' goods from any damages or an event which is uncontrollable.

A contract of marine insurance is a contract whereby insurer agrees to compensate or indemnify the aggrieved party against marine losses or damages.

A marine insurance contract shall include elements like features of general contracts, insurable interest, utmost good faith, indemnity, subrogation, warranties, proximate cause, assignment and nomination of the policy and return of premium.

The proposal for marine insurance can be made by broker or insurer itself. The broker can prepare slip wherein all material information is recorded.

8) Seafarer's Employment Contracts

Seafarer's employment contracts gained importance since the enforcement of the Maritime Labor Convention (MLC). MLC mandates the ship-owner/employer to have written employment agreements with all seafarers working on seagoing ships. The payment of wages of seafarers shall match the standards formed by MLC.

The agreement must be signed by both the parties i.e., the seafarer and the employer/ship-owner.

9) Collective Bargaining Agreement

A Collective Bargaining Agreement is an agreement which is made between an employer and a trade union whereby agreeing on terms and obligations of employment relating to rates of pay, hours of work and other conditions of crew employed on the ship.

10) Freight Forwarding Agreements

Freight Forwarding is a service used by companies engaged in import and export of goods. It provides guarantee that the goods will get delivered to proper destination and maintain good condition.

For this purpose, companies enter into an agreement with Freight Forwarder. A Freight Forwarder is a commission agent performing on behalf of the importer and exporter, in activities like loading and unloading, storage of goods, maintaining quality of goods, arranging local transport, collecting payment from customers, etc. In simple words, a freight forwarder will provide services which cover the total transportation and distribution process.

A freight forwarding agreement shall include rights and obligations of the parties, standard quality norms, terms relating to import and export of goods to customers, delivery terms, modes of payment, terminations, indemnity, etc.

What are the risk factors in the shipping industry?

Every industry has their own risk factors, shipping industry is no different. There are numerous factors that must be considered while trading in shipping industry, which are delivery time, safety of the crew members, etc.

Other major factors are rapid changes in technology, cyber security, technical uncertainty etc.

The Shipping Industry has been in existence for decades. The industry contributes 90% in the development of the world economy. Hence, it is important to understand the consequence of mismanagement of shipping contracts. If not taken care of properly it can cause holdups and delays occurring throughout the process. Therefore, it is essential to properly negotiate the terms and obligations of the parties before signing the contract. Abovementioned are 10 important contracts one must come across when dealing with shipping industry.

Contract between cargo seller and buyer - Procedure for Cargo ships employment

Ships employment

The contract of sale between the seller and the buyer of the goods is separate from the contract of carriage which one party or the other, or a third party (such as a freight forwarder), will make with the carrier.

Sale of goods contracts

Goods are most often carried by sea as a result of a sales contract (or sale of goods contract) made between the seller and buyer. The contract of carriage, which is separate, comes about as a result of this sales contract. UK sales are subject to the provisions of the Sale of Goods Act 1979, as amended. This Act sets out an unpaid seller's rights, one of which (in section 44) is the right of stoppage in transit. Contracts for the sale of goods usually include provisions covering three important points:

- The time or circus of the passing of title (i.e. ownership) of the goods from seller to buyer;
- The time when payment becomes due; and
- The time when the risk (of loss or damage) passes from seller to buyer.

These points are normally addressed in international sale of goods contracts by incorporation of one of a set of mutually-agreed standard trade terms named INCOTERMS.

Ships employment -Contractual relationships

In connection with the cargo ship's employment, contractual relationships will exist between:

i) The ship's owner and any ship manager employed (embodied in a ship management contract);
ii) The ship's owner, manager or operator and any charterers (charter party);
iii) The head charterer and any sub-charterer (charter party);

iv) The ship's owner, manager or operator and a shipbroker who fixes the ship's employment;
v) The buyer and seller of each consignment of goods carried on board (sale of goods contract);
vi) An exporter and any freight forwarder hired to arrange for the delivery of goods;
vii) The legal carrier and each shipper of goods on board (contract of carriage);
viii) The ship's owner, manager or operator and each port agent appointed by him;
ix) The ship's owner, manager or operator and various other parties whose services are used during a voyage such as chandlers, equipment suppliers, repairers, tug owners, pilotage authorities, port authorities, stevedoring companies, etc. (contract for services);
x) A ship-owner and each passenger (contract of passage).

A "charter" is a contract for the hire of a vessel, aircraft, bus, etc. for a specified journey or an agreed period of time. In a maritime context, charters include:

i) Contracts for carriage of specified quantities of cargo in specified vessels between specified ports (i.e. voyage charters); and

ii) Contracts for hire of specified vessels, including:

a. time charters; and
b. bareboat charters (also known as "demise charters").

Owners' Responsibility

Owners will usually accept liability only where the loss, damage or delay has been caused by the improper or negligent stowage of the goods (unless the stowage is performed by shippers or charterers or their stevedores or servants), or by personal want of due diligence on the part of the owners or their manager to make the vessel in all respects seaworthy and to secure that she is properly manned, equipped and supplied, or by the personal act or default of the owners or their manager.

Contracts of affreightment in cargo ships employment

In modern shipping parlance, a contract of affreightment (often abbreviated to "COA")

i) Is essentially a contract to satisfy a long-term need for transport, most often for iron ore and coal in bulk.
ii) Is an agreement between a charterer and a ship-owner, disponent owner or carrier for the carriage of a specified (and often large) quantity of specified goods between specified places, over a specified (and usually long) period of time, by vessels of a type and size stipulated by the charterer, but which are nominated by the owners. (In a charter for consecutive voyages, by contrast, the carrying ship is named.) The vessels may be chartered. The goods to be carried and the total period are clearly defined, but the shipment dates may be approximate, often giving an even spread of shipments over the period (which may, for example, be 12 months). A stated minimum quantity must usually be loaded each voyage, with a "more-or-less" margin at the option of either the charterers (MOLCO) or the owners (MOLOO).
iii) May be based on a standard charter party as the main COA document, with a number of rider clauses added, or on a main COA document (such as BIMCO's VOLCOA form)

supplemented by separate voyage charter parties relating to each voyage made under the COA.
iv) May be used by an operator who has no fleet of his own and who charters ships in for each voyage.
v) Is the type of contract on which a very large ore carrier or Capesize bulk carrier is likely to be employed.

In summary

• The owners agree to transport an agreed volume of cargo over a specified period;
• The charterers nominate cargoes and loading dates;
• The owners nominate suitable vessels.

* Note: The term "contract of affreightment" is also commonly used in maritime law textbooks for what (in view of the modern usage of COAs as described above) might be better termed a "contract of carriage by sea".

Summarized below seagoing cargo ship various employment guide

Charter party forms

Charter party forms in a charter agreement between ship-owner and charterer:

Defining a charter party
A charter party (commonly abbreviated to "C/P")
i) Is a document containing the written terms of a charter agreement between a ship-owner and a charterer, who are usually respectively referred to in the text in the plural, i.e. as "Owners" and "Charterers".
ii) Defines the obligations, rights and liabilities of the ship-owner and charterer.
iii) Is usually drawn up by the broker representing the charterers following negotiation and agreement of terms between both parties.
iv) Is usually based on a particular edition of a recognized standard form (e.g. GENCON, BALTIME, and NYPE).
v) Is sometimes based on a specified charter party already performed by another vessel at an earlier date, in order to save effort and time in negotiating many of the terms.
vi) Usually comprises a set of standard clauses on a printed form, with additional typed rider clauses appended if the standard clauses fail to cover all aspects of the parties' agreement. Where there is a conflict between standard and rider terms, the rider clauses override the standard clauses.
vii) May have many amendments to the standard clauses, as agreed by the parties. Generally, the more amendments there are, the more scope for legal disputes, and it is preferable to have as few amendments as possible.
viii) May be in a modern "boxed" layout, with plain wording of clauses (as with BIMCO-designed forms), or in a more traditional style with (sometimes) rather archaic wording.
ix) May contain annexes dealing with special arrangements (as with CRUISEVOY, which has five annexes).

x) May have sensitive clauses in an addendum and/or side letter. Side letters are legally not as important as addenda.
xi) Should be signed by a broker representing each party to the contract, unless their principals sign instead.
xii) Should ideally be balanced so that it does not favor one party to the disadvantage of the other. (Some charter parties, such as SUGAR CHARTER 1999, are sometimes accused of being biased.)
Numerous charter party forms are in use for different trades and purposes. The use of an "off-the-shelf" form which has been carefully drafted, amended and improved over the years to avoid legal pitfalls is generally preferred by brokers and shipping practitioners to creating a totally new document for an individual charter.
Many forms have more than one edition, having been amended and improved over the years. Brokers may still use an older version, however, in preference to a newer version that has not gained their confidence.
Modern charter party forms drafted by BIMCO9 generally have boxed layouts, whereas older forms are in "conventional" layout. In a BIMCO boxed layout form, variable information is contained in boxes in Part I, while standard terms are contained in printed terms in Part II. Legally, the contract is generally contained in the Part I details, and in any other variable details in rider clauses, etc.

Voyage charter party forms

Examples of voyage charter party forms used in various trades are as follows:

Codename	Trade	Remarks
AFRICANPHOS	Moroccan phosphates	Charterers' form
AMWELSH	Coal	Americanized Welsh coal C/P. Widely used
ASBATANKVOY	Tanker	American form
AUSTWHEAT	Australian wheat	Australian Wheat Board form
BEEPEEVOY	Tanker	BP form, used by many companies
CHEMTANKVOY	Chemicals	BIMCO form. Boxed layout
CRUISEVOY	Cruising	BIMCO form for cruise ship charter
C"ORE" 7	Iron ore	Full name: Mediterranean Iron Ore C/P.
FERTIVOY	Fertilizers	Unknown origin.
GENCON	General purpose	BIMCO form. 1922, 1976 and 1994 revisions
GRAINVOY	Grain	BIMCO form
INTERTANKVOY	Tanker Intertanko form	used by independent owners
NORGRAIN	North American grain	American form
NUBALTWOOD	Timber	Used in Baltic trade
OREVOY	Iron ore	BIMCO form with boxed layout
PANSTONE	Stone (UK/Eire and N Continent trade)	BIMCO form last amended 1995 but retaining traditional layout.
SHELLVOY	Tanker	Shell form, used by many companies. Various editions

The format of GENCO charter party is inserted above by clicking on the logo you can study the charter party form and in the chapter six we are going to refer to this charter party a lot more**.**

Time charter party forms

Examples of time charter party forms in use are as follows:

Codename	Trade	Remarks
ASBATIME	Dry cargo tramp or liner	American form
BALTIME	Dry cargo tramp or liner	BIMCO form. Boxed layout. Popular in short sea trades
BEEPEESUPPLYTIME	Offshore service	BP form
BEEPEETIME	Tanker	Widely used BP form with various versions
GENTIME 1999	Dry cargo tramp or container	Designed to replace BALTIME 1939 and LINERTIME, and as an alternative to NYPE
INTERTANKTIME	Tanker	Intertanko form. Used by independent owners
LINERTIME	Dry cargo	liner BIMCO form. Boxed layout
NEW YORK PRODUCE EXCHANGE (NYPE)	Dry cargo tramp or liner Most commonly used time C/P form.	1946 version more popular than 1993 version.
SHELL VESSEL TIME	Offshore service	Shell form. 1986 revision of SHELL SUPPLY
SHELLTIME	Tanker	Shell form, but widely used. Various versions
SUPPLYTIME	Offshore supply	BIMCO form
TEXACOTIME	Tanker	Texaco form. Various versions

Defining a sub charter

It is common for the terms of both time and voyage charters to permit the charterers to sub-let the vessel in whole or in part, on condition that the head charterer remains responsible to the ship-owner for the performance of the original charter. It would be possible, therefore, for a vessel to be:

1. Owned by a bank or finance house;
2. Leased or bareboat chartered to Company A
3. Time-chartered from Company A by Company B.
4. Voyage-chartered from Company B by Company C;

5. Employed by Company C in its own liner service, or even sub-chartered from Company C by Company D.

* Any reference in a charter party to a "disponent owner" refers to the time or bareboat charterer of a sub-let vessel, who assumes, in relation to the sub-charterer, the responsibilities of a real owner.

Nature of a time charter

The charterers agree to hire from the ship-owner a named vessel, of specified technical characteristics, for an agreed period of time, for the charterer's purposes subject to agreed restrictions.

Defining a time charter

A time charter - is a contract for the hire of a named vessel for a specified period of time. - may be thought of as equivalent to the hire of a chauffeur-driven car (the ship's crew being "the chauffeur").

i) The charterers agree to hire from the ship-owner a named vessel, of specified technical characteristics, for an agreed period of time, for the charterer's purposes subject to agreed restrictions. The hire period may be the duration of one voyage (a "trip charter") or anything up to several years ("period charter").
ii) The ship-owner is responsible for vessel's running expenses, i.e. manning, repairs and maintenance, stores, master's and crew's wages, hull and machinery insurance, etc. He operates the vessel technically, but not commercially. The owners bear no cargo-handling expenses and do not normally appoint stevedores.
iii) The charterers are responsible for the commercial employment of the vessel, bunker fuel purchase and insurance, port and canal dues (including pilotage, towage, linesmen, etc.), and all loading/stowing/trimming/discharging arrangements and costs. They direct the ship's commercial operations, but not her daily running and maintenance. The charterers normally appoint stevedores and nominate agents.
iv) There may be an agreement between the parties for an extra payment (of perhaps several hundred US$) to be made by the charterers each time the ship's crew sweep and/or wash down the holds of a dry cargo ship.
v) A Directions and Logs Clause requires the charterers to provide the master with all instructions and sailing directions, and the master and chief engineer to keep full and correct logs accessible to the charterers or their agents, so that they can monitor the vessel's efficiency. Stevedoring damage notification forms, and log extracts (or "abstracts") will usually be required to be sent to the charterers.
vi) Time charterers are normally allowed to fly their own house flag and, at their own expense, paint their own colors on the funnel and/or sides.

Cargo ships employment for time charter

A time charter party usually incorporates a clause defining the ship's permitted employment or trade limits. Typically, the charterers may employ the vessel only in lawful trades, carrying

lawful merchandise, using only "good and safe ports or berths" and sometimes safe anchorages where the vessel can lie always safely afloat within the agreed trading limits.
The charter party should always be checked for trade limits. Some countries, areas and ports (e.g. Israel, Persian/Arabian Gulf, Cuba, Vietnam, Kampuchea, North Korea, Lebanon, Angola, Namibia, Syria, Libya, Somalia, Ethiopia and South Africa) may be excluded from the permitted trading area. "Worldwide within Institute Warranty Limits" is a common term describing agreed trading areas (the "Institute" being the Institute of London Underwriters). "Institute Warranty Limits" is sometimes abbreviated as "IWLs".
Guarantees may be required from owners that the vessel has not traded to certain countries since a particular date, since the discovery of a past visit to a particular country may cause problems for the ship in another country.
The charter party should be checked for cargo exclusions. At common law, the charterers are under an implied obligation not to load any dangerous cargoes, but most charter parties state that the charterers may load certain dangerous goods if various statutes and regulations (e.g. the IMDG Code) are complied with. Usually, the vessel will be allowed by her owner to carry any "lawful merchandise" with the exception of certain excluded commodities which may be injurious to the ship, e.g. "bulk asphalt, pitch or tar, livestock, logs, acids, scrap, Sulphur, petroleum coke, explosives, fishmeal and nuclear materials".
Lightening at sea is not normally allowed without permission of underwriters (since this is usually outside terms of the Hull and Machinery policy).
The charterers are responsible for the vessel's commercial employment and direct her commercial operations, e.g. by giving instructions as to the sailing itinerary and cargo to be loaded.
The Master shall perform the voyages with due despatch, and shall render all customary assistance with the Vessel's crew and equipment. The Master shall be conversant with the English language and (although appointed by the Owners) shall be under the orders and directions of the charterers as regards employment and agency but the Master shall have the right to reject charterers' orders and/or directions as to the employment of the vessel where, in his sole discretion, he considers that these may compromise the safety and/or seaworthiness of the vessel, such right of the Master to be exercised in good faith; and the charterers shall perform all cargo handling, including but not limited to loading, stowing, trimming, lashing, securing, dunnaging, unlashing, discharging, and tallying, at their risk and expense, under the supervision of the Master.
Although he is a servant of the owners, the master is always under the time charterer's orders as far as the employment of the vessel and agency matters are concerned. He must accordingly prosecute the voyage with utmost despatch and give the charterers "customary and reasonable assistance" with the crew and ship's equipment.
The charter party may require the owners to investigate complaints by the charterers regarding the master or officers, and replace them if requested.

Defining a voyage

Carriage of cargo between named ports or places.

It may be thought of as equivalent to the hire of a taxi for a single journey, or for a series of several consecutive journeys in the case of a consecutive voyage charter.

i) The ship-owner basically agrees that he will present the named vessel for loading at the agreed place within an agreed period of time and, following loading (responsibility for which will be as agreed between the parties), will carry the cargo to the agreed place, where he will deliver the cargo.
ii) The charterer, who may be the cargo owner or may be chartering for the account of another party such as the shipper or the receiver, agrees to provide for loading, within the agreed period of time, the agreed quantity of the agreed commodity, to pay the agreed amount of freight, and to take delivery of the cargo at the destination place.
iii) In effect the charterers hire the cargo capacity of the vessel, and not the entire vessel, and to this extent a voyage charter agreement can be considered as the maritime equivalent of a taxi hire agreement. (Control of the ship's operations remains with the ship-owner.)
iv) In some trades, e.g. chemical tankers, several cargo parcels carried on one voyage may have been fixed with several different charterers.

The ship-owner must provide the master and crew, act as carrier and pay all running and voyage costs, unless the charter party specifically provides otherwise.

On the loaded voyage

During a loaded voyage a vessel must normally proceed to the destination port or place with "due despatch" (but sometimes "utmost despatch") and always without deviation from the contracted voyage, which includes ports of loading and discharge (and their rotation), dates of loading and discharge where stipulated, voyage route and other agreed elements.

If the vessel deviates in any respect (e.g. by discharging at a port other than that originally agreed, unless with the charterer's consent, or in the wrong rotation of ports) there is a serious breach of contract and the owners will not be able to rely on any of the exceptions in the contract. The owners will be reduced to the status of "common carrier" and will be have no protection against liability for loss of or damage to the goods carried other than the "common law exceptions". The owners would also have to prove that the loss/damage would inevitably have occurred even if the contract had not been breached; this applies whether the loss/damage occurred before, during or after the deviation.

Typical voyage charter party clauses in a voyage charter agreement for a cargo vessel

Defining voyage charter party clauses

A general purpose dry cargo voyage charter party will usually incorporate clauses covering the basic provisions tabulated below. The provisions may be expressed in different charter parties by clauses bearing different names, or by numbered clauses with no names.

Name of clauses and matters to be covered are discussed here.

Preamble: Identity of parties; identity of vessel; warranty of seaworthiness; present position of vessel; expected date of readiness to load; obligation to proceed to loading port or place; identity of and safety of loading port or place; amount and nature of cargo to be loaded; obligation to proceed to and identity of discharge port or place; obligation to deliver cargo.

Owners' Responsibility: Responsibility of the owners for loss of or damage to goods or delay in delivery of goods; exclusion of owner's liability for loss of or damage to goods or delay in delivery of goods.

Deviation: Liberty of vessel to call at ports in any order; liberty of vessel to tow and assist vessels; liberty of vessel to deviate for purpose of saving life or property or other purposes.

Freight: Rate and amount of payment of freight.

Loading/Discharging Costs: Responsibility for costs of loading and/or discharging of cargo.

Laytime: Duration of laytime allowed; exceptions to laytime; commencement of laytime; time and manner of tendering of notice of readiness.

Demurrage: Duration of demurrage period allowed; whether demurrage allowed at loading and/or discharge ports.

Lien: Whether the owners are to have a lien on cargo for freight, dead freight, demurrage and/or damages for detention; whether the charterers are to be responsible for freight and demurrage, etc. incurred at the discharge port.

Bills of Lading: Master's obligation to sign bills of lading.

Laydays and Cancelling: Laydays; cancelling date; conditions under which charterers have option to cancel charter; charterers' obligation to declare intention to exercise option to cancel, if applicable.

General Average: Rules under which any General Average is to be settled; obligation of cargo owners to pay cargo's share of General Average expenses.

Agency: Owner's (or charterer's) obligation to appoint agents at loading and discharge ports.

Brokerage: Amount of brokerage commission due and party or parties to whom payable.

Strikes: Allocation of responsibility for consequences of strikes or lock-outs preventing fulfilment of obligations.

War Risks: Liberty of owner to cancel charter in event of outbreak of war; liberty of master to sail from loading port before completion of loading in event of outbreak of war.

Ice: Liberties of master in event of inaccessibility of, or threat of trapping at, loading and/or discharge ports due to ice.

Clause Paramount: Identity of liability regime applying to bills of lading issued.

New Jason Clause: Protection of owner against US lawsuits where General Average is to be adjusted in accordance with US law.

Both To Blame Collision Clause: Protection of owner against US law in collision cases.

Law and Arbitration: Jurisdiction to which any dispute will be referred; place of any arbitration; appointment of arbitrators.

Rider clauses: as agreed between the parties, will generally be appended to the standard clauses.

Laytime calculation in a voyage charter party agreement for cargo ships employment

Purpose, stages in calculations

The purpose of laytime calculations is to determine whether on completion of loading or discharge operations despatch is payable to the charterers or demurrage is due to the owners.

The port agent is normally responsible for calculating the sum due and rendering accounts, but the master should also keep a tally of laytime used as he may be required to confirm the agent's figures. The master should also be aware, at any given moment, of whether laytime has commenced, is still running, is interrupted or has expired. Laytime calculations are recorded on a laytime statement.

There are seven stages in a laytime calculation

1. Read relevant clauses in the charter party.
2. Obtain Statement of Facts from agent.
3. Determine duration of laytime allowed.
4. Establish time of commencement of laytime.
5. Allow for interruptions to laytime as per the charter party.
6. Establish time of expiry of laytime.
7. Calculate despatch or demurrage payable.

The Statement of Facts is an extract from the port operations log kept by the charterer's agent, and contains times of all relevant events, including:

• arrival of ship;
• tendering of Notice of Readiness;
• commencement of laytime;
• commencement of cargo operations;
• periods of suspension of laytime, with reason in each case (so that risk of stoppage can be apportioned);
• termination of cargo operations;
• termination of laytime.

The Statement of Facts should be approved by all parties involved (master, stevedore, agent, etc.), and will normally be presented by the agent to the master for his signature and return; the master should retain a copy. It is important before signing to compare the times stated with those recorded on board the ship, since the charterer's agent may have obtained inaccurate times from his terminal supervisor, or may, for example, have recorded

a period of rain in the vicinity of his office that did not affect the ship for the same period. For a ship on a demurrage rate of USD24,000 per day, 6 minutes of time on demurrage is worth USD100; it is therefore important that all times are accurately recorded.

The Statement of Facts is used by the agent in drafting up the Laytime Statement, from which any amount of demurrage or despatch money payable will be calculated.

The duration of the laytime allowed depends on whether the laytime is:

• definite, e.g. "2 running days";
• calculable, e.g. where there is a given tonnage of cargo and a given rate of loading or discharging; or
• indefinite, e.g. on "FAC" ("fast as can") terms - which are unusual.

Where calculable, the allowed laytime for the operation involved (loading or discharging) should be calculated to the nearest minute.

Interpretation of the contract laytime terms should be in accordance with the law governing the contract (which is determined from the: Jurisdiction Clause), or, if expressly provided for, the internationally recognized Voyage Charter party Laytime Interpretation Rules 1993. As a result of court rulings, definitions of certain laytime expressions under English law differ from those given in the Laytime Interpretation Rules.

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- tendering of Notice of Readiness(NOR);
- commencement of laytime;
- commencement of cargo operations;
- periods of suspension of laytime, with reason in each case (so that risk of stoppage can be apportioned);
- termination of cargo operations;
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Nature of a bareboat charter and lease arrangement- cargo ships employment procedure

A bareboat charter (sometimes called a charter by demise or demise charter, particularly by lawyers)

i) Is a contract for the hire of a vessel for an agreed period during which the charterers acquire most of the rights of the owners.

ii) May be thought of as the marine equivalent of a long-term vehicle lease contract.

iii) Is most usually on the BARECON 89 charter party form.

iv) Is used by owners such as banks and finance houses who are not prepared to operate or manage ships themselves.

v) Is often hinged to a management agreement. (e.g. where an oil company bareboat charters a tanker from an independent tanker owner but agrees that the owners will manage the ship on the oil company's behalf during the charter period).
vi) May be hinged to a purchase option after expiry of the charter or during the hire period. (Hire payments may include instalments of the purchase price, and transfer of ownership may follow the final instalment. Many permutations are possible.)

In essence the vessel owners put the vessel (without any crew) at the complete disposal of the charterers and pay the capital costs, but (usually) no other costs. The charterers have commercial and technical responsibility for the vessel, and pay all costs except capital costs.

The "**BARECON A**" form, under which the owners bear responsibility for insurance premiums, was designed by BIMCO for short-period chartering (e.g. the summer hire of a passenger vessel).

The "**BARECON B**" form was designed as a long-period, financial type of contract, mainly for newbuildings although it can be modified for second-hand tonnage. The charterers are responsible for insurance premiums.

The "**BARECON 89**" form is an amalgamation of the "BARECON A" and "B" forms designed to reflect the growing use of bareboat charter registration. Part I contains the familiar BIMCO-style boxed details. Part II contains the standard clauses. Part III contains provisions applicable to newbuilding vessels. Part IV contains a hire-purchase agreement. Part V contains provisions to apply for vessels registered in a bareboat charter registry.

Benefits of lease arrangement in cargo ships employment

A lease arrangement is a means of financing the acquisition of a vessel that utilizes a bareboat charter party as the vehicle for the loan repayment agreement. It is used as an alternative to a traditional ship mortgaging arrangement. The "sharing" of tax benefits available to the owner and charterer is sometimes the main purpose of a lease arrangement.

In a typical lease arrangement, the lessee or borrower already owns a vessel or has contracted a newbuilding from a shipyard. On entering into the lease agreement, ownership of the vessel is formally transferred to the lessor or lender, who then becomes the registered owner. The lessor then charters the vessel to the borrower on the terms of a bareboat charter party. The lessor retains ownership of the vessel for a (usually) lengthy period, following which ownership may pass to the lessee/charterer. The charter hire payments cover the instalments of a loan that represents the finance required to acquire the vessel. The lender's tax benefits, which stem from ownership of the vessel, are passed on to the lessee/charterer by way of reduced charter hire payments. A vast set of financial documents is required in addition to the bareboat charter party.

Some of the terms of the bareboat charter party are designed to protect the lessor/charterer against the risks and liabilities normally associated with ownership of a vessel.

Contract between cargo seller and buyer - Procedure for Cargo ships employment Ships employment

The contract of sale between the seller and the buyer of the goods is separate from the contract of carriage which one party or the other, or a third party (such as a freight forwarder), will make with the carrier.

Sale of goods contracts

Goods are most often carried by sea as a result of a sales contract (or sale of goods contract) made between the seller and buyer. The contract of carriage, which is separate, comes about as a result of this sales contract.

UK sales are subject to the provisions of the Sale of Goods Act 1979, as amended. This Act sets out an unpaid seller's rights, one of which (in section 44) is the right of stoppage in transit.

Contracts for the sale of goods usually include provisions covering three important points:

• the time or circumstances of the passing of title (i.e. ownership) of the goods from seller to buyer;
• the time when payment becomes due; and
• the time when the risk (of loss or damage) passes from seller to buyer.

These points are normally addressed in international sale of goods contracts by incorporation of one of a set of mutually-agreed standard trade terms named INCOTERMS

The contract of sale between the seller and the buyer of the goods is separate from the contract of carriage which one party or the other, or a third party (such as a freight forwarder), will make with the carrier.

Contract between ship-owner and cargo owner

The obligation to provide a seaworthy vessel is absolute, i.e. there are no exceptions from the rule. At the time the contract is made the vessel must be fit to encounter the "ordinary perils of the sea" (e.g. bad weather) and other incidental risks to which she will be exposed on the voyage. However, the common law recognizes that owners cannot guarantee their vessels' seaworthiness once they have left port, so the obligation is only imposed at the start of the voyage, i.e. when the vessel leaves the berth either under her own power or under tow.

Ships employment -Contractual relationships

In connection with the cargo ship's employment, contractual relationships will exist between:

i) The ship's owner and any ship manager employed (embodied in a ship management contract);
ii) The ship's owner, manager or operator and any charterers (charter party);
iii) The head charterer and any sub-charterer (charter party);

iv) The ship's owner, manager or operator and a shipbroker who fixes the ship's employment;
v) The buyer and seller of each consignment of goods carried on board (sale of goods contract);
vi) An exporter and any freight forwarder hired to arrange for the delivery of goods;
vii) The legal carrier and each shipper of goods on board (contract of carriage);
viii) The ship's owner, manager or operator and each port agent appointed by him;
ix) The ship's owner, manager or operator and various other parties whose services are used during a voyage such as chandlers, equipment suppliers, repairers, tug owners, pilotage authorities, port authorities, stevedoring companies, etc. (contract for services);
x) a ship-owner and each passenger (contract of passage).

A "charter" is a contract for the hire of a vessel, aircraft, bus, etc. for a specified journey or an agreed period of time. In a maritime context, charters include:

i) contracts for carriage of specified quantities of cargo in specified vessels between specified ports (i.e. voyage charters); and
ii) contracts for hire of specified vessels, including:
    a. time charters; and
    b. bareboat charters (also known as "demise charters").

Owners' Responsibility

Owners will usually accept liability only where the loss, damage or delay has been caused by the improper or negligent stowage of the goods (unless the stowage is performed by shippers or charterers or their stevedores or servants), or by personal want of due diligence on the part of the owners or their manager to make the vessel in all respects seaworthy and to secure that she is properly manned, equipped and supplied, or by the personal act or default of the owners or their manager.

Contracts of affreightment in cargo ships employment

In modern shipping parlance, a contract of affreightment (often abbreviated to "COA")

i) is essentially a contract to satisfy a long-term need for transport, most often for iron ore and coal in bulk.
ii) Is an agreement between a charterer and a ship-owner, disponent owner or carrier for the carriage of a specified (and often large) quantity of specified goods between specified places, over a specified (and usually long) period of time, by vessels of a type and size stipulated by the charterer, but which are nominated by the owners. (In a charter for consecutive voyages, by contrast, the carrying ship is named.) The vessels may be chartered. The goods to be carried and the total period are clearly defined, but the shipment dates may be approximate, often giving an even spread of shipments over the period (which may, for example, be 12 months). A stated minimum quantity must usually be loaded each voyage, with a "more-or-less" margin at the option of either the charterers (MOLCO) or the owners (MOLOO).
iii) May be based on a standard charter party as the main COA document, with a number of rider clauses added, or on a main COA document (such as BIMCO's VOLCOA form)

supplemented by separate voyage charter parties relating to each voyage made under the COA.
iv) May be used by an operator who has no fleet of his own and who charters ships in for each voyage.
v) Is the type of contract on which a very large ore carrier or Capesize bulk carrier is likely to be employed.

In summary

• the owners agree to transport an agreed volume of cargo over a specified period;
• the charterers nominate cargoes and loading dates;
• the owners nominate suitable vessels.

* Note: The term "contract of affreightment" is also commonly used in maritime law textbooks for what (in view of the modern usage of COAs as described above) might be better termed a "contract of carriage by sea".

Seaworthiness has three aspects

1. Technical seaworthiness, relating to the vessel's design, condition of her hull and machinery, and her stability, etc.;
2. "Cargo worthiness", relating to her suitability for the intended cargo and the condition of her cargo spaces; and
3. Fittedness for the intended voyage, relating to her equipment (including charts), manning, bunkering and stores for the voyage.

The ship may be held to be unseaworthy, therefore, if she sails without:

• Statutory certificates in force;
• Certificate (or interim certificate) of class in force;
• Holds properly fitted for the cargo (e.g. ventilation system working, dunnage, fire-fighting agent);
• Cargo properly stowed or secured;
• A properly qualified master or officers;
• Appropriate (and corrected) charts for the voyage; or
• Sufficient bunkers for the voyage.

Under the doctrine of stages, seaworthiness at each stage of the voyage, e.g. in dock, in a river, in an estuary, must be considered separately.

Warranty of seaworthiness

A general purpose dry cargo voyage charter party will usually incorporate clauses covering warranty of seaworthiness. The provisions may be expressed in different charter parties by clauses bearing different names, or by numbered clauses with no names.

Unless a contract of carriage by sea has an express provision concerning seaworthiness, the absolute (common law) obligation, known as the warranty of seaworthiness, is implied in the contract.

In a charter party the absolute warranty of seaworthiness is usually moderated, however, to an undertaking that the shipowner or carrier will only exercise due diligence to make the vessel seaworthy before sailing.

For a ship-owner or carrier to exercise due diligence he must

1. Make a reasonable and careful inspection and perform maintenance of the vessel in accordance with the custom of the trade; and
2. Do this before the commencement of the voyage.

Exercising due diligence to ensure that a vessel is seaworthy would therefore mean, for example, ensuring that:

• Class surveys and statutory safety construction, equipment and loadline surveys are carried out and passed in accordance with current requirements (i.e. the vessel is technically seaworthy);
• The cargo spaces are fit for the reception and carriage of the cargo and that the cargo is properly loaded and stowed taking into account the expected perils of the voyage (the vessel is "cargo worthy");
• The vessel is properly equipped and supplied for the expected duration of the voyage in terms of sufficient competent crew, navigational equipment and supplies, stores, provisions and spares, bunker fuel, fresh water, etc. ("fittedness for the voyage").

"In all respects ready to load"

Means the vessel is seaworthy and in every way fit to carry the particular cargo on the voyage contemplated by the charterer. The vessel must be fully at the charterer's disposal, i.e. with derricks or cranes ready for operation, holds or tanks cleaned, prepared and surveyed, free pratique and customs clearance granted, etc. - unless the charter party allows otherwise, which it may do by the inclusion of a protecting phrase as outlined above.

At common law the duty to provide a seaworthy ship on presentation was absolute, i.e. no exceptions were allowed. However, most modern charter party forms have reduced the absolute obligation to a duty of "exercising due diligence", i.e. doing everything which a prudent ship-owner can reasonably do to make the vessel seaworthy without actually guaranteeing her seaworthiness.

International trade terms (INCOTERMS) in sea transportation of goods -Rights and liabilities for parties involved.

Forming links in the transport chain

It is important for the seller and buyer of goods, as well as their bankers, cargo insurers and the various carriers who may be involved in the total journey to know precisely when the right

to ownership and risk of loss or damage passes from seller to buyer, so that the respective obligations, rights and liabilities of each party can be determined and disputes avoided. The obligations of the seller and buyer with respect to delivery of the goods and the division of functions, costs and risks related to the delivery should be contained in trade terms incorporated in the contract of sale.

Misinterpretation of trade terms and uncertainties may result where there are different trading practices in the respective countries of the buyer and seller which are not known to each other. The trade term "FOB", for example, has a different meaning to a merchant in the USA than to a UK merchant. Language differences between buyer and seller, or lack of a common language, may also cause misinterpretation of contract terms.

What are International trade terms (INCOTERMS)

* INCOTERMS is a set of rules, published by the International Chamber of Commerce, for the uniform interpretation of the most commonly used trade terms used in international trade contracts. The main purpose of INCOTERMS is to clearly set out the obligations of the seller and buyer with respect to the delivery of the goods and the division of functions, costs and risks associated with delivery. By the use of INCOTERMS misinterpretations or uncertainties described above may be avoided or reduced.

* INCOTERMS are published in various languages used by the chief trading nations. The latest edition is INCOTERMS 2000. A sales contract should contain an express reference to the edition used.

* Thirteen INCOTERMS are defined, which can be arranged in four groups: E, F, C and D according to the seller's basic obligations, as follows:

• Group E – where the goods are to be made available to the buyer at the seller's premises;
• Group F – where the seller and buyer must deliver the goods to a carrier appointed by the buyer;
• Group C – where the seller must contract for the carriage of the goods without bearing the risk of loss of or damage to the goods or additional costs following shipment; and
• Group D – where the seller has to bear all costs and risks required to bring the goods to their destination.

* INCOTERMS can be further grouped into two basic categories: terms suitable for use in contracts involving water transport, and terms suitable for all transport modes.

An outline meaning of commonly used INCOTERMs are shown in the following paragraphs:

EXW [Ex Works (named place)]: Seller to place goods at disposal of buyer at seller's premises or another named place, not cleared for export and not loaded onto any collecting vehicle. Title and risk pass to buyer at seller's door.

FCA [Free Carrier (named place)]:Seller to deliver goods, cleared for export, to carrier nominated by buyer at named place. Title and risk pass to buyer on delivery to carrier.

FAS [Free Alongside Ship (named port of shipment)]: Seller to place goods, cleared for export, alongside vessel at named port of shipment. Title and risk pass to buyer alongside ship.

FOB [Free On Board (named port of shipment)]: Seller delivers goods, cleared for export, when they pass ship's rail at named loading port. Title and risk pass to buyer as goods pass ship's rail.

CFR [Cost and Freight (named port of destination)]: Seller delivers goods when they pass ship's rail at named loading port and must pay costs and freight necessary to bring goods to named port of destination. Buyer bears all additional costs and risks after goods have been delivered over ship's rail at loading port. Title and risk pass to buyer when goods delivered on board ship.CIF [Cost, Insurance and Freight (named port of destination)]: Seller's obligations same as under CFR with addition that seller must obtain insurance against buyer's risk of loss/damage during sea carriage. Title and risk pass to buyer when goods delivered on board ship.

CPT [Carriage Paid To (named place of destination)]: Seller delivers goods to nominated carrier and pays cost of carriage to named destination. Buyer bears all additional costs and risks after goods delivered to carrier. Title, risk and insurance cost pass to buyer when goods delivered to carrier.

CIP [Carriage and Insurance Paid To (named place of destination)]: Obligations same as under CPT with addition that seller procures insurance against buyer's risk of loss/damage to goods during carriage. Title and risk pass to buyer when goods delivered to carrier.

DAF [Delivered at Frontier (named place)]: Seller to place goods at disposal of buyer on arriving means of transport, not unloaded, cleared for export but not cleared for import, at named border point. Title, risk and responsibility for import clearance pass to buyer when delivered to named border point by seller.

DES [Delivered Ex Ship (named of destination)]: Seller delivers when goods are placed at buyer's disposal on board ship, not cleared for import, at named port of destination. Title, risk and responsibility for vessel discharge and import clearance pass to buyer when seller delivers goods on ship at destination port.

DEQ [Delivered Ex Quay (named port of destination)]: Seller delivers when goods are placed at disposal of buyer, not cleared for import, on quay at named port of destination. Title and risk pass to buyer when delivered on board ship at destination point by seller who delivers goods on dock at destination point cleared for import.

DDU [Delivered Duty Unpaid (named place of destination)]: Seller must deliver the goods to the buyer, not cleared for import, and not unloaded, at the named place of destination. Title, risk and responsibility of import clearance pass to buyer when seller delivers goods to named destination point. Buyer is obligated for import clearance.

DDP [Delivered Duty Paid (named place of destination)]: Seller must deliver goods to buyer, cleared for import, and not unloaded, at named place of destination. Title and risk pass to buyer when seller delivers goods to named destination point cleared for import.

Money transfer procedure in sea transport -The documentary credit system:

The "documentary credit system" is a money transfer system commonly used in overseas trade to enable sellers to obtain early payment, i.e. soon after shipment of the goods.

- relies heavily on documents, which are carefully checked by the banks involved before they make payment.

- operates with the procedure in the following example, which assumes a Seller in the UK and a Buyer in New Zealand.

1. Seller and Buyer conclude their sales contract, specifying payment by documentary credit.
2. Buyer instructs his bank in NZ to open a Credit in favor of Seller.
3. Buyer's NZ bank verifies Buyer's credit-worthiness and issues a Letter of Credit (LOC) containing terms of the Credit (i.e. stringent requirements regarding use of CIF terms, documents, time of loading, etc. Buyer's bank sends LOC to Seller's bank.
4. Seller's bank checks LOC requirements, then sends LOC to Seller.
5. Seller despatches goods, assembles documents required by LOC (usually invoice, insurance certificate, full set of "clean on board" bills of lading made "to order" which are obtained once goods are shipped). Seller presents all shipping documents to his bank and asks for his payment.
6. Seller's bank checks documents against LOC requirements. If they comply (including "clean" bills of lading), Seller's bank pays Seller and sends documents to Buyer's bank.
7. Buyer's bank checks documents against LOC. If they comply, Buyer's bank releases documents to Buyer against payment, then reimburses Seller's bank.
8. Buyer receives documents, enabling him to obtain release of goods from ship.

Note: A problem will arise when a bank is instructed by the Letter of Credit to pay only on production of a full set of "clean on board" bills of lading, whereas the bills of lading have been claused in respect of some defect or shortage.

Parties involved in sea transportation of goods -buyer, seller, carrier, freight forwarder, shipper, consignee, agent & banks

Forming links in the transport chain

The transport of goods by sea from seller to buyer usually involves several parties whose roles may be unclear to those on board ship. The following notes are intended to outline the basic functions of the most prominent players forming links in the transport chain.

The seller and the buyer are the parties contracting with each other for the delivery of the goods. The seller may be the producer or manufacturer of the goods, or may be a party acting as the producer/manufacturer's agent. Both parties agree on the trade terms which will influence the type and terms of shipping documents (e.g. bill of lading or sea waybill).

As far as the ship-owner is concerned, the shipper is the party who contracts for the carriage of the goods by sea and delivers the goods into his care, whether this party is the seller or an agent of the seller. The seller, however, may be employing the services of a freight forwarder

to perform the various functions involved in exporting the goods, and it may be the freight forwarder who contracts for carriage of the goods with the ship-owner, making the freight forwarder the legal shipper. Another possibility is that a certain amount of cargo space on board the ship has been contracted to a non-vessel owning carrier (NVOC) , and the seller or his agent has contracted with the NVOC to transport the goods; in that case, the NVOC will be the legal shipper in the contract with the ship-owner. Whoever the shipper is in law, however, the document evidencing receipt of the goods by the carrier (e.g. a bill of lading or sea waybill) will be issued by the carrier to that party, and that party will be giving employment to the ship. In some countries, including the USA, the shipper may be called the consignor.

A freight forwarder is a transport intermediary, operating in the liner trades, who arranges the export of another party's goods (by land, sea or air) and "forwards" the goods into the care of the sea carrier. Freight forwarders can advise on routeing, can arrange carriage with a carrier (booking space, paying freight, etc.), can prepare or assist in preparting customs documents, can make customs entry (clearance) of goods, can arrange packaging and warehousing of goods before shipment, can arrange goods transit insurance, and can in many cases arrange "groupage" or "consolidation", meaning the more cost-effective shipment in one transport unit of several small parcels sent by different shippers, where they are all destined for the same delivery port or place).

A carrier is a party who contracts with a shipper for the transport of goods by sea. In the liner trades, where non-vessel owning carriers offer shipping services, the carrier with whom the seller or the seller's agent makes his carriage contract is not necessarily the carrier actually performing the sea carriage. Furthermore, where a ship is chartered and is being operated commercially by the charterer (such as a time charterer), the identity of the legal carrier may depend on the information stated on the bill of lading or sea waybill.

The consignee is the party to whom the goods are consigned or sent by the shipper. The consignee may be the buyer of the goods, or a party acting as import agent for the buyer.

The receiver is the party who takes receipt of the goods from the sea carrier at the port or place of delivery. Some consignees will take direct delivery of goods from carriers, but many consignees in the liner trades employ an agent such as a freight forwarder to act as a "clearing agent" in the customs and other formalities of importing the goods, and for transportation of goods to their ultimate destination. When loss or damage to goods is discovered on discharge, it is often the receiver who notifies the carrier.

The notify party (a term found in most bills of lading and sea waybills) is the party who must be informed by the carrier of the ship's arrival, so that collection of the goods can be arranged. The notify party may be the consignee or a receiver.

Banks will form links in the transport document chain when payment for the goods is being made by means of a Letter of Credit. For notes on the documentary credit system. For notes on the bill of lading in the documentary credit system.

Depending on the trade terms, either the seller or the buyer will usually take out goods transit insurance with a cargo insurer.

Charterers agent: Since time charterers require their cargo operations in each port to be overseen by reliable port agents, particularly in specialized trades, the charterers will normally reserve the right to nominate agents, although these "charterers' agents" will usually be appointed and have their fees paid by the owners. (The owners will therefore be the principal in the legal relationship.)

As well as expediting cargo operations, charterer's agents should attend to the ship's (i.e. owner's) business, e.g. crew reliefs and repatriation, subs, etc., and a Disbursements Clause may provide that they will be paid for this work by a commission on the actual cost of the disbursements.

As in a voyage charter on free in and out terms, a protecting agent may be appointed by the owners where there is any conflict of interest between owner's and charterer's requirements.

Since the master is normally under the charterer's orders regarding employment and agency, charterer's agents have the right to sign bills of lading on behalf of the master, although the master will usually be required to sign a form or letter authorizing them to do this.

Carriage of goods by sea act 1992 (COGSA 92)

Carriage of Goods by Sea Act 1992 (COGSA 92) repeats the Bill of Lading Act 1855 and makes major changes to the law regarding who has the right to sue the carrier and who the carrier can sue for freight, demurrage, etc. Because of uncertainties and anomalies about the wording of the Bill of Lading Act 1855, much legal time and expense had been incurred before the passing of COGSA 92 over the question of who had the right to sue under a bill of lading.

It applies to any bill of lading, sea waybill and ships' delivery order. And contains powers to enable regulations to be made for the application of the Act to electronic documents.

Section 3 of COGSA 92 lays down guidelines establishing when liabilities under a bill of lading, sea waybill or ship's delivery order will be transferred to a party who is not an original party to the contract of carriage (i.e. an endorsee or transferee). The party who takes or demands delivery of the goods to which a bill of lading, sea waybill or ship's delivery order relate becomes subject to the same liabilities as the original shipper.

If delivery is demanded before the bill of lading is transferred (e.g. under a Letter of Indemnity), then once the bill of lading is transferred the holder will become subject to the same liabilities (i.e. the obligation to pay freight, port charges, demurrage. etc.) as the previous holder.

Liabilities are not imposed on third parties who take up shipping documents with no intention of demanding delivery or making a claim under the contract of carriage, e.g. banks taking up the documents as security.

The case of Grant v. Norway (1851) involved a master who had signed a bill of lading for 12 bales of wool which were not in fact shipped. It was held that the carrier was not liable to the receivers since the master did not have authority to sign the bill of lading for goods which had not actually been shipped. Section 4 of COGSA 92 overturns that decision. A bill of lading which represents that goods have been shipped on board or received for shipment will be conclusive evidence of such shipment against the carrier in the hands of a lawful holder of the bill of lading, provided that the bill of lading was signed by the master or a person with the authority of the master. This rule will not apply, however, if the bill of lading has not been transferred (e.g. where cargo is delivered against a Letter of Indemnity where a bill of lading has not arrived).

Section 4 (Representations in bills of lading) provides that a properly signed bill of lading representing goods to have been shipped or received for shipment will, in favor of a person who has become the lawful holder (i.e. a transferee), be conclusive evidence against the carrier of the shipment of the goods or, as the case may be, of their receipt for shipment.

The chief consequences of the Act for carriers are that

• the number of claims made in tort is likely to be substantially reduced since it is much clearer as to who has the right to claim under the bill of lading; and
• the carrier's rights of claim or counter-claim against cargo receivers, in addition to the original shippers, are now free from uncertainty.

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Laytime interpretation rules

Rules, which were issued jointly by BIMCO, CMI, FONASBA and INTERCARGO, replace the Charter party Laytime Definitions 1980.

Voyage Charter party Laytime Interpretation Rules 1993 for Cargo ships Employment.

Laytime Interpretation Rules 1993

The following Rules, which were issued jointly by BIMCO, CMI, FONASBA and INTERCARGO, replace the Charter party Laytime Definitions 1980. The interpretation of words and phrases used in a charter party, as set out below, and the corresponding initials if customarily used, shall apply when expressly incorporated in the charter party, wholly or partly, save only to the extent that they are inconsistent with any express provision of it.

When the word "charter party" is used, it shall be understood to extend to any form of contract of carriage or affreightment including contracts evidenced by bills of lading.

1. “Port” shall mean an area within which vessels load or discharge cargo whether at berths, anchorages, buoys or the like, and shall also include the usual places where vessels wait for their turn or are ordered or obliged to wait for their turn no matter the distance from that area. If the word “PORT” is not used, but the port is (or is to be) identified by its name, this definition shall still apply.
2. “Berth” shall mean the specific place within a port where the vessel is to load or discharge. If the word “berth” is not used, but the specific place is (or is to be) identified by its name, this definition shall still apply.
3. “Reachable on arrival” or “Always accessible” shall mean that the charterers undertake that an available loading or discharging berth be provided to the vessel on her arrival at the port which she can reach safely without delay in the absence of an abnormal occurrence.
4. “Laytime” shall mean the period of time agreed between the parties during which the owners will make and keep the vessel available for loading or discharging without payment additional to the freight.
5. “Per hatch per day” shall mean that the laytime is to be calculated by dividing (A), the quantity of cargo, by (B), the result of multiplying the agreed daily rate per hatch by the number of the vessel’s hatches. Thus:

Laytime = Quantity of cargo / (Daily Rate x Number of Hatches)= Days

Each pair of parallel twin hatches shall count as one hatch. Nevertheless, a hatch that is capable of being worked by two gangs simultaneously shall be counted as two hatches.

6. “Per working hatch per day” (WHD) or “Per workable hatch per day” (WHD) shall mean that the laytime is to be calculated by dividing (A), the quantity of cargo in the hold with the largest quantity, by (B), the result of multiplying the agreed daily rate per working or workable hatch by the number of hatches serving that hold. Thus:
Laytime = Largest quantity in one hold / (Daily Rate per Hatch x Number of Hatch serving that Hold) = Days Each pair of parallel twin hatches shall count as one hatch. Nevertheless, a hatch that is capable of being worked by two gangs simultaneously shall be counted as two hatches.
7. “Day” shall mean a period of 24 consecutive hours running from 0000 hours to 2400 hours. Any part of a day shall be counted pro rata.
8. “Clear days” shall mean consecutive days commencing at 0000 hours on the day following that on which a notice is given and ending at 2400 hours on the last of the number of days stipulated.
9. “Holiday” shall mean a day other than the normal weekly day(s) of rest, or part thereof, when by local law or practice the relevant work during what would otherwise be ordinary working hours is not normally carried out.
10. “Working days” (WD) shall mean days not expressly excluded from laytime.
11. “Running days” or “Consecutive days” shall mean days which follow one immediately after the other.
12. “Weather working day” (WWD) or “Weather working day of 24 hours” or “Weather working day of 24 consecutive hours” shall mean a working day of 24 consecutive hours except for any time when weather prevents the loading or discharging of the vessel, or would have prevented it, had work been in progress.
13. “Weather permitting” (WP) shall mean that any time when weather prevents the loading or discharging of the vessel shall not count as laytime.

14. “Excepted” or “excluded” shall mean that the days specified do not count as laytime even if loading or discharging is carried out on them.
15. “Unless sooner commenced” shall mean that if laytime has not commenced but loading or discharging is carried out, time used shall count against laytime.
16. “Unless used” (UU) shall mean that if laytime has commenced but loading or discharging is carried out during periods excepted from it, such time shall count.
17. “To average laytime” shall mean that separate calculations are to be made for loading and discharging and that any time saved in one operation is to be set off against any excess time used in the other.
18. “Reversible laytime” shall mean an option given to the charterers to add together the time allowed for loading and discharging. Where the option is exercised the effect is the same as a total time being specified to cover both operations.
19. “Notice of Readiness” (NOR) shall mean the notice to charterer, shipper, receiver or other person as required by the charter party that the vessel has arrived at the port or berth, as the case may be, and is ready to load or discharge.
20. “In writing” shall mean any visibly expressed form of reproducing words; the medium of transmission shall include electronic communications such as radio communications and telecommunications.
21. “Time lost waiting for berth to count as loading or discharging time” or “as laytime” shall mean that if no loading or discharging berth is available and the vessel is unable to tender notice of readiness at the waiting-place then any time lost to the vessel shall count as if laytime were running, or as time on demurrage if laytime has expired. Such time shall cease to count once the berth becomes available. When the vessel reaches a place where she is able to tender notice of readiness laytime or time on demurrage shall resume after such tender and, in respect of laytime, on expiry of any notice time provided in the charter party.
22. “Whether in berth or not” (WIBON) or “berth or no berth” shall mean that if no loading or discharging berth is available on her arrival the vessel, on reaching any usual waiting place at or off the port, shall be entitled to tender notice of readiness from it and laytime shall commence in accordance with the charter party. Laytime or time on demurrage shall cease to count once the berth becomes available and shall resume when the vessel is ready to load or discharge at the berth.
23. “Vessel being in free pratique” and/or “having been entered at the Custom House” shall mean that the completion of these formalities shall not be a condition precedent to tendering notice of readiness, but any time lost by reason of delay in the vessel’s completion of either of these formalities shall not count as laytime or time on demurrage.
24. “Demurrage” shall mean an agreed amount payable to the owners in respect of delay to the vessel beyond the laytime, for which the owners are not responsible. Demurrage shall not be subject to laytime exceptions.
25. “Despatch money” or “despatch” shall mean an agreed amount payable by the owners if the vessel completes loading or discharging before the laytime has expired.
26. “Despatch on (all) working time saved” (WTS) or “on (all) laytime saved” shall mean that despatch money shall be payable for the time from the completion of loading or discharging to the expiry of the laytime excluding any periods excepted from the laytime.
27. “Despatch on (all) time saved” (ATS) shall mean that despatch money shall be payable for the time from the completion of loading or discharging to the expiry of the laytime including periods excepted from the laytime.

28. "Strike" shall mean a concerted industrial action by workmen causing a complete stoppage of their work which directly interferes with the working of the vessel. Refusal to work overtime, go-slow or working to rule and comparable actions not causing a complete stoppage shall not be considered a strike. A strike shall be understood to exclude its consequences when it has ended, such as congestion in the port or effects upon the means of transportation bringing or taking the cargo to or from the port.

Charter related problems at loading ports - procedure for cargo ships employment

If charterers repeatedly reject the vessel on grounds of unclean holds or tanks most charter parties have clauses dealing with cleaning of compartments before loading. Some charter parties give the master sole authority to decide when the vessel is sufficiently clean for loading to commence, while others require the vessel to be cleaned "to the satisfaction of the Charterer's Inspector", which may lead to the charterers repeatedly rejecting the vessel and asking for more cleaning to be done before acceptance. The charterers must be able to show that such rejections and requests were reasonable.

Unless the charter party provides otherwise, the master has final responsibility for deciding when cargo compartments are sufficiently clean for loading. If personally satisfied that compartments are clean enough for the intended cargo, the master should:

• act reasonably;
• bear in mind that he is acting in the interests of both the owners and the charterer;
• politely and firmly point out to the surveyor that the responsibility outlined above is the master's;
• point out that the cost of any further cleaning will be for the charterer's account; and
• note protest. If ordered to leave the loading berth before acceptance, the master should not agree to do so unless so instructed by the owners/disponent owners, or unless there is a clause in the charter party giving the charterers the right to order the vessel off the berth, in which case the order should come from the charterers to the master via the owners.

If charterers cannot provide a cargo on arrival

The master should tender notice of readiness in accordance with the charter party, and inform the ship-owner.

The charterers are not in breach of contract until the agreed laytime has expired.

The vessel should "sit out" the laytime, the period of which should be computed from the charter party. If no cargo has been provided by the time of expiry of laytime, the master should note protest, stating that the owners' obligations under the charter party have been met, and await instructions.

If charterers cannot provide the agreed cargo quantity

It is customary in the bulk trades for the charter party to allow for the actual weight intaken to be more or less (MOL) than the proposed weight by a margin of perhaps 10%, in either the charterer's option (MOLCO) or the owners' option (MOLOO).

If the weight loaded is less than the agreed margin, the charterers will be in breach of contract and liable for dead freight. The owners will be entitled to take reasonable steps to find other cargo to fill the unused space.

In such a case the master should send a letter of protest to the charterer, contact the owners, and note protest. A dead freight claim form may have to complete by the master, for submission to the charterer.

Outline of bill of lading functions for cargo ships employment in time charter agreement

A bill of lading is a receipt for goods either received (before shipment) or shipped on board. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.)

A bill of lading is not a true contract, since it is usually signed by only one of the parties. It is a document of title, signifying that the holder has the legal right to possession of the goods it describes. (The right to possession should not be confused with the right to ownership, which will usually be determined by the terms of the sales contract.)

A bill of lading may, depending on how it is made out, be negotiable, i.e. transferable to a third party so as to effect transfer of title to the goods it describes.

The bill of lading as a receipt for goods

The bill of lading's prime function is as a receipt issued for:

• goods received for shipment either by a carrier or a freight forwarder, etc. pending shipment on a vessel; or
• goods shipped on board the carrying vessel, depending on the wording or endorsements on the bill.

A bill of lading states the quantity and apparent order and condition of the goods when received into the carrier's care and is normally printed with wording such as "Received in good order and condition unless otherwise stated..." or "shipped in good order and condition unless otherwise stated....". If this statement is not true, appropriate remarks should be made on the face of the bill of lading. Any shortage or damage to the goods occurring before acceptance by the carrier should therefore be stated on the face of the bill of lading.

If there is no clausing of the bill of lading showing a defective condition or quantity of the goods on receipt by the carrier, the consignee may reasonably expect to receive his goods in good order and condition. Any loss or damage found on delivery will be assumed to be caused by the carrier's negligence unless he can prove it to be attributable to one of the excepted perils listed in his contract of carriage (e.g. Act of God, inherent vice, etc.).

Where a mate's receipt is issued, the bill of lading's description of the quantity/condition of the goods is copied from the description in the mate's receipt. It is most important, therefore, that the mate's receipt states the actual quantity/condition of the goods at the time of loading

where this is other than “in good order or condition” or differs in quantity from that stated in the shipping note.

Delivery of the goods

The carrier, carrier’s agent or master is legally obliged to deliver the goods to the first person presenting a signed original bill of lading at the discharge port, together with proof of his identity and proof that freight and any other charges due have been paid. (A negotiable bill of lading is effectively, therefore, a cloakroom ticket for cargo: whoever has the bill of lading can collect the cargo.)

Once the goods are released to a receiver (i.e. legally delivered), any carrier’s lien for unpaid freight, etc. will be lost.

If the bill of lading has been transferred by the original consignee, the endorsements on it should be checked before delivery.

If the presented bill of lading appears to be in order, the master or the agent should sign it and date it (known as “sighting the bill”). It is then said to be “accomplished” and is usually stamped “ACCOMPLISHED”. The goods can then be released to the receiver. A delivery order may be issued by the agent to the receiver.

Delivery may be (and in practice is often) made without presentation of a bill of lading, but only when certain precautions have been taken.

For a better understanding of the main functions of a bill of lading it is useful to know the basic documentary procedures used in tramp and liner shipping operations, as outlined below.

Bill of lading freight clause

“Freight” is the remuneration payable by the charterers to the owners for the performance of the contract. It may be called charter party freight in the contract. Frieght clause specifies the freight rate, how freight will be calculated, when it must be paid, and the arrangements for payment. Details of bank accounts may be in a separate document annexed to the charter party.

Bill of lading freight is calculated on shipped or intaken weights, as stated in a bill of lading. Is used in trades where intaken and outturn weights are likely to differ, e.g. where:

• oil evaporates during the voyage;• there is “clingage”;
• there is sedimentation;
• logs loaded from the water dry out on the voyage;
• ice melts on timber after loading;
• grabs cannot discharge all of a cargo.

Bill of lading freight is the usual type of freight stipulated in tanker charter parties. It may be payable in advance or at destination. Or may be payable, where outstanding, by any endorsee of a bill of lading.

Outline of clean and dirty bill of ladings in cargo ships agreement

A bill of lading is a receipt for goods either received (before shipment) or shipped on board. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.)

A clean bill of lading is a bill of lading bearing no superimposed clauses stating a defective condition or shortage of the goods. It states that the goods have been received "in apparent good order and condition...", without further remarks as to their condition.

A dirty bill of lading, also known as a "claused" or "foul" bill, is one claused with remarks such as "torn bags", "rusty drums", "three (3) more c/s in dispute - if on board to be delivered", etc.

A full set of "clean on board bills of lading" is normally demanded as a condition of a bank's letter of credit, and if not issued will prevent early payment of the exporter by the bank. Pressure may therefore be exerted by a shipper for clean bills to be issued, even where these would not be justified by the actual condition or quantity of the goods.

A Letter of Indemnity (or "back letter") may be offered by the shipper, promising to indemnify the master or carrier against any loss or liability as a consequence of signing a clean bill of lading. However, acceptance of a Letter of Indemnity of this type in return for clean bills makes the master a party to an act of deception or fraud on banks, consignee/buyer, and insurers, since it is an attempt to obtain payment for goods knowing them to be unsound. There may be personal criminal liability for fraud on the part of the carrier and the master, and a heavy financial liability on the ship-owner. This type of Letter of Indemnity has no legal standing in English law and cannot be sued on if the shipper goes back on his promise of indemnity.

A master should consult his owners and their P&I club's correspondent if he is in any doubt, but should never accept a Letter of Indemnity of this sort without the written orders of his owners.

Signing bills of lading

Where a shipmaster has to sign and issue original bills of lading, great care must be taken to see that all potential contractual pitfalls are covered. In such cases it would be advisable to consult the P&I club correspondent beforehand.

"Shipped" bills of lading are signed on behalf of the carrier by or for the master of the carrying ship. A full set of original bills will be signed, then returned (via the agent) to the shipper. Freight may be payable before signing bills, depending on the carrier's terms.

Where a mate's receipt was issued to the shipper on shipment of cargo, this may be required to be surrendered in exchange for the "shipped" bills of lading.

The master or his authorized deputy should always check the following when signing a bill of lading:

1. That the goods have actually been shipped (which may be determined from the ship's copy of any mate's receipt issued; this should be identical to the original mate's receipt issued to the shipper, which should be presented by the shipper when requesting his bills of lading);
2. That the date of shipment is correct, i.e. as stated on the mate's receipt or standard shipping note;
3. That the bill of lading is not marked "freight paid" or "freight prepaid" if not true;
4. That any clausing of the corresponding mate's receipt is also contained in the bill of lading;
5. That reference is made to the charter party where one exists;
6. That any charter party terms do not conflict with the bill of lading terms; and
7. That the number of original bills in the set is stated.

Every original in the set must be signed.

Types of Bill of lading forms

A bill of lading is a receipt for goods either received (before shipment) or shipped on board. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.)

Bill of lading forms are produced in many styles by shipping companies, shippers, charterers, freight forwarders and organizations such as BIMCO. Several types are used for different purposes.

A "**long-form**" bill of lading has spaces or boxes on its front for typed details and numerous printed conditions of carriage on its back. Most liner shipping companies print their own long-form bills of lading with their company conditions of carriage on the back.

A "**short form**" bill of lading has only a few standard terms printed on it, avoiding the need for shippers to hold stocks of bills of lading for every carrier they use, so that they can prepare the bill of lading with the required details before presentation for signature. A short form bill of lading made out for cargo loaded aboard a voyage-chartered ship will usually indicate that the terms and conditions of the relevant charter party are deemed to be incorporated in the bill of lading. This allows any party to whom the bill of lading is transferred to see where the contract of carriage actually is.

A "**direct**" bill of lading is issued when the goods are for carriage from one port to another. Transshipment is not anticipated although there may be a clause giving the carrier liberty to transship (in which case the goods may lie at the merchant's risk whilst in the transshipment port). This type of bill of lading has printed clauses on the reverse and is used in liner services.

A "**combined transport**" bill of lading covers carriage from door-to-door by several modes of transport, which is common in many liner services. The "combined transport operator" (CTO)

takes responsibility for the goods throughout the entire journey and issues the CT bill of lading at its start.

A "**through**" bill of lading is issued when the carriage will involve both sea and other transport modes, but different carriers will be involved at each stage, e.g. a railway company, a shipping company, a road haulier. The bill of lading is issued by the sea carrier but he states on it that he only accepts responsibility for the goods during the sea passage.

Function of a bill of lading in cargo ships agreement

Bills of Lading are internationally respected documents on which banks and other institutions rely when advancing large sums of money. If a Master or agent signs a bill of lading knowing or suspecting that the cargo description is incorrect, or if a false date is deliberately inserted in the bill, a court will probably consider that a fraud has been committed. This will render worthless any guarantees or letters of indemnity that may have been tendered by the shipper and expose the ship to liability for any loss that has been suffered.

The Master should be aware of the condition of cargo loaded to the extent that he can reasonably be expected to have inspected it. If it is impossible for him to properly inspect the cargo, the Bill of Lading should be qualified accordingly. Additionally, the Master will often be under a duty to state the quantity or weight or number of pieces of cargo shipped, and once he has signed bills to that effect it will be very difficult to claim that a different quantity was shipped. As it seldom, if indeed it ever, happens that the Master or his officers are in a position to check or vouch for the quantity of cargo shipped, mate's receipts and bills should always be claused "...shipper's weight, quantity and quality unknown..." or, in the case of bagged cargo "...xxxx bags said to contain... weight, quantity and quality unknown..."

The intrinsic value represented by a Bill of Lading tends to give rise to many disputes and accordingly, if there is any doubt about how a bill should be claused, advice of the owners or the P&I Club should be sought.

The bill of lading in the hands of a third party

At common law, a bill of lading is only prima facie evidence as to the quantity, weight and condition of goods shipped, i.e. if a bill is signed for a greater quantity of cargo than is actually shipped, it may be possible, provided the bill is not endorsed to a third party, for the carrier to refute the statements on it. Once the bill is endorsed to a third party, however, it becomes conclusive evidence of the shipment, i.e. the carrier will be bound by the bill of lading's terms and conditions, whether the goods were shipped or not. (Since liner bills of lading are usually made out in a shore office and not on board, it is quite possible for bills to be issued for cargo that was not shipped for some reason.)

Section 4 of the **Carriage of Goods by Sea Act 1992 (COGSA 92)** underlines the common law position in the UK by providing that: "A bill of lading which

a) represents goods to have been shipped on board a vessel or to have been received for shipment on board a vessel; and

b) has been signed by the master of the vessel or by a person who was not the master but had the express, implied or apparent authority of the carrier to sign bills of lading, shall, in favor of a person who has become the lawful holder of the bill, be conclusive evidence against the carrier of the shipment of the goods or, as the case may be, of their receipt for shipment. Every bill of lading in the hands of a consignee or endorsee for valuable consideration becomes conclusive evidence of the shipment as against the master or person signing the bill of lading, notwithstanding that such goods or part of them may not have been shipped."

A Conclusive Evidence Clause is inserted in some bills of lading stating that the contents of the bill will be conclusive evidence against the contracting parties. It is very important, therefore, for the master to ensure, before signing a bill containing such a clause, that an accurate tally has been made of the goods received on board. (If there has been fraud on the part of the shipper, however, the clause will not be binding on the carrier.)

The bill of lading as a receipt for freight

If the bill of lading is endorsed with words such as "FREIGHT PAID or "FREIGHT PREPAID", then once it is signed it becomes prima facie a receipt for the freight.

If the freight has not actually been paid, but the receipted bill of lading is endorsed to a third party, the carrier will probably lose his right to recover the freight, i.e. the statement becomes conclusive evidence that freight has been paid. It is important, therefore, to verify before signing such a bill of lading that freight has in fact been paid. (In practice the agent will normally do this.)

The bill of lading as a document of title

"Title", in the context of carriage of goods, means the right to possession, as distinct from the right to ownership.

A "document of title" is a document embodying the undertaking of a person holding goods (who is called a "bailee") to hold the goods for whoever is the current holder of the document and to deliver them to that person in exchange for the document16.

Possession of an original bill of lading is equivalent in law to the right to possession of the goods described in the bill, i.e. it gives title or "constructive possession" to the goods it represents. In other words, an original bill of lading, being a "bearer document", is good evidence that its holder is the rightful possessor of the goods. This enables any holder to obtain delivery of the goods at the discharge port by production of an original bill of lading.

Title to the goods may be transferred after shipment to a third party, such as a bank under a Letter of Credit arrangement, by "negotiation" (i.e. transfer) of the full set of original bills of lading by the shipper, subject to the bills being made out in a way that permits this in law. A bill of lading made out so as to enable its negotiation is a "negotiable document of title". Bills which are not made out in a way that permits negotiation are termed "nonnegotiable", and are often endorsed to clearly indicate this.

To make the original bills of lading negotiable they must either be made out with the words "to order" in the space allocated for the consignee's name, or "to (XYZ CONSIGNEE LTD.) or his order" in the same space, which allows the original consignee to transfer title to a third party, such as another buyer of the goods, if required.

Transfer of title from the shipper may be made by any one of three methods, as follows

i) By means of a "blank endorsement", whereby the shipper stamps the back of each original bill with his company's stamp and adds his signature, but without inserting any transferee's name, before passing the set of bills to the transferee. A blank-endorsed "order" bill of lading (i.e. one made out "to order") is a bearer document, like a postal order or a cheque made out to "Cash", and the carrier must deliver the goods to whoever presents any one of the originals (unless he has reason to suspect fraud). Like a bearer cheque, a blank-endorsed bill of lading is a dangerous document but due to the requirements of banks which are asked by international traders to advance money against documents it is commonly used.
ii) By "specific endorsement" on the back of the bill of lading, e.g. "deliver to ABC Receivers Ltd", with the stamp and signature of the shipper. The person to whom title is thus transferred may be termed the "endorsee".
iii) By attaching authorized delivery instructions on the shipper's stationery, e.g. a Delivery Order from the shipper to the consignee.

Once a bill of lading has been negotiated, the endorsee or transferee becomes subject to the same liabilities and has the same rights against the carrier as if the contract of carriage had originally been made with the endorsee. This means that if freight or demurrage is payable before delivery of the cargo, the endorsee may be liable for the payment. To protect the endorsee the contract terms must be clear and unambiguous, and where some term in the original contract is not included in the bill of lading terms, it will not be binding on the endorsee.

The reason for making out a set of original bills of lading is that, if a single bill of lading were to be lost, the consignment of goods would have to be warehoused, a duplicate obtained (which would cause delay), or an indemnity given to the carrier, before the goods could be released. Since this would be time-consuming and costly, bills of lading are normally issued in sets of two or more "originals", the most common number of originals being three.

It is unwise to enclose a full set of bills of lading in one envelope, because of the danger of all the bills being lost together. Banks will therefore split a set into two envelopes, one being posted immediately and the second being held for 2, 3 or 4 days and then posted, to avoid the possibility of both envelopes being in transit in the same bag.

Several non-negotiable, "copy" bills of lading will normally be made for filing and other purposes, and one of them is usually marked "CAPTAIN'S COPY" and travels on the ship in the master's custody.

Outline of bill of lading contents

A bill of lading is a receipt for goods either received (before shipment) or shipped on board. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.)

Long form bills of lading, as issued by carriers operating liner services, typically contain about 30 printed and numbered clauses. The majority of clauses are common to the bills of most major carriers, although the wording may differ. Additional clauses are added by carriers to address the special features of their particular trades.

A long form liner bill of lading will usually, when issued, contain the following details:

• a reference number;
• name and address of the shipper or his agent;
• name and address of the consignee, or "to order", or "to the order of (consignee's name inserted)";
• name and address of any notify party (e.g. a receiver taking delivery of the goods for the consignee);
• ports of loading and discharge;
• name of the carrying vessel;
• any leading marks for identification of the goods (as stated by the shipper);
• the number and kind of packages or pieces (as stated by the shipper);
• description of the goods (as stated by the shipper);
• gross weight or measurement (as stated by the shipper);
• the order and condition of the goods if not in "apparent good order and condition" on receipt;
• the place where freight is payable, if freight has not been paid;
• the number of original bills of lading forming the "set" (so that the consignee or any transferee, such as a bank, can determine whether all original documents in the set have been delivered, in case of fraud or mistake);
• the date of receipt of the goods for shipment or, on a "shipped" bill of lading, the date of shipment;
• the place and date of issue;
• the signature of the carrier, master or carrier's agent; and
• the carrier's standard terms and conditions (on the back).

P&O Nedlloyd's bill of lading includes clauses numbered and named as follows

1. Definitions;
2. Carrier's tariff;
3. Warranty;
4. Sub-contracting and indemnity;
5. Carrier's responsibility – port-to-port shipment;
6. Carrier's responsibility – combined transport;
7. Sundry liability provisions;
8. Shipper-packed containers;

9. Inspection of goods;
10. Carriage affected by condition of goods;
11. Description of goods;
12. Shipper's/merchant's responsibilities;
13. Freight;
14. Lien;
15. Optional stowage and deck cargo;
16. Live animals;
17. Methods and routes of carriage;
18. Matters affecting performance;
19. Dangerous goods;
20. Notification and delivery;
21. FCL multiple bills of lading;
22. General average and salvage;
23. Variations of the contract;
24. Law and jurisdiction;
25. Validity;
26. Limitation of liability;
27. USA clause paramount.

A charter party bill of lading will usually contain a clause to the effect that all terms and conditions of the charter party identified in the bill of lading are incorporated in the bill.

The "CONGENBILL" charter party bill of lading (1994 edition) includes clauses numbered and named as follows:

1. Unnamed;
2. General Paramount Clause;
3. General Average;
4. New Jason Clause;
5. Both to- Blame Collision Clause.

"CONGENBILL" Clause 1 states as follows:

"All terms and conditions, liberties and exceptions of the Charter Party, dated as overleaf, are herewith incorporated. The Carrier shall in no case be responsible for loss of or damage to cargo arisen prior to loading and after discharging."

The carrier's exceptions from liability are contained in the Hague or Hague-Visby Rules, which are normally applied to the contract by the Clause Paramount.

Stamped or hand-written clauses, e.g. "CLEAN ON BOARD" and "FREIGHT PREPAID", may be endorsed on a bill of lading, and will override any printed clauses. A bill of lading that has been surrendered at the discharge port may be endorsed by the carrier's agent with the word "ACCOMPLISHED".

Bill of lading related problems & handling guideline for ship master

A bill of lading is a receipt for goods either received (before shipment) or shipped on board cargo ship. It provides good evidence of the existence and terms of a contract between the shipper and carrier. (A contract of carriage may exist without issue of a bill of lading, however.) Problems may arise handling a bill of lading. Summarized below some basic procedures need to be followed by ship master.

If damaged or otherwise defective cargo is presented for loading

Where shippers offer damaged or defective goods for shipment, i.e. cargo which is not in the "apparent good order and condition" as stated in the printed terms on most bills of lading, the master's duty is either:

i) to reject the goods (with the advice/assistance of an independent cargo surveyor where necessary); or
ii) to accept the goods for carriage on condition that he will issue a claused bill of lading stating the nature of the deficiency.

The master is entitled, as the carrier's agent, to enter remarks on the bill of lading as to the apparent order and condition of the goods. Since some remarks may not be effective in protecting the carrier against claims by third parties, the master should contact the owner's P&I club correspondent before making any remarks of which he is uncertain; certain remarks may have adverse consequences for the shipper when he presents a "shipped" bill of lading to his bank in compliance with the terms of a Letter of Credit.

Where the damaged or defective cargo is steel in any form, the P&I club correspondent should always be consulted before any remarks are made on the bill of lading. Where rusty steel is shipped, as is often the case, claims will inevitably arise. The master is fully justified in clausing a bill of lading relating to a steel cargo on which rust is apparent. However, to simply write "rusty" on the bills of lading is not recommended by the P&I clubs, since it may not be effective in protecting the carrier's position and it may have adverse consequences for the shipper when he presents the bills of lading to his bank and demands payment for the goods.

The P&I clubs advise that remarks on the degree of rusting, e.g. "extremely rusty" or "superficially rusty" should never be made.

In every case where steel is being loaded and rust is apparent, the master should contact the P&I club correspondent before making any remarks on the bill of lading. Certain clauses will be recommended by the club, while the use of others will not be approved of.

If master is asked to sign "clean" bills of lading when these are not justified

A clean bill of lading is a bill of lading bearing no superimposed clauses stating a defective condition or shortage of the goods. It states that the goods have been received "in apparent good order and condition...", without further remarks as to their condition.

A **dirty bill of lading**, also known as a "claused" or "foul" bill, is one claused with remarks such as "torn bags", "rusty drums", etc.

A Letter of Indemnity (or "back letter") may be offered by the shipper, promising to indemnify the master or carrier against any loss or liability as a consequence of signing a clean bill of lading. However, acceptance of a Letter of Indemnity of this type in return for clean bills makes the master a party to an act of deception or fraud on banks, consignee/buyer, and insurers, since it is an attempt to obtain payment for goods knowing them to be unsound. There may be personal criminal liability for fraud on the part of the carrier and the master, and a heavy financial liability on the shipowner. This type of Letter of Indemnity has no legal standing in English law and cannot be sued on if the shipper goes back on his promise of indemnity.

A master should consult his owners and their P&I club's correspondent if he is in any doubt, but should never accept a Letter of Indemnity of this sort without the written orders of his owners.

If ship and shore loading figures differ

Where the ship's cargo quantity measurements show less cargo loaded than the quantity stated by the shipper, the master should generally enter the ship's figures on the face of the bill of lading.

Some ship-owners require their masters to endorse a bill of lading which does not provide space for the ship's figures in the following terms: "Vessel's measurements are stated below and this Bill of Lading only acknowledges the shipment of the weight or quantity given in the vessel's measurements on completion of loading".

Where the shipper refuses to accept such an endorsement the master should write a Letter of Protest to the shipper, pointing out the discrepancy in the figures and stating that the bill of lading will be signed under protest. A copy of the Letter of Protest should be stapled to each negotiable copy of the bill of lading (i.e. each bill of lading in the set of "originals").

If the ship's measurements show more cargo loaded than advised by the shipper, the shipper's figures should be entered on the bill of lading. No Letter of Protest will be necessary.

If a charterer's bill of lading has to be used

Where a charter party requires the master to sign bills of lading as presented by the charterer, the master should first verify that the bills of lading incorporate the terms of the Hague or Hague-Visby Rules. (This will generally be stated in the Clause Paramount or Paramount Clause.)

P&I clubs usually restrict cover to contracts incorporating terms at least as favourable as those given by the Hague Rules or Hague-Visby Rules. Where there is no reference in the charterer's bill of lading to the incorporation of these Rules, the P&I club correspondent should be contacted.

Where the master is required to sign "clean" bills of lading as presented by the charterer, "clean" has been held by a court to mean only that the bill of lading should not be claused to the effect that demurrage was due at the loading port, without affecting the master's right to clause the bill of lading as to the apparent order and condition of the goods where necessary.

Where a contractual lien for demurrage is given by the charter party terms, and demurrage is due at the loading port but not paid, the master should clause the bill of lading to that effect so that the lien can be exercised if necessary at the discharge port.

If the number of original bills of lading shown on the face of the bill is not the same as the number of negotiable bills of lading

The number of original bills of lading in the set should, before signing, be entered in a space provided on the face of each bill. (In addition to these "originals", there may be several other "non-negotiable copy" bills, each of which should be clearly marked as such.)

Where the master is asked to sign bills of lading and the number of "original" bills presented for signature is not the same as the number indicated on the face of the bill, the master should:

- Attempt to ascertain the reason for the discrepancy;
- Call the P&I club correspondent;
- Refuse to sign the bills until the correct number is inserted.

If two or more sets of bills of lading are requested by the shipper

Two or more sets of original bills of lading may have to be issued in the following circumstances:

- where cargo is shipped by more than one shipper (e.g. at multiple loading ports);
- where cargo is consigned to more than one consignee; or
- where more than one type, grade or specification of cargo is shipped by one shipper.

In the tanker trades it may happen that two or more consignments of cargo, shipped by different shippers, are intentionally loaded into one tank, so that it becomes impossible to determine the respective shippers' quantities on completion of loading. In such cases the master should endorse and sign separate bills of lading to the effect that the shipments are part cargoes, or are part of a bulk cargo.

Where multiple consignments are loaded, but only one total figure is given, the master should consult the shipper as to the apportionment of quantities on the bills of lading for each consignment. Where no instructions are obtainable, the total quantity loaded should generally be divided between the bills of lading in proportion to the original split of the nominated consignments. For example, where the consignments were nominated as 40,000 tons consigned to Party A and 60,000 tons to Party B, but only 99,400 tons are loaded, the apportionment on the bills of lading should be 39,760 tons and 59,640 tons respectively

If a bill of lading presented for signing is written in an incomprehensible foreign language or alphabet

Bills of lading are, in some countries (e.g. Libya), presented for signing in a foreign language or alphabet which may not be known to the master. In such case the master should arrange for the bill of lading to be translated by an independent third party (i.e. someone other than an agent of either the carrier or charterer). If in doubt, the P&I club correspondent or British consul should be asked whom to employ.

If a translator cannot be found, the master should make out his own bill of lading in English (using another bill of lading form as a model), and issue this to the shipper for completion of the shipment details before signing. Only appropriate clauses should be incorporated.

If the master is asked to sign blank or partially completed bills of lading

Except where the Early Departure Procedure is being properly used in the tanker trades , blank or partially-completed bills of lading should never be signed and issued by the master, for obvious reasons.

In all cases where the master is asked to sign blank or partially-completed bills of lading, the P&I club correspondent should be advised.

If Early Departure Procedure is used

Some oil terminals and tanker companies use an “Early Departure Procedure” (“EDP”) to allow tankers to sail on completion of cargo operations without having to wait for cargo figures to be prepared and documents produced. The practice is more commonly used when the ship’s time is at a premium, but at other times is discouraged.

In the EDP system

1. Bills of lading are prepared before completion of loading, but without any loaded cargo quantity as advised by the shipper.
2. The agent presents the bills of lading for the master’s signature before completion of loading.
3. The master returns the originals of the bills of lading to the agent but retains the non-negotiable “captain’s copies” together with “copy” bills for consignees, and other completed cargo documents.
4. The master writes any necessary Letter of Protest regarding the order or condition of the cargo, and allows any investigation to be completed before departure.
5. After departure of the ship, the agent communicates the shipper’s final loading figures to the master as soon as they are available.
6. If the master agrees the communicated figures, he enters them on his “captain’s copies” of the bill of lading and on the consignee’s copies, while the agent completes the original bills of lading and signs them on behalf of the master.
7. If the master does not agree with the shipper’s figures he informs the agent, who writes a Letter of Protest to the shipper on the master’s behalf and completes and signs the bills of lading under protest.

8. The agent releases all original documents to the shipper, who sends them to the consignee.

At some ports the practice may be to present bills of lading to the master for signature either blank or only partially completed, but the master should never sign such documents, and should instead call the P&I club correspondent. Agents should be authorized to sign bills of lading on behalf of the master only after the master has been made aware of, and has agreed to, any details (including loading figures) to be entered.

If bills of lading have to be re-issued or amended

The master may be asked to re-issue or amend a previously issued bill of lading. He should never agree to this without the consent of the P&I club correspondent.

The P&I club correspondent will normally ensure that before a second set is issued, all bills of lading in the first set are returned and cancelled or destroyed. (The number of original bills returned should, of course, tally with the number of originals issued, as stated on the face of each bill.)

Each bill of lading in the new set should be claused as follows

This is a replacement Bill of Lading issued at…… on the …… day of …… (month/year) on cancellation of an original Bill issued at …… on the …… day of ……. (month/year) to show (reason for re-issuing bills of lading).

If the master is asked to pre-date or post-date bills of lading

Under the terms of a Letter of Credit, payment to the seller of the goods will normally depend on the goods being shipped on a particular date, or between particular dates, and banks will generally refuse to pay the seller if the actual date of loading does not correspond with the date stipulated in the Letter of Credit. Cases therefore arise where the incorrect loading date is inserted in bills of lading in an attempt to evade a delay in obtaining payment.

A “shipped” bill of lading should always be dated for the actual date of loading, or the date of completion of loading. Although the master may be requested to sign pre-dated or post-dated bills of lading, he should never do so.

If delivery of cargo is requested without presentation of the relevant bill of lading

In the tanker trades, cargoes are commonly bought and sold many times during a voyage, causing delays in the arrival of the bills of lading, and the problem commonly arises that the cargo arrives at the discharge port before a copy of an original bill of lading can be produced.

In other cases, the bill of lading may be missing for a variety of reasons. The receiver may claim that the bills have been lost, stolen or delayed. In such cases, there is there is the possibility of misdelivery and a serious risk of fraud.

If the master negligently delivers cargo to the wrong party without first requiring production of an original bill of lading, the carrier will be held wholly liable for the consequences and will

receive no backing from his P&I club or sympathy from the courts. Wrongful delivery may even result in the arrest and sale of the ship to recover the cargo's value for the rightful owner.

If it is likely that the bill of lading has merely been delayed, the goods may be delivered - with the ship owner's and the P&I club's agreement - after the receiver signs an acceptable Letter of Indemnity. An "acceptable" Letter of Indemnity is one that:

• promises to indemnify the ship-owner against all consequences and liabilities of delivery to the wrong person;
• is phrased in terms acceptable to the owner's P&I club; and
• is countersigned by a first class bank or cargo insurance underwriter, i.e. one able to meet any claim. Some P&I clubs print the text of their standard Letter of Indemnity in their club handbook or rulebook, which should be carried on board. This does not imply, however, that the club will always give cover for claims arising under such Letters of Indemnity.

If an acceptable Letter of Indemnity cannot be offered, the cargo should not be delivered.

If cargo delivery is requested against presentation of an original bill of lading carried on board

In some cases an original bill of lading may be sent to the consignee on board the carrying vessel. The master should issue a receipt to the shipper or his representative (e.g. the freight forwarder). The master should not accept for carriage original bills of lading made out "to order", or where there is no named destination or where the destination is qualified, e.g. "Lands End for orders/intention Le Havre".

The master should not accept original bills of lading for carriage if the shipper refuses to sign the receipt, or if no party is named as receiver in the bill of lading.

The master should not discharge against an original bill of lading carried on board if the discharge port is different from the destination shown in the bill of lading. In this case he should consult the owner and the P&I club correspondent.

On arrival at the discharge port the master should hand the bill of lading to the party named in the receipt, if his identity can be confirmed.

If two parties present "original" bills of lading

The master should immediately contact the P&I Club correspondent. The bills of lading may be left with a court of law to settle the dispute. In the meantime, the goods should be landed to a warehouse/tank, etc., where they should be held until the dispute has been settled and freight and charges have been paid.

If goods are unclaimed at the discharge port

The master is not obliged to deliver goods to a receiver until one original bill of lading is presented, but neither is he obliged to retain unclaimed goods on board. At common law, if

goods are not claimed within a reasonable time, the master may land and warehouse them. The master has a duty to do this, in fact, rather than detain his ship in port beyond her laytime and make the charterer liable for demurrage. The warehouseman becomes a common agent of both carrier and consignee and should be instructed to release the goods only on payment of all outstanding charges (e.g. freight and demurrage). Warehousing expenses will be for account of the receiver of the goods.

If the goods remain unclaimed, they may usually be sold by the carrier after a reasonable time (depending on local law) and after advertising for the consignee in the national press. Carriers often insert a clause known as a London Clause in their bills of lading giving them the right to land goods on arrival; this clause overrides the common law position

How the bolero system works in general cargo ships employment?

The Bolero System, the "**shop front**" of which is the **bolero.net website**, is a technological environment, owned by the world's logistics and banking communities, in which paper bills of lading and other trade documentation are replaced by electronic messages sent via the Internet. Bolero is designed for all parties in the trade process: importers, exporters, freight forwarders, port authorities, inspection agencies, carriers, ship's agents, customs agencies and financial institutions.

The Bolero technological environment is supported by a legal framework based on a Bolero Rule Book which establishes a contractually binding set of rules which all users of the Bolero System are required to sign.

The backbone of the Bolero System is the Core Messaging Platform, which enables users to exchange electronic trade documents via the Internet. The system is secure, is underpinned by a unique legal structure, and is maintained by a trusted third party. All messages between users are validated. All messages are acknowledged, and notifications are provided as requested. Additional messages determine whether the recipient accepts or refuses the stated offer. Another major feature is the Title Registry application, which allows for the ownership of goods to be exchanged online.

Carriage of deck cargo at sea and Hague-Visby Rules

General cargo ships guideline

Unless the contract contained in the bill of lading, charter party or sea waybill expressly provides otherwise, goods stated in the contract of carriage as being carried on deck and which are, in fact, stowed on deck will not be protected by the Hague-Visby Rules.

In view of the exclusion of coverage of deck cargo, where the Hague-Visby Rules are incorporated into a contract of carriage (e.g. by insertion of a Clause Paramount in a charter party or bill of lading), a shipper of deck cargo must make a separate contract with the carrier. The carrier, not being bound by any special rules covering deck cargo, is then free to insert in his "on deck" bill of lading any exceptions from liability he wishes. This generally means that the deck cargo will be carried on deck "at shipper's risk", i.e. without liability to the carrier for

any loss or damage, however caused. Many carriers' bill of lading forms contain an express clause underlining this position.

Where goods are, with the shipper's agreement, stowed on deck, the carrier (or the master or agent on his behalf) should issue a bill of lading expressly recording the fact that the goods are carried on deck (e.g. by a "STOWED ON DECK" endorsement on the face of the bill) so that there is no doubt as to the special risks of the carriage. Any innocent transferee or endorsee of the bill of lading acting in good faith (e.g. a bank or third party buyer) will then know the risks attaching to the goods. (It would be unfair to transfer a bill of lading relating to deck cargo without declaring to the transferee that the goods are on deck and may therefore be damaged.)

Cargo which is carried on deck without being expressly stated as such in the bill of lading or waybill will be subject to the Rules, as will cargo which is stated as being carried on deck but which is, in fact, carried below deck.

In many time charter parties, responsibility for loading, stowing and discharging cargo lies with the charterer, unless specifically allocated to the ship owner. If this is so, as permitted under the Hague-Visby Rules, the charterer's responsibility will extend to matters affecting seaworthiness, the owner being liable only if the master intervenes in stowage arrangements. If charterers are responsible to load and stow containers, they're must follow regulations on segregation and stowage. If there is any breach the master must protest, requiring re-stowage 'in accordance with the IMDG Code' whilst leaving details of re-stowing to charterers.

Where deck cargo is jettisoned in a general average act

Jettison of Deck Cargo - of the York-Antwerp Rules 1994 provides that:

"No jettison of deck cargo shall be made good as general average unless such cargo is carried in accordance with the recognized custom of the trade." This means that where there is a general average act (e.g. of jettisoning cargo to save the ship, other cargo, etc.) but the jettisoned cargo is not of a type customarily carried on deck (i.e. not timber, logs, containers on a purpose-built container ship, etc.) the cargo owner will have no claim under the York-Antwerp Rules to a general average contribution from the other parties to the adventure.

Where the jettisoned deck cargo was being carried in accordance with the recognized custom of the trade, however, as in the case of containers on a purpose-built container ship or logs on a purpose-built log carrier, the cargo owner will have a claim to general average contributions from the other parties to the adventure. He will also have a claim if the cargo had been carried on deck with the consent of all the other parties to the adventure.

Where jettisoned cargo had been wrongfully stowed on deck

Where jettisoned deck cargo had been stowed on deck without the shipper's consent or knowledge, the ship-owner, apart from being liable for breach of contract, will be totally liable to the goods owner.

Where deck cargo has been saved by a general average act

Where deck cargo is saved by a General Average act (e.g. by the refloating of a grounded ship), the owner of the deck cargo is liable to make a General Average contribution along with the other parties to the adventure who have benefited by the General Average act. Carriers usually underline this in an express statement in their bills of lading.

P&I club advice regarding carriage of deck cargo at sea

Where there is an agreement between the carrier and a shipper or owner of goods (or their agents) to carry goods under deck, but the goods are stowed on deck, the deck carriage will be a fundamental breach of contract similar in gravity to an unlawful deviation. The consequences will probably be that the carrier will have no defenses to a claim for loss or damage, and he will not be indemnified by his P&I club.

P&I clubs recommend their members who regularly or occasionally carry cargo on deck to cover the deck cargo by an "on deck" bill of lading expressly recording the deck stowage. They also recommend the inclusion in the bill of lading of a clause disclaiming liability for loss or damage, howsoever caused. A statement such as "**CARRIED ON DECK WITHOUT LIABILITY TO THE CARRIER**" fulfils both these functions.

Even when there is no agreement concerning under-deck stowage, it may well be a fundamental breach of the contract of carriage to stow cargo on deck which:

- is not suitable for on-deck carriage; or
- is stowed in an unsuitable position on deck.

Some types of goods should never be stowed on deck. Other types of goods are unsuitable for deck carriage if they are not packed in such a way as to protect them from sea water damage.

The place of stowage on deck is also important. For example, an open-top container should not be stowed in an exposed tier at the forward end of the ship but could, in appropriate circumstances, be safely carried in a lower tier further aft. Unprotected vehicles and boats, etc. should not be carried outboard on the forepart of the upper deck, especially if their window glass is not specially protected.

The P&I clubs warn carriers that it is most important that, where their bills of lading are not claused for "on deck" carriage, they should incorporate a suitable liberty clause permitting on-deck stowage at the carrier's option. Such a liberty clause is recommended even when the custom of the trade permits on-deck stowage, e.g. when closed containers are carried on purpose-built container ships. The purpose of these clauses (which are nevertheless ineffective in a few jurisdictions which do not follow the generally accepted principles of maritime law) is to ensure that the carrier has a contractual right to stow cargo on deck at his option. Liberty clauses must always be used reasonably, however, and should not be used to justify deck stowage for cargo which is unsuitable for deck stowage.

Timber deck cargo

A ship carrying a timber deck cargo must comply with the Carriage of Cargoes Regulations and must carry a copy of the IMO Code of Safe Practice for Ships Carrying Timber Deck Cargoes (TDC Code) . Requirements for the assignment of timber freeboards and load lines, and the carriage of timber deck cargoes, must be complied with.

Hague-Visby Rules defining cargo ships obligations and liability

Hague-Visby Rules (HVRs) are properly called the Hague Rules as Amended by the Brussels Protocol 1968 and apply to every bill of lading or any similar document of title relating to the carriage of goods between ports in two different States if:

i) the bill of lading or document is issued in a contracting State; or
ii) the carriage is from a port in a contracting State; or
iii) the contract contained in or evidenced by the bill of lading provides that the Hague-Visby Rules or the legislation of any State giving effect to them (e.g. the UK's Carriage of Goods by Sea Act 1971) are to govern the contract.

Under Article V, the Rules will not be applicable to charter-parties, but if bills of lading are issued in the case of a ship under a charter-party, they must comply with the Rules.

Many States, such as the UK, have legislation incorporating the Hague-Visby Rules into national law. Where no such national law applies, the Hague-Visby Rules may still apply to the carriage by agreement of the contracting parties. (See Clause Paramount in bill of lading, waybill or charter party.)

Article II provides that, subject to the provisions of Article VI, under every contract of carriage of goods by sea, the carrier, in relation to the loading, handling, stowage, carriage, custody, care and discharge of such goods, will be subject to the responsibilities and liabilities, and entitled to the rights and immunities, set out in the Rules.

"Goods" is defined in Article I as including goods, wares, merchandise, and articles of every kind whatsoever except live animals and cargo which by the contract of carriage is stated as being carried on deck and is so carried.

Carrier's responsibilities under the Hague-Visby Rules

The carrier has three basic obligations:

i) to ensure the vessel's seaworthiness;
ii) to care for the cargo; and
iii) to issue a bill of lading where the shipper requests one.

Obligation in respect of seaworthiness

Article III paragraph 1 provides that the carrier must, before and at the beginning of the voyage (i.e. up to the moment of sailing), exercise due diligence to:

• make the ship seaworthy;
• properly man, equip and supply the ship; and
• make the holds, refrigerating and cool chambers, and all other parts of the ship in which goods are carried, fit and safe for their reception, carriage and preservation.

"**Exercising due diligence**" means taking all reasonable precautions to see that the vessel is fit for the voyage contemplated. The carrier is not obliged to give an absolute guarantee of seaworthiness. The carrier may delegate his duty to exercise due diligence (e.g. to surveyors or repairers) but he will be responsible if his servants or contractors, etc. fail to exercise due diligence in carrying out their work.

"**Seaworthy**" in this context means that the hull must be in sound condition, the vessel must be mechanically sound, equipped with charts, etc., and crewed by a properly trained crew. She need only be seaworthy at the commencement of the voyage, which usually means when she leaves the berth, whether under her own motive power or with the aid of tugs.

If a cargo owner can show that his loss was caused by a failure of the carrier to exercise due diligence to make the vessel seaworthy, the carrier will not be able to rely on any other clauses in the Rules which reduce his liability (i.e. the exceptions from liability).

The holds must be fit and safe for the reception, carriage and preservation of the cargo and, in particular, the hatch covers must be tight and there must be no instability of the vessel through improper stowage. It has been held that the neglect to protect a water pipe in a hold from frost which could have been expected at the time of year showed lack of due diligence to make the vessel seaworthy.

Carrier's obligation in respect of the cargo

Article III paragraph 2 provides that, subject to the provisions of Article IV, the carrier must "properly and carefully load, handle, stow, carry, keep, care for and discharge any goods carried". Unlike seaworthiness, this duty extends throughout the voyage and implies a greater degree of care than exercising "due diligence". The courts do not expect perfection from the carrier, but it has been held that stowage was improper where –

• contamination of other goods occurred;
• there was inadequate or no ventilation;
• dry cargo was damaged by liquid goods; and
• vehicles were secured only by their own brakes.

The carrier must have a proper system for looking after the cargo when stowed. He has a duty to use all reasonable means to ascertain the nature and characteristics of the cargo and to care for it accordingly, although the shipper should give special instructions where special care is required. (Where water in tractor radiators froze, it was held that the carrier should have been told of the risks.)

Obligation to issue a bill of lading

Article III paragraph 3 provides that after receiving the goods into his charge, the carrier, the master or the carrier's agent must, if the shipper demands, issue a bill of lading to the shipper showing, amongst other things:

• all leading marks for identification of the goods, as stated by the shipper before loading (in his shipping note), provided these are visible on the goods or their coverings;
• either the number of packages or pieces, or the quantity, or weight, as stated by the shipper (in his shipping note); and
• the apparent order and condition of the goods.

The carrier, master or agent need not insert any inaccurate statements on the bill of lading or give any details which he cannot reasonably check. (Hence the practice for statements to be made such as "said to weigh...." and "shipper's load and count".)

Any bill of lading thus issued will be prima facie evidence of receipt of the goods by the carrier as described, but proof to the contrary will not be admissible if the bill of lading is transferred to a third party acting in good faith (Article III paragraph 4).

Any bill of lading issued after loading must be a "shipped" bill of lading if the shipper demands, provided he surrenders any previously issued document of title (e.g. a "received" bill of lading issued when the goods arrived at a warehouse or depot before shipment) (Article III paragraph 7).

Carrier's rights and immunities

• The carrier's exceptions from liability;
• The carrier's right to deviate; and
• The carrier's rights in respect of dangerous goods.

Article IV paragraph 2 grants seventeen exceptions from liability to the carrier (compared with six under English common law). Neither the carrier or ship will be responsible for loss or damage arising or resulting from:

• Act, neglect or default of the master, mariner, pilot, or the servants of the carrier in the navigation or management of the ship;
• Fire, unless caused by actual fault or privity of the carrier;
• Perils, dangers and accidents of the sea or other navigable waters;
• Act of God;
• Act of war;
• Act of public enemies;
• Arrest or restraint of princes, rulers or people, or seizure under legal process;
• Quarantine regulations;
• Act or omission of the shipper or owner of the goods, his agent or representatives;
• Strikes, lockouts, stoppage or restraint of labour;
• Riots and civil commotions;
• Saving or attempting to safe life or property at sea;

• Wastage in bulk or weight or any other loss or damage arising from inherent defect, quality or vice of the goods;
• Insufficiency of packing;
• Insufficiency or inadequacy of marks;
• latent defects not discoverable by due diligence;
• Any other cause arising without the actual fault or privity of the carrier, or without the fault or neglect of the agents or servants of the carrier (but the burden of proof will be on the carrier to show that his fault or privity or the fault or neglect of his agents or servants did not contribute to the loss or damage).

Article IV paragraph 4 provides that any deviation in saving or attempting to save life or property at sea, or any reasonable deviation, will not be an infringement or breach of the Hague-Visby Rules or of the contract of carriage, and the carrier will therefore not be liable for any resulting loss or damage.

Article IV paragraph 6 provides that goods of an inflammable, explosive or dangerous nature, if not properly marked, or if shipped without the knowledge or consent of the carrier, may be landed, destroyed, jettisoned or rendered innocuous at any time before discharge. Such goods, even when shipped with the carrier's knowledge and consent, may be dealt with in this way without liability to the carrier, should they become dangerous.

General Average under the Hague-Visby Rules

Under Article V, nothing in the Rules may be held to prevent the insertion in a bill of lading of any lawful provision regarding General Average. (Most bills of lading have a clause making the merchant or shipper aware that he may become liable for a contribution in General Average.)

Exclusion of deck cargo and live animals from Hague-Visby Rules cover

Article I(c) excludes from the items defined as "goods" live animals and cargo which by the contract of carriage is stated as being carried on deck and is so carried. Live animals are excluded from cover at all times. Cargo which is carried on deck without being stated as such in the contract will, therefore, be subject to the Rules, as will cargo which is stated as being carried on deck but which is, in fact, carried below deck.

Where the carrier's terms and conditions of carriage incorporate the Hague-Visby Rules, then in the absence of any term expressly providing to the contrary those terms will not cover live animals or deck cargo. A shipper of live animals or deck cargo should therefore make a special contract with the carrier, and should specifically state "FOR DECK CARRIAGE" on his shipping note.

Hamburg Rules defining sea carrier's obligations and liability

International contracts of sea carriage

Hamburg Rules are properly called the United Nations Convention on the Carriage of Goods by Sea 1978, were drafted under the auspices of the UN agency UNCITRAL and introduced in

1992 in response to shippers' complaints that the Hague and Hague-Visby Rules were unfavorably weighted in favor of the carrier.

The Hamburg Rules are supported by very few States with any significant maritime trade. The main features of the Hamburg Rules of interest to a shipmaster are:

• The carrier is liable from the time he accepts the goods at the port of loading until he delivers them at the port of discharge. (Under the other rules the carrier is liable from "tackle to tackle".
• The carrier is liable for loss, damage or delay to the goods occurring whilst in his charge unless he proves that "he, his servants or agents took all measures that could reasonably be required to avoid the occurrence and its consequences"
• The Hamburg Rules do not give the carrier so many exceptions from liability as the Hague and Hague-Visby Rules. In particular, the carrier is not exonerated from liability arising from negligence in navigation or management of the ship
• The Hamburg Rules govern both inward and outward bills of lading, whereas the Hague and Hague-Visby Rules govern only outward bills of lading.
• The Hamburg Rules cover live animals, unlike the Hague and Hague-Visby Rules, but the carrier is not liable for loss, damage or delay in delivery resulting from any special risks inherent in their carriage.
• The carrier can only carry cargo on deck if there is a custom of the trade to do so or by an agreement with the shipper. If such an agreement exists the carrier must insert a statement to this effect on the bill of lading. Where goods are carried on deck without a custom of the trade or an agreement with the shipper, the carrier is liable for loss, damage or delay.

Outline of a mate's receipt for cargo ships employment

A mate's receipt is a receipt, issued and signed by the carrying ship's chief mate (or the ship's agent on his behalf), for goods received on board.

It may be encountered in virtually any conventional trade (general cargo, dry bulk or tanker), but has been replaced in the liner trades (i.e. container and ro-ro shipping) by a more modern document, the Standard Shipping Note.

It is the document on which the details entered on the bill of lading are based; the information on both mate's receipt and bill of lading should therefore be identical. The mate's receipt should not be copied directly from the shipping note presented when the goods are brought alongside, but should be compiled from a ship's tally or measurement and show the actual quantity and condition of the goods as received. should, when the condition or quantity of the cargo justifies it, be endorsed with remarks such as "torn bags", "stained bales", "rusty drums", etc. and should, where the ship's and shipper's tallies disagree, be made out for the smaller figure, with the clause "X more (drums) in dispute; if onboard to be delivered", "X" being the difference between the tallies.

It will normally be on the ship owner's form, in a triplicate pad or book kept on board. The original should be given to the person delivering the goods to the ship, a copy should go to

the agent, and a second copy should be retained in the pad on the ship for comparing with bills of lading before signature, and for use in compiling the cargo plan.

It is not a document of title to the goods shipped and does not pass any title by its endorsement or transfer.

In ports and trades where mate's receipts are used, the shipper must usually present the signed mate's receipt to the agent in order to be issue with the signed set of original bills of lading before the vessel sails.

Function of Mate's receipt defending claims

Goods or packages received in unsound condition clearly cannot be delivered in a sound condition. Therefore, it is essential to maintain a careful watch during loading for any packages which may have been tampered with, which are improperly or inadequately protected, broken, leaking, damaged, repaired, spilled, torn or stained. Such packages should be rejected unless reconditioning is an option. Care should, of course, be taken to see that any packages for which Mate's receipts (see below) have been issued but for some reason have been returned ashore and then reloaded, are still in good condition.

The Mate's receipt is given for goods actually received on board and is given up to the agent or broker authorized to issue the Bill of Lading.

The Mate's receipts are often the ship owner's first line of defense in defending a cargo claim for damage or shortage. It is essential that the receipts are accurate and correctly reflect the quantity and condition of the cargo received on board.

Where it is practical for the ship's staff to carry out a tally, the total received on board may differ from charterers' or shippers' tallies. The lower quantity should be stated on the receipt and claused, for example, "23,850 bags received on board. 150 bags in dispute, to be delivered if found on board at discharge".

It is more difficult to verify the quantity of cargo on board a bulk carrier, particularly as it may be impossible for the Master to carry out a draft survey to compare with the shippers' figures. For example, the ship may be loading at a roadstead, where the weather and sea conditions would render the survey inaccurate. The only practical remedy is to endorse the Mate's receipts showing shippers' figures, "weight, measure, quantity, quality, conditions, contents and value unknown to the vessel and owners". A partial, practical remedy may be for the ship's hatches and cargo accesses to be sealed and certified by an independent surveyor appointed by the owners P&I Club.

A surveyor should be appointed at the discharge port to certify that seals are intact before breaking bulk with receivers/charterers invited to attend the verification, although it may be found that the charterers' representative seldom appears. The Master should keep a written sequence of events at load ports and make annotations in the deck log book. His letter of authority to agents to sign bills of lading on his behalf must state that they are to be issued in strict conformity with remarks on the Mate's receipts. Charterers' attempt to word the

authority "Mate's receipts or tallies" should be resisted as they may attempt to use the tallies issued clean rather than the claused Mate's receipts.

Cargo arriving at shipside in a damaged condition should be rejected. It is fraud to sign Mate's receipts that do not reflect the true condition of the cargo. The rejection of bagged cargo or packaged goods for mold, wet damage or leakage, is relatively straightforward. However, this may not always be practical with limited ship's staff and six hatches being loaded with bagged commodities.

Often, it is not possible to verify the condition of the contents within the packaging; rice may be infested, and coffee may be moldy, for example. The best the ship's staff can do, is to be vigilant and exercise due diligence. If there is a problem, this should be drawn to the attention of the shipper or charterer. The Mate's receipts should be signed in good faith and endorsed, "... quality, condition, contents and value unknown..."

Cargo tallying

It is impossible for ship's staff to efficiently tally loading and/or discharge of cargo except in circumstances involving small parcels such as mail or bullion. In some ports it will be sensible for the ship to employ tally clerks independent of any employed by the shipper or receiver to ensure that the ship has figures to defend any shortage claim. Even this may not be sufficient in some jurisdictions and the Master should consult his P&I Club to ensure that the best course of action is followed in a particular port.

If tally clerks are employed jointly by shipper and owner, the clerk's receipt may be accepted in place of the Mate's receipt and spot checks by ship's staff on the accuracy of the tally are a sensible precaution. The ship's tally should be taken on board both for loading and discharge and not ashore or in a lighter as the ship's liability usually commences and ceases when the cargo passes over the ship's rail. Tally records should be retained on board for defence in the event of a claim against the ship.

What is standard shipping note for cargo ships employment

Outline of standard shipping note (SSN)

Standard Shipping Note (SSN) is a shipping document widely used in the UK liner trades to accompany a consignment of goods from their place of origin (e.g. a factory) to the place of loading (e.g. an inland container depot) or the port of shipment. The SITPRO form of SSN is most commonly used; this is a 6-part set compiled by the shipper or freight forwarder. A copy is retained by each party handling the goods until they are finally on board, when a “shipped” bill of lading is issued after matching the details on the documents.

Standard Shipping Note (SSN) replaces a mate’s receipt in trades where it is used. It gives full details of the exporter, customs status, carrier’s booking number, consignee, freight forwarder, international carrier, vessel, port of discharge, shipping marks, number and type of packages, description of the goods, special stowage requirements, gross weight, cubic measurement of goods, container ID number, seal number, container/vehicle size and type (e.g. 40ft open top), tare weight and shipper preparing the note.

SSN enables all receiving parties to have clear, accurate and precise information on how the goods should be handled and the applicable Customs procedures. It should not be used where the consignment is classified as hazardous (in which case a Dangerous Goods/Marine Pollutant Note should be provided by the shipper).

Purpose of CIF (Cost, Insurance and Freight) used in international trade terms (INCOTERMS) for sea transportation of goods

Defining CIF

"CIF" means Cost, Insurance and Freight (paid to a named place), e.g. CIF London. - is a contract based on the discharge port.

i) The seller must pay all costs including marine insurance and freight to carry the goods to the named destination, but risk passes from the seller to the buyer when the goods cross the ship's rail at the loading port. The seller must supply the goods and make a contract (at his own expense) for carriage of the goods to the agreed port of destination, paying freight and charges for loading/unloading. He must arrange (at his own expense) a marine insurance policy covering the goods against the risks of carriage for the CIF price plus 10%. Any war risks insurance required by the buyer must be arranged by the seller but charged to the buyer. (The cost of providing these services are included in the invoice price for the goods.)

ii) The seller must provide the buyer with clean, negotiable bills of lading (dated for the agreed period of loading), an invoice and an insurance policy or certificate of insurance. The bills of lading must be a full set of negotiable "order" marine bills so that delivery can be made to the order of the buyer or his agreed representative. (This enables the bills of lading to be passed to a bank in the documentary credit system, enabling the seller to obtain early payment.) If the bill of lading contains a reference to a charter party, the seller must also provide a copy of the charter party. The seller must tender all the documents to the buyer, his agent or his bank.

iii) The buyer must accept the documents when tendered by the seller, and must pay the agreed contract price. Property passes on transfer to the buyer of the documents. The buyer bears all costs and charges excluding freight, marine insurance and unloading costs unless included in the freight when collected by the carrier. The buyer must also pay for war risks insurance if he requires it. He must effectively bear all risks of the goods from passing the ship's rail at the port of shipment. (He is protected by the insurance arranged by the seller.)

iv) As freight is paid by the seller, the bill of lading is normally marked "FREIGHT PRE-PAID", but the master should ensure that freight has been paid before signing the bills of lading.

v) The buyer bears the risks during the voyage, but title in the goods only passes when the documents are taken up by the buyer. When the buyer has received the documents he must pay for the goods; he cannot demand receipt of the goods first.

vi) The purpose of a CIF contract is not so much the sale of goods as the sale of documents relating to the goods, so as to enable the negotiability of the bill of lading. CIF is therefore widely used where the documentary credit system is used.

vii) The advantage of CIF to the buyer is in making the seller wholly responsible for arranging the shipment. The seller is protected against loss or damage before payment by the insurance policy. The seller can also retain title in the goods beyond the time of shipment and as security against payment by the buyer, so it is easier for the seller to obtain credit at his bank. Once the buyer receives the documents and pays, he can secure credit or resell the goods. However, the goods will cost more on CIF terms than on FOB terms.

viii) In view of the advantages in CIF for normal international sales, in which the banks' documentary credit system requires the transfer of title through the passing of documents (including the set of bills of lading and a certificate of insurance), the vast majority of international seaborne cargo shipments are CIF.

Defining FOB (free on board) used in international trade terms (INCOTERMS) for sea transportation of goods

Defining FOB

"FOB" means Free On Board (named port of shipment), e.g. "FOB Newcastle NSW". It is one of the most commonly used term (INCOTERMS) in sales contracts involving sea transportation of goods.

i) The seller must supply the goods and documents stated in the contract of sale. He must load the goods on board the vessel named by the buyer at the named port of shipment on the date or within the period stipulated. He must bear all costs and risks of the goods until they have passed the ship's rail at the named port of shipment, including export charges and taxes. He must also pay for packing where necessary. Risk passes when the goods pass the ship's rail. The seller must notify the buyer when the goods have been loaded. The seller must give sufficient information to the buyer for him to arrange insurance; if the seller fails to give enough information, the risk stays with him.

ii) The buyer must charter a ship or reserve the necessary space on a ship and notify the seller of the ship's name, loading berth and loading dates. The buyer must bear all costs, including insurance (which he must arrange) and freight, from the time the goods cross the ship's rail at the loading port, from when he is liable to pay the contract price. (Freight is normally collectable by the carrier from the buyer at the discharge port.) The buyer must also pay the seller for providing the required documents, e.g. bills of lading and certificate of origin.

iii) FOB is advantageous when the cargo is of a type (e.g. oil) and size that the buyer wishes to charter a particular vessel, or where foreign currency restrictions compel an importer to use FOB (e.g. where governments want importers to use national flag vessels). It is mainly used for bulk sales contracts. With respect to the bill of lading, title in the goods does not pass to the buyer until shipment. The FOB contract is based on the loading port, so the buyer is

free after loading to re-sell the goods, even while they are on the vessel. The FOB invoice price is lower than the CIF price.

iv) Variants of FOB are: FOB Stowed, FOB UK Port, FOB With Services (e.g. arranging shipping space). Passing of property may be delayed with variants.

International Shipbroking marketplace - The Baltic Exchange & special purpose charters

The Baltic Exchange

London is the hub of the international shipbroking community, and many individual brokers and broking firms are members of the Baltic Exchange, which is a self-regulated shipbroking marketplace. The activities of its members, who are mostly ship-owners, cargo interests and shipbrokers, include the matching of bulk ships and bulk cargoes, and the sale and purchase of ships. Baltic Exchange members undertake to abide by a strict code of business practice, enshrined in the famous Baltic motto "Our Word Our Bond".

The Baltic's membership includes shipbrokers of all types as well as non-trading individuals such as maritime lawyers, insurers, financiers, classification societies and consultants who wish to mix with key players in the bulkshipping market and take advantage of the Baltic's facilities. Many operators in the dry and wet bulk trades are members of the Baltic, particularly international commodity traders in grain, oils, seeds and fats.

Market information in various forms published by the Baltic Exchange is internationally recognized and serves as "barometers" of the cost of transporting dry and wet cargoes. Brokers working at the Baltic collect market data from a number of major broking houses around the world, from which five daily indices are built up and published:

- Baltic Panamax Index (BPI);
- Baltic Capesize Index (BCI);
- Baltic Handymax Index (BHMI);
- Baltic Tanker Dirty Index;
- Baltic Tanker Clean Index;

The indices are built up from specifically defined international bulk routes for the particular trades and ship sizes. The three "dry" indices (BPI, BCI and BHMI) are combined to produce the Baltic Dry Index.

About half of the world's sale and purchase of ships is estimated to be dealt with through firms represented at the Baltic Exchange. Altogether, this international business generates around $2½ billion a year in freight commissions which comprise 5% of the UK's total invisible earnings. In addition, tens of billions of dollars in chartering costs go through London's banking system.

For more details visit Baltic Exchange Website: www.balticexchange.co.uk

Nature of special purpose charters in a sales contract between ship-owner and charterer

A special service vessel, such as a heavy lift ship, could be chartered on a general purpose charter party form, e.g. "GENCON", suitably adapted by the parties, but this would necessitate a large number of amendments and rider clauses. It would therefore be preferable to charter the vessel on a form specific to the type of operation concerned, e.g. BIMCO's "**HEAVYCON**" form - the standard transportation contract for heavy and voluminous cargoes.

"**SLOTHIRE**" is a BIMCO form on which a slot charterer hires a number of container bays on a containership's sailings, but not the entire cargo capacity.

"**TOWCON**" is an international ocean towage agreement for a lump sum, used in the professional towage industry.

"**TOWHIRE**" is an ocean towage agreement for a daily hire rate.

Cargo ships employment in the charter markets

Defining charter markets

Where a ship is employed in the charter markets (sometimes known as the "tramp trades"), the owner generally intends that she will be "fixed" by shipbrokers on a succession of charters. The ship may be employed in the voyage charter market (also called the "spot market") or in the time charter market, and in both cases may be sub-chartered by the "head charterer" to another charterer. The ship may simultaneously be employed under a contract of affreightment . As a "tramp", the ship will not normally operate on a fixed route to an advertised schedule, except when time-chartered to a liner operator.

Most ships employed in the charter markets are dry bulk carriers, tankers, combination carriers (e.g. OBOs), or reefer vessels, although there is also a charter market for container ships and for vessels of various special purpose types.

A chartered ship's charterers may be time charterers or voyage charterers, and will normally employ the services of a shipbroker to fix the ship . The charterers may in some cases be the legal carrier , in which case they may order the ship to issue bills of lading on their behalf to shippers of goods loaded. The charterers may be carrying their own goods in an "in house" shipment, or the goods of another party. In other cases the charterers may only be hired to fix the ship and load the cargo.

Dry bulk carrier market categories

For charter marketing purposes, dry bulk carriers are categorized by owners, charterers and brokers, and in market reports, as outlined below.

i) Handysize bulk carriers are vessels in the range10,000-29,999 dwt.
ii) Handymax bulk carriers are vessels in the range 30,000-49,999 dwt.
iii) Panamax bulk carriers are vessels in the range 50,000-79,999 dwt.

iv) Capesize bulk carriers are vessels of 80,000 dwt or more.

A good example of a dry bulk shipping market report can be seen on the website of

E.A.Gibson Shipbrokers Ltd

Tanker market categories

* For charter marketing purposes, tankers are categorized (by owners, charterers and brokers, and in market reports) as outlined below.

i) Handysize tankers are vessels in the range 27,000-36,999 dwt.
ii) Handymax tankers are vessels in the range 37,000-49,999 dwt.
iii) Panamax tankers are vessels in the range 50,000-74,999 dwt.

The London Tanker Brokers' Panel determine market rates under a freight billing system called "Average Freight Rate Assessment" or "AFRA". This allows an assessment to be made of a freight scale for tankers of various sizes,

Aframax tankers are vessels large enough to carry "Aframax"-size cargoes of between 80,000 tonnes and 119,000 tonnes. The average size of Aframax cargoes varies from one world region to another, resulting in different tanker market practitioners quoting different sizes for an "Aframax" tanker.

*A Suezmax tanker is a vessel of such a size (around 150,000-200,000 dwt, depending on dimensions and draught) that she can sail through the Suez Canal when fully loaded. Some brokers categorise "Suezmax" tankers as vessels in the range 120,000-199,999 dwt.

Fixing of cargo ships on charter - Role of shipbrokers -Who are shipbrokers?

Ships are normally "fixed" on charters arranged between the ship-owner and charterer by shipbrokers acting as negotiators for the two parties[1]. Shipbrokers include:

• Owners' brokers, who find and arrange employment for their principals' ships;
• Charterers' brokers (or "chartering brokers") who find ships to carry out their principals' requirements
• Tanker brokers, who arrange oil cargo fixtures in the specialist tanker market;
• Liner brokers and liner agents, who find cargoes for liner owners and operators;
• Coasting brokers, who work in the short sea market and often combine the functions of owners' and charterers' brokers;
• Ships' agents, who are employed by ship-owners and charterers to service their vessels' needs in ports; and

[1] Institute of Chartered Shipbrokers website www.ics.org.uk

• Sale and purchase brokers, who buy and sell ships and can, if required, arrange newbuilding contracts for their principals.

Many shipbrokers are self-employed, while others work in large firms active in several of the above disciplines. The chief stages in the fixing process include:

1. Circulation by the charterers' broker of "cargo orders", outlining charterers' forthcoming cargo transportation requirements.
2. Circulation by the owners' broker of "position lists" or "tonnage lists", detailing expected "open" dates and positions of available ships.
3. Study of market reports by brokers.
4. Negotiations on main terms between brokers on behalf of their respective principals, with offers and counteroffers by either side; if main terms cannot be resolved, there is little or no point in negotiating further details.
5. Negotiations "on subjects", e.g. "subject stem", "subject receiver's approval", etc., where the main terms have been agreed, but final agreement is subject to various secondary conditions being agreed.
6. Fixture, i.e. the full and final agreement, with all "subjects" removed.

Following fixture is a "post-fixture" or follow-up period during which the broker may undertake various administrative functions on behalf of his principal, such as (in some cases) collection of freight or hire.

Shipbrokers are remunerated by commission, called "brokerage", payable by the ship-owner to each broker involved in arranging a contract. In voyage or time charters the brokerage payable is stipulated in a Brokerage Clause and is normally 1.25% of the ship owner's gross receipts from hire, freight, dead freight and demurrage, payable to each broker involved. (It is not uncommon to see a total brokerage figure of 3.75% or 5% in a charter party.)

The professional body for shipbrokers world-wide is the London-based Institute of Chartered Shipbrokers, whose motto is "Our Word, Our Bond". The Institute sets and monitors professional standards for shipbrokers through annual examinations. Its Tutorship correspondence courses enable shipbroking students (including serving mariners) to study for the Institute's annual exams (from which qualified mariners are usually granted some exemptions).

Common Chartering abbreviations used in cargo ships employment

Defining Chartering abbreviations

We have summarized below, many terms commonly used by shipbrokers and others involved in ship chartering, mainly to save time and effort in communications. Shipmasters may come across many of the acronyms and abbreviations in documents relating to charters, e.g. in telexed voyage orders and market reports.

Term: Meaning

• AA: always afloat

- ABT: about
- AG: Arabian Gulf
- APS: arrival pilot station
- B: ballast
- B/Ls or Bs/L: bills of lading
- BB: below bridges; ballast bonus
- BBB: before breaking bulk
- BENDS: both ends (load and discharge ports)
- BWAD: brackish water arrival draft
- C/P: charter party
- CD: customary despatch
- CFR: cost and freight
- CHOPT: charterers' option
- CIF: cost, insurance and freight
- COA: contract of affreightment
- COMBO: combination port
- CONT: Continent
- COP: custom of port
- CQD: customary quick despatch
- CVS: consecutive voyages
- DELY: delivery
- DFD: demurrage/free despatch
- DHD: demurrage/half despatch
- DLRS: US dollars DOP: dropping outward pilot
- DWAT: deadweight all told
- DWCC: deadweight cargo capacity
- ECSA: East Coast South America
- EIU: even if used
- ETA: estimated/expected time of arrival
- ETC: estimated/expected time of commencement/completion
- ETD: estimated/expected time of departure
- ETS: estimated/expected time of sailing
- FAC: fast as can
- FAS: free alongside
- FCL: full container load
- FDESP: free of despatch
- FEAST: Far East
- FHEX: Fridays and holidays excepted
- FHINC: Fridays and holidays included
- FILO: free in, liner out
- FIO: free in and out
- FIOS: free in, out and stowed
- FIOSPT: free in, out and spout-trimmed
- FIOST: free in, out, stowed and trimmed
- FIOT: free in, out and trimmed
- FIT: free in and trimmed
- FLT: full liner terms

- FOB: free on board
- FOQ: free on quay
- FOW: free on wharf
- FP: free pratique
- FWAD: fresh water arrival draft
- Gross terms: carrier arranges/pays for cargo-handling, but laytime will probably apply
- GSB: good and safe berth
- GSP: good and safe port
- HAT: highest astronomical tide
- HSS: heavy grain, sorghums, soyabeans
- HWOST: high water, ordinary spring tides
- IWL: Institute Warranty Limits
- K: knots
- Liner terms: carrier arranges/pays for cargo-handling at load
- and discharge ports as well as carriage
- L/C: letter of credit
- LT: long ton (1LT = 2240lb = 1.016MT)
- L: laden
- LAT: lowest astronomical tide
- LO/LO: lift-on/lift-off
- LWOST: low water, ordinary spring tides
- MHWN: mean high water neaps
- LCL: less than container load
- MT: metric tonne (1 MT = 1000kg = 0.9842LT)
- Min/max: minimum/maximum (i.e. exact quantity)
- MHWS: mean high water springs
- MLWN: mean low water neaps
- MLWS: mean low water springs
- MOL: more or less
- MOLCO: more or less at charterers' option
- MOLOO: more or less at owners' option
- NAABSA: not always afloat but safe aground
- Nett terms: cargo-handling is arranged/paid for by charterers or shipper
- NOR: Notice of Readiness
- NVOC(C): non-vessel-owning (common) carrier
- PCT: percent
- PPT: prompt (cargo or ship available promptly)
- RO/RO: roll-on/roll-off
- ROB: remaining on board
- SA: safe anchorage
- SATPMSHEX: Saturday afternoons, Sundays & holidays excluded
- SB: safe berth
- SC: scale
- SCALE LOAD: load rate according to C/P scale
- SHEX: Sundays and holidays excluded
- SHINC: Sundays and holidays included
- Sous: palan under hook (i.e. barge cargo)

- SP: safe port
- Spot: cargo or ship available immediately
- Stem: readiness of cargo
- SWAD: salt water arrival draft
- SWL: safe working load
- T/C: time charter
- TIP: taking inward pilot
- USNH: US East Coast north of Cape Hatteras
- W/M: weight or measure
- WCCON: whether customs cleared or not
- WIBON: whether in berth or not
- WIFPON: whether in free pratique or not
- WIPON: whether in port or not
- WP: weather permitting
- WW: weather working
- WWReady: when and where ready

Worldwide Tanker Nominal Freight Scale - "World scale"

What is world scale

“Freight” is the remuneration payable by the charterers to the owners for the performance of the contract. It may be called charter party freight in the contract.

"World scale" is the code name for the “New Worldwide Tanker Nominal Freight Scale”, published by the World scale Association (London) Limited and the World scale Association (NYC) Inc., which are controlled by panels of leading tanker brokers in London and New York City respectively.

Because an oil cargo may be bought and sold many times whilst aboard a tanker at sea, the cargo owner requires great flexibility in his choice of discharge options. If tanker fixtures were priced in the same way as dry cargo fixtures the ship-owner would have to calculate a different freight rate for each discharge port that the charterers may opt for. World scale avoids this problem in that it provides a set of nominal rates designed to provide roughly the same daily income irrespective of the place of discharge.

World scale is a schedule of nominal tanker freight rates used as a standard of reference by means of which rates for all voyages and market levels in the crude and oil products tanker trades can be readily compared and judged. This is aimed at making the business of fixing tankers simpler, quicker and more flexible.

World scale is based on an average vessel with average costs earning an average rate. It works on the basis that, using the realistic costs of operating an imaginary standard tanker of “average” size on an “average” 15,000- mile round voyage, the break-even freight rate for that ship on that route can be calculated. This “World scale Flat” rate is calculated in US dollars per metric ton of cargo carried on a standard loaded voyage between a loading port and a discharge port with a ballasted return voyage.

The freight rate actually negotiated in a fixture, using the World scale Flat rate as a basis for negotiation, is called the "World scale Freight Rate". This negotiated rate will depend on the strength of the market and will be quoted in market reports in World scale points in the way outlined above.

Pumping Clause

Tanker charter parties often contain a clause under which the owner warrants that the vessel will discharge her full cargo within 24 hours, or will maintain a specified manifold pressure (e.g. 188 psi), provided that the shore facility is capable of receiving at the stated rate.

The clause further provides that if the vessel fails to comply with the stated warranty, the charterer will have the right to order the vessel to be withdrawn from the berth at the owner's time and expense until such time as the berth again becomes available for discharging the balance of cargo remaining on board

Under what forms of contract do most merchant ships trade?

1) Liner vessels trade on liner terms, also called bill of lading terms.
The carrier's standard terms and conditions are stated in his bill of lading (or similar document, such as a sea waybill) which he issues to each shipper of goods carried.

2) Bulk carriers and tankers generally trade on charter party terms, whether a bill of lading is issued to the shipper or not.
3) Passenger ships carry passengers on the carrier's standard terms and conditions, which are usually available from the carrier's offices or from his website. (The passenger ticket should mention this.)

Required Documents for carriage of cargo by ships

A. **Bill of Lading** (Ocean freight Bill of Lading) - the main maritime document. It identifies the shipper, consignee, name and quantity of the goods.

B.1. For transportation of commercial cargo - **Commercial Invoice.** It contains more complete information about the cargo, including price, quantity, and name of the goods.

B.2. To send a private personal belongings need a **Packing List**. It contains a list of items and their approximate cost. Note: Some companies also require commercial invoices for transportation of personal belongings.

To accept and confirm all documents U.S. Customs, all commercial invoices and packing lists must be in English, they contain the following information:

- Freight cost in U.S. dollars (exchange rate on the day of shipment;
- Full name and address of shipper, commercial goods - the ID number of the company;
- Full name and address of consignee;
- Detailed specification of the goods;
- Quantity of cargo;

• Weight of the load;
• Place of origin of goods (country of manufacture).

Additional documents, depending on commodity and country of origin

D**. Packing List** (Packing List) - with the full description: quantity, weight, packaging material (for example: wooden pallets, boxes, crates, pallets, etc.)

E**. Certificate handling** (Fumigation Certificate) - certification, indicating that the goods and packaging materials were processed after being loaded into the container and the cargo is safe from infection.

F**.** Special Documents - depending on commodity and country of origin.

• Visa
• Quota
• Visa/Quota
• Certificate of Origin
• North American Free Trade Agreement Certificate of Origin (N.A.F.T.A.)
• Packing Declaration
• Dangerous Goods Declaration – hazardous materials
• Fish and Wildlife Declaration
• Consular Legalized documents
• F.D.A.
• U.S.D.A.
• Anti-Dumping

Certificates and Documents for Merchant Ships

Ships must carry various certificates and documents on board to operate legally and to trade freely both nationally and internationally. The maritime industry commonly uses the terms “certificates” and “documents” interchangeably. Technically, however, certificates validate a fact, and documents provide evidence or proof of meeting a standard. This text will treat the two words as synonyms.

Do Merchant Ships Need to Bring Regulation Documents With Them?

Regulations govern procedure, behavior and standards within an industry, and are designed to meet the statutory or legal requirements of the state. A vessel’s flag state or country of registry determines the standard of law governing how their vessels operate in international waters and in their country’s water, territories and possessions. Ships traveling and conducting trade in a foreign country or flag state must also meet the international and national regulations of the country they are entering.

Regulatory documents such as certificates for merchant ships are often “mandatory” in that it is a requirement to carry them on board, but the laws of the vessel’s flag state do not directly require them. The word “mandate” can also denote a legal requirement. People often

use “statutory certificates” and “mandatory certificates” interchangeably, but the term “mandatory” can be confusing, and we will avoid it in this introductory text.

What Documents Are Needed?

Ships conducting international trade may need to carry more than 50 documents on board. The specific documents a ship should carry must meet the requirements of the vessel’s flag state, as well as all international regulations and treaties per the International Maritime Organization (IMO) and the documents necessary to meet the operational and safety requirements of the local port authorities and its flag state.

The IMO has standardized documents some countries may accept, per the Facilitation of Maritime Traffic Convention, but it is also common for countries to require a crew list and other forms for port entry. The specific documents required to operate and enter port are also a function of the ship’s classification, construction, tonnage and cargo.

How Are Laws and Regulations Different?

Legal or statutory requirements legally mandate the standards of construction, safe operation and management of ships. A country’s maritime laws set the legal requirements for operation within their jurisdiction, and the specific regulations establish the standards needed to meet the expectations of the law.

A vessel that does not meet the standards is non-compliant with the regulation, and might be breaking the law, depending on the structure of the regulations. A ship’s non-compliance with a regulation or standard may require any of several solutions or defaults. A ship which is non-compliant with a regulation:

1. may not be allowed to operate until they fix the problem;
2. may require further inspections to determine the extent of the problem;
3. the solution may get deferred until a later date, such as in cases where the infraction is minor or when a port or shipyard facilities must resolve the non-conformity;
4. may resolve the issue by sending corrected documentation to authorities; or
5. the violation may be severe enough to warrant civil or criminal action, such as in cases of fraud, collusion or falsification of documents and records.

Flag states enforce their standards and regulations upon ships operating within or visiting their countries, but they may not choose to adopt a specific IMO regulation, or the regulation may yet to become codified into the laws of the flag state. In such cases, it is common for the flag state to advise its ships that the IMO regulation requires compliance for all vessels in international trade.

What Are Classification Societies?

Maritime classification societies are non-governmental organizations that establish and maintain technical standards for the construction and safe operation of ships and offshore structures. Worldwide, there are more than 70 such organizations. Approximately 90 percent

of cargo ships in the world have received certification from the 12 classification societies that are members of the International Association of Classification Societies (IACS).

What Do Classification Societies Do?

Classification societies inspect and survey vessels during ship construction and commissioning to verify its design and structures are in compliance. This inspection includes examining the ship engine, pumps and other onboard machinery. Classification societies also inspect and class submarines, oil platforms and other offshore structures. After construction of a ship or other marine structure concludes, the classification society will perform periodic inspections to confirm the ship is meeting maintenance and safety standards.

Flag state regulations, local laws and international conventions require initial and periodic inspections for ships. The vessel must make its survey and inspection records available to charterers and insurance companies, and they may be necessary for port entry and when transiting certain canals and waterways.

Although classification certificates themselves are not statutory, some classification societies have the authority to perform statutory vessel inspections and surveys for the flag state. These flag states can empower recognized classification societies to conduct regulatory inspections and certify compliance with regulatory standards. These delegated duties require the authorized classification societies to maintain high standards of inspection and compliance with flag states and international regulations.

What Primary Regulatory or Statutory Certificates Should Seafarers Be Familiar With?

All flag states generally require merchant ship regulatory certificates and documents, as do IMO conventions and other international treaties. The IMO is a United Nations agency that sets standards for the international shipping community. The IMO has more than 171 member or flag states, and it represents governments, companies and labor interests in these states.

The following certificates and documents constitute a partial list of international regulatory or statutory certificates and documents seafarers should be familiar with.

1. Certificate of Classification

A Certificate of Classification from a qualified classification society certifies a vessel is structurally sound, and verifies the reliability and function of the propulsion and steering systems, power generation and auxiliary systems.

The certificate states that the vessel is complying with the rules of the classification society, but the document does not act as a warranty of safety, fitness of purpose or seaworthiness of the vessel. The registration of the vessel by its flag state requires this certificate.

2. Certificate of Registry

A Certificate of Registry is a statutory certificate required by local law and the United Nations Convention on the Law of the Sea. Merchant ships must be registered in a flag state and carry a Certificate of Registry detailing and verifying this registration. This trading certificate contains essential information about the vessel and the owner of the vessel, including the following.

• **Ship owner particulars:** Details about the ship owner or owners, including their name, address, percent of ownership and other information
• **Ship particulars:** Details about the vessel, including its length, breadth, depth, gross tonnage and where the ship was built
• **Ship engine particulars:** Details about the ship's engine, including the make and model and a description of the engine

Ship owners must meet specific requirements set by the flag state to qualify for a Certificate of Registry. These requirements may vary by country, but can include holding a classification certificate, a builder's certificate with details of the vessel and a certificate of sale to the current owner or owners. Ships can receive a Certificate of Registry from government or private agencies called registries.

3. SOLAS Certificates

One of the most impactful international treaties governing merchant ships is the **International Convention for the Safety of Life at Sea** (SOLAS). The IMO first adopted the SOLAS Convention in 1914 after the sinking of the Titanic, and it has undergone several revisions since, with the most recent version adopted in 1974. The SOLAS Convention establishes safety standards for the equipment, construction and operation of merchant ships. Ships of party nations must carry various SOLAS certificates on board, including the following.

• **International Ship Safety Equipment Certificate:** This certificate verifies the operational readiness of all ship safety equipment under SOLAS Chapter III. Form E, detailing all safety equipment required to be on board, must also accompany the certificate.
• **Minimum Safe Manning Certificate:** This certificate lists the minimum number of onboard crew required to safely operate a vessel, as established under SOLAS Chapter V.
• **International Ship Construction Certificate:** As required by SOLAS Chapter II-1, this certificate verifies safe and secure ship construction. Various documents must also accompany this certificate, including construction drawings, damage control plans and a coating technical file, among others.
• **International Ship Safety Radio Certificate:** SOLAS Chapter IV requires cargo ships and passenger ships to carry appropriate radio equipment on international voyages. This certificate verifies a vessel has the necessary equipment and that it is in good working condition.
• **Safety Management Certificate (SMC):** This certificate verifies that a ship complies with the International Safety Management Code, which outlines standards for safe operation and

management of vessels while at sea. The SMC lasts for five years, with verification of compliance performed between the second and third year.

- **International Ship Security Certificate (ISSC):** The ISSC verifies that a ship complies with maritime security regulations outlined in SOLAS Chapter XI-2 and Part A of the International Ship and Port Facility Security Code.

As of October 2018, the 1974 SOLAS Convention had 165 contracting states, which accounted for over 99 percent of the global gross tonnage of merchant ships. Therefore, SOLAS certificates are statutory for the vast majority of cargo ships and other seafaring vessels.

4. MARPOL Certificates

The International Convention for the Prevention of Pollution from Ships, called the MARPOL Convention, is one of the most significant international maritime treaties addressing environmental protection. Also called MARPOL 73/78, this treaty first got introduced in 1973, and then modified in 1978. MARPOL is short for "maritime pollution," and the convention aims to minimize pollution from dumping, oil, air pollution and other harmful substances. The MARPOL Convention requires ships of party nations to carry multiple statutory certificates, including the following.

- **International Oil Pollution Prevention (IOPP) Certificate:** This certificate, required under MARPOL Annex I, includes standards for oily water separation, filtering equipment and oil discharge monitoring equipment. The IOPP Certificate is a necessity for oil tankers, ships carrying oil as cargo and ships carrying bunker oil as fuel.
- **International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk:** Also called the NLS Certificate, this document verifies that ships carrying noxious liquid substances in bulk comply with standards for discharge of residues that contain pollutants.
- **International Sewage Pollution Prevention Certificate:** MARPOL Annex IV requires ships to control marine pollution from sewage. This certificate details a vessel's sewage holding tank and its capacity or a vessel's sewage treatment plant, depending on which equipment the vessel has, and lists how many people the sewage system is certified for.
- **International Air Pollution Prevention Certificate:** This certificate verifies compliance with MARPOL Annex VI requirements for air pollution, including limits on the emission of volatile organic compounds, nitrogen oxides, sulfur oxides and other pollutants, as well as regulations regarding incinerators, fuel quality and exhaust gas cleaning systems.
- **International Energy Efficiency Certificate (IEEC):** The IEEC, added to the MARPOL Convention in 2011, verifies that a ship meets requirements for energy efficiency. This certificate is specific to each vessel and is subject to inspections and audits.

MARPOL certificates are statutory for ships registered in one of the 158 contracting states and are mandatory for ships seeking to trade with MARPOL party nations. As of 2019, ships from MARPOL contracting states accounted for over 99 percent of world tonnage.

5. International Anti-Fouling System Certificate

Another maritime certificate aimed toward environmental protection is the International Anti-Fouling System Certificate. It is a mandate of the **International Convention on the Control of Harmful Anti-Fouling Systems** on Ships, and got adopted in 2001. This certificate verifies a ship's anti-fouling system does not contain harmful organotin compounds. It also confirms that a protective coating is in place to prevent organotin compounds from leaching from anti-fouling paint on the ship's hull or another external surface.

6. International Load Line Certificate

The **International Convention on Load Lines** establishes regulations for determining ship load lines, accounting for seasons and zones as well as factors of the ship construction, such as the quality of watertight doors and drain plugs of watertight compartments. The convention establishes six load lines that must be marked on all vessels:

- Summer
- Tropical
- Winter
- Winter North Atlantic
- Fresh Water
- Tropical Fresh Water

Cargo ships carrying timber must have a second set of load line markings that correspond with each season.

The load lines this convention requires represent the maximum cargo load a ship can hold while maintaining the minimum freeboard limit. Compliance with load line requirements ensures ship stability and prevents too much stress on the hull of the ship. Ships registered in flag states that have ratified this convention must carry an International Load Line Certificate, which is up for renewal annually, or an International Load Line Exemption Certificate if the vessel has received an exemption.

7. International Tonnage Certificate

Adopted in 1969 and entered into force in 1982, the **International Convention on Tonnage Measurement of Ships** established a universal system for tonnage measurement of ships. Ships registered in, or trading with, party nations must carry a statutory International Tonnage Certificate that lists the gross tonnage (GT) and net tonnage (NT) of the vessel.

A ship's GT allows for the calculation of safety rules, regulations for safe manning and registration fees. Both GT and NT play a role in calculating dues at ports, making an International Tonnage Certificate crucial for international trading.

8. Certificates for Masters, Officers and Ratings

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) requires all seafarers serving on merchant vessels and yachts to maintain

and carry proper certificates. All crew, including officers, masters and watch personnel, must meet qualification standards for training, certification and watch keeping, as outlined in the STCW.

Certificates required by the STCW are statutory for ships registered to party nations of the convention and mandatory for ships visiting ports of party nations. In 2019, there were 165 parties of the STCW Convention, accounting for over 99 percent of global tonnage.

9. Maritime Labor Certificates

All commercial ships in international trade must carry a Maritime Labour Certificate issued by the **International Labour Organization** (ILO) and the IMO. By requiring this certificate, the ILO Convention addresses a wide variety of labor and social issues, including employment policies, wages, employee contracts and industrial relations.

In 2006, the **Maritime Labor Convention** set standards for employment conditions and accommodations on ships, as well as minimum employment requirements, medical care and more. After passing an inspection, a ship will receive a Maritime Labour Certificate verifying its compliance with the standards of this convention. Flag states that have not yet ratified this convention may establish a voluntary compliance inspection program for their vessels until their body of law accepts and codifies it.

Bill of Lading and other shipping documents for cargo ship

The Bill of Lading is one of the most important documents that the Master will sign and therefore strict controls on how it is issued are required. Although the B/L is usually drafted by the Shipper and presented to the Master for signature, it is an Owners document. One of its three functions is to act as a receipt for the cargo, so therefore the Master must make sure that the quantity and description of the goods is accurate as he will be expected to deliver the same to the Receiver.

Bill of Lading functions

The Bill of Lading (B/L) is a unique type of document which has three distinct but overlapping functions. These are usually expressed as:-

1. A receipt for goods loaded on board the vessel;
2. A document of title through which property in the goods may be passed from one party to another; and
3. A contract (or evidence of a contract) governing the receipt, carriage and delivery of these goods.

From this, three important consequences arise for the Owners and the Masters as their employee: -

a) When he signs the B/L, the Master does so, not on behalf of the Charterers or Shippers, but on behalf of the Owners. The B/L is an Owner's document, and it is the Master's

responsibility to ensure to the best of his ability that it is properly prepared and signed. This applies whether the ship is employed on a Voyage or Time Charter.
b) If the B/L contains inaccurate or misleading statements about the quality or quantity of the cargo it covers, then Owners will be liable for the consequences, at least in the first instance. The Master's main concern must be, to see that this cannot happen. Therefore it is essential that the Master clauses directly on the bills the correct condition of the quality and quantity of cargo if these two items have not be properly described in the document presented to him for signing. If he wants assistance with the wording to be used in the clausing, he should call the commercial office who may engage the local P & I representative for advice.
c) If an incorrect B/L is issued, for whatever reason, the situation is not necessarily wholly beyond repair, but speed of action is essential, since once a third party takes up the B/L relying on what is says, it is too late to make any correction. The Master must therefore notify the Owners and Charterers immediately of any apparent irregularity in any B/L which he has issued (or which he knows or believes has been issued by the ship's agents).

As the B/L is an Owners' document, third parties such as Charterers and Shippers have limited powers to interfere with the Master signing it. However it is not unusual for a charter party to provide for the Charterers or their agents the authority to sign B/L's for and on behalf of the Master. In such cases the Master must issue the agent with the authority to sign B/L's on his behalf in writing, such authority is to include any additional remarks the Master expressly requires included in the B/L's.

Under normal circumstances, the B/L is the principal evidence of the receipt of the cargo which it describes. However, it is not the only evidence, and it remains open to the Owners to avoid a claim by showing that what the B/L states is in fact incorrect.

For example, apart from paying great attention to the contents of the B/L itself, the Master must also take all practical steps which may subsequently assist Owners to resist any short delivery claim by proving that no cargo has been physically lost (e.g. by draught survey, by written protest as to any doubt or discrepancy in determining of weights or volumes. Charterers' surveyors or inspectors must justify any statement which they may make as to the condition of the cargo or 'pump ability' of oil residues, and also by keeping properly consistent records of bilge pumping with wet cargoes such as ore concentrates).

In some circumstances, shippers/agents may offer to give the Master a letter of indemnity in return for the Master signing clean Bills of Lading. The Master must not accept such a letter without first checking/obtaining authorization from the Company. A Letter of Indemnity is strictly not enforceable in law. Only the Company can decide if such a letter is acceptable on commercial grounds.

Signing of Bills of Lading and EDP

On no account is the Master to sail from a load port without either issuing a B/L under his own signature or else delegating the signing to the agent, unless some suitable alternative has been agreed in advance by Owners.

In some trades (particularly tankers loading AG ports), the Bill of Lading is always signed by the Agent on behalf of the Master at some later time after sailing the port. This practice is called Early Departure Procedure (EDP). The Master will authorize the Agent in writing that he may sign the B/L on his behalf under certain strict conditions. An example of such a letter is in Attached Documents. EDP should NOT be followed unless the Master has permission form his commercial operator and/or Charterer.

If the Master at any time discovers that he has issued an incorrect B/L, he must notify his commercial operator and/or management office immediately, giving full details of its particulars, including names of shippers, consignees and notify parties. When confronted with a B/L, the Master must examine it in six main areas;

i) Quantity of Cargo
ii) Description and Condition of Cargo
iii) Date
iv) Description of Voyage
v) Terms and Conditions
vi) Payments of Freight

Original Bill of Lading Carried On Board

In certain trades it is not uncommon for the Master to carry one Original Bill of Lading on board and the other two go ashore. Supposedly, this enables the Master to deliver the cargo having sighted an original bill of lading. However, the drawback is that any one of the originals is adequate to negotiate the sale of the cargo. The two originals not carried on board may have been used for trading the cargo. If so, the original on board will no longer reflect the true ownership of the cargo. If the Master is aware that he is carrying one original from a set of originals, he must also be aware that this original does not necessarily show the ownership of the cargo. The Owner's legal defenses against a wrongful delivery claim will be less than viable if delivery is made against an original carried on board.

However, if a bill must be carried on board, then the Owner may seek to protect himself by inserting a clause in the Bill of Lading along the following lines: "One original bill of lading retained on board against which, bill delivery of cargo may properly be made on instructions from shippers/charterers." In such a situation the Master is to advise the commercial operator and/or management office.

Delivery of the Cargo/Transshipment

The Master must not commence discharging any cargo without first receiving an original B/L. If no original B/L is presented to him, he must immediately contact the commercial operator and or management office, who may authorize the start of discharge against receipt of an appropriate Letter of Indemnity and/or Bank guarantee. (Indeed this is common practice on tanker vessels).

Note: that in certain dry cargo liner trades, presentation of original B/L's is also not common practice. There are three main areas where the Master may in practice become involved in problems of rightful delivery of the cargo. These are: -

1. Change of destination;
2. Delivery without presentation of original B/L; and
3. Transshipment/lightening

Once the cargo has been received by the ship and Bills of Lading issued the Master has become responsible for it. His responsibilities are then as follows:

1. to perform the contract voyage without unreasonable delay and/or deviation;
2. to discharge all the cargo (so far as is reasonably and physically possible); and
3. to deliver it to those whom he believes are entitled to its possession.

Change of Destination

If the Master receives an instruction to proceed to some port or place other than that which appears on the B/L, he must draw this fact to the attention of the commercial operator as soon as possible, (regardless of where the instruction comes from). The commercial operator will then seek the necessary letter of indemnity (LOI) from the Charterers. Only on receipt of confirmation of the LOI, will the commercial operator authorize the Master to discharge cargo at to the new destination.

Delivery without presentation of original B/L

If the original B/L is not presented to the Master at the discharge port, then the Master must not commence discharge unless the commercial operator has given prior authorisation. The Master is to contact the agents in advance of the vessels arrival at the discharge port to ascertain if the B/L's have arrived. If not, he must advise his commercial operator who may then seek the appropriate LOI from the Charterers. A Letter of Indemnity received on the ship is not sufficient, and instructions MUST emanate from the operator.

If the cargo is to be discharge at a port other than stated on the B/L and without production of the original B/L then a composite LOI wording is used. Note: These wordings are drafted by the International Group of P&I Clubs, but it is still a commercial decision for the Owner on whether he wishes to accept it or not.

Transshipment/Lightening

Here again, on receiving the instruction to transship or lighten all or part of his cargo, the Master must always consider whether or not this instruction is consistent with the B/L. If it is not, he must immediately notify the commercial operator. On parting with all or part of the vessel's cargo other than at its final destination, the Master must ensure that a clean (i.e. unqualified) and unambiguous receipt for it signed by some person in authority is received, such as the Master or Chief Officer of the other vessel.

At this point, the Master must bear in mind that there is a reversal of roles, as he now stands in the shoes of a shipper, and he must take care to see that the receipt does not understate the quantity transferred. This is particularly important with part discharge or lightening as, if the vessel has actually transferred more cargo than stated in such a receipt, it is likely to deliver short at the next port and so, although no cargo has been physically lost in total, the Receiver at that next port may raise a shortage claim. In the event that there is some dispute concerning the quantity transferred at such lightening or transshipment, and the Master feels that the receipt reads low, he must note this in protest at all subsequent ports of discharge.

Unique Bill of Lading US Trading

The US customs require that all cargoes being imported into the USA have a unique Bill of Lading number. This number must be shown on the Bill of Lading and also on the vessel's manifests, cargo declaration and other documents. No cargo will be allowed to be discharged in the USA without such a number. This number must not be repeated for three years. The number to be used is composed of two parts, a SCAC code which is assigned to the carrier and consists of four letters and a further sequence of numbers up to a maximum of 12.

The SCAC code must be registered with the US authorities by the "carrier" and is usually assigned by the Owner when on Voyage Charter and the Time Charterer when on Time Charter. Where more than one Bill of Lading is issued the number should be increased by 1, 2, 3 etc., for each separate bill. Where doubt exists, the commercial operator is to be advised.

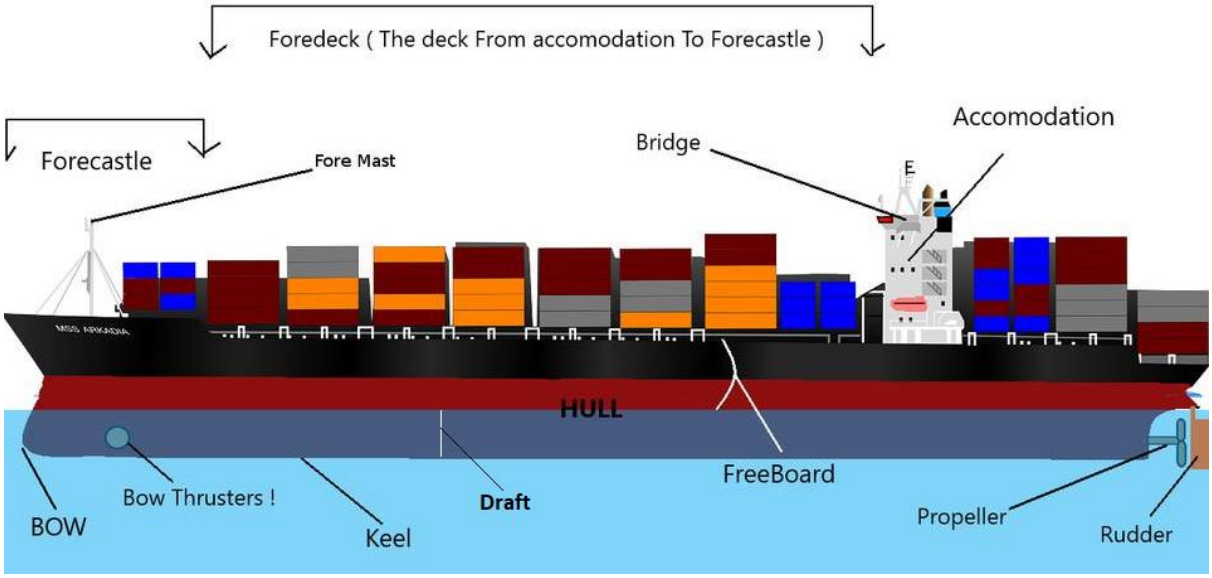
Chapter Six: More Practical Shipping Exercise

Parts of Ship Its Definition and Their Function

Have you wondered what ships are made of and what are its parts? Well, you are not alone; it is this curiosity to know about ships lead me to pursue my career as a marine engineer.

Chances are, you have watched a film related to ship or want to pursue a career in the navy; wondering how are they structured and what are their parts called! While a ship may be of many types from small to large and merchant to the military; they all have two points in common.

One they are made of steel and composite material and second; they all have three main parts i.e. Navigation Bridge, hull, and Engine room. You can learn more about different types of ships based upon their size and use on our earlier post; A ship has both visible and invisible but structural parts. While common visible parts of a ship are; rudder, anchor, bow, keel, accommodation, propeller, mast, bridge, hatch coves, and bow thrusters.



On another hand invisible but structural part of the ship consists of; bulkheads, frames, cargo holds, hopper tank, double bottom, girders, cofferdams, side shell, etc.

Understanding ship construction is hard and uneasy with common terms such as front, left, right and back; so we will look into some of the common nautical terms used on the ship. For a person facing the bow (The most forward part of the ship) for a moving ship; the side to his left hand is called port side while on his right is called starboard side.

Similarly; the side to his front is forward and that to his back is called astern. Since we have gone through a transformation from floating vessel to large ships; we will learn about parts of ship that is common to all.

1) Anchor

An anchor is a heavy metal piece attached to the chain cables and is stored or secured in the hose pipe during the voyage / ship operation. It can be either permanent or temporary with an additional sub class of sea anchors.

All ships carrying anchors are of the temporary type; as they are not always fixed to the same position and often lowered at different position depending upon need. Together with its chain cables, connecting devices, windlass and chain stopper it is called anchor gear.

An anchor is made of five major parts; shank, crown, stock, flute and tripping ring. A shank is a fixed stem structure which is fitted together with flute by the tripping pin passing through the shank hole.

Together; these connecting structures along with stack (A crossbar that helps turn the anchor to assist flute to dig into the ground) are known as anchor crowns. The fluke on respect is the key part of an anchor that actually dig deep into the ground to hold the ship in place.

Function: While most ships move from port to port; many have to wait outside for the berth. With increased shipping over time and growing number of ships, it becomes more and more common to wait for long for the berth.

So to secure them in place against the natural forces such as wind and tide current; anchors are used in the ship. They act as a holding hand securing them to a definite place with their flute hooked deep into sea bed and weight of chain along with its resultant force keeping the ship fixed to its place.



An anchor secured in the hawse pipe in hull structure

2) Bow

A bow is the front most part of a ship which cuts the water along its sides as the ship proceeds. The key two requirement for a bow is to have; minimum drag possible or so-called resistance between the water and the ships hull and must be tall enough to avoid water splashing to easily on top of it.

In all the different bow types tested so far in the history only a handful of them pass the test of time; bulbous bow, Inverted bow and an Axe bow.



Bulbous Bow of a ship

See the budging shape of the bulbous bow that effectively cuts the water as the ship proceeds.

A bulbous bow is the one that you will see in most ships including that used for commercial shipping. It can be identified easily by its distinct bulging bulb like shape just under the waterline; and has an advantage of increased fuel efficiency of a ship by 10 to 15 percent.

On another hand a ship with inverted bow design have its part of hull and bow; upside down much like that of a submarine with extended waterline. This on one hand improve its water drag while on another restricts its reserve buoyancy and speed in bad weather.

Such a bow type is usually used for ships involved in anchor handling, laying deep sea pipes and offshore. An Axe bow type have a vertically stem line hull structure; along with a deep Axe like structure in the foremost part of the ship. It is one of the parts of ship which due to its design capabilities; helps improve the speed of ship for same power.

Function: Have you feel that extra effort you have to make to walk through water? That is due to water drag and its resistance to your body motion. So to reduce similar negative forces on ships body; bow are placed on ship assisting easy propulsion.

3) Bow Thrusters

A bow thruster is a propeller like device fitted on both side of ships bow. It is used to increase the maneuverability of a ship in congested waters under very slow speed like that in canals or near ports.

For most designs you will only found a tunnel passing through ships bow with an impeller in place. It is for this distinct look; bow thrusters are also referred to as tunnel thrusters. The impeller can rotate in both direction; clockwise and anticlockwise generating bidirectional thrust capabilities.

Having bow thrusters greatly affects the overall running cost of a ship by reducing part of port cost for tug (A small boat used by port authorities to help safely dock a ship) assistance. For ships having bow thrusters it is required to have proper markings on both sides above waterline.

These thrusters are mostly powered electrically using a prime mover attached to the impeller shaft using a bevel gear assembly. For some ships they are also powered hydraulically where electrical option is not possible or is unfeasible.

Function: A ship is maneuvered using propulsion and rudder angle variation. A rudder is a blade like structure situated at aft of propeller which moves horizontally across the medium to steer a ship. Rudder angle is changed by a value to get desired change in ship direction.

But what if the speed of ship is too slow to be effectively controlled by rudder angle? This is where the bow thrusters came into picture assisting captain to steer ship even at very low speed.

4) Accommodation

It is a place on ship where the crew resides or live. Together with offices, crew cabins, gym, prayer room (Few ships), salon, recreation room, laundry, hospital and galley it is the heart of a ship next to engine room and bridge.

A salon on board is the common area or living space for its crew, passengers and any visiting authorities to interact; and often include common room and dining space or mess room. On another hand galley is just a nautical term for kitchen; where food is prepared.

Being one of the key parts of ship; accommodation accounts for major systems on board including; fresh water system, refrigeration system (domestic), garbage disposal system, sewage treatment plant and air conditioning for accommodation block.

Under international and local maritime laws of flag state it is required to have accommodation of all vessels including; passenger ship, cargo ship, salvage ship, tug and dredger above the summer load line situated aft or amidships of the ship structure.

Function: An accommodation accounts for the living space of the ship. Under maritime labor convention (MLC 2006-2007); it is required by law to provide adequate accommodation facilities to ship's crew and officers along with proper recreational facilities.

In this it is stated to have proper provision for safety, accommodation, health and accidents of crew on board ship. It is now required to have hospital accommodation, proper ventilation, lighting, head space, heating with adequate size of crew cabins.

5) Deck

A deck is a floor or covering to the ship's hull structure. A ship can have different decks at different section or parts of ship; namely upper and lower deck or deck 1, deck 2 and deck 3 in a sequential downward way. What it means is that; the topmost deck exposed to weather is called main deck or weather deck.

The levels and floors below weather deck is called deck 1, while one below deck 1 is called deck 2 and so on. On other hand decks or floors that does not extends from aft to forward are generally called as level.

Based on the position and level a ship's deck can be divided into six main types; main deck, poop deck, upper deck, lower deck, weather deck and Foredeck. The main deck on the ship which run through its entire length is called main deck.

For most ships it also the top most deck and so also called the upper deck; but in war ships it is a separate deck below the upper deck. The deck below upper deck is called lower deck while any part of ship which is exposed to open weather is called whether deck.

The deck situated in the aft side of a ship is called poop deck; while the part of deck situated in between accommodation and forecastle is called fore deck.

Function: One of many parts of ship; a deck is the plane that holds the hull structure providing different celling floor to the ship. The other job it do is to provide space and floor for the equipment and people to stand and work while protecting them from outside weather.

6) Ship's Hull

A hull is that part of ship that extends below the waterline to cover and protect water from getting in. You can consider it as the shell which protects the inside treasures from outside environment.

Everything that is stored and situated within the main ship structure is covered and protected by the ship's hull. It includes the key parts of the ship such as bow, deck, the bottom keel and the both sides of the ship.

They are made up of series of plates jointed together called stakes along with other structural member such as plating and stiffeners.

A stiffener consists of structural parts such as longitudinal and transverse frames, bulkhead stiffness, girders and beam. While ships plating consists mainly of deck platting along with bottom, bulkhead and side platting.

Ship's hull are designed as such to offer minimum resistance to water, is feasible and economical to construct without losing on much needed cargo space. One can easily calculate and improve the overall efficiency of a ship calculating and reducing hull's resistance to ships motion.

Function: Made of steel the key role of ship's hull is to maintain its water tight integrity and reduce water drag. And so hull plays a major role in determining overall efficiency of a ship.

Ship's hull are thus coated with special paints that not only reduce frictional drag but also avoid marine growth which further increase the resistance to ships motion. Thus ship's hull are cleaned and repainted with special coating during dry dock operation.

7) Keel

A keel is a part of ship's hull that is responsible for providing strength to the ships structure; spreading stress and load equally along its longitudinal sides.

Due to its property to hold and support ship structure it is often termed as the backbone of the ship. In simple terms it provide stability to a ship and increase its effective speed. The introduction of keel in shipping reduce much of the work regarding stabilizing ship structure.

It was first known to be used by vikings to reduce lateral movement of their boats at the time. A keel is nothing but a thick plate that runs longitudinal across the ship from stern to stern; passing through the centerline of ships bottom structure.

There are three main types of keels used in marine industry; flat keel, duct keel and bar keel. A flat keel is used in all major ships in operation; bar keels are used when the ship has to work in shallow water while duct keels are preferred for offshore vessels and double hull tankers.

Function: Being one of the key parts of ship; it helps stabilize and support ship structure. It also plays an important role increasing the effective speed of a ship. With displacement of ship dependent upon the depth of keel from water line; it is helpful to measure draft and reserve buoyancy of ship.



Image representing freeboard of a container ship

8) Freeboard

A freeboard stands for the part of ship's hull located above the waterline. It is the distance between the upper deck of ship and the point of waterline. The freeboard of a ship is not fixed but rather depends on the amount of cargo it carries.

It is required at all times to maintain a minimum freeboard at all times to avoid ship from sinking. Thus to ensure safety of ships at sea; load line marking is used to ensure maximum possible draft for safe voyage.

The distance between the upper deck and the load line accounts for the minimum freeboard of a ship. Under international convention on load line (ICLL 1966); it is required by law to maintain a minimum freeboard at all times.

This puts a cap on the amount of cargo a ship can load. By law it is required by ships to load only up to the load line marking for the designated water type. Thus it is a must for ships to have proper load line marking amidships on either side of the ship's hull.

Function: The role of freeboard among different parts of ship is to maintain ships stability and avoid it from sinking. Under ICLL 1996 (International convention on load line) following load line marking are put on ships hull; Tropical Freshwater, Freshwater, Tropical, summer, winter and Winter North Atlantic. These load lines ensure that the ship have minimum sufficient freeboard at all times for safe voyage.

9) Engine Room

An engine room is the power house of the ship located in the lowest most deck on aft of the ship. It contains important machinery such as main engine, auxiliary engine (Alternator), shafting, boiler, fresh water generator, air compressor, calorifier, purifier, incinerator, pumps, heat exchangers, workshop machineries etc.

If you ask a mariner about engine room the first thing he might tell; its hot, noisy and full of vibration. The average temperature of engine room is always above 45 degree centigrade.

All the machinery in engine room is well segregated across different places on three different decks named utility deck, weather deck and machinery deck. With all the propulsion and auxiliary machinery installed in place it is also called as the heart of the ship.

All the machinery in engine can be controlled from a control room called Engine control Room or ECR in short. It is the only place in engine room where you will get relief from hot temperature and much of the noise.

Function: The key role of engine room is to hold all the key machinery and auxiliaries required for different operations on board ship. On deck one it usually has control panels for diesel generators and pump, workshop, store room, settling tanks, service tanks, fresh water expansion tanks, Inert gas platform, deck air compressor, air bottles etc.

On deck two it contains; Fuel oil heaters, purifiers, boilers, main air compressor, diesel generators, fresh water generator etc. While the deck 3 mainly consist of main engine, different supporting coolers, oily water separators etc.

10) Funnel

A funnel is what from which the exhaust gases are released into atmosphere. You can consider it as the chimney of the ship. Since the introduction of mechanized ship; it has been an integral part of the ships structure.

The cross section or width of these funnel largely depends on the amount of exhaust engine room produce. In early days of shipping it was used to release everything that the ship emits; but nowadays it is used within the limits of controlled emission with shoot collection in place to reduce pollution.

All the shoot that is collected in the shoot collection tank is then later discharged to the port authorities. If not possible they are discharged overboard via an educator recording the time and amount in garbage record book.

If you look up-close carefully; will find that these funnels are in fact not that straight but inclined to an angle. This is done deliberately to assist the flow of flue gas away from the navigation bridge and ships deck.

Function: Being one of the parts of ship the function of a funnel is to safely release exhaust gas produced in engine room to the outside atmosphere. Together with the forward motion of the ship and funnel inclination towards the aft; exhaust gas is easily moved away from ship avoiding possible hindrance to ship navigation.



11) Navigation Bridge

If engine room is the heart of the ship; Navigation Bridge is its brain. It is a wide platform on top of the accommodation from which the ship is controlled. They are many a times aided with additional narrow passage called bridge wing; to allow broader and better view of the outside to safely maneuver the ship.

The main part of the bridge from which the ship is controlled and steered is called pilot house. According to the maritime rules and regulation it should be constructed such that; it provide a clear view from 120^0 port to 120^0 starboard from conning position.

It is the position in the navigation bridge from which the duty officer command, monitor and maneuver a ship. Under normal condition an able seaman is present with duty officer in the navigation bridge.

Under dangerous maneuvers or near port; captain is present in the navigation room with assisting duty officer, able seaman and a pilot (If provided). A ships bridge is equipped with equipment including; gyroscope, radar, magnetic compass, auto pilot, sonar, rudder angle indicator, G.P.S, ships horn, navigation lights, signaling flags etc.

Function: Out of various parts of ship; the function of Navigation Bridge is to provide ample space for officers to look out and maneuver safely. It also holds necessary equipment and controls to change ships speed and its direction while monitoring outside sea condition and establishing proper means of communication.

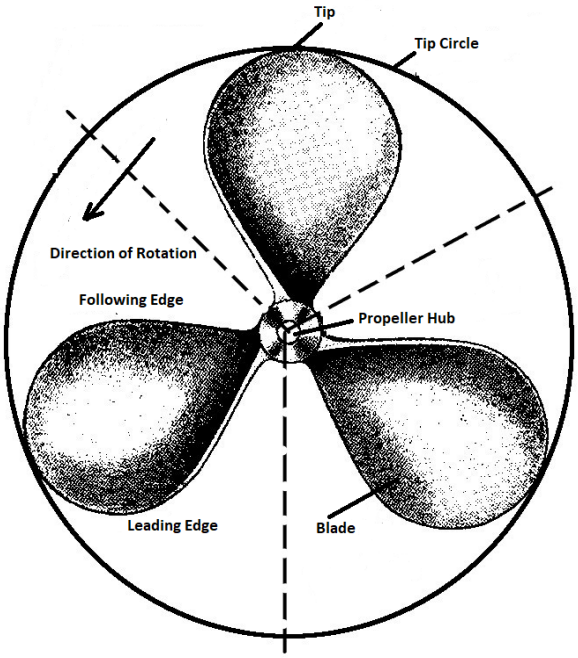
13) Forecastle

A forecastle is the foremost parts of ship. It accounts for the front part of the ships upper deck and is not more than 7% of total deck length. It can be easily identified on a ship structure by a sudden rise in the fore deck near the ships bow.

In earlier days forecastle of a ship was used for a specific purpose of taking defensive positions by the soldier in the military vessel. These days it is used most for holding and securing major ships parts.

It is the hose for anchoring tools and ground tackles with parts including but not limited to; windlass, haws pipe, anchor chain, chain block, open rail, deck flange, gear box, hydraulic motor, anchor, bollard and foremast. It is the part most used for anchoring operation and checking or maintaining navigation lights on foremast.

Function: Being one of the key structural parts of ship; a forecastle or the foremost part of the fore deck it hold all the necessary equipment required for anchoring operation. On navy ships apart from holding anchoring tools and equipment a forecastle also holds strategic defensive guns position.



14) Propeller

It is a fan like mechanical device with blades fitted on the shaft. It rotates with the shaft to produce much needed thrust to propel a ship. The propeller of a ship produce this thrust by converting the rotational energy of its blades to pressure energy.

This is done by using the difference in pressure generated on its near and far side of the blade to push the water aside. Together with its parts; hub, blades and its faces it produce the required thrust for propulsion using Newton's third law of motion.

Newton's third law of motion states that; for every action there is an equal and opposite reaction. The propeller of the ship push the water backwards creating a net resultant force of equal magnitude that makes the ship move forward.

A propeller is a part of ship propulsion system which includes; engine its shafts (including intermediate & propeller shaft) and propeller. Being one of the vital parts of ship; a propeller is made of non-corrosive alloys such as aluminum and manganese bronze.

Function: A ship would be useless if it does not move; so propellers are installed on ship to provide it a forward motion. So the function of propeller in ship is to provide much needed thrust to propel the ship.

A propeller can be divided in four main types based on its number of blades; while of two main types based on its pitch. Based upon its pitch a propeller can be of either fixed pitch propeller or controllable pitch propeller. Similarly based upon number of its blades; it can be of three blade, four blade, five or six blade type.

15) Rudder

If propeller is the parts of ship that propels then rudder is the one that makes it steer. Situated in the aft of propeller; it is a flat hollow structure that moves from port to starboard turning on its axis to help steer the ship.

A rudder is consist of parts such as; rudder trunk, main rudder blade, movable flap, hinge system, links and rudder carrier bearing. The rudder steers the ship following Newton's third law of motion similar to that of propeller.

It moves to a direction producing resistance to water flow forcing them to move to the other side. In this very process it produce much needed resultant force for the ship to turn it to the opposite side of the altered water flow.

Based on its construction a rudder can be balanced, semi balanced and of unbalanced type. A balanced rudder is the one which have more than 20% of its part forward to its turning axis. Similarly a semi balanced is the one with less than 20% of its part outside or forward to its turning axis; while none for unbalanced rudder type.

Function: A rudder is the parts of ship that make it steer. Based on the Newton's third law of motion it generates enough resultant force to steer a ship to desired direction. The movement of a rudder is controlled by steering gear system. A rudder must be capable of moving from 35 degree port to 35 degree starboard; with the ability of steering gear to move from 35 degree on one side to 30 degree on another in not more than 28 seconds.



Look for Equipment's installed – radar receiver, navigation lights and Flag.

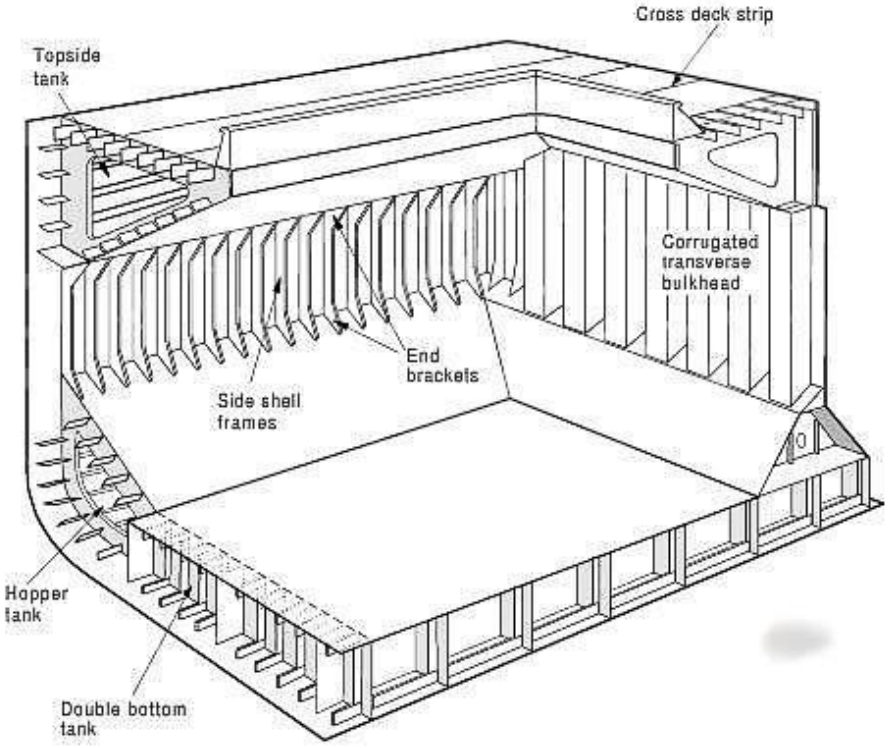
16) Mast

A mast is a vertical ship structure mounted on top of bridge and forward of the forecastle towards the ships bow. It accounts for the support platform for the ships derrick and hold necessary equipment such as radars, navigation light and ships horn in case of foremast. They are made of high tensile steel with added rigidity based on the size of derricks it holds. Other than that a ships main mast is also used to hoist ships flag.

Function: Out of different parts of ship the main job of mast is to hold necessary equipment such as radar receiver, navigation lights, ships horn, flags and derricks in some case.

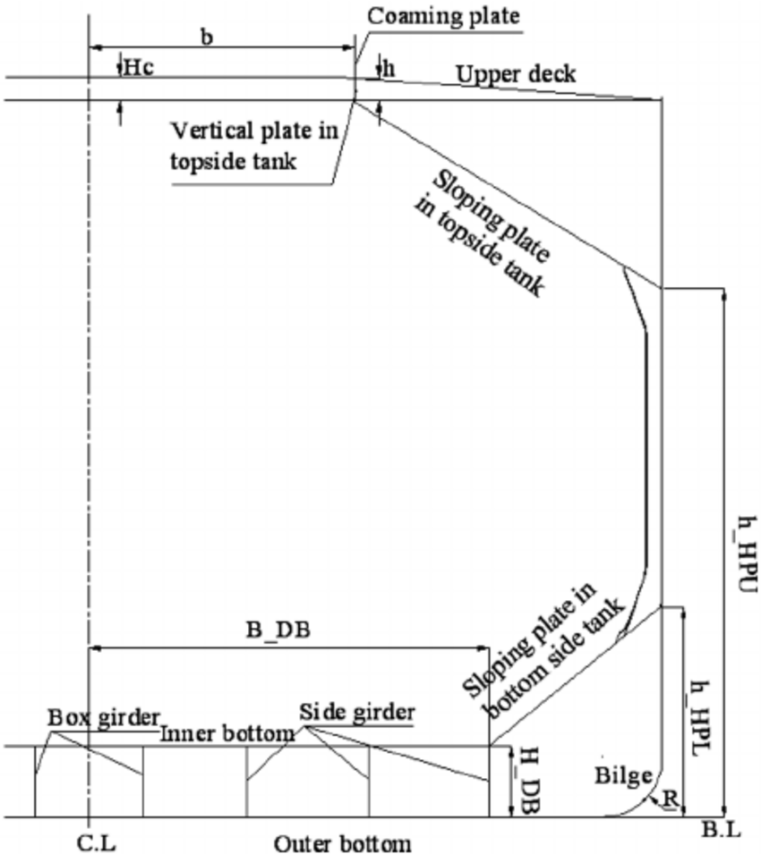
Bulk carrier





Sabrina I is a modern Handymax bulk carrier.

Cross section of a bulk carrier



A complete half section of a bulk carrier

Different types of bulk carriers

Class overview

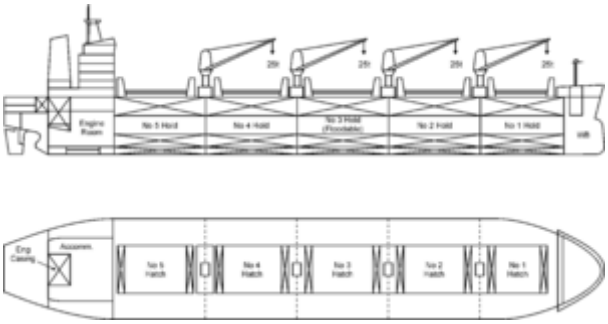
Subclasses" Handymax, Handysize, Panamax, Capesize:

Handymax and **Supramax** are naval architecture terms for the larger bulk carriers in the Handysize class. Handysize class consists of Supramax (50,000 to 60,000 DWT), Handymax (40,000 to 50,000 DWT), and Handy (<40,000 DWT). The ships are used for less voluminous cargoes, and different cargoes can be carried in different holds. Larger capacities for dry bulk include Panamax, Capesize and Very Large Ore Carriers and Chinamax.

A handymax ship is typically 150–200 m (492–656 ft) in length, though certain bulk terminal restrictions, such as those in Japan, mean that many handymax ships are just under 190 meters (623 ft) in overall length. Modern handymax and supramax designs are typically 52,000 58,000 t DWT in size, have five cargo holds and four cranes of around 30 tonnes working load, making it easier to use in ports with limited infrastructure. The average speed depends on size and age.

The cost of building a handymax is driven by the laws of supply and demand. In early 2007 the cost building a handymax was around $20 million. As the global economy boomed, the cost doubled to over $40 million, as demand for vessels of all sizes exceeded available yard

capacity. After the Global Economic Crisis in 2009, the cost fell back to $20M. As of 2018, the average price was £23 million.



Plans of a geared Handymax bulk carrier

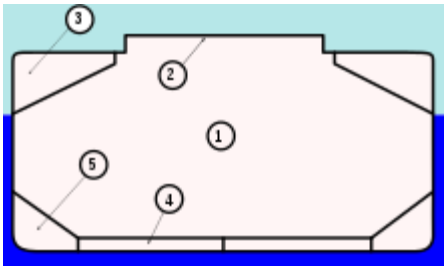
A **bulk carrier, bulker** is a merchant ship specially designed to transport unpackaged bulk cargo, such as grains, coal, ore, steel coils and cement, in its cargo holds. Since the first specialized bulk carrier was built in 1852, economic forces have led to continued development of these ships, resulting in increased size and sophistication. Today's bulk carriers are specially designed to maximize capacity, safety, efficiency, and durability.

Today, bulk carriers make up 21% of the world's merchant fleets and range in size from single-hold mini-bulk carriers to mammoth ore ships able to carry 400,000 metric tons of deadweight (DWT). A number of specialized designs exist: some can unload their own cargo, some depend on port facilities for unloading, and some even package the cargo as it is loaded. Over half of all bulk carriers have Greek, Japanese, or Chinese owners and more than a quarter are registered in Panama. South Korea is the largest single builder of bulk carriers, and 82% of these ships were built in Asia.

On bulk carriers, crew are involved in operation management and maintenance of the vessel taking care of safety, navigation, maintenance and cargo care, in accordance with international maritime legislation. Cargo loading operations vary in complexity and loading and discharging of cargo can take several days. Bulk carriers can be gearless (dependent upon terminal equipment) or geared (having cranes integral to the vessel). Crews can range in size from three people on the smallest ships to over 30 on the largest.

Bulk cargo can be very dense, corrosive, or abrasive. This can present safety problems: cargo shifting, spontaneous combustion, and cargo saturation can threaten a ship. The use of ships that are old and have corrosion problems has been linked to a spate of bulk carrier sinking in the 1990s, as have the bulk carrier's large hatchways. While important for efficient cargo handling, these allow the entry of large volumes of water in storms or if a ship is endangered by sinking. New international regulations have since been introduced to improve ship design and inspection, and to streamline the process of a crew's abandoning ship.

Definition



The term bulk carrier has been defined in varying ways. As of 1999, the International Convention for the Safety of Life at Sea defines a bulk carrier as "a ship constructed with a single deck, top side tanks and hopper side tanks in cargo spaces and intended to primarily carry dry cargo in bulk; an ore carrier; or a combination carrier." Most classification societies use a broader definition, by which a bulk carrier is any ship that carries dry unpackaged goods. Multipurpose cargo ships can carry bulk cargo, but can also carry other cargoes and are not specifically designed for bulk carriage. The term "dry bulk carrier" is used to distinguish bulk carriers from bulk liquid carriers such as oil, chemical, or liquefied petroleum gas carriers. Very small bulk carriers are almost indistinguishable from general cargo ships, and they are often classified based more on the ship's use than its design.

A number of abbreviations are used to describe bulk carriers. "OBO" describes a bulk carrier that carries a combination of ore, bulk, and oil, and "O/O" is used for combination oil and ore carriers. The terms "VLOC", "VLBC", "ULOC", and "ULBC" for very large and ultra-large ore and bulk carriers were adapted from the supertanker designations very large crude carrier and ultra-large crude carrier.

History

Before specialized bulk carriers were developed, shippers had two methods to move bulk goods by ship. In the first method, longshoremen loaded the cargo into sacks, stacked the sacks onto pallets, and put the pallets into the cargo hold with a crane. The second method required the shipper to charter an entire ship and spend time and money to build plywood bins into the holds. Then, to guide the cargo through the small hatches, wooden feeders and shifting boards had to be constructed. These methods were slow and labor-intensive. As with the container ship, the problem of efficient loading and unloading has driven the evolution of the bulk carrier.

Specialized bulk carriers began to appear as steam-powered ships became more popular. The first steam ship recognized as a bulk carrier was the British collier *John Bowes*, built in 1852. She featured a metal hull, a steam engine, and a ballasting system which used seawater instead of sandbags. These features helped her succeed in the competitive British coal market. The first self-unloader was the lake freighter *Hennepin* in 1902 on the Great Lakes. This greatly decreased the unloading time of bulk carriers by using conveyor belt to move the cargo. The first bulk carriers with diesel propulsion began to appear in 1911.

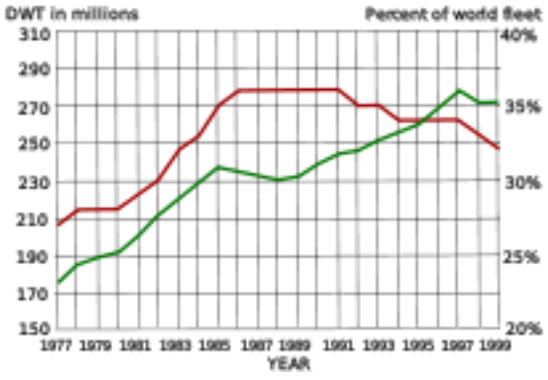
Before World War II, the international shipping demand for bulk products was low—about 25 million tons for metal ores—and most of this trade was coastal. However, on the Great

Lakes, bulk carriers hauled vast amounts of ore from the northern mines to the steel mills. In 1929, 73 million tons of iron ore was transported on the Lakes, and an almost equal amount of coal, limestone, and other products were also moved.[14] Two defining characteristics of bulk carriers were already emerging: the double bottom, which was adopted in 1890, and the triangular structure of the ballast tanks, which was introduced in 1905. After World War II, an international bulk trade began to develop among industrialized nations, particularly between the European countries, the United States and Japan.[11] Due to the economics of this trade, ocean bulk carriers became larger and more specialized. In this period, Great Lakes freighters increased in size, to maximize economies of scale, and self-unloaders became more common to cut turnaround time. The thousand-footers of the Great Lakes fleets, built in the 1970s, were among the longest ships afloat and in 1979, a record 214 million ton of bulk cargo were moved on the Great Lakes.



Post-deepening of the Suez Canal, a capesize bulk carrier approaches the Egyptian-Japanese Friendship Bridge

Fleet characteristics

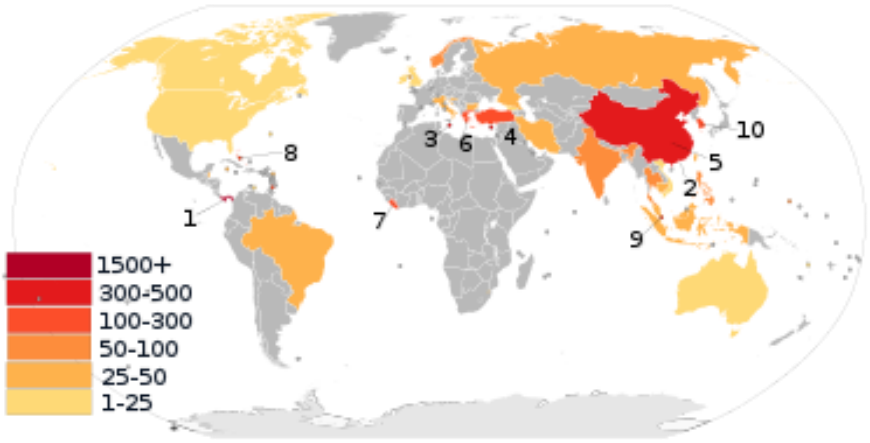


Growth of bulk carrier deadweight tonnage in green and percentage of bulk carriers to the entire fleet in red, from 1977 to 1999.

The world's bulk transport has reached immense proportions: in 2005, 1.7 billion metric tons of coal, iron ore, grain, bauxite, and phosphate was transported by ship. Today, the world's bulk carrier fleet includes 6,225 ships of over 10,000 DWT, and represent 40% of all ships in

terms of tonnage and 39.4% in terms of vessels. Including smaller ships, bulk carriers have a total combined capacity of almost 346 million DWT. Combined carriers are a very small portion of the fleet, representing less than 3% of this capacity. The lake freighters of the Great Lakes, with 98 ships of 3.2 million total DWT, despite forming a small fraction of the total fleet by tonnage and only operating 10 months a year, carried a tenth of the world's bulk cargo because of the short trip distance and fast turnarounds.

As of 2005, the average bulk carrier was just over 13 years old. About 41% of all bulk carriers were less than ten years old, 33% were over twenty years old, and the remaining 26% were between ten and twenty years of age. All of the 98 bulk carriers registered in the Great Lakes trade are over 20 years old and the oldest still sailing in 2009 was 106 years old.



Bulk carriers by flag state

Flag states

As of 2005, the United States Maritime Administration counted 6,225 bulk carriers of 10,000 DWT or greater worldwide. More bulk carriers are registered in Panama, with 1,703 ships, more than any four other flag states combined. In terms of the number of bulk carriers registered, the top five flag states also include Hong Kong with 492 ships, Malta (435), Cyprus (373), and China (371). Panama also dominates bulk carrier registration in terms of deadweight tonnage. Positions two through five are held by Hong Kong, Greece, Malta, and Cyprus.

Deadweight tonnage

Deadweight tonnage is a measure of a vessel's weight carrying capacity, not including the empty weight of the ship. It is distinct from the **displacement** (weight of water displaced), which includes the ship's own weight, or other volume or capacity measures such as **gross tonnage** or **net tonnage** (or their more archaic forms gross register tonnage or net register tonnage).

Deadweight tonnage was historically expressed in long tons but is now usually given internationally in tons (metric tons). In modern international shipping conventions such as the International Convention for the Safety of Life at Sea and the International Convention for the Prevention of Pollution From Ships, deadweight is explicitly defined as the difference

in tonnes between the displacement of a ship in water of a specific gravity of 1.025 (corresponding to average density of sea water) at the draft corresponding to the assigned summer freeboard and the light displacement (lightweight) of the ship.

Largest fleets

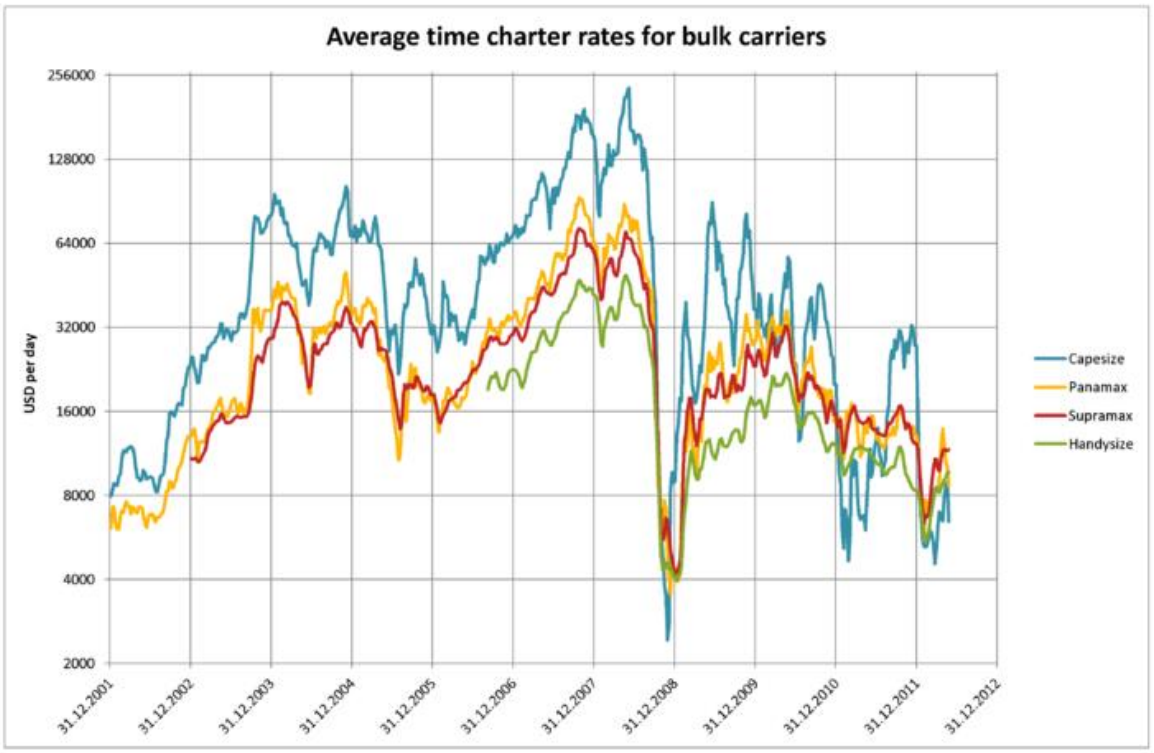
Greece, Japan, and China are the top three owners of bulk carriers, with 1,326, 1,041, and 979 vessels respectively. These three nations account for over 53% of the world's fleet.

Several companies have large private bulk carrier fleets. The multinational company Gearbulk Holding Ltd. has over 70 bulk carriers. The Fednav Group in Canada operates a fleet of over 80 bulk carriers, including two designed to work in Arctic ice. Croatia's Atlantska Plovidba d.d. has a fleet of 14 bulk carriers. The H. Vogemann Group in Hamburg, Germany operates a fleet of 19 bulk carriers. Portline in Portugal, owns 10 bulk carriers. Dampskibsselskabet Torm in Denmark and Elcano in Spain also own notable bulk carrier fleets. Other companies specialize in mini-bulk carrier operations: England's Stephenson Clarke Shipping Limited owns a fleet of eight mini-bulk carriers and five small Handysize bulk carriers, and Cornships Management and Agency Inc. in Turkey owns a fleet of seven mini-bulk carriers.

Builders

Asian companies dominate the construction of bulk carriers. Of the world's 6,225 bulk carriers, almost 62% were built in Japan by shipyards such as Oshima Shipbuilding and Sanoyas Hishino Meisho. South Korea, with notable shipyards Daewoo and Hyundai Heavy Industries, ranked second among builders, with 643 ships. The People's Republic of China, with large shipyards such as Dalian, Chengxi, and Shanghai Waigaoqiao, ranked third, with 509 ships. Taiwan, with shipyards such as China Shipbuilding Corporation, ranked fourth, accounting for 129 ships. Shipyards in these top four countries built over 82% of the bulk carriers afloat.

Freight charges



Average time charter rates for bulk carriers

Several factors affect the cost to move a bulk cargo by ship. The bulk freight market is very volatile, and it fluctuates, along with the type of cargo, the ship's size, and the route traveled all affect the final price. Moving a capesize load of coal from South America to Europe cost anywhere from $15 to $25 per ton in 2005. Hauling a panamax-sized load of aggregate materials from the Gulf of Mexico to Japan that year could cost as little as $40 per ton to as much as $70 per ton.

Some shippers choose instead to charter a ship, paying a daily rate instead of a set price per ton. In 2005, the average daily rate for a Handymax ship varied between $18,000 – $30,000. A Panamax ship could be chartered for $20,000 – $50,000 per day, and a Capesize for $40,000 – $70,000 per day.

Ship breaking

Generally, ships are removed from the fleet by going through a process known as ship breaking or scrapping. Ship-owners and buyers negotiate scrap prices based on factors such as the ship's empty weight (called light ton displacement or LDT) and prices in the scrap metal market. In 1998, almost 700 ships were scrapped in places like Alang, India and Chittagong, Bangladesh. This is often done by 'beaching' the ship on open sand, then cutting it apart by hand with gas torches, a dangerous operation that results in injuries and fatalities, as well as exposure to toxic materials such as asbestos, lead, and various chemicals. Half a million deadweight tons worth of bulk carriers were scrapped in 2004, accounting for 4.7% of the

year's scrapping. That year, bulk carriers fetched particularly high scrap prices, between $340 and $350 per LDT.

Operation

Crew

During the 1990s, bulk carriers were involved in an alarming number of shipwrecks. This led ship-owners to commission a study seeking to explain the effect of various factors on the crew's effectiveness and competence. The study showed that crew performance aboard bulk carriers was the lowest of all groups studied. Among bulk carrier crews, the best performance was found aboard younger and larger ships. Crews on better-maintained ships performed better, as did crews on ships where fewer languages were spoken.

Fewer deck officers are employed on bulk carriers than on similarly sized ships of other types. A mini-bulk carrier carries two to three deck officers, while larger Handysize and Capesize bulk carriers carry four. Liquid natural gas tankers of the same size have an additional deck officer and unlicensed mariner.

The crew on a bulk carrier typically consists of 20 to 30 people, though smaller ships can be handled by 8. The crew includes the captain or master, the deck department, the engine department, and the steward's department. The practice of taking passengers aboard cargo ships, once almost universal, is very rare today and almost non-existent on bulk carriers.

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Typical bulk carrier crew		
Captain/Master		
Deck department	**Engine department**	**Steward's department**
1 Chief mate 1 Second mate 1 Third mate 1 Boatswain 1 Carpenter 2–6 Able seamen 0–2 Ordinary seamen	1 Chief engineer 1 Second engineer 1 Third engineer 1–2 Fourth engineers 3 Watch keepers 0–2 Motormen 1–3 Oilers 0–3 Greasers 1–3 Wipers	1 Chief steward 1 Chief cook 1 Crew cook 1 Chief Steward assistant 4 Stewards

• A **sea captain**, **ship's captain**, **captain**, **master**, or **shipmaster**, is a high-grade licensed mariner who holds ultimate command and responsibility of a merchant vessel. The captain is responsible for the safe and efficient operation of the ship—including its seaworthiness,

safety and security, cargo operations, navigation, crew management, and legal compliance and for the persons and cargo on board.

• A **chief mate** (**C/M**) or **chief officer (Ch/O)**, usually also synonymous with the **first mate** or **first officer**, is a licensed mariner and head of the deck department of a merchant ship. The chief mate is customarily a watch stander and is in charge of the ship's cargo and deck crew. The actual title used will vary by ship's employment, by type of ship, by nationality, and by trade: for instance, *chief mate* is not usually used in the Commonwealth, although *chief officer* and *first mate* are; on passenger ships, the first officer may be a separate position from that of the chief officer that is junior to the latter. The chief mate answers to the captain for the safety and security of the ship. Responsibilities include the crew's welfare and training in areas such as safety, firefighting, search and rescue.

• A **second mate** (**2nd Mate**) or **second officer** (**2/O**) is a licensed member of the deck department of a merchant ship holding a Second Mates Certificate of Competency, which is issued by the administration. The second mate is the third in command (or on some ocean liners fourth) and a watch keeping officer, customarily the ship's navigator. Other duties vary, but the second mate is often the medical officer] and in charge of maintaining distress signaling equipment. On oil tankers, the second mate usually assists the chief mate with the Cargo operations. The Navigator's role focuses on creating the ship's passage plans. A passage plan is a comprehensive, step by step description of how the voyage is to proceed from berth to berth or one port to another. The plan includes undocking, departure, the en route portion of a voyage, approach, and mooring at the destination. The GMDSS (Global Maritime Distress and Safety System) officer role consists of performing tests and maintenance, and ensuring the proper log-keeping on the ship's Global Maritime Distress Safety System equipment. Safety equipment includes Emergency Position-Indicating Radio Beacons, a NAVTEX unit, INMARSAT consoles, various radios, Search and Rescue Transponders, and Digital Selective Calling systems. **Passage planning** or **voyage planning** is a procedure to develop a complete description of a vessel's voyage from start to finish. The plan includes leaving the dock and harbor area, the *en route* portion of a voyage, approaching the destination, and mooring, the industry term for this is 'berth to berth'. According to international law, a vessel's captain is legally responsible for passage planning, the duty of passage planning is usually delegated to the ship's navigation officer, typically the second officer on merchant ships. Studies show that human error is a factor in 80 percent of navigational accidents and that in many cases the human making the error had access to information that could have prevented the accident. The practice of voyage planning has evolved from penciling lines on nautical charts to a process of risk management. A **mooring** is any permanent structure to which a vessel may be secured. Examples include quays, wharfs, jetties, piers, anchor buoys, and mooring buoys. A ship is secured to a mooring to forestall free movement of the ship on the water. An *anchor mooring* fixes a vessel's position relative to a point on the bottom of a waterway without connecting the vessel to shore. As a verb, *mooring* refers to the act of attaching a vessel to a mooring. The term likely stems from the Dutch verb *meren* (to *moor*), used in English since the end of the 15th century.



A dockworker places a mooring line on a bollard.

• A **third mate** (**3/M**) or **third officer** is a licensed member of the deck department of a merchant ship. The third mate is a watch stander and customarily the ship's safety officer and fourth-in-command (fifth on some ocean liners). The position is junior to a second mate. Other duties vary depending on the type of ship, its crewing, and other factors. Duties related to the role of safety officer focus on responsibility for items such as firefighting equipment, lifeboats, and various other emergency systems.
• A **boatswain**, **bo's'n**, **bos'n**, or **bosun**, also known as a **Petty Officer**, **deck boss**, or a **qualified member of the deck department**, is the senior most rate of the deck department and is responsible for the components of a ship's hull. The boatswain supervises the other members of the ship's deck department, and typically is not a watch stander, except on vessels with small crews. Additional duties vary depending upon ship, crew, and circumstances.
• An **able seaman** (AB) is a naval rating of the deck department of a merchant ship with more than two years' experience at sea and considered "well acquainted with his duty". An AB may work as a watch stander, a day worker, or a combination of these roles. Once a sufficient amount of sea time is acquired, then the AB can apply to take a series of courses/examinations to become certified as an officer.

• An **ordinary seaman** (OS) is a naval rating of the deck department of a ship. The position is an apprenticeship to become an able seaman, and has been for centuries. In modern times, an OS is required to work on a ship for a specific amount of time, gaining what is referred to as "sea time". For centuries, the term ordinary seaman was used to refer to a seaman with between one and two years' experience at sea, who showed enough seamanship to be so rated by their captain. Historically in some navies and the merchant marine a sailor with less experience was called a landsman.

• An **OS** is generally not required to stand watch, but must pass examinations on watch standing skills such as performing lookout duty and being a helmsman. Thus an OS will often be found on a ship's bridge after working hours taking a turn at the ship's wheel or being familiarized with bridge equipment. During the apprenticeship, an OS performs a variety of duties concerned with the operation and upkeep of deck department areas and equipment. These duties vary with the type of ship, the type of voyage, the number of crewmembers, the

weather, the supervisor, and any number of other variables. However, in most cases, one can expect an ordinary seaman to clean, to perform maintenance, to work with deck equipment, and to undergo on-the-job-training under the supervision of senior deck department members.

- A **chief engineer**, commonly referred to as "**Ch/Eng**" or "**Chief**", is the senior most engine officer of an engine department on a ship, typically a merchant ship, and holds overall leadership and the responsibility of that department. As a person who holds one of the most senior roles on the ship, they must have excellent communication and leadership skills. They will be expected to regularly work alongside other crew members and external consultants, and most importantly, provide guidance to his or her team. To be a chief engineer, an engineer must attain a chief engineer's license appropriate to the tonnage, power rating, and type of ship that they are employed on. A chief engineer is ultimately responsible for all operations and maintenance that has to do with any and all engineering equipment throughout the entire ship, and supervises all other engineering officer and engine ratings within the department. The chief engineer is a similar rank as the Captain, but the Captain is the commanding officer on board and in overall command of the vessel. As commanding officer he is responsible for the vessel, cargo and crew. Therefore, all personnel on board answer to him.
- A **second engineer** or **first assistant engineer** is a licensed member of the engineering department on a merchant vessel. This title is used for the person on a ship responsible for supervising the daily maintenance and operation of the engine department. They report directly to the chief engineer. On a merchant vessel, depending on term usage, "**the First**" or "the **Second**" is the marine engineer second in command of the engine department after the ship's chief engineer. Due to the supervisory role this engineer plays, in addition to being responsible for the refrigeration systems, main engines (steam/gas turbine, diesel), and any other equipment not assigned to the third engineer or fourth engineer(s), he is typically the busiest engineer aboard the ship. If the engine room requires 24/7 attendance and other junior engineers can cover the three watch rotations, the first is usually a "day worker" from 0800-1700, with overtime hours varying according to ship/company. The second engineer is usually in charge of preparing the engine room for arrival, departure, or standby and oversees major overhauls on critical equipment.
- A **third engineer** or **second assistant engineer** is a rank of engine officer who is part of the engine department on a ship. The third engineer is usually in charge of boilers, fuel, auxiliary engines, condensate and feed systems, and is the third most senior engine officer on board. Depending on usage, "the Third" or "the Second" is also typically in charge of fueling (a.k.a. bunkering), granted the officer holds a valid Person In Charge (PIC) endorsement for fuel transfer operations. The exact duties of this position will often depend upon the type of ship and arrangement of the engine department. On ships with steam propulsion plants the Second or Third is in charge of the boilers, combustion control, soot blowers, condensate and feed equipment, feed pumps, fuel, and condensers. On diesel and gas turbine propulsion plants the Second is in charge of auxiliary boilers, auxiliary engines, incinerator, air compressors, fuel, and fuel oil purifiers.
- A **Fourth Engineer** or **Third Assistant Engineer** is a rank of engine officer who is part of the engine department on a merchant vessel.
- An Engine Room watch keeper, also known as a **qualified member of the engineering department** and keeps watch along with a qualified Engineer in the engine Room.

- A **motorman**, also known as a **qualified member of the engineering department** (**QMED**), is the senior most rate in the engine room of a ship. The motorman performs a variety of tasks connected with the maintenance and repair of engine room, fireroom, machine shop, ice-machine room, and steering-engine room equipment. The motorman inspects equipment such as pumps, turbines, distilling plants, and condensers, and prepares record of condition. The motorman lubricates and maintains machinery and equipment such as generators, steering systems, lifeboats, and sewage disposal systems, and also cleans and restores tools and equipment. A **motorman**, also known as a **qualified member of the engineering department** (**QMED**), is the senior most rate in the engine room of a ship. The motorman performs a variety of tasks connected with the maintenance and repair of engine room, fireroom, machine shop, ice-machine room, and steering-engine room equipment. The motorman inspects equipment such as pumps, turbines, distilling plants, and condensers, and prepares record of condition. The motorman lubricates and maintains machinery and equipment such as generators, steering systems, lifeboats, and sewage disposal systems, and also cleans and restores tools and equipment.
- An **oiler** (also known as a "greaser") is a worker whose main job is to oil machinery. In previous eras there were oiler positions in various industries, including maritime work (naval and commercial), railroading, steelmaking, and mining. Today most such positions have been eliminated through technological change; lubrication tends to require less human intervention, so that workers seldom have oiling as a principal duty. In the days of ubiquitous plain bearings, oiling was often a job description in and of itself. Today, shipping is the economic segment that most thoroughly retains the notion of the oiler as a separate position. On a merchant ship, an oiler is an unlicensed rate of the engineering department. The position is of the junior rate in the engine room of a ship. The oiler is senior only to a wiper. Once a sufficient amount of sea time is acquired, the Oiler can apply to take a series of courses/examinations to become certified as an engineer.
- A **wiper** is the most junior rate in the engine room of a ship. The role of a wiper consists of cleaning the engine spaces and machinery, and assisting the engineers as directed. The position is an apprenticeship to become an oiler. In modern times, a wiper is required to work on a ship for a specific amount of time, gaining what is referred to as "sea time."
- A **chief steward** is the senior crew member working in the steward's department of a ship. Since there is no purser on most ships in the United States Merchant Marine, the steward is the senior person in the department, whence its name. In the British Merchant Navy, a steward **(GS)**. d is a junior member of the department (referred to as a steward's assistant in the United States), and so the term "chief steward" is always used for the senior member.
- A **chief cook** (often shortened to cook) is a senior most unlicensed crewmember working in the steward's department of a merchant ship. The chief cook's principal role is to ensure the preparation and serving of meals that are both delicious and nutritious. In addition to directing and participating in the preparation and serving of meals, the chief cook determines timing and sequence of operations required to meet serving times; inspects galley and equipment for cleanliness; and oversees proper storage and preparation of food. The cook may plan or assist in planning meals and taking inventory of stores and equipment.
- Chief Steward assistance normally under training to become a chief steward.
- A **steward's assistant** (**SA**) is an unlicensed, entry-level crewmember in the Steward's department of a merchant ship. This position can also be referred to as **steward** (the usual term on British ships), **galley utility man**, **mess man**, **supply**, **waiter** or **General Steward.** The

role of the steward's assistant consists mainly of stocking, cleaning and assisting with the preparation and serving of meals.

Crew safety



Launch of a free-fall lifeboat.

Voyages

A bulk carrier's voyages are determined by market forces; routes and cargoes often vary. A ship may engage in the grain trade during the harvest season and later move on to carry other cargoes or work on a different route. Aboard a coastal carrier in the tramp trade, the crew will often not know the next port of call until the cargo is fully loaded.

Because bulk cargo is so difficult to discharge, bulk carriers spend more time in port than other ships. A study of mini-bulk carriers found that it takes, on average, twice as much time to unload a ship as it does to load it. A mini-bulk carrier spends 55 hours at a time in port, compared to 35 hours for a lumber carrier of similar size. This time in port increases to 74 hours for Handymax and 120 hours for Panamax vessels. Compared with the 12-hour turnarounds common for container ships, 15-hour turnarounds for car carriers, and 26-hour turnarounds for large tankers, bulk carrier crews have more opportunities to spend time ashore.

Loading and unloading (Discharging)

Loading and unloading a bulk carrier is time-consuming and dangerous. The process is planned by the ship's chief mate under the direct and continued supervision of ship's captain. International regulations require that the captain and terminal master agree on a detailed plan before operations begin. Deck officers and stevedores oversee the operations. Occasionally loading errors are made that cause a ship to capsize or break in half at the pier.

The loading method used depends on both the cargo and the equipment available on the ship and on the dock. In the least advanced ports, cargo can be loaded with shovels or bags poured from the hatch cover. This system is being replaced with faster, less labor-intensive methods. Double-articulation cranes, which can load at a rate of 1,000 tons per hour, represent a widely used method, and the use of shore-based gantry cranes, reaching 2,000 tons per hour, is growing. A crane's discharge rate is limited by the bucket's capacity (from 6 to 40 tons) and by the speed at which the crane can take a load, deposit it at the terminal and return to take the next. For modern gantry cranes, the total time of the grab-deposit-return cycle is about 50 seconds.

Conveyor belts offer a very efficient method of loading, with standard loading rates varying between 100 and 700 tons per hour, although the most advanced ports can offer rates of 16,000 tons per hour. Start-up and shutdown procedures with conveyor belts, though, are complicated and require time to carry out. Self-discharging ships use conveyor belts with load rates of around 1,000 tons per hour.

Once the cargo is discharged, the crew begins to clean the holds. This is particularly important if the next cargo is of a different type. The immense size of cargo holds and the tendency of cargoes to be physically irritating add to the difficulty of cleaning the holds. When the holds are clean, the process of loading begins.

It is crucial to keep the cargo level during loading in order to maintain stability. As the hold is filled, machines such as excavators and bulldozers are often used to keep the cargo in check. Leveling is particularly important when the hold is only partly full, since cargo is more likely to shift. Extra precautions are taken, such as adding longitudinal divisions and securing wood atop the cargo. If a hold is full, a technique called tomming is used, which involves digging out a 6 feet (2 m) hole below the hatch cover and filling it with bagged cargo or weights.

A typical bulk carrier offload

				
1. A bulldozer is loaded into the hold.	**2.** The bulldozer pushes cargo to the center of the hold.	**3.** The gantry crane picks up the cargo.	**4.** The gantry crane removes the cargo from the ship.	**5.** The gantry crane moves the cargo to a bin on the pier.

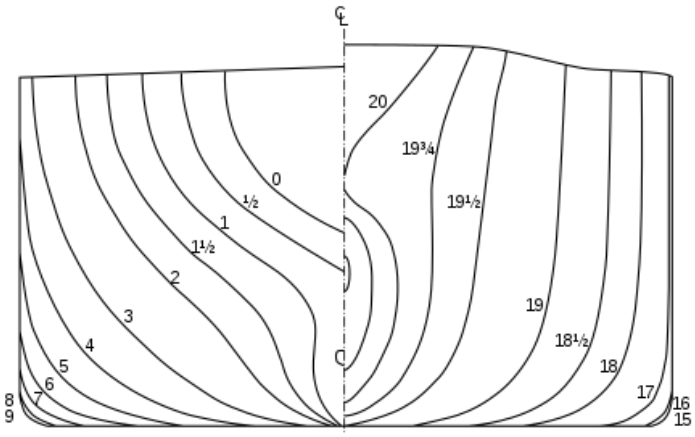
Architecture

A bulk carrier's design is largely defined by the cargo it will carry. The cargo's density, also known as its stowage factor, is the key factor. Densities for common bulk cargoes vary from 0.6 tons per cubic meter for light grains to 3 tons per cubic meter for iron ore.

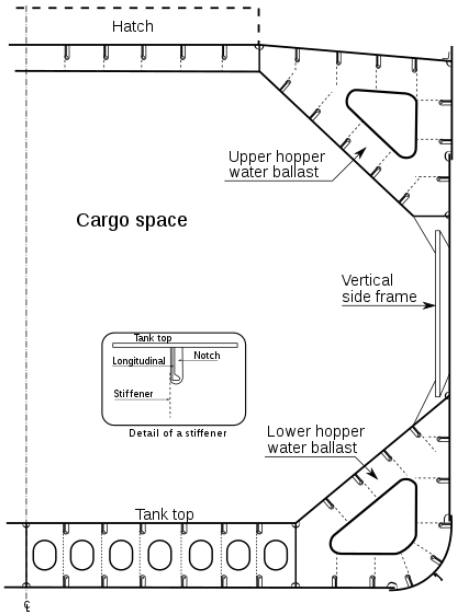
The overall cargo weight is the limiting factor in the design of an ore carrier, since the cargo is so dense. Coal carriers, on the other hand, are limited by overall volume, since most bulk carriers can be completely filled with coal before reaching their maximum draft.

For a given tonnage, the second factor which governs the ship's dimensions is the size of the ports and waterways it will travel to. For example, a vessel that will pass the Panama Canal will be limited in its beam and draft. For most designs, the ratio of length-to-width ranges between 5 and 7, with an average of 6.2. The ratio of length-to-height will be between 11 and 12.

Examples of bulk carrier architectural plans



Line plan of a 1990 Capesize ore carrier.



Typical midship section of a bulk carrier with a single hull and double bottom.

Machinery

The engine room on a bulk carrier is usually near the stern, under the superstructure. Larger bulk carriers, from Handymax up, usually have a single two-stroke low-speed crosshead diesel engine directly coupled to a fixed-pitch propeller. Electricity is produced by auxiliary generators and/or an alternator coupled to the propeller shaft. On the smaller bulk carriers, one or two four-stroke diesels are used to turn either a fixed or controllable-pitch propeller via a reduction gearbox, which may also incorporate an output for an alternator.[3] The average design ship speed for bulk carriers of Handysize and above is 13.5–15 knots (25.0–27.8 km/h; 15.5–17.3 mph). The propeller speed is relatively low, at about 90 revolutions per minute, although it depends on the size of the propeller.

As a result of the 1973 oil crisis, the 1979 energy crisis, and the resulting rise in oil prices, experimental designs using coal to fuel ships were tested in the late 1970s and early 1980s. The Australian National Lines (ANL) constructed two 74,700-ton coal-burner ships called *River Boyne* and *River Embely*. Along with two constructed by TNT called *TNT Capricornia* and *TNT Capentaria* and renamed *Fitzroy River* and *Endeavor River*. These ships were financially effective for the duration of their lives, and their steam engines were able to generate a shaft-power of 19,000 horsepower (14,000 kW). This strategy gave an interesting advantage to carriers of bauxite and similar fuel cargoes, but suffered from poor engine yield compared to higher maintenance cost and efficient modern diesels, maintenance problems due to the supply of ungraded coal, and high initial costs.

Hatches



The sliding hatch covers of Zaira.

A hatch or hatchway is the opening at the top of a cargo hold. The mechanical devices which allow hatches to be opened and closed are called hatch cover. In general, hatch covers are between 45% and 60% of the ship's breadth, or beam, and 57% to 67% of the length of the holds. To efficiently load and unload cargo, hatches must be large, but large hatches present structural problems. Hull stress is concentrated around the edges of the hatches, and these areas must be reinforced. Often, hatch areas are reinforced by locally increasing the scantlings or by adding structural members called stiffeners. Both of these options have the undesired effect of adding weight to the ship.

As recently as the 1950s, hatches had wooden covers that would be broken apart and rebuilt by hand, rather than opened and closed. Newer vessels have hydraulic-operated metal hatch covers that can often be operated by one person. Hatch covers can slide forwards, backwards,

or to the side, lift up or fold up. It is essential that the hatch covers be watertight: unsealed hatches lead to accidental cargo hold flooding, which has caused many bulk carriers to sink.

Regulations regarding hatch covers have evolved since the investigation following the loss of the MV *Derbyshire*. The Load Line Conference of 1966 imposed a requirement that hatch covers be able to withstand load of 1.74 tons/m^2 due to sea water, and a minimum scantling of 6 mm for the tops of the hatch covers. The International Association of Classification Societies then increased this strength standard by creating its *Unified Requirement S21* in 1998. This standard requires that the pressure due to sea water be calculated as a function of freeboard and speed, especially for hatch covers located on the forward portion of the ship.

Hull



Unloaded Trillium-class dry bulk carrier at the Port of Redwood City

Bulk carriers are designed to be easy to build and to store cargo efficiently. To facilitate construction, bulk carriers are built with a single hull curvature. Also, while a bulbous bow allows a ship to move more efficiently through the water, designers lean towards simple vertical bows on larger ships. Full hulls, with large block coefficients, are almost universal, and as a result, bulk carriers are inherently slow. This is offset by their efficiency. Comparing a ship's carrying capacity in terms of deadweight tonnage to its weight when empty is one way to measure its efficiency. A small Handymax ship can carry five times its weight.[3] In larger designs, this efficiency is even more pronounced: Capesize vessels can carry more than eight times their weight.

Bulk carriers have a cross-section typical of most merchant ships. The upper and lower corners of the hold are used as ballast tanks, as is the double bottom area. The corner tanks are reinforced and serve another purpose besides controlling the ship's trim. Designers choose the angle of the corner tanks to be less than that of the angle of repose of the anticipated cargoes. This greatly reduces side-to-side movement, or "shifting," of cargo which can endanger the ship.

The double bottoms are also subject to design constraints. The primary concern is that they be high enough to allow the passage of pipes and cables. These areas must also be roomy enough to allow people safe access to perform surveys and maintenance. On the other hand, concerns of excess weight and wasted volume keep the double bottoms very tight spaces.

Bulk carrier hulls are made of steel, usually mild steel. Some manufacturers have preferred high-tensile steel recently in order to reduce the tare weight. However, the use of high-tensile steel for longitudinal and transverse reinforcements can reduce the hull's rigidity and resistance to corrosion. Forged steel is used for some ship parts, such as the propeller shaft

support. Transverse partitions are made of corrugated iron, reinforced at the bottom and at connections. The construction of bulk carrier hulls using a concrete-steel sandwich has been investigated.

Double hulls have become popular in the past ten years. Designing a vessel with double sides adds primarily to its breadth, since bulk carriers are already required to have double bottoms. One of the advantages of the double hull is to make room to place all the structural elements in the sides, removing them from the holds. This increases the volume of the holds, and simplifies their structure which helps in loading, unloading, and cleaning. Double sides also improve a ship's capacity for ballasting, which is useful when carrying light goods: the ship may have to increase its draft for stability or seakeeping reasons, which is done by adding ballast water.

A recent design, called Hy-Con, seeks to combine the strengths of single-hull and double-hull construction. Short for Hybrid Configuration, this design doubles the forward-most and rear-most holds and leaves the others single-hulled. This approach increases the ship's solidity at key points, while reducing the overall tare weight.

Since the adoption of double hull has been more of an economic than a purely architectural decision, some argue that double-sided ships receive less comprehensive surveys and suffer more from hidden corrosion. In spite of opposition, double hulls became a requirement for Panamax and Capesize vessels in 2005.

Freighters are in continual danger of "breaking their backs" and thus longitudinal strength is a primary architectural concern. A naval architect uses the correlation between longitudinal strength and a set of hull thicknesses called scantlings to manage problems of longitudinal strength and stresses. A ship's hull is composed of individual parts called *members.* The set of dimensions of these members is called the ship's scantlings. Naval architects calculate the stresses a ship can be expected to be subjected to, add in safety factors, and then can calculate the required scantlings.

These analyses are conducted when traveling empty, loading and unloading, when partially and fully loaded, and under conditions of temporary overloading. Places subject to the largest stresses are studied carefully, such as hold-bottoms, hatch-covers, bulkheads between holds, and the bottoms of ballast tanks. Great Lakes bulk carriers also must be designed to withstand springing, or developing resonance with the waves, which can cause fatigue fractures.

Since 1 April 2006, the International Association of Classification Societies has adopted the *Common Structural Rules.* The rules apply to bulk carriers more than 90 meters in length and require that scantlings' calculations take into account items such as the effect of corrosion, the harsh conditions often found in the North Atlantic, and dynamic stresses during loading. The rules also establish margins for corrosion, from 0.5 to 0.9 mm.

Safety

The 1980s and 1990s were a very unsafe time for bulk carriers. Many bulk carriers sank during this time; 99 were lost between 1990 and 1997 alone. Most of these sinking were sudden and

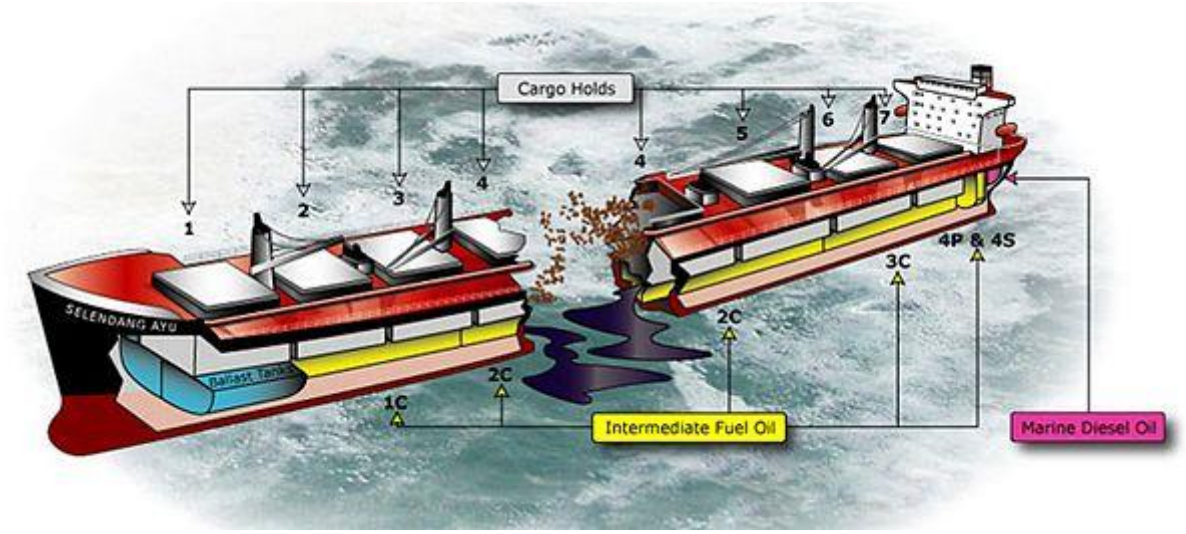
quick, making it impossible for the crew to escape: more than 650 sailors were lost during this same period. Due partly to the sinking of MV *Derbyshire*, a series of international safety resolutions regarding bulk carriers were adopted during the 1990s.

Stability problems

Cargo shifting poses a great danger for bulk carriers. The problem is even more pronounced with grain cargoes, since grain settles during a voyage and creates extra space between the top of the cargo and the top of the hold. Cargo is then free to move from one side of the ship to the other as the ship rolls. This can cause the ship to list, which, in turn, causes more cargo to shift. This kind of chain reaction can capsize a bulk carrier very quickly.

The 1960 SOLAS Convention sought to control this sort of problem. These regulations required the upper ballast tanks designed in a manner to prevent shifting. They also required cargoes to be leveled, or trimmed, using excavators in the holds. The practice of trimming reduces the amount of the cargo's surface area in contact with air which has a useful side-effect: reducing the chances of spontaneous combustion in cargoes such as coal, iron, and metal shavings.

Another sort of risk that can affect dry cargoes is absorption of ambient moisture. When very fine concretes and aggregates mix with water, the mud created at the bottom of the hold shifts easily and can produce a free surface effect. The only way to control these risks is by good ventilation practices and careful monitoring for the presence of water.



Structural problems

Diagram showing the wreck of Selendang Ayu, and the double-bottom tank leaks.

In 1990 alone, 20 bulk carriers sank, taking with them 94 crewmen. In 1991, 24 bulk carriers sank, killing 154. This level of loss focused attention on the safety aspects of bulk carriers, and a great deal was learned. The American Bureau of Shipping concluded that the losses were "directly traceable to failure of the cargo hold structure" and Lloyd's Register of Shipping

added that the hull sides could not withstand "the combination of local corrosion, fatigue cracking and operational damage."

The accident studies showed a clear pattern:

1. Sea water enters the forward hatch, due to a large wave, a poor seal, corrosion, etc.
2. The extra water weight in hold number one compromises the partition to hold number two,
3. Water enters hold number two and alters the trim so much that more water enters the holds
4. With two holds rapidly filling with water, the bow submerges and the ship quickly sinks, leaving little time for the crew to react.

Previous practices had required ships to withstand the flooding of a single forward hold, but did not guard against situations where two holds would flood. The case where two after (rear) holds are flooded is no better, because the engine room is quickly flooded, leaving the ship without propulsion. If two holds in the middle of the ship are flooded, the stress on the hull can become so great that the ship snaps in two.



Selendang Ayu suffered a catastrophic fracture in number 4 hold in December 2004.

Other contributing factors were identified:

- Most shipwrecks involved ships over 20 years in age. A glut of ships of this age occurred in the 1980s, caused by an overestimate of the growth of international trade. Rather than replace them prematurely, shipping companies were compelled on cost grounds to keep their aging vessels in service.
- Corrosion, due to a lack of maintenance, affected the seals of the hatch covers and the strength of the bulkheads which separate holds. The corrosion is difficult to detect due to the immense size of the surfaces involved.
- Advanced methods of loading were not foreseen when the ships were designed. While the new processes are more efficient, loading is more difficult to control (it can take over an hour just to halt the operation), occasionally resulting in overloading the ship. These unexpected shocks, over time, can damage the hull's structural integrity.
- Recent use of high-tensile steel allows building a structure with less material and weight while retaining similar strength. However, because it is thinner than regular steel, HT steel can corrode more easily, plus it can develop metal fatigue in choppy seas.
- According to Lloyd's Register, a principal cause of sinking was the attitude of ship-owners, who sent ships with known problems to sea.

The new rules adopted in the 1997 annexes to the SOLAS convention focused on problems such as reinforcing bulkheads and the longitudinal frame, more stringent inspections (with a particular focus on corrosion) and routine in-port inspections. The 1997 additions also required bulk carriers with restrictions (for instance, forbidden from carrying certain types of cargoes) to mark their hulls with large, easy-to-see triangles.

Oil tanker

Tankers move approximately 2.0 billion metric tons (2.2 billion short tons) of **oil** every year. Second only to pipelines in terms of efficiency, the **average cost** of **transport** of **crude oil** by tanker amounts to only US$5 to $8 per cubic metre ($0.02 to $0.03 per US gallon).

An **oil tanker**, also known as a **petroleum tanker**, is a ship[2] designed for the bulk transport of oil or its products. There are two basic types of oil tankers: **crude tankers** and **product tankers**.[1] Crude tankers move large quantities of unrefined crude oil from its point of extraction to refineries. For example, moving crude oil from oil wells in a producing country to refineries in another country. Product tankers, generally much smaller, are designed to move refined products from refineries to points near consuming markets. For example, moving gasoline from refineries in Europe to consumer markets in Nigeria and other West African nations.

Oil tankers are often classified by their size as well as their occupation. The size classes range from inland or coastal tankers of a few thousand metric tons of deadweight[3] (DWT) to the mammoth ultra large crude carriers (ULCCs) of 550,000 DWT. Tankers move approximately

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[2] - A ship is a large watercraft that travels the world's oceans and other sufficiently deep waterways, carrying goods or passengers, or in support of specialized missions, such as defense, research and fishing. Ships are generally distinguished from boats, based on size, shape, load capacity, and tradition. In the Age of Sail a "ship" was a sailing vessel defined by its sail plan of at least three square rigged masts and a full bowsprit.

Ships have been important contributors to human migration and commerce. They have supported the spread of colonization and the slave trade, but have also served scientific, cultural, and humanitarian needs. After the 15th century, new crops that had come from and to the Americas via the European seafarers significantly contributed to the world population growth. Ship transport is responsible for the largest portion of world commerce.

As of 2016, there were more than 49,000 merchant ships, totaling almost 1.8 billion dead weight tons. Of these 28% were oil tankers, 43% were bulk carriers, and 13% were container ships.

[3] - Deadweight tonnage is a measure of a vessel's weight carrying capacity, not including the empty weight of the ship. It is distinct from the **displacement** (weight of water displaced), which includes the ship's own weight, or other volume or capacity measures such as **gross tonnage** or **net tonnage** (or their more archaic forms gross register tonnage or net register tonnage).

Deadweight tonnage was historically expressed in long tons but is now usually given internationally in tonnes (metric tons). In modern international shipping conventions such as the International Convention for the Safety of Life at Sea and the International Convention for the Prevention of Pollution From Ships, deadweight is explicitly defined as the difference in tonnes between the displacement of a ship in water of a specific gravity of 1.025 (corresponding to average density of sea water) at the draft corresponding to the assigned summer freeboard and the light displacement (lightweight) of the ship.

2.0 billion metric tons (2.2 billion short tons[4]) of oil every year. Second only to pipelines in terms of efficiency, the average cost of transport of crude oil by tanker amounts to only US$5 to $8 per cubic meter ($0.02 to $0.03 per US gallon).

Some specialized types of oil tankers have evolved. One of these is the naval replenishment oiler, a tanker which can fuel a moving vessel. Combination ore-bulk-oil carriers[5] and permanently moored floating storage units are two other variations on the standard oil tanker design. Oil tankers have been involved in a number of damaging and high-profile oil spills. As a result, they are subject to stringent design and operational regulations.

A brief history of shipbuilding designs



Falls of Clyde is the oldest surviving American tanker and the world's only surviving sail-driven oil tanker.

The technology of oil transportation has evolved alongside the oil industry. Although human use of oil reaches to prehistory, the first modern commercial exploitation dates back to James Young's manufacture of paraffin in 1850. In the early 1850s, oil began to be exported from Upper Burma, then a British colony. The oil was moved in earthenware vessels to the river bank where it was then poured into boat holds for transportation to Britain.

In the 1860s, Pennsylvania oil fields became a major supplier of oil, and a center of innovation after Edwin Drake had struck oil near Titusville, Pennsylvania. Break-bulk boats and barges

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[4] - The **short ton** is a *mass* measurement unit equal to 2,000 pounds-mass (907.18474 kg). Its usage is confined to the United States, where it is known as simply a common *ton*.

(Short) **ton** most commonly references its weight, the force exerted by its mass at standard gravity (i.e., short-tons-force). One short-ton contains 2,000 pound-mass (lb), which corresponds to a weight at one standard gravity of 2,000 pound-force (lbf).

[5] - An **ore-bulk-oil carrier**, also known as **combination carrier** or **OBO**, is a ship designed to be capable of carrying wet or dry cargoes. The idea is to reduce the number of empty (ballast) voyages, in which large ships only carry a cargo one way and return empty for another. These are a feature of the larger bulk trades (e.g. crude oil from the Middle East, iron ore and coal from Australia, South Africa and Brazil).

The Russian word for 'ore-bulk-oil carrier', *nefterudovoz* (нефтерудовоз, literally 'oil/ore carrier'), in combination with a number, is often used as a proper name for a ship, e.g. *Nefterudovoz-51M*.

were originally used to transport Pennsylvania oil in 40-US-gallon (150 l) wooden barrels.[7] But transport by barrel had several problems. The first problem was weight: they weighed 29 kilograms (64 lb), representing 20% of the total weight of a full barrel. Other problems with barrels were their expense, their tendency to leak, and the fact that they were generally used only once. The expense was significant: for example, in the early years of the Russian oil industry, barrels accounted for half the cost of petroleum production.

Early designs

In 1863, two sail-driven tankers were built on England's River Tyne. These were followed in 1873 by the first oil-tank steamer, *Vaderland* (Fatherland), which was built by Palmers Shipbuilding and Iron Company for Belgian owners. The vessel's use was curtailed by U.S. and Belgian authorities citing safety concerns. By 1871, the Pennsylvania oil fields were making limited use of oil tank barges and cylindrical railroad tank-cars similar to those in use today.

Modern oil tankers

The modern oil tanker was developed in the period from 1877 to 1885. In 1876, Ludvig and Robert Nobel, brothers of Alfred Nobel, founded Branobel (short for Brothers Nobel) in Baku, Azerbaijan. It was, during the late 19th century, one of the largest oil companies in the world.



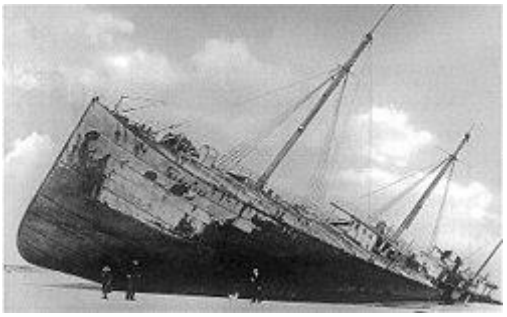
Zoroaster, the world's first tanker, delivered to the Nobel brothers in Baku (Azerbaijan).

Ludvig was a pioneer in the development of early oil tankers. He first experimented with carrying oil in bulk on single-hulled barges. Turning his attention to self-propelled tankships, he faced a number of challenges. A primary concern was to keep the cargo and fumes well away from the engine room to avoid fires. Other challenges included allowing for the cargo to expand and contract due to temperature changes, and providing a method to ventilate the tanks.

The first successful oil tanker was *Zoroaster*, which carried its 246 metric tons (242 long tons) of kerosene cargo in two iron tanks joined by pipes. One tank was forward of the midships engine room and the other was aft. The ship also featured a set of 21 vertical watertight compartments for extra buoyancy. The ship had a length overall of 56 metres (184 ft), a beam of 8.2 metres (27 ft), and a draft of 2.7 metres (9 ft). Unlike later Nobel tankers, the *Zoroaster* design was built small enough to sail from Sweden to the Caspian by way of the Baltic Sea, Lake Ladoga, Lake Onega, the Rybinsk and Mariinsk Canals and the Volga River.

In 1883, oil tanker design took a large step forward. Working for the Nobel Company, British engineer Colonel Henry F. Swan designed a set of three Nobel tankers. Instead of one or two large holds, Swan's design used several holds which spanned the width, or beam, of the ship.

These holds were further subdivided into port and starboard sections by a longitudinal bulkhead. Earlier designs suffered from stability problems caused by the free surface effect[6], where oil sloshing from side to side could cause a ship to capsize. But this approach of dividing the ship's storage space into smaller tanks virtually eliminated free-surface problems. This approach, almost universal today, was first used by Swan in the Nobel tankers *Blesk*, *Lumen*, and *Lux*.



Glückauf grounded in heavy fog at Blue Point Beach on Fire Island.

Others point to *Glückauf*, another design of Colonel Swan, as being the first modern oil tanker. It adopted the best practices from previous oil tanker designs to create the prototype for all subsequent vessels of the type. It was the first dedicated steam-driven ocean-going tanker in the world and was the first ship in which oil could be pumped directly into the vessel hull instead of being loaded in barrels or drums. It was also the first tanker with a horizontal bulkhead; its features included cargo valves operable from the deck, cargo main piping, a vapor line, cofferdams for added safety, and the ability to fill a ballast tank with seawater when empty of cargo. The ship was built in Britain and was purchased by Wilhelm Anton Riedemann, an agent for the Standard Oil Company along with several of her sister ships. After *Glückauf* was lost in 1893 after being grounded in fog, Standard Oil purchased the sister ships.

[6] - The **free surface effect** is a mechanism which can cause a watercraft to become unstable and capsize.

It refers to the tendency of liquids — and of unbound aggregates of small solid objects, like seeds, gravel, or crushed ore, whose behavior approximates that of liquids — to move in response to changes in the attitude of a craft's cargo holds, decks, or liquid tanks in reaction to operator-induced motions (or sea states caused by waves and wind acting upon the craft). When referring to the free surface effect, the condition of a tank that is not full is described as a "**slack tank**", while a full tank is "**pressed up**"

Asian trade



A Royal Dutch Petroleum dock in the Dutch East Indies (now Indonesia)

The 1880s also saw the beginnings of the Asian oil trade the idea that led to moving Russian oil to the Far East via the Suez Canal was the brainchild of two men: importer Marcus Samuel and ship-owner/broker Fred Lane. Prior bids to move oil through the canal had been rejected by the Suez Canal Company as being too risky. Samuel approached the problem a different way: asking the company for the specifications of a tanker it would allow through the canal. Armed with the canal company's specifications, Samuel ordered three tankers from William Gray & Company in northern England. Named *Murex*, *Conch* and *Clam*, each had a capacity of 5,010 long tons of deadweight. These three ships were the first tankers of the Tank Syndicate, forerunner of today's Royal Dutch Shell Company. With facilities prepared in Jakarta, Singapore, Bangkok, Saigon, Hong Kong, Shanghai, and Kobe, the fledgling Shell Company was ready to become Standard Oil's first challenger in the Asian market. On August 24, 1892, *Murex* became the first tanker to pass through the Suez Canal. By the time Shell merged with Royal Dutch Petroleum in 1907, the company had 34 steam-driven oil tankers, compared to Standard Oil's four case-oil steamers and 16 sailing tankers.

The supertanker era

Until 1956, tankers were designed to be able to navigate the Suez Canal. This size restriction became much less of a priority after the closing of the canal during the Suez Crisis of 1956. Forced to move oil around the Cape of Good Hope, ship-owners realized that bigger tankers were the key to more efficient transport. While a typical T2 tanker of the World War II era was 162 metres (532 ft) long and had a capacity of 16,500 DWT, the ultra-large crude carriers (ULCC) built in the 1970s were over 400 metres (1,300 ft) long and had a capacity of 500,000 DWT. The **T2 tanker**, or **T2**, was a class of oil tanker constructed and produced in large quantities in the United States during World War II. Only the **T3 tankers** were larger



"navy oilers" of the period. Some 533 T2s were built between 1940 and the end of 1945.

The T2 tanker Hat Creek in August 1943The T2 tanker Hat Creek in August 1943The T2 tanker Hat Creek in August 1943

The **T3 tanker,** or **T3,** are a class of sea worthy large tanker ships produced in the United States and used to transport fuel oil, gasoline or diesel before and during World War II, the Korean War and the Vietnam War. The T3 tanker classification is still used today. The T3 tanker has a full load displacement of about 24,830 tons. The **T3 tanker,** or **T3,** are a class of sea worthy large tanker ships produced in the United States and used to transport fuel oil, gasoline or diesel before and during World War II, the Korean War and the Vietnam War. The T3 tanker classification is still used today. The T3 tanker has a full load displacement of about 24,830 tons.

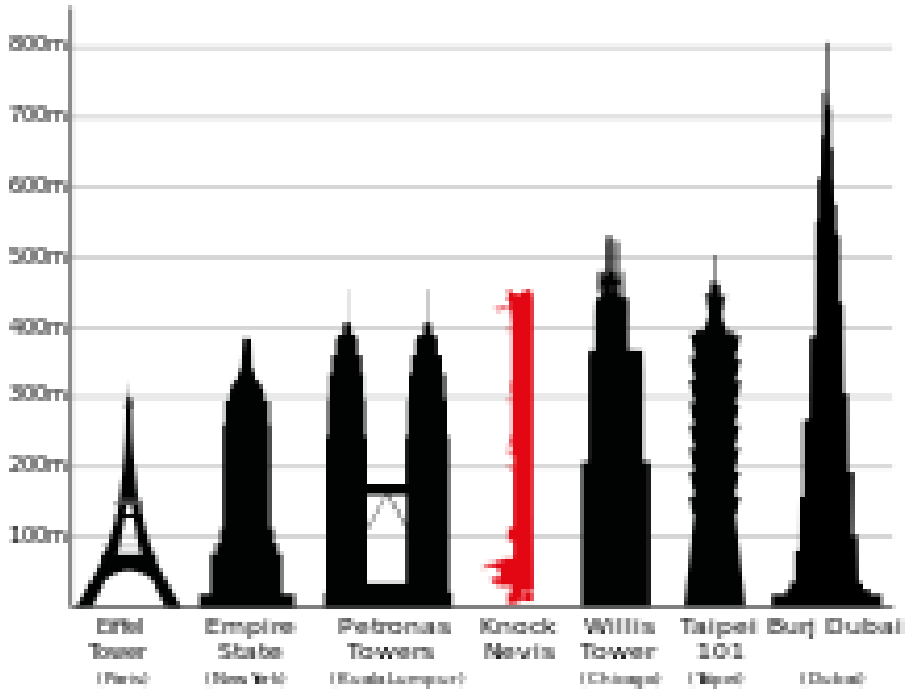


USS *Niobrara*, a T3-S-A1 tanker

Several factors encouraged this growth. Hostilities in the Middle East which interrupted traffic through the Suez Canal contributed, as did nationalization of Middle East oil refineries. Fierce competition among ship-owners also played a part. But apart from these considerations is a simple economic advantage: the larger an oil tanker is, the more cheaply it can move crude oil, and the better it can help meet growing demands for oil.

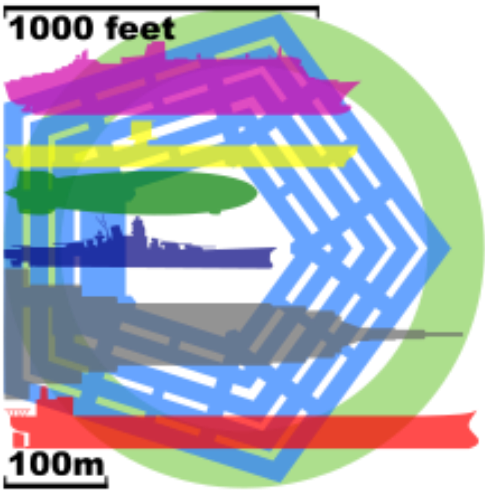
In 1955 the world's largest supertanker was 30,708 GRT and 47,500 LT DWT: SS *Spyros Niarchos* launched that year by Vickers Armstrongs Shipbuilders Ltd in England for Stavros Niarchos.

In 1958 United States shipping magnate Daniel K. Ludwig broke the record of 100,000 long tons of heavy displacement. His *Universe Apollo* displaced 104,500 long tons, a 23% increase from the previous record-holder, *Universe Leader* which also belonged to Ludwig.



Knock Nevis, ex Seawise Giant rivaled some of the world's largest buildings in size

The world's largest supertanker was built in 1979 at the Oppama shipyard by Sumitomo Heavy Industries, Ltd., named. ***Seawise Giant*** (known later as the **Happy Giant**, **Jahre Viking**, **Knock Nevis**, **Oppama**, and **Mont**) was a ULCC supertanker. It was the longest ship ever built and had the greatest deadweight tonnage that has ever been recorded. When it was heavily loaded, the ship had a displacement of 657,019 tons (646,642 long tons; 724,239 short tons) and had a draft of 24.6 m (81 ft). Due to its size and lack of maneuverability, it was not able to move through the English Channel, Suez Canal or the Panama Canal. The ship was sunk during the Iran–Iraq War but was salvaged, restored and put back into service. The ship sailed its final journey in December 2009 after being sold to Indian ship breakers. It was then intentionally beached in Alang, Gujarat, India and was demolished.



*The size comparison between the Knock Nevis (in red) compared to other ships and buildings: The Pentagon, 431 m RMS Queen Mary 2, 345 m USS Enterprise (CVN-65), 342 m Hindenburg, 245 m Yamato, 263 m Empire State Building, 443 m Knock Nevis, ex-**Seawise Giant**, 458 m*

As of 2011, the world's two largest working supertankers are the TI-class supertankers *TI Europe* and *TI Oceania*. These ships were built in 2002 and 2003 as *Hellespont Alhambra* and *Hellespont Tara* for the Greek Hellespont Steamship Corporation. Hellespont sold these ships to Overseas Shipholding Group and Euronav in 2004. Each of the sister ships has a capacity of over 441,500 DWT, a length overall of 380.0 metres (1,246.7 ft) and a cargo capacity of 3,166,353 barrels (503,409,900 l). They were the first ULCCs to be double-hulled. To differentiate them from smaller ULCCs, these ships are sometimes given the *V-Plus* size designation.

With the exception of the pipeline, the tanker is the most cost-effective way to move oil today. Worldwide, tankers carry some 2 billion barrels (3.2×10^{11} l) annually, and the cost of transportation by tanker amounts to only US$0.02 per gallon at the pump.

Size categories:

Oil tanker size categories

AFRA Scale		Flexible market scale			
Class	**Size in DWT**	**Class**	**Size in DWT**	**New price**	**Used price**
General Purpose tanker	10,000–24,999	Product tanker	10,000–60,000	$43M	$42.5M
Medium Range tanker	25,000–44,999	Panamax	60,000–80,000		
LR1 (Long Range 1)	45,000–79,999	Aframax	80,000–120,000	$60.7M	$58M
LR2 (Long Range 2)	80,000–159,999	Suezmax	120,000–200,000		
VLCC (Very Large Crude Carrier)	160,000–319,999	VLCC	200,000–320,000	$120M	$116M
ULCC (Ultra Large Crude Carrier)	320,000–549,999	ULCC	320,000–550,000		



Hellespont Alhambra (now TI Asia), a ULCC TI-class supertanker, which are the largest ocean-going oil tankers in the world

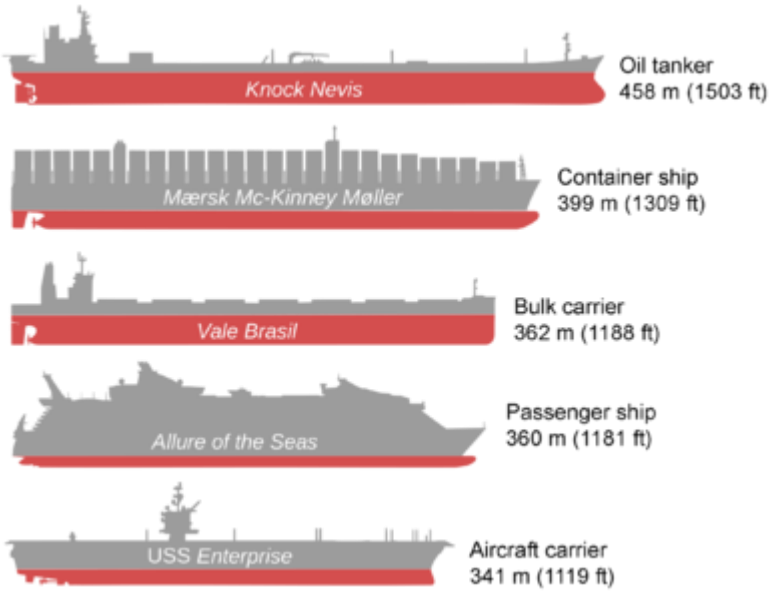
In 1954, Shell Oil developed the "average freight rate assessment" (AFRA) system which classifies tankers of different sizes. To make it an independent instrument, Shell consulted the *London Tanker Brokers' Panel (LTBP)*. At first, they divided the groups as *General Purpose* for tankers under 25,000 tons deadweight (DWT); *Medium Range* for ships between 25,000 and 45,000 DWT and *Long Range* for the then-enormous ships that were larger than 45,000 DWT. The ships became larger during the 1970s, which prompted rescaling.

The system was developed for tax reasons as the tax authorities wanted evidence that the internal billing records were correct. Before the New York Mercantile Exchange started trading crude oil futures in 1983, it was difficult to determine the exact price of oil, which could change with every contract. Shell and BP, the first companies to use the system, abandoned the AFRA system in 1983, later followed by the US oil companies. However, the system is still used today. Besides that, there is the flexible market scale, which takes typical routes and lots of 500,000 barrels (79,000 m^3).

Merchant oil tankers carry a wide range of hydrocarbon liquids ranging from crude oil to refined petroleum products. Their size is measured in deadweight metric tons (DWT). Crude carriers are among the largest, ranging from 55,000 DWT Panamax-sized vessels to ultra-large crude carriers (ULCCs) of over 440,000 DWT.

Smaller tankers, ranging from well under 10,000 DWT to 80,000 DWT Panamax vessels, generally carry refined petroleum products, and are known as product tankers. The smallest tankers, with capacities under 10,000 DWT generally work near-coastal and inland waterways. Although they were in the past, ships of the smaller Aframax and Suezmax classes are no longer regarded as supertankers.

VLCC and ULCC



Knock Nevis (1979–2010), a ULCC supertanker and the longest ship ever built.

"Supertankers" are the largest tankers, and the largest man-made mobile structures. They include very large and ultra-large crude carriers (VLCCs and ULCCs) with capacities over 250,000 DWT. These ships can transport 2,000,000 barrels (320,000 m^3) of oil/318,000 metric tons. By way of comparison, the United Kingdom consumed about 1.6 million barrels (250,000 m^3) of oil per day in 2009. ULCCs commissioned in the 1970s were the largest vessels ever built, but have all now been scrapped. A few newer ULCCs remain in service, none of which are more than 400 meters long.

Because of their size, supertankers often cannot enter port fully loaded. These ships can take on their cargo at offshore platforms and single-point moorings. On the other end of the journey, they often pump their cargo off to smaller tankers at designated lightering points off-coast. Supertanker routes are typically long, requiring them to stay at sea for extended periods, often around seventy days at a time.



AMYNTAS, a brand new VLCC inaugurated in February 2019 berthing at Donges / Saint-Nazaire (France).

Chartering and hiring tankers

The act of hiring a ship to carry cargo is called chartering. Tankers are hired by four types of charter agreements: the voyage charter, the time charter, the bareboat charter, and contract of affreightment. In a voyage charter the charterer rents the vessel from the loading port to the discharge port. In a time charter the vessel is hired for a set period of time, to perform voyages as the charterer directs. In a bareboat charter the charterer acts as the ship's operator and manager, taking on responsibilities such as providing the crew and maintaining the vessel. Finally, in a contract of affreightment or COA, the charterer specifies a total volume of cargo to be carried in a specific time period and in specific sizes, for example a COA could be specified as 1 million barrels (160,000 m^3) of JP-5 in a year's time in 25,000-barrel (4,000 m^3) shipments. A completed chartering contract is known as a charter party.

One of the key aspects of any charter party is the freight rate, or the price specified for carriage of cargo. The freight rate of a tanker charter party is specified in one of four ways: by a lump sum rate, by rate per ton, by a time charter equivalent rate, or by World scale rate. In a lump sum rate arrangement, a fixed price is negotiated for the delivery of a specified cargo, and the ship's owner/operator is responsible to pay for all port costs and other voyage expenses. Rate per ton arrangements are used mostly in chemical tanker chartering, and differ from lump sum rates in that port costs and voyage expenses are generally paid by the charterer. Time charter arrangements specify a daily rate, and port costs and voyage expenses are also generally paid by the charterer.

A *freight rate* (historically and in ship chartering simply **freight**) is a price at which a certain cargo is delivered from one point to another. The price depends on the form of the cargo, the mode of transport (truck, ship, train, and aircraft), the weight of the cargo, and the distance to the delivery destination. Many shipping services, especially air carriers, use dimensional weight for calculating the price, which takes into account both weight and volume of the cargo.

World scale is a unified system of establishing payment of freight rate for a given oil tanker's cargo. World scale was established in November 1952 by London Tanker Brokers' Panel on the request of British Petroleum and Shell as an average total cost of shipping oil from one port to another by ship. A large table was created as result.

The same scale is used today, although it was merged with the American Tanker Rate Schedule (ATRS) in 1969. By 2002, the table included the average cost of 320,000 voyages of different combinations of one load and one discharge port to five loads and ten discharge ports. World scale is produced by World scale Association (NYC) Inc. for the Americas and by World scale Association (London) Ltd. for the rest of the world. The freight for a given ship and voyage is normally expressed in a percentage of the published rate and is supposed to reflect the freight market demand at the time of fixing.

Following are some samples.

From Yokohama to:	US$/tonne	Miles
Adelaide	10.60	10,574
Aden	12.39	13,038
Chiba	2.90	50

In negotiating a price to pay, the above table is referred to as WS100 or 100% of World scale. The actual price negotiated between ship-owner and charterer can range from 1% to 1000% and is referred to respectively as WS1 to WS1000, depending on how much loss the first is willing to take on that voyage and how much the latter is willing to pay.

The Worldwide Tanker Normal Freight Scale, often referred to as World scale, is established and governed jointly by the World scale Associations of London and New York. World scale establishes a baseline price for carrying a metric ton of product between any two ports in the world. In World scale negotiations, operators and charterers will determine a price based on a percentage of the World scale rate. The baseline rate is expressed as WS 100. If a given charter party settled on 85% of the World scale rate, it would be expressed as WS 85. Similarly, a charter party set at 125% of the World scale rate would be expressed as WS 125.

Recent markets

This section needs to be **updated**. Please update this article to reflect recent events or newly available information. *(April 2020)*

Recent time charter equivalent rates, per day									
Ship size	**Cargo**	**Route**	**2004**	**2005**	**2006**	**2010**	**2012**	**2014**	**2015**
VLCC	Crude	Persian Gulf–Japan	$95,250	$59,070	$51,550	$38,000	$20,000	$28,000	$57,000
Suezmax	Crude	West Africa – Caribbean or East Coast of North America	$64,800	$47,500	$46,000	$31,000	$18,000	$28,000	$46,000
Aframax	Crude	Cross-Mediterranean	$43,915	$39,000	$31,750	$20,000	$15,000	$25,000	$37,000
All product carriers		Caribbean – East Coast of North America or Gulf of Mexico	$24,550	$25,240	$21,400	$11,000	$11,000	$12,000	$21,000

The market is affected by a wide variety of variables such as the supply and demand of oil as well as the supply and demand of oil tankers. Some particular variables include winter temperatures, excess tanker tonnage, supply fluctuations in the Persian Gulf, and interruptions in refinery services.

In 2006, time-charters tended towards long term. Of the time charters executed in that year, 58% were for a period of 24 or more months, 14% were for periods of 12 to 24 months, 4% were from 6 to 12 months, and 24% were for periods of less than 6 months.

From 2003, the demand for new ships started to grow, resulting in 2007 in a record breaking order backlog for shipyards, exceeding their capacity with rising newbuilding prices as a result. This resulted in a glut of ships when demand dropped due to a weakened global economy and dramatically reduced demand in the United States. The charter rate for very large crude carriers, which carry two million barrels of oil, had peaked at $309,601 per day in 2007 but had dropped to $7,085 per day by 2012, far below the operating costs of these ships. As a result, several tanker operators laid up their ships. Prices rose significantly in 2015 and early 2016, but delivery of new tankers was projected to keep prices in check.

Owners of large oil tanker fleets include Teekay Corporation, A P Moller Maersk, DS Torm, Frontline, MOL Tankship Management, Overseas Shipholding Group, and Euronav.

Fleet characteristics

1. Teekay Corporation
2. National Shipping Company of Saudi Arabia
3. Frontline
4. MOL Tankship Management
5. Overseas Shipholding Group
6. Euronav
7. Tanker Pacific Management
8. Kristen Navigation
9. Nippon Yusen Kaisha (NYK)
10. MISC Berhad
11. Tsakos Group
12. Vela International Marine
13. NITC
14. Hyundai Merchant Marine
15. BW Shipping
16. Dynacom Tankers Management
17. Maersk Tankers
18. BP Shipping
19. Sovcomflot
20. Novorossiysk Shipping Company
21. National Shipping Company of Saudi Arabia
22. Shipping Corporation of India
23. Thenamaris
24. TORM
25. Chevron Shipping
26. COSCO Group
27. Kuwait Oil Tanker Co.
28. Titan Ocean
29. China Shipping Development Tanker

30. SK Shipping
31. Minerva Marine
32. E-Ships

In 2005, oil tankers made up 36.9% of the world's fleet in terms of deadweight tonnage. The world's total oil tankers deadweight tonnage has increased from 326.1 million DWT in 1970 to 960.0 million DWT in 2005. The combined deadweight tonnage of oil tankers and bulk carriers, represents 72.9% of the world's fleet

Cargo movement

In 2005, 2.42 billion metric tons of oil were shipped by tanker. 76.7% of this was crude oil, and the rest consisted of refined petroleum products. This amounted to 34.1% of all seaborne trade for the year. Combining the amount carried with the distance it was carried, oil tankers moved 11,705 billion metric-ton-miles of oil in 2005.

By comparison, in 1970 1.44 billion metric tons of oil were shipped by tanker. This amounted to 34.1% of all seaborne trade for that year. In terms of amount carried and distance carried, oil tankers moved 6,487 billion metric-ton-miles of oil in 1970.

The United Nations also keeps statistics about oil tanker productivity, stated in terms of metric tons carried per metric ton of deadweight as well as metric-ton-miles of carriage per metric ton of deadweight. In 2005, for each 1 DWT of oil tankers, 6.7 metric tons of cargo was carried. Similarly, each 1 DWT of oil tankers was responsible for 32,400 metric-ton miles of carriage.

The main loading ports in 2005 were located in Western Asia, Western Africa, North Africa, and the Caribbean, with 196.3, 196.3, 130.2 and 246.6 million metric tons of cargo loaded in these regions. The main discharge ports were located in North America, Europe, and Japan with 537.7, 438.4, and 215.0 million metric tons of cargo discharged in these regions.

Flag states

International law requires that every merchant ship be registered in a country, called its flag state[7]. A ship's flag state exercises regulatory control over the vessel and is required to inspect it regularly, certify the ship's equipment and crew, and issue safety and pollution prevention documents. As of 2007, the United States Central Intelligence Agency(CIA) statistics count 4,295 oil tankers of 1,000 long tons deadweight (DWT) or greater worldwide. Panama was the world's largest flag state for oil tankers, with 528 of the vessels in its registry. Six other flag states had more than 200 registered oil tankers: Liberia (464), Singapore (355), China (252), Russia (250), the Marshall Islands (234) and the Bahamas (209). The Panamanian, Liberian, Marshallese and Bahamian flags are open registries and considered by the International

[7] - The **flag state** of a merchant vessel is the jurisdiction under whose laws the vessel is registered or licensed, and is deemed the nationality of the vessel.

Transport Workers' Federation to be flags of convenience. By comparison, the United States and the United Kingdom only had 59 and 27 registered oil tankers, respectively.



Vessel life cycle

Tankers may carry unusual cargoes – such as grain – on their final trip to the scrapyard.

In 2005, the average age of oil tankers worldwide was 10 years. Of these, 31.6% were under 4 years old and 14.3% were over 20 years old. In 2005, 475 new oil were built, accounting for 30.7 million DWT. The average size for these new tankers was 64,632 DWT. Nineteen of these were VLCC size, 19 were Suezmax, 51 were Aframax, and the rest were smaller designs. By comparison, 8.0 million DWT, 8.7 million DWT, and 20.8 million DWT worth of oil tanker capacity was built in 1980, 1990, and 2000 respectively.

Ships are generally removed from the fleet through a process known as tankers scrapping. Ship-owners and buyers negotiate scrap prices based on factors such as the ship's empty weight (called light ton displacement or LDT) and prices in the scrap metal market. In 1998, almost 700 ships went through the scrapping process at shipbreakers in places such as Gadani, Alang and Chittagong. In 2004 and 2005, 7.8 million DWT and 5.7 million DWT respectively of oil tankers were scrapped. Between 2000 and 2005, the capacity of oil tankers scrapped each year has ranged between 5.6 million DWT and 18.4 million DWT. In this same timeframe, tankers have accounted for between 56.5% and 90.5% of the world's total scrapped ship tonnage. In this period the average age of scrapped oil tankers has ranged from 26.9 to 31.5 years.

Vessel pricing:

Size DWT	1985 US$	2005 US$
32,000–45,000	18M	43M
80,000–105,000	22M	58M
250,000–280,000	47M	120M

In 2005, the price for new oil tankers in the 32,000–45,000 DWT, 80,000–105,000 DWT, and 250,000–280,000 DWT ranges were US$43 million, $58 million, and $120 million respectively. In 1985 these vessels would have cost $18 million, $22 million, and $47 million respectively.

Oil tankers are often sold second-hand. In 2005, 27.3 million DWT worth of oil tankers were sold used.[77] Some representative prices for that year include $42.5M for a 40,000 DWT tanker, $60.7 million for a 80,000–95,000 DWT, $73 million for a 130,000–150,000 DWT, and

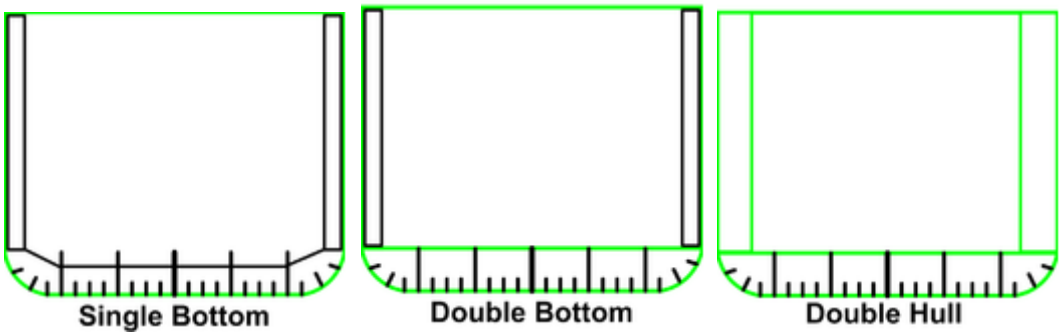
$116 million for 250,000–280,000 DWT tanker. For a concrete example, in 2006, Bonheur subsidiary First Olsen paid US$76.5 million for *Knock Sheen*, a 159,899 DWT tanker.

The cost of operating the largest tankers, the Very Large Crude Carriers, is currently between $10,000 and $12,000 per day.

Current structural design

Oil tankers generally have from 8 to 12 tanks. Each tank is split into two or three independent compartments by fore-and-aft bulkheads. The tanks are numbered with tank one being the forward most. Individual compartments are referred to by the tank number and the athwart ships position, such as "one port", "three starboard", or "six center."

Hull designs



Single hull, double bottom, and double hull ship cross sections. Green lines are watertight; black structure is not watertight

Architecture of the oil tanker

Oil tankers generally have from 8 to 12 tanks. Each tank is split into two or three independent compartments by fore-and-aft bulkheads. The tanks are numbered with tank one being the forward most. Individual compartments are referred to by the tank number and the athwart ships position, such as "one port", "three starboard", or "six center."

A cofferdam[8] is a small space left open between two bulkheads, to give protection from heat, fire, or collision. Tankers generally have cofferdams forward and aft of the cargo tanks, and sometimes between individual tanks. A pump room houses all the pumps connected to a tanker's cargo lines. Some larger tankers have two pump rooms. A pump room generally spans the total breadth of the ship.

[8]- A **cofferdam**, also called a **coffer**, is an enclosure built within, or in pairs across, a body of water to allow the enclosed area to be pumped out. This pumping creates a dry working environment so that the work can be carried out safely. Enclosed coffers are commonly used for construction or repair of permanent dams, oil platforms, bridge piers, etc., built within or over water.

Hull designs

A major component of tanker architecture is the design of the hull or outer structure. A tanker with a single outer shell between the product and the ocean is said to be *single-hulled* Most new tankers are *double-hulled*, with an extra space between the hull and the storage tanks. Hybrid designs such as *double-bottom* and *double-sided* combine aspects of single and double-hull designs.[4] All single-hulled tankers have been phased out as of 2015, in accordance with amendments to Annex I of the MARPOL Convention. IMO distinguishes three categories of tankers that will be phased out:

- Category 1 - oil tankers of 20,000 tonnes deadweight and above carrying crude oil, fuel oil, heavy diesel oil or lubricating oil as cargo, and of 30,000 tonnes deadweight and above carrying other oils, which do not comply with the requirements for protectively located segregated ballast tanks (commonly known as Pre-MARPOL tankers)
- Category 2 - as category 1, but complying with protectively located segregated ballast tank requirements (MARPOL tankers), and
- Category 3 - oil tankers of 5,000 tonnes deadweight and above but less than the tonnage specified for Category 1 and 2 tankers

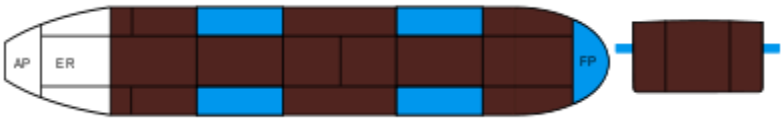
Phased out types



Pre MARPOL tanker

Pre MARPOL tanker

Category 1 tankers have been phased out in 2005. These so-called pre MARPOL tankers were single hull only with some segregated ballast tanks. Around one third of the cargo tanks also acted as ballast tanks. During ballast discharge oil was released into the environment. These tankers did not extend high above the water line, allowing Hydrostatically Balanced Loading (HBL), so relatively little oil was spilled in case of bottom damage.



30 percent of the side shell in way of the tanks of a MARPOL tanker should be non-cargo.

MARPOL tanker

Category 2 tankers were used for a number of years and were planned to be phased out by 2010 at the latest, depending on the year of delivery. With MARPOL tankers, it is not allowed to use ballast tanks as cargo tanks. This has reduced operational spillage drastically. The

downside is designs based on MARPOL spill more oil when damaged than a pre MARPOL tankers. This is due to several factors:

1. As ballast tanks could not be used as cargo tanks anymore, cargo space was lost. To compensate for this, tanks were made taller, which means that more oil is spilled before hydrostatic balance[9] is reached,
2. A MARPOL rule is that 30 percent of the side shell in way of the tanks of a MARPOL tanker should be non-cargo. The cheapest way to reach this, is by making these tanks as narrow as possible. This means that centre tanks became extremely large, so in case of damage, the amount of spillage increased,
3. In a pre MARPOL tanker ballast tanks were also filled with inert gas, as these were also used as cargo tanks, which reduced corrosion. Ballast tanks of MARPOL tankers are not protective this way, causing structural failure by corrosion on the *Erika*, *Castor* and *Prestige*,
4. The painted area tripled, increasing required maintenance and corrosion in case this maintenance is done poorly.

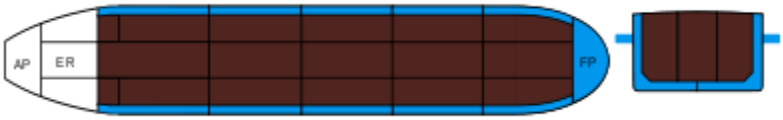
Category 3

These small tanker will also be phase out by 2010.

New types

After the *Exxon Valdez* disaster, public outcry became so strong that authorities were forced to come with preventive measures. Especially the double hull design was favored and although this is not the best design in all cases, because of OPA 90, this is the only design currently in operation.

Double hull



Double hull tanker

OPA 90 caused the phasing out of single hull tankers in the United States between 1997 and 2000 — apart from tankers lightering off the coast, which are allowed to be single hull until 2015. In this design, cargo tanks are protected by ballast tanks of at least 2 meters. As long as this barrier is not breached, there will be no spillage.

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[9] - In fluid mechanics, a fluid is said to be in **hydrostatic equilibrium** or **hydrostatic balance** when it is at rest, or when the flow velocity for each parcel of fluid is constant over time. This occurs when external forces such as gravity are balanced by a pressure-gradient force. For instance, the pressure-gradient force prevents gravity from collapsing Earth's atmosphere into a thin, dense shell, whereas gravity prevents the pressure gradient force from diffusing the atmosphere into space.

In 1998, the Marine Board of the National Academy of Science[10] conducted a survey of industry experts regarding the pros and cons of double-hull design. Some of the advantages of the double-hull design that were mentioned include ease of ballasting in emergency situations, reduced practice of saltwater ballasting in cargo tanks decreases corrosion, increased environmental protection, cargo discharge is quicker, more complete and easier, tank washing is more efficient, and better protection in low-impact collisions and grounding.

The same report lists the following as some drawbacks to the double-hull design, including more expensive to build, higher canal and port expenses, ballast tank ventilation difficult, ballast tanks need continual monitoring and maintenance, increased transverse free surface, more surfaces to maintain, explosion risk in double-hull spaces if vapor detection system not fitted, cleaning mud from ballast spaces a bigger problem.

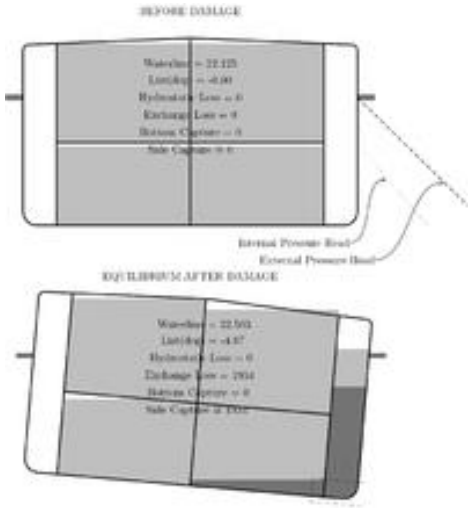
In all, double-hull tankers are said to be safer than a single-hull in a grounding incident, especially when the shore is not very rocky. The safety benefits are less clear on larger vessels and in cases of high speed impact.

Other downsides of this design are:

1. As small leakages from cargo tanks do not spill in sea, they can go unnoticed for a long time. This can cause an explosive mixture in ballast tanks, as there is no requirement to connect these to the IG system,
2. The painted area is three times as large as on a MARPOL tanker, and almost tenfold compared to a pre MARPOL tanker.
3. Although double-hull design is superior in low energy casualties and prevents spillage in small casualties, in high energy casualties where both hulls are breached, oil can spill through the double-hull and into the sea and spills from a double-hull tanker can be significantly higher than designs like the Mid-Deck Tanker, the Coulombi Egg Tanker and even a pre-MARPOL tanker, as the last one has a lower oil column and reaches hydrostatic balance sooner.

[10] - The **National Academy of Sciences** (**NAS**) is a United States nonprofit, non-governmental organization. NAS is part of the National Academies of Sciences, Engineering, and Medicine, along with the National Academy of Engineering (NAE) and the National Academy of Medicine (NAM).

Mid-Deck Oil Tanker



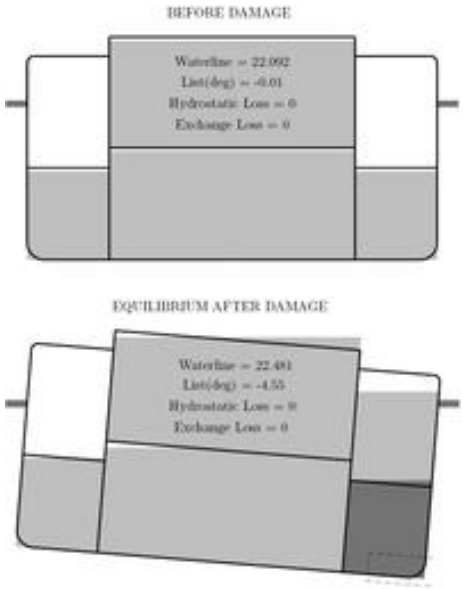
Mid-Deck Tanker, damage up 3 m. Light gray is oil, dark gray is seawater.

A Mid-Deck Tanker is a tanker design, which includes an additional deck intended to limit spills if the tanker is damaged. The extra deck is placed at about the middle of the draft of the ship.

With double hull tankers, in high energy casualties where both hulls are breached, oil can spill through the double-hull and into the sea. In grounding events of this type, a mid-deck design overcomes this by eliminating the double-bottom compartments that are void with air. Since the density of seawater is greater than that of oil, water comes into the tanks instead of oil escaping out, and rather than spilling, oil is vented upwards into overflow tanks.

If the *Exxon Valdez* had been a Mid-Deck ship, she would have spilled very little oil.

Coulombi Egg Tanker



Coulombi Egg, damage up 3 m. Light gray is oil, dark gray is seawater.

A variation on the Mid-Deck Tanker is the Coulombi Egg Tanker, which was approved by IMO as an alternative to the double hull concept. The design consists of a series of center and wing tanks that are divided by horizontal bulkheads. The upper wing tanks form ballast tanks and act as emergency receiver tanks for cargo should the lower tanks be fractured. The lower tanks are connected to these ballast tanks by non-return valves. The United States Coast Guard does not allow this design to enter US waters, effectively preventing it from being built.

When a lower tank is damaged, the incoming sea water pushes the oil in the damaged tank up into the ballast tank. Because of the hydrostatic pressure, there is an automatic transfer out of the damaged tank. The double-hull design is aimed at the probability of zero outflow. In low energy casualties where only the outside hull is penetrated, this will be the case. However, in high energy casualties both hulls are penetrated. As the tanks of a double hull tanker are larger than those of MARPOL-tankers and pre MARPOL-tankers and the height of the cargo above the water line is higher, the resulting spill can be much larger than these single hull designs. In the Coulombi Egg design spillage is greatly reduced, possibly to zero.

Where a double hull VLCC has a ballast tank coated area of about 225,000 m^3, in a Coulombi Egg tanker this area is reduced to 66,000 m^3. This reduces maintenance and corrosion risks, which otherwise may result in structural failure.

Inert gas system

An oil tanker's inert gas system is one of the most important parts of its design.[18] Fuel oil itself is very difficult to ignite, however its hydrocarbon vapors are explosive when mixed with air in certain concentrations. The purpose of the system is to create an atmosphere inside tanks in which the hydrocarbon oil vapors cannot burn.

As inert gas is introduced into a mixture of hydrocarbon vapors and air, it increases the lower flammable limit[11] or lowest concentration at which the vapors can be ignited. At the same time it decreases the upper flammable limit or highest concentration at which the vapors can be ignited. When the total concentration of oxygen in the tank reaches about 11%, the upper and lower flammable limits converge and the flammable range disappears.

Inert gas systems deliver air with an oxygen concentration of less than 5% by volume. As a tank is pumped out, it's filled with inert gas and kept in this safe state until the next cargo is loaded. The exception is in cases when the tank must be entered. Safely gas-freeing a tank is accomplished by purging hydrocarbon vapors with inert gas until the hydrocarbon concentration inside the tank is under about 1%.Thus, as air replaces the inert gas, the concentration cannot rise to the lower flammable limit and is safe.

[11] - **Lower flammability limit** (LFL), usually expressed in volume per cent, is the lower end of the concentration range over which a flammable mixture of gas or vapor in air can be ignited at a given temperature and pressure. The flammability range is delineated by the upper and lower flammability limits.

Cargo operations



Cargo flows between a tanker and a shore station by way of marine loading arms attached at the tanker's cargo manifold.

Operations aboard oil tankers are governed by an established body of best practices and a large body of international law. Cargo can be moved on or off of an oil tanker in several ways. One method is for the ship to moor alongside a pier, connect with cargo hoses or marine loading arms. Another method involves mooring to offshore buoys, such as a single point mooring, and making a cargo connection via underwater cargo hoses. A third method is by ship-to-ship transfer, also known as lightering. In this method, two ships come alongside in open sea and oil is transferred manifold to manifold via flexible hoses. Lightering is sometimes used where a loaded tanker is too large to enter a specific port.

Pre-transfer preparation

Prior to any transfer of cargo, the chief officer must develop a transfer plan detailing specifics of the operation such as how much cargo will be moved, which tanks will be cleaned, and how the ship's ballasting will change. The next step before a transfer is the pretransfer conference. The pretransfer conference covers issues such as what products will be moved, the order of movement, names and titles of key people, particulars of shipboard and shore equipment, critical states of the transfer, regulations in effect, emergency and spill-containment procedures, watch and shift arrangements, and shutdown procedures.

After the conference is complete, the person in charge on the ship and the person in charge of the shore installation go over a final inspection checklist. In the United States, the checklist is called a Declaration of Inspection or DOI. Outside the U.S., the document is called the "Ship/Shore Safety Checklist." Items on the checklist include proper signals and signs are displayed, secure mooring of the vessel, choice of language for communication, securing of all connections, that emergency equipment is in place, and that no repair work is taking place.



Loading cargo

Oil is pumped on and off the ship by way of connections made at the cargo manifold.

Loading an oil tanker consists primarily of pumping cargo into the ship's tanks, as oil enters the tank, the vapors inside the tank must be somehow expelled. Depending on local regulations, the vapors can be expelled into the atmosphere or discharged back to the pumping station by way of a vapor recovery line. It is also common for the ship to move water ballast during the loading of cargo to maintain proper trim.

Loading starts slowly at a low pressure to ensure that equipment is working correctly and that connections are secure. Then a steady pressure is achieved and held until the "topping-off" phase when the tanks are nearly full. Topping off is a very dangerous time in handling oil, and the procedure is handled particularly carefully. Tank-gauging equipment is used to tell the person in charge how much space is left in the tank, and all tankers have at least two independent methods for tank-gauging. As the tanker becomes full, crew members open and close valves to direct the flow of product and maintain close communication with the pumping facility to decrease and finally stop the flow of liquid.

Unloading cargo



This cargo pump aboard a VLCC can move 5,000 cubic meters of product per hour.

The process of moving oil off of a tanker is similar to loading, but has some key differences. The first step in the operation is following the same pretransfer procedures as used in loading. When the transfer begins, it is the ship's cargo pumps that are used to move the product ashore. As in loading, the transfer starts at low pressure to ensure that equipment is working correctly and that connections are secure. Then a steady pressure is achieved and held during the operation. While pumping, tank levels are carefully watched and key locations, such as the connection at the cargo manifold and the ship's pump room are constantly monitored.

Under the direction of the person in charge, crew members open and close valves to direct the flow of product and maintain close communication with the receiving facility to decrease and finally stop the flow of liquid.

Tank cleaning



The nozzle of an automated tank cleaning machine

Tanks must be cleaned from time to time for various reasons. One reason is to change the type of product carried inside a tank. Also, when tanks are to be inspected or maintenance must be performed within a tank, it must be not only cleaned, but made *gas-free*.

On most crude-oil tankers, a special crude oil washing (COW) system is part of the cleaning process. The COW system circulates part of the cargo through the fixed tank-cleaning system to remove wax and asphaltic deposits. Tanks that carry less viscous cargoes are washed with water. Fixed and portable automated tank cleaning machines, which clean tanks with high-pressure water jets, are widely used. Some systems use rotating high-pressure water jets to spray hot water on all the internal surfaces of the tank. As the spraying takes place, the liquid is pumped out of the tank.

After a tank is cleaned, provided that it is going to be prepared for entry, it will be *purged*. Purging is accomplished by pumping inert gas into the tank until hydrocarbons have been sufficiently expelled. Next the tank is *gas freed* which is usually accomplished by blowing fresh air into the space with portable air powered or water powered air blowers. "Gas freeing" brings the oxygen content of the tank up to 20.8% O2. The inert gas buffer between fuel and oxygen atmospheres ensures they are never capable of ignition. Specially trained personnel monitor the tank's atmosphere, often using hand-held gas indicators which measure the percentage of hydrocarbons present. After a tank is gas-free, it may be further hand-cleaned in a manual process known as mucking. Mucking requires protocols for entry into confined spaces, protective clothing, designated safety observers, and possibly the use of airline respirators.

Special-use oil tankers

Some sub-types of oil tankers have evolved to meet specific military and economic needs. These sub-types include naval replenishment ships, oil-bulk-ore combination carriers, floating storage and offloading units (FSOs) and floating production storage and offloading units (FPSOs).

Replenishment ships

Replenishment ships, known as oilers in the United States and fleet tankers in Commonwealth countries, are ships that can provide oil products to naval vessels while on the move. This process, called underway replenishment, extends the length of time a naval vessel can stay at sea, as well as her effective range. Prior to underway replenishment, naval vessels had to enter a port or anchor to take on fuel. In addition to fuel, replenishment ships may also deliver water, ammunition, rations, stores and personnel.

Ore-bulk-oil carriers



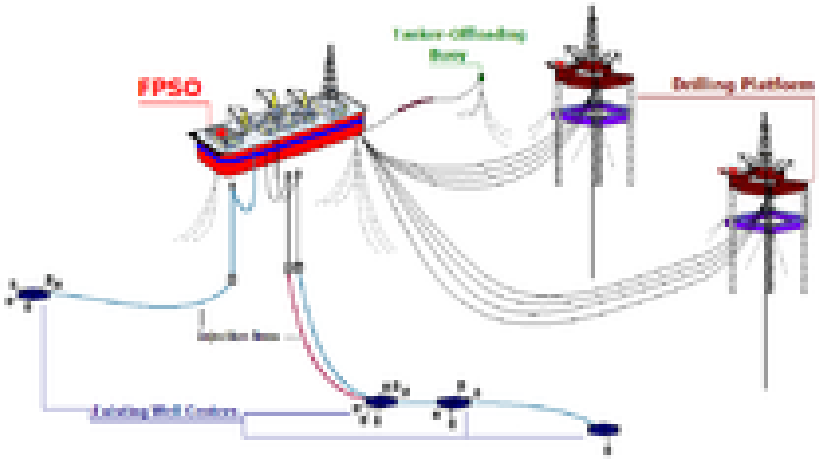
The OBO-carrier Maya. The picture is showing both the cargo hold hatches used for bulk and the pipes used for oil

An ore-bulk-oil carrier, also known as combination carrier or OBO, is a ship designed to be capable of carrying wet or dry bulk cargoes. This design was intended to provide flexibility in two ways. Firstly, an OBO would be able to switch between the dry and wet bulk trades based on market conditions. Secondly, an OBO could carry oil on one leg of a voyage and return carrying dry bulk, reducing the number of unprofitable ballast voyages it would have to make.

In practice, the flexibility which the OBO design allows has gone largely unused, as these ships tend to specialize in either the liquid or dry bulk trade. Also, these ships have endemic maintenance problems. On one hand, due to a less specialized design, an OBO suffers more from wear and tear during dry cargo onload than a bulker. On the other hand, components of the liquid cargo system, from pumps to valves to piping, tend to develop problems when subjected to periods of disuse. These factors have contributed to a steady reduction in the number of OBO ships worldwide since the 1970s.

One of the more famous OBOs was MV *Derbyshire* of 180,000 DWT which in September 1980 became the largest British ship ever lost at sea. It sank in a Pacific typhoon while carrying a cargo of iron ore from Canada to Japan.

Floating storage units



Floating storage units, often former oil tankers, accumulate oil for tankers to retrieve.

Floating storage and offloading units (FSO) are used worldwide by the offshore oil industry to receive oil from nearby platforms and store it until it can be offloaded onto oil tankers. A similar system, the floating production storage and offloading unit (FPSO), has the ability to process the product while it is on board. These floating units reduce oil production costs and offer mobility, large storage capacity, and production versatility.

FPSO and FSOs are often created out of old, stripped-down oil tankers, but can be made from new-built hulls Shell España first used a tanker as an FPSO in August 1977. An example of a FSO that used to be an oil tanker is the *Knock Nevis*. These units are usually moored to the seabed through a spread mooring system. A turret-style mooring system can be used in areas prone to severe weather. This turret system lets the unit rotate to minimize the effects of sea-swell and wind.

Pollution



Exxon Valdez spilled 10.8 million US gallons (41,000 m^3) of oil into Alaska's Prince William Sound.



Demonstration in Canada against oil tankers, 1970.

Oil spills have devastating effects on the environment. Crude oil contains polycyclic aromatic hydrocarbons (PAHs) which are very difficult to clean up, and last for years in the sediment and marine environment. Marine species constantly exposed to PAHs can exhibit developmental problems, susceptibility to disease, and abnormal reproductive cycles.

By the sheer amount of oil carried, modern oil tankers can be a threat to the environment. As discussed above, a VLCC tanker can carry 2 million barrels (320,000 m^3) of crude oil. This is about eight times the amount spilled in the widely known *Exxon Valdez* incident. In this spill, the ship ran aground and dumped 10,800,000 US gallons (41,000 m^3) of oil into the ocean in March 1989. Despite efforts of scientists, managers, and volunteers over 400,000 seabirds, about 1,000 sea otters, and immense numbers of fish were killed.[116] Considering the volume of oil carried by sea, however, tanker owners' organizations often argue that the industry's safety record is excellent, with only a tiny fraction of a percentage of oil cargoes carried ever being spilled. The International Association of Independent Tanker Owners has observed that "accidental oil spills this decade have been at record low levels—one third of the previous decade and one tenth of the 1970s—at a time when oil transported has more than doubled since the mid 1980s."

Oil tankers are only one source of oil spills. According to the United States Coast Guard, 35.7% of the volume of oil spilled in the United States from 1991 to 2004 came from tank vessels (ships/barges), 27.6% from facilities and other non-vessels, 19.9% from non-tank vessels, and 9.3% from pipelines; 7.4% from mystery spills. Only 5% of the actual spills came from oil tankers, while 51.8% came from other kinds of vessels. The detailed statistics for 2004 show tank vessels responsible for somewhat less than 5% of the number of total spills but more than 60% of the volume. Tanker spills are much more rare and much more serious than spills from non-tank vessels.

The International Tanker Owners Pollution Federation has tracked 9,351 accidental spills that have occurred since 1974. According to this study, most spills result from routine operations such as loading cargo, discharging cargo, and taking on fuel oil. 91% of the operational oil spills are small, resulting in less than 7 metric tons per spill. On the other hand, spills resulting from accidents like collisions, groundings, hull failures, and explosions are much larger, with 84% of these involving losses of over 700 metric tons.

Following the *Exxon Valdez* spill, the United States passed the Oil Pollution Act of 1990 (OPA-90), which excluded single-hull tank vessels of 5,000 gross tons or more from US waters from 2010 onward, apart from those with a double bottom or double sides, which may be permitted to trade to the United States through 2015, depending on their age. Following the sinking of *Erika* (1999) and *Prestige* (2002), the European Union passed its own stringent anti-

pollution packages (known as Erika I, II, and III), which also require all tankers entering its waters to be double-hulled by 2010. The Erika packages are controversial because they introduced the new legal concept of "serious negligence".

Air pollution

Air pollution from engine operation and from cargo fires is another serious concern. Large ships are often run on low quality fuel oils, such as bunker oil, which is highly polluting and has been shown to be a health risk.[121] Ship fires may result in the loss of the ship due to lack of specialized firefighting gear and techniques and fires can burn for days.

What does a ship agent do?

A shipping **agent** is a person who deals with the transactions of a **ship** in every port that the **ship** visits or docks. In simple terms, it is a shipping **agent** who with a local expert acts as a representative of the owner of the **ship** and carries out all essential duties and obligations required by the crew of the **ship**.

What do shipbrokers do?

Shipbroking is a financial service, which forms part of the global shipping industry. **Shipbrokers** are specialist intermediaries/negotiators (i.e. brokers) between ship-owners and charterers who use ships to transport cargo, or between buyers and sellers of vessels.

History

In the 19th century, it was the work of ship-brokers to procure goods on freight or a charter for ships outward bound. They also went through the formalities of entering and clearing vessels at the customs-house. They collected the freight on vessels brought into port and took an active hand in the management of all business matters between ship-owners and merchants, whether shippers or consignees, for which they were paid a fee. In major British ports, ship-brokers were also usually insurance-brokers.

Modern shipbroking

Some brokerage firms have developed into large companies, incorporating departments specializing in shipping's various sectors, *e.g.* Dry Cargo Chartering, Tanker Chartering, Container Chartering, Sale & Purchase, Demolition, Futures and Research; other "boutique" shipbroking firms concentrate on specific sectors of the shipping market.

The principal shipping and shipbroking centers worldwide are London, New York City, Singapore and Tokyo, as well as where many ship-owners are based such as Oslo and Athens. Other places continue to develop in international shipping services, such as Hong Kong and Shanghai, Delhi and Mumbai, Copenhagen, Geneva, Genoa, Hamburg and Paris in Europe; and in North America, Connecticut, Houston and Montreal are important shipbroking centers.

Until the late 20th century, it was commonplace for shipbrokers to cover more than one discipline, although nowadays the vast majority of shipbrokers specialize in a specific sector. Like many financial services, historically shipbroking grew out of the City coffee houses, becoming established at the Baltic Exchange; among its most famous members being Ernest Simpson, ex-husband of The Duchess of Windsor (died 1972), and Alderman the Lord Mountevans.

The Institute of Chartered Shipbrokers sets educational standards throughout the industry worldwide, whose Fellows are accorded the privilege of using the post-nominal letters FICS.

Sale and purchase

Sale & Purchase ("S&P") brokers handle the buying and selling of existing vessels in the secondhand market or contract new ships (called new buildings in industry *parlance*) from shipbuilding yards. S&P brokers promote opportunities and discuss market trends with ship-owners, charterers, investors and bankers, as well as reporting on market sales, vessel values, market trends and activity. When a ship-owner has a vessel to sell or is looking for a vessel to acquire, the shipbroker will scour the market for buyers, or for suitable sales candidates, discuss with potential counterparties or their broker the main points of the sale transaction and eventually negotiate all of the details, usually based on a standard contract. During such proceedings, shipbrokers not only negotiate the price of the vessel on behalf of their principals but also all the logistical details for the transfer of the title and the vessel itself to the buyers (new owners), including the banking arrangements. During any negotiation minor disputes may occur which are to be handled in accordance with market fluctuation, *i.e.* the market may be moving in favor of the buyer (vessel price is softening) or in favor of the seller (vessel price is strengthening) giving each party a potential reason to cancel the transaction. When shipbrokers act on behalf of passive investors or financial buyers, they may also have to find time charter employment for the vessel and assist with practical arrangements such as the appointment of ship managers. Some S&P brokers specialize in the sale of ships for scrap, requiring a different set of skills and contacts.

Dry Cargo Broking

Dry Cargo brokers are typically specialists in the chartering of Bulk carriers, and are engaged to act either for a ship-owner looking for employment for a ship, or a charterer with a cargo to be shipped. Dry Cargo brokers maintain large databases of vessel positions, cargoes and rates, paying constant attention to the direction of the markets so as to advise their clients accurately as to how to maximize profits or minimize expenses. Dry Cargo shipping can, in general terms, be categorized by Vessel size: namely, Bulkers such as Capesizes, Panamaxes and Handysize. Each size of vessel suits different types of cargo and trade routes/ports. Many owners, charterers and brokers tend to specialize in one or other of these sectors.

Tanker Broking

Tanker brokers specialize in the chartering of Tankers, which requires a different skillset, knowledge and contacts from Dry Cargo broking. Tanker brokers may specialize in crude oil,

gas, oil products or chemical tankers. Tanker brokers similarly negotiate maritime contracts, known as Charter Parties. The main terms of negotiation are freight/hire and demurrage.

Oil being a fast moving trade, freight rates for crude oil tanker charters are most commonly based on the World scale Index; the World scale Association publishes flat rates annually.

For some specific voyages, such as named voyages (*i.e.* from A to B) and for specialist ships, like LNG tankers (a highly specialized sector of the tanker market), freight rates can be agreed on a lump sum (or dollar per ton) fixed rate between both parties.

Container Vessel Broking

Container brokers specialize in the chartering of container ships and provide container ship-owners and charterers with market-related information and opportunities.

Leisure yacht broking

Normally some brokers engage in sale and purchase of leisure yacht. The procedure is not to the extent of merchant ship complications, but it has the inspection and yacht document procedure.

Future Broking

Shipping Futures brokers specialize in negotiating maritime futures contracts.

What is liner and tramp shipping?

Liners carry goods in large quantities from merchants and consigners. Tramps **ships**, on the other hand, often carry cargo on a more random, per-load basis. The primary advantage of **ships** is their ability to carry tons of merchandise and equipment.

Ship's employment Procedures.

A cargo owner needs cargo moved (or a **ship** operator or a ship-owner needs an additional **ship**.) He engages a shipbroker who finds suitable **ships**. After meticulous checking of the **ships**, the charterer chooses a **ship**, and via the broker, makes a FIRST OFFER.

Chartering

Chartering is an activity within the shipping industry. In some cases a charterer may own cargo and employ a shipbroker to find a ship to deliver the cargo for a certain price, called freight rate. Freight rates may be on a per-ton basis over a certain route (e.g. for iron ore between Brazil and China) or alternatively may be expressed in terms of a total sum – normally in U.S. dollars – per day for the agreed duration of the charter.

A charterer may also be a party without a cargo who takes a vessel on charter for a specified period from the owner and then trades the ship to carry cargoes at a profit above the hire rate, or even makes a profit in a rising market by re-letting the ship out to other charterers.

Depending on the type of ship and the type of charter, normally a standard contract form called a charter party is used to record the exact rate, duration and terms agreed between the shipowner and the charterer.

Time Charter Equivalent is a standard shipping industry performance measure used primarily to compare period-to-period changes in a shipping company's performance despite changes in the mix of charter types.

- A **voyage charter** is the hiring of a vessel and crew for a voyage between a load port and a discharge port. The charterer pays the vessel owner on a per-ton or lump-sum basis. The owner pays the port costs (excluding stevedoring[12]), fuel costs and crew costs.
- A **time charter** is the hiring of a vessel for a specific period of time; the owner still manages the vessel but the charterer selects the ports and directs the vessel where to go. The charterer pays for all fuel the vessel consumes, port charges, and a daily 'hire' to the owner of the vessel.
- A **bareboat charter** is an arrangement for the hiring of a vessel whereby no administration or technical maintenance is included as part of the agreement. The charterer pays for all operating expenses, including fuel, crew, port expenses and hull insurance. Usually, the charter period (normally years) ends with the charterer obtaining title (ownership) in the hull. Effectively, the owners finance the purchase of the vessel.
- A **demise charter** shifts the control and possession of the vessel; the charterer takes full control of the vessel along with the legal and financial responsibility for it.

Chartering (shipping)

Freight transport is the physical process of transporting commodities and merchandise goods and cargo. The term **shipping** originally referred to transport by sea but in American English, it has been extended to refer to transport by land or air (International English: "carriage") as well. "Logistics", a term borrowed from the military environment, is also used in the same sense.

FREIGHT Rate

A *freight rate* (historically and in ship chartering simply **freight**) is a price at which a certain cargo is delivered from one point to another. The price depends on the form of the cargo, the mode of transport (truck, ship, train, and aircraft), the weight of the cargo, and the distance to the delivery destination. Many shipping services, especially air carriers, use dimensional

[12] - A **stevedore** (/ˈstivɪˌdɔːr/), **longshoreman**, **docker**, or **dockworker** is a waterfront manual laborer who is involved in loading and unloading ships, trucks, trains or airplanes.

After the shipping container revolution of the 1960s, the number of dockworkers required declined by over 90%, and the term "stevedore" has increasingly come to mean a **stevedoring firm** that contracts with a port, ship-owner, or charterer to load and unload a vessel.[

weight for calculating the price, which takes into account both weight and volume of the cargo.

For example, bulk coal long-distance rates in America are approximately 1 cent/ton-mile.[2] So a 100 car train, each carrying 100 tons, over a distance of 1000 miles, would cost $100,000. On the other hand, Intermodal container shipping rates depend heavily on the route taken over the weight of the cargo, just as long as the container weight does not exceed the maximum lading capacity. Prices can vary between $300-$10,000 per Twenty foot equivalent unit (TEU) depending on the supply and demand of a given route.

In ship chartering, freight is the price which a charterer pays a ship-owner for the use of a ship in a voyage charter.

General Average

The law of **general average** is a principle of maritime law whereby all stakeholders in a sea venture proportionally share any losses resulting from a voluntary sacrifice of part of the ship or cargo to save the whole in an emergency. For instance, should the crew jettison some cargo overboard to lighten the ship in a storm, the loss would be shared *pro rata* by both the carrier and the cargo-owners.

In the exigencies of hazards faced at sea, crew members may have little time in which to determine precisely whose cargo they are jettisoning. Thus, to avoid quarreling that could waste valuable time, there arose the equitable practice whereby all the merchants whose cargo landed safely would be called on to contribute a portion, based upon a share or percentage, to the merchant or merchants whose goods had been tossed overboard to avert imminent peril. General average traces its origins in ancient maritime law, and the principle remains within the admiralty law of most countries.

Maritime Lien

In admiralty law, a **maritime lien** is a privileged claim upon sea-connected property, such as a ship, for services rendered to, or the injuries caused by that property. In common law, a lien is the right of the creditor to retain the properties of his debtor until the debt is paid.

It is a proprietary lien where interest is about the property. It should be understood that “res” may be the vessel (including its appurtenances and equipment), the cargo, the freight or even the proceeds of sale. The rights include *jus in re* (right on the property) and *jus in rem* (right against the property). The doctrine of maritime lien is that a ship will be treated as a wrongdoer, not the owner, that the loss, damage or harm is caused by the maritime property, *itself*, and it has to make good for the loss. The attachment of maritime lien will start when the cause of action arises and will not be eliminated even by change of ownership in a good faith purchase.

Two significant differences between maritime liens, which only exist in admiralty law, and the right to keep that exist in general civil law are (1) that in general civil law, "Prior in time is prior in right", i.e., the rights of the lienholder with the earliest lien are superior to those of later lienholders, whereas in maritime law the rights of the most recent lienholder are superior,

and (2) all maritime liens are superior to all non-maritime liens. For instance, in the United States, a federal tax lien, which is a non-maritime lien, is subordinate to every lien for supplies, fuel, repairs, etc., which are all maritime liens.

Normally, a maritime lien relates to the different marine transactions in the admiralty jurisdiction and creates the maritime claims. It will be created by the statute such as the Ship Mortgage Act.

Bill of lading



A **bill of lading** (/ˈleɪdɪŋ/) (sometimes abbreviated as **B/L** or **BOL**) is a document issued by a carrier (or their agent) to acknowledge receipt of cargo for shipment. Although the term historically related only to carriage by sea, a bill of lading may today be used for any type of carriage of goods. A comprehensive article on Bill of Lading Bills of lading are one of three crucial documents used in international trade to ensure that exporters receive payment and importers receive the merchandise. The other two documents are a policy of insurance and an invoice. Whereas a bill of lading is negotiable, both a policy and an invoice are assignable. In international trade outside the United States, bills of lading are distinct from waybills in that the latter are not transferable and do not confer title. Nevertheless, the UK Carriage of Goods by Sea Act 1992 grants "all rights of suit under the contract of carriage" to the lawful holder of a bill of lading, or to the consignee under a sea waybill or a ship's delivery order.

A bill of lading must be transferable, and serves three main functions:

- It is a conclusive receipt, i.e. an acknowledgement that the goods have been loaded; and
- It contains or evidences the terms of the contract of carriage; and
- It serves as a document of title to the goods, subject to the *nemo dat* rule.

Typical export transaction use Incoterms such as CIF, FOB or FAS, requiring the exporter/shipper to deliver the goods to the ship, whether onboard or alongside.

Nevertheless, the loading itself will usually be done by the carrier himself or by a third party stevedore.

Description

A bill of lading is a standard-form document that is transferable by endorsement (or by lawful transfer of possession). Most shipments by sea are covered by the Hague Rules, the Hague-Visby Rules or the Hamburg Rules, which require the carrier to issue the shipper a bill of lading identifying the nature, quantity, quality and leading marks of the goods.

In the case of *Coventry v Gladstone*, Lord Justice Blackburn defined a bill of lading as "A writing signed on behalf of the owner of ship in which goods are embarked, acknowledging the receipt of the Goods, and undertaking to deliver them at the end of the voyage, subject to such conditions as may be mentioned in the bill of lading." Therefore, it can be stated that the bill of lading was introduced to provide a receipt to the shipper in the absence of the owners.

Although the term "bill of lading" is well known and well understood, it may become obsolete. Articles 1:15 & 1:16 of the Rotterdam Rules create the new term "transport document"; but (assuming the Rules come into force) it remains to be seen whether shippers, carriers and "maritime performing parties" (another new Rotterdam Rules coinage) will abandon the long-established and familiar term, "bill of lading".

History

While there is evidence of the existence of receipts for goods loaded aboard merchant vessels stretching back as far as Roman times, and the practice of recording cargo aboard ship in the ship's log is almost as long-lived as shipping itself, the modern bill of lading only came into use with the growth of international trade in the medieval world.

The growth of mercantilism (which produced other financial innovations such as the charterparty (once *carta partita*), the bill of exchange and the insurance policy) produced a requirement for a title document that could be traded in much the same way as the goods themselves. It was this new avenue of trade that produced the bill of lading in much the same form as we know today.

Roles and purposes of bill of lading

As cargo receipt

The principal use of the bill of lading is as a receipt issued by the carrier once the goods have been loaded onto the vessel. This receipt can be used as proof of shipment for customs and insurance purposes, and also as commercial proof of completing a contractual obligation,[14] especially under INCOTERMS such as CFR[15] (cost and freight) and FOB (free on board).

Although the Hague-Visby Rules provide that a bill of lading is only *prima facie* evidence of receipt, the Carriage of Goods by Sea Act 1992 s.4 declares a BoL "conclusive evidence of receipt".

• A "clean bill of lading" (aka "on-board bill of lading") is used when there is full compliance with no discrepancies between the description filed by shipper and the actual goods shipped. A clean bill of lading indicates that the goods have been properly loaded on board the carrier's ship in accordance with the contract.
• A "dirty bill of lading" (aka "claused bill of lading") will be issued if the goods to be shipped differ in quality or quantity from the contract description, or if freight has yet to be paid. The buyer's bank is entitled to reject a dirty bill of lading, but will often accept it after an agreed reduction in price.
• "STC": if the cargo cannot be effectively examined, such as goods in a sealed container), the carrier will issue a bill of lading describing the goods as "container (identified by number) **said to contain**" the contracted cargo. If the cargo within the container does not comply with description, the consignee will take action against the seller, and the carrier will not be involved.

As evidence of the contract of carriage

The bill of lading from carrier to the shipper can be used as an evidence of the contract of carriage by the fact that carrier has received the goods and upon the receipt the carrier would deliver the goods. In this case, the bill of lading would be used as a contract of carriage. In this case, the bill of lading can be used if shipper does not properly ship the goods then the shipper cannot receive the bill of lading from the carrier. Eventually, the shipper would have to deliver the bill of lading to the seller. In this case, the bill of lading is used as a contract of carriage between seller and carrier. However, when the bill of lading is negotiated to a bona fide third party then the bill of lading becomes a conclusive evidence where no contradictory evidence can be introduced. It is because the third party cannot examine the actual shipment and can only pay attention to the document itself, not survey or examination of the shipment itself.[18] However, the bill of lading will rarely be the contract itself, since the cargo space will have been booked previously, perhaps by telephone, email or letter. The preliminary contract will be acknowledged by both the shipper and carrier to incorporate the carrier's standard terms of business. If the Hague-Visby Rules apply, then all of the Rules will be automatically annexed to the bill of lading, thus forming a statutory contract.

As title

When the bill of lading is used as a document of title, it is particularly related to the case of buyer. When the buyer is entitled to received goods from the carrier, bill of lading in this case performs as document of title for the goods. There are two types of bill of lading that can perform as document of title. They are straight bill of lading and order bill of lading. Straight bill of lading is a bill of lading issued to a named consignee that is not negotiable. In this case, the bill of lading should be directed only to one specific consignee indicated on the bill of lading. Order bill of lading is the opposite from a straight bill of lading and there is no specific or named consignee. Therefore, an order bill of lading can be negotiated to a third party.

Simply, the bill of lading confers *prima facie* title over the goods to the named consignee or lawful holder. Under the "*nemo dat quod non habet*" rule ("no one gives what he doesn't have"), a seller cannot pass better title than he himself has; so if the goods are subject to an

encumbrance (such as a mortgage, charge or hypothec), or even stolen, the bill of lading will not grant full title to the holder.

Types of bills of lading

Bills of lading may take various forms, such as on-board and received-for-shipment.

- An on-board bill of lading denotes that merchandise has been physically loaded onto a shipping vessel, such as a freighter or cargo plane.
- A received-for-shipment bill of lading denotes that merchandise has been received, but is not guaranteed to have already been loaded onto a shipping vessel. (Typically, it will be issued by a freight-forwarder at a port or depot). Such bills can be converted upon being loaded.



Charter-party bill of lading, for a sulfuric acid bulk cargo

- A straight bill of lading is used when payment has been made in advance of shipment and requires a carrier to deliver the merchandise to the appropriate party.
- An order bill of lading is used when shipping merchandise prior to payment, requiring a carrier to deliver the merchandise to the importer, and at the endorsement of the exporter the carrier may transfer title to the importer. Endorsed order bills of lading can be traded as a security or serve as collateral against debt obligations.

Bills of lading and charter parties compared

A charter party is the contract governing the relationship between the ship-owner and the charterer. The bill of lading governs the relationship between the shipper and the carrier (who will be either a shipowner or a demise charterer). If the exporter (the shipper) is shipping a small amount of cargo, he will arrange for a carrier to carry the goods for him, using a bill of lading. If the exporter needs the whole (or a very substantial part) of the ship's cargo capacity, the exporter may need to charter the vessel, and he will enter into a charter party agreement with the ship-owner.

If the charter party is a time or voyage charter party, the ship-owner will still have control of the ship and its crew. If there is a demise (or "bareboat") charter party, the charterer will effectively have a long lease and will have full control of the vessel. When the master (captain) issues a B/L to a shipper, he will be acting as an agent for the carrier, who will be either the ship-owner (time or voyage) or the charterer (demise).

In a time-charter party or voyage-charter party, if the charterer is shipping his own cargo (rather than the cargo of a third party) he will receive a bill of lading from the master, acting as agent of the ship-owner; but that B/L will serve solely as a receipt and document of title, and its terms will (subject to contrary intent) be secondary to the terms of the charter party, which remains the dominant contract.

Sea waybills and electronic data interchange (EDI)

Under Art. III of the Hague-Visby Rules, a carrier must, on demand, provide the shipper with a bill of lading; but if the shipper agrees, a lesser document such as a "sea waybill" may be issued instead. In recent years, the use of bills of lading has declined, and they have tended to be replaced with the sea waybill. (If a so-called bill of lading is declared to be "non-negotiable", then it is not a true B/L, and instead will be treated as a sea waybill.)

The main difference between these two documents is that the waybill gives the bearer the right to **possession** of the cargo, but does not confer **title in the goods**. As a result, there is no need for the physical document to be presented for the goods to be released. The carrier will automatically release the goods to the consignee once the import formalities have been completed. This results in a much smoother flow of trade, and has allowed shipping lines to move towards electronic data interchange which may greatly ease the flow of global trade.

For some time, it has been the case that the cargo may arrive at the destination before the bill of lading; and a practice has arisen for the shipper (having sent the bill of lading to the banks for checking) to send to the consignee a **letter of indemnity** (LOI) which can be presented to the carrier in exchange for the cargo. The LOI indemnifies the carrier against any cargo claim, but the document is not transferable and has no established legal status. For letter of credit and documentary collection transactions, it is important to retain title to the goods until the transaction is complete. This means that the bill of lading still remains a vital document within international trade.

Alternatively, to overcome the possibility of the goods reaching the destination ahead of the cargo, majority of the Shipping Lines offer an “Express release” service (formerly known as “Telex release”). By surrendering the full set of bills of lading issues at the port of loading, the

shipping line can instruct the port of discharge to release the cargo without the physical presentation of bills of lading at destination.

Electronic bills of lading

For many years, the industry has sought a solution to the difficulties, costs and inefficiencies associated with paper bills of lading. One answer is to make the bill an electronic document. An electronic bill of lading (or **eB/L**) is the legal and functional equivalent of a paper bill of lading. An electronic bill of lading must replicate the core functions of a paper bill of lading, namely its functions as a receipt, as evidence of or containing the contract of carriage and as a document of title.

The UK Carriage of Goods Act 1992 s.1 (5) enables the trade minister to make regulations for electronic transactions. As yet, no such regulations have been made, as electronic interchange is already lawful. Electronic "clubs" such as BOLERO have been quite successful, but the maritime trade community is traditional and loath to move away from paper transactions, so progress has been very slow. However, in recent times, it has been proposed that **Blockchain** technology may be the answer to cover the myriad steps in an export trade transaction, thereby enabling electronic transactions and information transfer that is both speedy and reliable.

Name

The word "lading" means "loading", both words being derived from the Old English word *hladan*. "Lading" specifically refers to the loading of cargo aboard a ship. The Dutch word "lading" has exactly the same meaning (freight, cargo, an amount of transportable goods) as it has in the English "bill of lading", but is not restricted to shipping.

Under English law, the Carriage of Goods by Sea Act 1992 provides that the term "bill of lading" includes a "received-for-shipment" bill of lading issued by, say, a freight forwarder or a storage depot/warehouse. A "combined bill of lading" may be issued by a carrier who, say, collects goods from a factory for subsequent delivery to a ship via multi-modal transport.

Parties involved in Maritime transportation

A **common carrier** in common law countries (corresponding to a **public carrier** in some civil law systems, usually called simply a ***carrier***) is a person or company that transports goods or people for any person or company and is responsible for any possible loss of the goods during transport. A common carrier offers its services to the general public under license or authority provided by a regulatory body, which has usually been granted "ministerial authority" by the legislation that created it. The regulatory body may create, interpret, and enforce its regulations upon the common carrier (subject to judicial review) with independence and finality as long as it acts within the bounds of the enabling legislation.

A common carrier (also called a *public carrier* in British English) is distinguished from a contract carrier, which is a carrier that transports goods for only a certain number of clients and that can refuse to transport goods for anyone else, and from a private carrier. A common

carrier holds itself out to provide service to the general public without discrimination (to meet the needs of the regulator's quasi judicial role of impartiality toward the public's interest) for the "public convenience and necessity." A common carrier must further demonstrate to the regulator that it is "fit, willing, and able" to provide those services for which it is granted authority. Common carriers typically transport persons or goods according to defined and published routes, time schedules, and rate tables upon the approval of regulators. Public airlines, railroads, bus lines, taxicab companies, phone companies, internet service providers, cruise ships, motor carriers (i.e., canal operating companies, trucking companies), and other freight companies generally operate as common carriers. Under US law, an ocean freight forwarder cannot act as a common carrier.

The term *common carrier* is a common law term and is seldom used in Continental Europe because it has no exact equivalent in civil-law systems. In Continental Europe, the functional equivalent of a common carrier is referred to as a *public carrier* or simply as a *carrier*. However, *public carrier* in Continental Europe is different from *public carrier* in British English in which it is a synonym for *contract carrier.*

In a contract of carriage, the **consignee** is the entity who is financially responsible (the buyer) for the receipt of a shipment. Generally, but not always, the consignee is the same as the receiver.

If a sender despatches an item to a receiver via a delivery service, the sender is the *consignor*, the recipient is the *consignee*, and the deliverer is the *carrier*.

A brief statement of law

This is a difficult area of law in that it regulates the mass transportation industry which cannot always guarantee arrival on time or that goods will not be damaged in the course of transit. Furthermore, two other problems are that unpaid consignors or freight carriers may wish to hold goods until payment is made, and fraudulent individuals may seek to take delivery in place of the legitimate consignees. The key to resolving such disputes lies in the documentation. The standard form of contract is a bill of lading which, in international shipping law, is simply a contract for the carriage of goods entered into between the shipper and the carrier that is not a charter party. It is always a term of that contract that the carrier must deliver the goods to a specific receiver.

Documentation and legal requirements for delivery

A straight bill of lading by land or sea, or air waybill are not documents of title to the goods they represent. They do no more than require delivery of the goods to the named consignee and (subject to the shipper's ability to redirect the goods) to no other. This differs from an "order" or "bearer" bill of lading which are possessory title documents and negotiable, i.e. they can be endorsed and so transfer the right to take delivery to the last endorsee. This aspect of shipping law is regulated by the Hague Rules, and the laws of individual countries, e.g. the UK Carriage of Goods by Sea Act 1992 and the U.S. Pomerene Act 1916. There is some international dispute as to whether the consignee on a straight bill must produce the bill in order to take delivery. The U.S. position is that the person taking delivery must prove his or

her identity but, as in Hong Kong, there is no need to present the bill itself. In the UK there are conflicting *obiter dicta* in "The Rafaela S" [2003] 2 Lloyd's Rep. 113 and "The Happy Ranger" [2002] 2 AER (Comm) 23, so the matter must remain unclear even though there are serious problems, for example, arising from the everyday occurrence of cargo being discharged against letters of indemnity when original bills of lading are not yet available to be presented at the discharge port.

Consignee rights

The rights of the consignee under an air waybill are regulated by the Warsaw Convention for the Unification of Certain Rules for International Carriage by Air, 1929 and the Montreal Convention for the Unification of Certain Rules for International Carriage by Air 1999 and the relevant state laws (which may be one law chosen as the proper law by the parties, or any combination of laws representing the seller, buyer, consignor, and carrier.) This is very important as per export documents.

The receiver can be different than that of the consignee.

IMPORTANCE

It is helpful to give and take the information about to be paid and received. It helps to settle dispute as it includes the detail about the goods and terms of trade and payment. It informs the selling price to the consignee. It helps to know the quality, the quantity, the price and the discount to the importer.

The **consignor**, in a contract of carriage, is the person sending a shipment to be delivered whether by land, sea or air. Some carriers, such as national postal entities, use the term "sender" or "shipper" but in the event of a legal dispute the proper and technical term "consignor" will generally be used.

If Sender sends a widget to Receiver via a delivery service, Sender is the consignor and Receiver is the consignee.

A **ship-owner** is the owner of a merchant vessel (commercial ship) and is involved in the shipping industry. In the commercial sense of the term, a ship-owner is someone who equips and exploits a ship, usually for delivering cargo at a certain freight rate, either as a per freight rate (given price for the transport of a certain cargo between two given ports) or based on hire (a rate per day). Ship-owners typically hire a licensed crew and captain rather than take charge of the vessel in person. Usually the ship-owner is organized through a company, but also people and investment funds can be ship owners. If owned by a ship company, the ship-owner usually performs technical management of the vessel through the company, though this can also be outsourced or relayed onto the shipper through bareboat charter.

Ship-owners are usually members of a national Chamber of Shipping such as the UK Chamber of Shipping. The International Chamber of Shipping is the global organization for ship-owners and their respective national chambers, representing approximately 80% of the entire world shipping tonnage.

In general, **technical management** are the systematic efforts used in the deployment of a system or process and in balancing its cost, effectiveness and supportability during its life cycle.

Technical managers can be found at the interface of application and technique; they act between the user and the technical means. Examples of technical management are: ICT management, real estate management, financial management, quality management. Often the managed field is a resource of the organization. Technical managers combine technical and management knowledge for the benefit of the user.

In logistics, technical management involves the duties a shipping company must perform for the technical operation of a vessel. This involves management related to crew management with related tasks, logistics related to operations as well as operations, service and maintenance. Often technical management is performed by the ship owning company, but not always. Technical management is sometimes performed by separate companies than the commercial management that involves chartering of the vessels and the financial aspects that is performed by the owner company.

Intermodal

Intermodal freight transport refers to shipments that involve more than one mode. More specifically it usually refers to the use of intermodal shipping containers that are easily transferred between ship, rail, plane and truck.

For example, a shipper works together with both ground and air transportation to ship an item overseas. Intermodal freight transport is used to plan the route and carry out the shipping service from the manufacturer to the door of the recipient.

Terms of shipment



Harbour cranes unload cargo from a container ship at the Jawaharlal Nehru Port, Navi Mumbai, India.

Common trading terms used in shipping goods internationally include

• Free on board (FOB) the exporter delivers the goods at the specified location (and on board the vessel). Costs paid by the exporter include load, lash, secure and stow the cargo, including securing cargo not to move in the ships hold, protecting the cargo from contact with the double bottom to prevent slipping, and protection against damage from condensation. For

example, "FOB JNPT" means that the exporter delivers the goods to the Jawahar lal Nehru Port, India, and pays for the cargo to be loaded and secured on the ship. This term also declares where the responsibility of shipper ends and that of buyer starts. The exporter is bound to deliver the goods at his cost and expense. In this case, the freight and other expenses for outbound traffic are borne by the importer.

- Carriage and freight (now known in the US as "cost and freight") (C&F, CFR, CNF): Insurance is payable by the importer, and the exporter pays all expenses incurred in transporting the cargo from its place of origin to the port/airport and ocean freight/air freight to the port/airport of destination. For example, C&F Los Angeles (the exporter pays the ocean shipping/air freight costs to Los Angeles). Most of the governments ask their exporters to trade on these terms to promote their exports worldwide such as India and China. Many of the shipping carriers (such as UPS, DHL, FedEx) offer guarantees on their delivery times. These are known as GSR guarantees or "guaranteed service refunds"; if the parcels are not delivered on time, the customer is entitled to a refund.
- Carriage, insurance and freight (now known in the US as "cost, insurance and freight")(CIF): Insurance and freight are all paid by the exporter to the specified location. For example, at CIF Los Angeles, the exporter pays the ocean shipping/air freight costs to Los Angeles including the insurance of cargo. This also states that responsibility of the shipper ends at the Los Angeles port.
- The term "best way" generally implies that the shipper will choose the carrier who offers the lowest rate (to the shipper) for the shipment. In some cases, however, other factors, such as better insurance or faster transit time will cause the shipper to choose an option other than the lowest bidder.

Door- to-door shipping

Door-to-door shipping is a service provided by many international shipping companies. The quoted price of this service includes all shipping, handling, import and customs duties, making it a hassle-free option for customers to import goods from one jurisdiction to another. This is compared to standard shipping, the price of which typically includes only the expenses incurred by the shipping company in transferring the object from one place to another. Customs fees, import taxes and other tariffs may contribute substantially to this base price before the item ever arrives.

Shipper may refer to: Someone who provides or sends goods for shipment, by packaging, labeling, and arranging for transit, or who coordinates the transport.

Admiralty court

Admiralty courts, also known as **maritime courts**, are courts exercising jurisdiction over all maritime contracts, torts[13], injuries, and offenses.

[13] - A **tort**, in common law jurisdiction, is a civil wrong that causes a claimant to suffer loss or harm, resulting in legal liability for the person who commits a tortious act. It can include the intentional infliction of emotional distress, negligence, financial losses, injuries, invasion of privacy, and many other things.

Vice admiralty court

Vice Admiralty Courts were juryless courts located in British colonies that were granted jurisdiction over local legal matters related to maritime activities, such as disputes between merchants and seamen.

International Conventions

Hague Visby Rules

The **Hamburg Rules** are a set of rules governing the international shipment of goods, resulting from the United Nations International Convention on the Carriage of Goods by Sea adopted in Hamburg on 31 March 1978. The Convention was an attempt to form a uniform legal base for the transportation of goods on oceangoing ships. A driving force behind the convention was the attempt of developing countries' to level the playing field. It came into force on 1 November 1992.

The first of the international conventions on the carriage of goods by sea was the Hague Rules of 1924. In 1968, the Hague Rules were updated to become the Hague-Visby Rules, but the changes were modest. The convention still covered only "tackle to tackle" carriage contracts, with no provision for multimodal transport. The industry-changing phenomenon of containerization was barely acknowledged. The 1978 Hamburg Rules were introduced to provide a framework that was both more modern, and less biased in favor of ship-operators. Although the Hamburg Rules were readily adopted by developing countries, they were shunned by richer countries who stuck with Hague and Hague-Visby. It had been expected that a Hague/Hamburg compromise might arise, but instead the more extensive Rotterdam Rules appeared. The first of the international conventions on the carriage of goods by sea was the Hague Rules of 1924. In 1968, the Hague Rules were updated to become the Hague-Visby Rules, but the changes were modest. The convention still covered only "tackle to tackle" carriage contracts, with no provision for multimodal transport. The industry-changing phenomenon of containerization was barely acknowledged. The 1978 Hamburg Rules were introduced to provide a framework that was both more modern, and less biased in favor of ship-operators. Although the Hamburg Rules were readily adopted by developing countries,

Tort law, a suit where the purpose of a legal action is to obtain a private civil remedy such as damages, may be compared to criminal law, which deals with criminal wrongs that are punishable by the state. Tort law may also be contrasted with contract law, which also provides a civil remedy after breach of duty; but whereas the contractual obligation is one chosen by the parties, the obligation in both tort and crime is imposed by the state. In both contract and tort, successful claimants must show that they have suffered foreseeable loss or harm as a direct result of the breach of duty.

they were shunned by richer countries who stuck with Hague and Hague-Visby. It had been expected that a Hague/Hamburg compromise might arise, but instead the more extensive Rotterdam Rules appeared.

The **Hague Rules** of 1924 (formally the "International Convention for the Unification of Certain Rules of Law relating to Bills of Lading, and Protocol of Signature") is an international convention to impose minimum standards upon commercial carriers of goods by sea. Previously, only the common law provided protection to cargo-owners; but the Hague Rules should not be seen as a "consumers' charter" for shippers because the 1924 Convention actually favored carriers and reduced their obligations to shippers.

The Hague Rules represented the first attempt by the international community to find a workable and uniform way to address the problem of ship-owners regularly excluding themselves from all liability for loss or damage to cargo. The objective of the Hague Rules was to establish a minimum mandatory liability of carriers.

Under the Hague Rules the shipper bears the cost of lost/damaged goods if they cannot prove that the vessel was unseaworthy, improperly manned or unable to safely transport and preserve the cargo, i.e. the carrier can avoid liability for risks resulting from human errors provided they exercise due diligence and their vessel is properly manned and seaworthy. These provisions have frequently been the subject of discussion between ship-owners and cargo interests on whether they provide an appropriate balance in liability.

The Hague Rules form the basis of national legislation in almost all of the world's major trading nations, and cover nearly all the present international shipping. The Hague Rules have been updated by two protocols, but neither addressed the basic liability provisions, which remain unchanged.

The Hague Rules were slightly amended (beginning in 1931, and further in 1977 and 1982) to become the Hague-Visby Rules. In addition, the U.N. established a fairer and more modern set of rules, the Hamburg Rules (effective 1992). Also a more radical and extensive set of rules is the Rotterdam Rules, but as of November 2015, only 3 states have ratified these rules, so they are not yet in force.[

The **Hague–Visby Rules** is a set of international rules for the international carriage of goods by sea. They are a slightly updated version of the original Hague Rules which were drafted in Brussels in 1924.

The premise of the Hague–Visby Rules (and of the earlier English common law from which the Rules are drawn) was that a carrier typically has far greater bargaining power than the shipper, and that to protect the interests of the shipper/cargo-owner, the law should impose some minimum affreightment obligations upon the carrier. However, The Hague and Hague–Visby Rules were hardly a charter of new protections for cargo-owners; the English common law prior to 1924 provided more protection for cargo-owners, and imposed more liabilities upon "common carriers".

The official title of the Hague Rules the "International Convention for the Unification of Certain Rules of Law relating to Bills of Lading". After being amended by the Brussels Amendments (officially the "Protocol to Amend the International Convention for the Unification of Certain Rules of Law Relating to Bills of Lading") in 1968, the Rules became known colloquially as the Hague–Visby Rules.

A final amendment was made in the SDR[14] Protocol in 1979. Many countries declined to adopt the Hague-Visby Rules and stayed with the 1924 Hague Rules.[2] Some other countries which upgraded to Hague-Visby subsequently failed to adopt the 1979 SDR protocol.

Rotterdam Rules

The "**Rotterdam Rules**" (formally, the **United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea**) is a treaty proposing new international rules to revise the legal framework for maritime affreightment and carriage of goods by sea. The Rules primarily address the legal relationship between carriers and cargo-owners.

The aim of the convention is to extend and modernize existing international rules and achieve uniformity of International trade law in the field of maritime carriage, updating or replacing many provisions in the Hague Rules, Hague-Visby Rules and Hamburg Rules. The convention establishes a comprehensive, uniform legal regime governing the rights and obligations of shippers, carriers and consignees under a contract for door-to-door shipments that involve international sea transport.

Although the final text was greeted with much enthusiasm, a decade later, little has happened. As of December 2018, the rules are not yet in force as they have been ratified by only four states, three of which are minor West African states. The Rotterdam Rules are extensive, with nearly ten times as many Articles as existing "tackle-to-tackle only" Rules. Although some have argued that the new Rules have flaws, the Hague-Visby Rules which dominate the sector are insufficient for modern multimodal transport. One possible way forward might be the interim adoption of a "Rotterdam-Lite Convention".

Maritime Labour Convention

The **Maritime Labour Convention (MLC)** is an International Labour Organization convention, number 186, established in 2006 as the *fourth pillar* of international maritime law and embodies "all up-to-date standards of existing international maritime labour Conventions and Recommendations, as well as the fundamental principles to be found in other international labour Conventions". The other "pillars are the SOLAS, STCW and MARPOL. The treaties

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[14]- **Special drawing rights** (**SDR**s) are supplementary foreign exchange reserve assets defined and maintained by the International Monetary Fund (IMF).[1] SDRs are units of account for the IMF, and not a currency *per se*.[2] They represent a claim to currency held by IMF member countries for which they may be exchanged. SDRs were created in 1969 to supplement a shortfall of preferred foreign exchange reserve assets, namely gold and U.S. dollars. The ISO 4217 currency code for special drawing rights is **XDR** and the numeric code is *960*.

applies to all ships entering the harbors of parties to the treaty (port states), as well as to all states flying the flag of state party (flag states, as of 2019: over 90 per cent).

The convention entered into force on 20 August 2013, one year after registering 30 ratifications of countries representing over 33 per cent of the world gross tonnage of ships. Already after five ratifications the ratifying countries (Bahamas, Norway, Liberia, Marshall Islands, and Panama) represented over 43 per cent of the gross world tonnage (which is over 33 per cent; the second requirement for entry into force). As of September 2019, the convention has been ratified by 97 states representing over 91 per cent of global shipping.

Although the Convention has not been ratified worldwide, it has widespread effect because vessels from non-signatory states that attempt to enter ports of signatory states may face arrest and penalties for non-compliance with the MLC.

International Convention on Salvage

The **International Convention on Salvage** is a treaty that was concluded in London on 28 April 1989 that replaced the Brussels Convention on Assistance and Salvage at Sea as the principal multilateral document governing marine salvage.

The Convention's main innovation is that the scope of salvage law has been extended to cover "environmental salvage".

"No cure, no pay" and environmental salvage

The 1910 Brussels Convention had established the principle (known as "no cure, no pay") that a salvor is rewarded only if the salvage operation successfully rescues the ship or its cargo. The International Convention on Salvage expanded on this principle by introducing the concept of an "enhanced salvage award", which may be awarded by an arbitrator or a tribunal if the salvor took effective action to prevent or minimize environmental damage but nevertheless failed to salvage the ship or its cargo.

The 1989 Convention entered into force on 14 July 1996 and as of April 2016 has been ratified by 69 states representing 52 per cent of the gross tonnage of the world's merchant fleet. The impetus for the new Convention was the LOF 1980[15] which permitted salvage rewards to be made to salvors who acted to limit damage to the coastal environment after oil spills.

Articles 13 & 14 of the Convention made provision for "Special Compensation", but *The Nagasaki Spirit* case revealed that the Convention had been poorly drafted and, rather than encouraging environmental salvors, instead it limited the amount that such salvors could be

[15] - The **Lloyd's Open Form**, formally "Lloyd's Standard Form of Salvage Agreement", and commonly referred to as the **LOF**, is a standard form contract for a proposed marine salvage operation. Originating in the late 19th century, the form is published by Lloyd's of London and is the most commonly used form for international salvage. Innovations in the LOF 1980 have engendered a major change in environmental salvage.

paid to mere "out-of-pocket expenses", with no allowance for any profit margin. This deficiency has since been addressed by the SCOPIC[16] codicil to the LOF.

United Nations Convention on the Law of the Sea (UNCLOS)

The United Nations Convention on the Law of the Sea (**UNCLOS**), also called **the Law of the Sea Convention** or **the Law of the Sea** treaty, is **the** international **Law of the sea** and agreements, modern law of the **sea** derives largely from **the United Nations Convention on the Law of the Sea** (**UNCLOS**), effective since 1994, which is List **of** parties to **the United Nations Convention on the Law of the Sea**. **The United Nations Convention on the Law of the Sea** (**UNCLOS**) is **the** international agreement that resulted from **the** third **United Nations** Conference **on United** States and **the United Nations Convention on the Law of the Sea** resulted in **the** international treaty known as **the United Nations Convention on the Law of the Sea** (**UNCLOS**). **The United** States also participated in **the** subsequent Admiralty **law** and **the** maritime relationships between **nations**. **The United Nations Convention on the Law of the Sea** has been adopted by 167 countries and **the** European.

SOLAS Convention

The **International Convention for the Safety of Life at Sea** (**SOLAS**) is an international maritime treaty which sets minimum safety standards in the construction, equipment and operation of merchant ships. The convention requires signatory flag states to ensure that ships flagged by them comply with at least these standards.

The current version of SOLAS is the 1974 version, known as SOLAS 1974, which came into force on 25 May 1980. As of November 2018, SOLAS 1974 had 164 contracting states, which flag about 99% of merchant ships around the world in terms of gross tonnage.

SOLAS in its successive forms is generally regarded as the most important of all international treaties concerning the safety of merchant ships.

Ballast Water Management Convention

The **International Convention for the Control and Management of Ships' Ballast Water and Sediments** (**Ballast Water Management Convention** or **BWM Convention**) is a 2004 international maritime treaty which requires signatory flag states to ensure that ships flagged by them comply with standards and procedures for the management and control of ships' ballast water and sediments. The Convention aims to prevent the spread of harmful aquatic organisms from one region to another and halt damage to the marine environment from

[16] - Following on from the innovations of the LOF 1980, the 1989 International Salvage Convention permitted salvage rewards to be made to salvors who acted to limit damage to the coastal environment after oil spills. Articles 13 & 14 of the Convention made provision for "Special Compensation", but the UK House of Lords case of the *Nagasaki Spirit* revealed that the convention had been poorly drafted, thereby limiting the amount that environmental salvors could be paid to mere "out-of-pocket expenses", with no allowance for any profit margin. As an antidote to this, the marine insurance industry and P&I clubs jointly developed the "SCOPIC clause", which is a codicil that may be appended to an LOF and invoked should the statutory payment provisions prove inadequate. The first SCOPIC clause was in 2000, and there have been several iterations since.

ballast water discharge, by minimizing the uptake and subsequent discharge of sediments and organisms. From 2024, all ships are required to have approved Ballast Water Management Treatment System, according to the D2 standard (see below). Existing ships are required to install an approved system, which may cost up to 5 million USD per ship to install.[2] To assist with implementation, the IMO has released 14 Guidance documents in regards to the Convention including the G2 Guidelines for Ballast Water Sampling, G4 Guidelines for Ballast Water management and G6 Guidelines for Ballast Water Exchange.

Chartering

Chartering is an activity within the shipping industry whereby a ship-owner hires out the use of their vessel to a charterer. The contract between the parties is called a charter party (from the French *"charte partie"*, or "parted document"). The three main types of charter are: **demise charter**, **voyage charter**, and **time charter**.

The charterer

In some cases, a charterer may own cargo and employ a shipbroker to find a ship to deliver the cargo for a certain price, called freight rate. Freight rates may be on a per-ton basis over a certain route (e.g. for iron ore between Brazil and China), in World scale points (in case of oil tankers) or alternatively may be expressed in terms of a total sum - normally in U.S. dollars - per day for the agreed duration of the charter.

A charterer may also be a party without a cargo who takes a vessel on charter for a specified period from the owner and then trades the ship to carry cargoes at a profit above the hire rate, or even makes a profit in a rising market by re-letting the ship out to other charterers.

Depending on the type of ship and the type of charter, normally a standard contract form called a charter party is used to record the exact rate, duration and terms agreed between the ship-owner and the charterer.

Time Charter Equivalent[17] is a standard shipping industry performance measure used primarily to compare period-to-period changes in a shipping company's performance despite changes in the mix of charter types.

[17] - The **time charter equivalent** (TCE) rate is a standard shipping industry performance measure used primarily to compare period-to-period changes in a shipping company's performance despite changes in the mix of charter types (i.e., spot charters, time charters and bareboat charters) under which the vessels may be employed between the periods. TCE revenue is a non-GAAP measure.

A standard method to compute TCE is to divide voyage revenues (net of expenses) by available days for the relevant time period. Expenses primarily consist of port, canal and fuel costs.

Charter types

There are three main types of charter:

A **demise charter,** or **bareboat charter[18],** is an arrangement for the hiring of a vessel whereby no administration or technical maintenance is included as part of the agreement. The charterer obtains possession and full control of the vessel along with the legal and financial responsibility for it. The charterer pays for all operating expenses, including fuel, crew, port expenses and P&I and hull insurance. In commercial demise chartering, a subtype of bareboat chartering, the charter period may last for many years and may end with the charterer acquiring title (ownership) of the ship. In this case, a demise charter is a form of hire-purchase from the owners, who may well have been the shipbuilders. Demise chartering is common for tankers and bulk-carriers.

A **voyage charter** is the hiring of a vessel and crew for a voyage between a load port and a discharge port. The charterer pays the vessel owner on a per-ton or lump-sum basis. The owner pays the port costs (excluding stevedoring), fuel costs and crew costs. The payment for the use of the vessel is known as *freight*. A voyage charter specifies a period, known as laytime, for loading and unloading the cargo. If laytime is exceeded, the charterer must pay *demurrage*. If laytime is saved, the charter party may require the ship-owner to pay *despatch* to the charterer.

A **time charter** is the hiring of a vessel for a specific period of time; the owner still manages the vessel but the charterer selects the ports and directs the vessel where to go. The charterer pays for all fuel the vessel consumes, port charges, commissions, and a daily *hire* to the owner of the vessel.

Variations on these types include

Chartering Procedures. A cargo owner needs cargo moved (or a **ship** operator needs an additional **ship**.) He engages a shipbroker who finds suitable **ships**. After meticulous checking of the **ships**, the charterer chooses a **ship**, and via the broker, makes a FIRST OFFER.

- **What is chartering a ship?**

Chartering is an activity within the **shipping** industry. ... A voyage **charter** is the hiring of a vessel and crew for a voyage between a load port and a discharge port. The charterer pays the vessel owner on a per-ton or lump-sum basis. The owner pays the port costs (excluding stevedoring), fuel costs and crew costs.

Demise charter is a contract whereby the ship owner leases its vessel to the charterer for a period of time during which the whole use and management of the vessel passes to the charterer. In such a situation, the charterer pays all expenses for the operation and

[18] - A **bareboat charter** or **demise charter** is an arrangement for the chartering or hiring of a ship or boat, whereby no crew or provisions are included as part of the agreement; instead, the people who rent the vessel from the owner are responsible for taking care of such things.

maintenance of the vessel. Officers and crew become servants of the charterer. A demise charter whereby the charterer has the right to place its own master and crew on board of the vessel is called a bareboat charter.

A **bareboat yacht charter** (In the leisure industry, the term "demise charter" is not used). Bareboat yacht chartering is the short-term hire for only a few weeks or even less. The owner supplies the yacht in seaworthy order, fully fueled and possibly revictualled. The yacht may be part of a holiday flotilla[19]; and sometimes the yacht is manned by an employee of the owner. At the end of the hire period, the charterers are expected to pay for the fuel used.

A **passenger cruise ship charter** - The hiring of a passenger cruise ship in regular service for a limited period of time exclusively for a private function, using all accommodations; often for business meetings or conferences, music festivals, charity fundraisers or global events such as the 2016 Rio Olympics.

A **trip time charter** is a comparatively short time charter agreed for a specified route only (as opposed to the standard time charter where charterer is free to employ the vessel within agreed trading areas).

A **contract of affreightment** is **not** strictly a charter contract, but is somewhat similar to a voyage charter. Under a contract of affreightment the ship-owner undertakes to carry a number of cargoes within a specified period of time on a specified route. Agreed frequency of cargoes may require more than one ship. Unlike a true charter, the cargo-owner does not have a laytime period, nor is he responsible for demurrage.

- **How do I become a ship charterer?**

Post-fixing and operation departments handle the daily issues of a charter party and provide experience which will definitely be required for a **chartering** position. Here you can start from the import/ export or the customs departments and then advance to post-fixing or **chartering** department.

- **What does Laycan mean?**

Laycan means the earliest date on which Laytime can commence and the latest date, after which the charterer can opt to cancel the Charter Party. ... **Laycan means** the period during which the Owner must notify Charterer that the Vessel is ready for delivery.

Chartering Procedures. A cargo owner needs cargo moved (or a **ship** operator needs an additional **ship**.) He engages a shipbroker who finds suitable **ships**. After meticulous checking of the **ships**, the charterer chooses a **ship**, and via the broker, makes a FIRST OFFER.

[19] - A **flotilla** (from Spanish, meaning a small *flota* (fleet) of ships), or **naval flotilla**, is a formation of small warships that may be part of a larger fleet. A flotilla is usually composed of a homogeneous group of the same class of warship, such as frigates, destroyers, torpedo boats, submarines, gunboats, or minesweepers.

First offer (fixture note) for chartering a ship under voyage charter.

After reaching agreement on text of first offer then, the **fixture note** signed by both parties is essentially a simple chartering contract performed by both parties. After signing the **fixture note**, the ship-owner compiles the formal chartering contract according to the agreed contents, and sends it to the lessee for examination and verification through the chartering agent.

Before reaching agreement the ship owner and charterer start negotiation on the base of the "FIRST OFFER" as per below:
\\\\\\\\\\\\ URGENT ////////////
VOYAGE FIXTURE NOTE:
ALL A/C FCC OR GTEED NOMINEE.
COMMODITY:
PAKING:
QUANTITY:
VOLUM:
LOAD PORT: 1SP 1SB ……
DISCHARGE PORT: 1SP 1SB ……..
FREIGHT: PCT PAYABLE W/I ……BANKING DAYS OF COMPLETION OF LOADING AND SIGNING AND RELEASING OF BS/L MARKED “FREIGHT PAYABLE AS PER CHARTER PARTY”
DEM: USD ……. DHD

- FREIGHT DEEMED EARNED AS CGO LOADED DISCOUNTLESS AND NON- RETURMABLE SHIP AND / OR CGO LOST OR NOT LOST.
- ANY TAXES / DUES INCLUDING FRT TAX, VSL AND/OR FLAG TO BE FOR OWNERS ACCOUNT.
- ANY TAXES AND/OR DUES, WHARFAGES ON CGO FOR CHARTERER / RECIEVER ACCT BE.
- OAP (IF ANY) DUE TO VSL AGE / FLAG ON CHRRTS ACCT BUT OWNERS WILL CONTRIBUTE USD TOWARDS SAME.
- SUB DETAILS GENCON C/P WITH ADDTNL RIDER CLAUSES.
- ADD COM TTL.
- OTHERS
- REPLY BY
- END OFFER AWAITING YOURS.

B.RGDS

FOR AND BEHALF OF SHIPPERS.

The negotiation takes place between ship-owner and charterer through ship-owner broker and charterer broker and after lifting of all subjects a fixture note such as indicated below will be signed (electronically) between ship-owner and charterer. After signing the fixture note, the text of main charter party will be adjusted according to the text of fixture note agreed and there may be additional rider clauses if required and agreed upon.

FIXTURE NOTE

No. 06/NS-VH/MAL - 2014

Hochiminh City, 26 Aug., 2014. It is mutually agreed between:

NORTHERN SHIPPING JSC

Address: 278 Ton Duc Thang St, Dong Da, Ha Noi - Vietnam.
Tel: 0438512688
Fax: 0435113347
Hereinafter called as the Owner.

and

VAN HAI SHIPPING SERVICES CO., LTD.

Address: 1168/4 Le Van Luong St, Phuoc Kien Ward, Nha Be Dist., Hochiminh City - Vietnam.
Tel.: 84 8 3 7815456.
Fax: 84 8 3 7815356.
Hereinafter called as the Charterer,

For the carriage of cargo under the following terms and conditions:

1. Cargo Quantity: min/max 5,900 MTS of rice in bags.

2. Shipment: 09-15 sept' 2014

Performing vessels to be as follows:

MV. NOSCO TRADER
VIETNAM FLAG, 2011 BUILD SINGLE DECK, DWT/GRT/NRT 6563.8/4219/2495MT, DRAFT 6.943M, LOA /B/D: 102.79/17/8.8M GRAIN/BALE CAPA8610/8159M3. H1: 33.4/17/7.5 M H2: 34.3/17/7.5 4 DERRICK X 20MT. ADA

- Performing vessel to be maximum twenty five (25) years of age with overage insurance premium for vessel over fifteen (15) years of age shall be for Owner's account at the Prevailing London Advisory rate/Schedule and shall be deducted from the freight payment.
- Cargo is to be carried by mechanically self-propelled vessels of steel construction classed with a Classification Society which is a member or associate member of the IACS (International Association of Classification Society) and VIRES (Vietnam Register of Shipping).
- Owner must provide the following copies of vessel trading certificates to Charterers:
    - Certificate of Classification.
    - PNI certificate of entry / Certificate of P&I Insurance.
    - Ships Registry certificate.
    - ISM certificate
    - Safe manning document certificate
    - International Load line certificate

- Cargo ship safety equipment certificate
- Cargo ship construction certificate

a) Vessel to carry cargo must be seaworthy, workable gear(s)/ derrick(s), single-decker or tween decker suitable for the transportation, loading and unloading of bagged rice.

b) The performing vessel to be fully ISM, ISSC, classed, Hull insurance and PNI covered by an Internationally Recognized Organization be remained so for the duration of the F/N.

c) The vessel must be complied with ISPS code. Non–compliance of ISPS code, if any, shall be at Owner's full time/account/responsibilities.

d) Owner guarantees that the descriptions of the vessel are correct and any breach by Owner of any term forming part of the descriptions of the vessel will give Charterer the option to terminate this fixture note and/or claim for damages, if any.

e) Owner must arrange qualified vessel to arrive the load port to ensure the arrival period to Malaysian ports. Otherwise, Owner shall be held for full responsibilities / liabilities for any problems/expenses arising from late of vessel laycan/arrival time. The Charterer has the right to refuse the vessel and claim for losses/damaged arisen from late of vessel laycan/arrival time.

3. Loading Port: 1 safe berth or anchorage, 1 safe port of Ho Chi Minh City - Vietnam.

4. Discharging Port: 1 safe berth, 1 safe port of Malaysia – **PASIR GUDANG.**

5. The Shipping Agent: At Load port: Van Hai Co.,Ltd, **At Disport**: Owner's agent.

6. Freight rate: USD **19.00** per net metric ton - FIOS on basis 1/1

7. Freight payment:

a) To be paid in Vietnamese dong (VND) with Vietcombank Ho Chi Minh City Branch's selling exchange rate at the time of issuance freight invoice.

b) 100 pct of freight to be paid by Charterer to Owner nominated bank against receipt of original freight invoice within 05 banking days from signing and releasing original Clean on Board Charter-Parties Bill of Lading marked " Freight Prepaid" but always before discharging cargo.

c) Freight to be discount less and non-returnable whether vessel and/or cargo lost or not lost.

d) All banking charges to be at Owner's account.

8. Loading terms:

a) Cargo to be loaded/stowed at Charterer's/Shipper's expenses on **CQD** basis, i.e. no demurrage/no despatch.

b) On arrival at load port, vessel's holds must be properly cleaned, dried and free from strange odour, insects and suitable for loading rice that means the vessels' holds must be satisfied with the surveyors' requirements for loading rice shown in holds' survey report. Loading shall only be commenced after passing holds surveys.

c) Charterer tries to load about 1000 MT on basis of 4 workable gangs or pro-rata per weather working day of 24 consecutive hours, Sundays, Holidays excepted **even if used**.

d) Owner/ Master/ Agent to give Vinafood II/ Buyer/ Receiver 72/48/24 hours notice of expected time of vessel's arrival at discharging port respectively.

e) Notice of Readiness (NOR) to be tendered to the Charterer/Shipper on receiving free pratique whether at berth or not, but the vessel is not considered as ready if her holds are not passed survey.
f) Charterer is responsible to arrange holds survey at their expenses before loading cargo and supply the Ship-owner a survey report.
g) Charterer/Shipper to co-ordinate with Owner/Master to load the sound cargo on board the performing vessel.
h) Owner/ Master agrees to cooperate and allow on board presence of Buyer's appointed surveyor from vessel loading commencement until the loading completion, even if there is no loading cargo on board.
e) During loading operation and once cargo has been trimmed and stowed in cargo hold, if cargo is found water – damaged, short of theft, … Owner will be responsible to immediately treat, settle and fully replace the stolen / wet cargo both in terms of quality and quantity at account and risks of Owner.
f) Upon completion of loading, all vessel's hatch/ hatch covers/ manholes to be sealed by Charterer's surveyor and a certificate to that effect is to be issued. The cost of seal shall be for account of the Charterer.

9. Bill of Lading form: CONGENBILL. EDITION 1994 to apply.

Cargo quantity stated in the Bills of Lading shall be conclusive evidence on actual cargo quantity loaded on board. CONGEN Bills of Lading form containing standard disclaimer clause on their face such as “Weight …. quantity …..unknown” shall be treated as null and void.

10. Discharging terms:

a) Customary Quick Despatch (CQD) i/e No Demurrage/No Despatch/ No detention.
b) Cargo to be discharged at Receiver's/ Consignee's expenses.
c) Owner/ Master/ Agent to give Vinafood II/ Buyer/ Receiver 72/48/24 hours notice of expected time of vessel's arrival at discharging port respectively.
d) NOR to be tendered/accepted during office hours, 0800 hours to 1700 hours from Monday to Friday, 0800 hours to 1200 hours on Saturday, WIPON, WIBON, WICCON, WIFPON.
e) NOR to be tendered by Ship master or their Agent in writing with the time received.
The 1st shifting from pilot station and/or waiting anchorage to discharging berth to be at Owner's account. Any additional shifting to be borne by the requesting party.
f) The Owner to guarantee sufficient salt water draft on vessel's arrival for assigned port-discharging port.

11. Cargo fumigation on board:

a) At loading port:
- Fumigation expenses to be Charterer's account.
- Expenses for crew during fumigation to be for Owner's account.
- Owner to allow 48 hours free time for cargo fumigation.
- Vessel quick sailing after fumigation shall be arranged if required by Owner/Master but should be in conformity with local/port authority’s regulations.

- On completion of fumigation, vessel sails out and moves directly from load port to discharge port in her routine waterway and not to be allowed to berth at any port, except in case of force majeure and for bunker purpose.

b) At discharging port:

In case of re-fumigation, if required, all expenses as mentioned in (a) above to be for Charterer's account.

12. **Dunnages/mats**: to be at Owner's account/ time/ arrangement. Laying/tying dunnage materials, mats for separation, to be for Charterer's account.

13. Lightening / Lighterage: if any, to be at Owner's account.

14. Letter of Indemnity (LOI): Cargo to be delivered/released against the presentation of original B(s)/L or Consignee's original LOI in the ship-owners PNI standard wording format subject to Charterer's approval.

15. Other responsibilities of Owner:

a) Owner to submit to Charterer the vessel's name, flag, age, P&I membership, ISM certificate, classification society and registry certificate, name, number of hatches/holds, number and capacity of derricks/gears for obtaining the Receivers acceptance of the performing vessel.
b) After completion of loading Owner shall advise Charterer vessel's time of departure at loadport and estimated time of arrival at disport. Owner to keep Charterer informed of vessel's position/daily status during her voyage from load port to disport.
c) No cargo shall be stowed in compartments which are not suitable for the cargo loading and discharging.
d) Owner to maintain the performing vessel's gears for loading and discharge in efficient working order. Any delay in loading and discharging due to inefficiency or breakdown of winches, derricks to be for Owner's account and time lost shall not be counted as laytime. In the case vessel's cranes/derricks/winches is/are out of order over 01 day, shore crane to be hired at Owner's account and time to count at both ends.
e) In case the vessel is gearless, the shore crane to be hired at Owner's responsibility and account at both ends
f) Owner/ Master to give free use of cargo gears, winches and derricks capable to lifting capacity as per described and necessary lights for any work free of charge to the Charterer and also for night work and Sundays/Holidays, if required.
g) Owner to guarantee the real Owner/Carriers/Operators of vessel to be supplied with no legal, financial problems and the Owner ship/Ship's name will not be changed until completion of the Fixture Note's period. But in any case Owner is fully responsible for any damages/ losses/ disputes ….arisen from this Fixture Note.
h) Owner to guarantee that the performing vessel is full seaworthiness and in good conditions and has appropriate gas tight seals suitable for fumigation and suitable for the carriage of exported rice.

i) Owner guarantee that the performing vessel to be equipped with suitable natural ventilation and facilities to keep cargo in good condition such as canvas for hatches covering, no leakage allowed.
j) Owner to be responsible for any losses and damages to the cargo after it has passed vessel's rail until completion of discharging including for the losses and any damage to the cargo caused by rain/ water through ventilators and leakage of water and / or oil from the pipes and / or valves and / or tanks etc...; for any damage to cargo arising from insufficient or inadequate dunnage for cargo and/or improper stowage; for all cargo loss/damage including but not limited to, pilferage, short landed, short-delivery, wet damage, sinking of ship, fire and piracy. Owner must confirm the Notice of Loss and Damage, if any.
k) Owner to guarantee that vessel hatches always be watertight during the employment. All opening and closing of hatches to be done by crew and at Owner expenses at both ends.
l) Master to maintain ventilation system in proper condition in order to avoid sweating, damages to the cargo on board.
m) Owner to be responsible for any claims against Charterer and whatever charges/consequences the Charterer is held liable arising from/in connection with the faults of Owner/ Master/Chief officer/ crews/Owner's servants/ Owner's agents.
n) Chief Officer to issue the clean Mate's receipt.
o) The Master to authorize the load port Agent to sign and release clean B(s)/L on his behalf. The content of B/L is always in conformity with Mate's receipt. For the purpose to send the shipping documents in time, B/L must be released right after completion of loading (within 24 hours). Otherwise, Owner shall be responsible for the time lost waiting for the documents at discharge port.
p) After completion of fumigation, vessel has to sails out and moves directly from loadport to discharge port in her routine waterway, otherwise Owner shall be held for full responsibilities / liabilities for all risks/damages/expenses arising from the delay of the vessel's departure.

16. Other Terms and Conditions:

a) Transshipment is not allowed.
b) Mixing of cargo with other commodities and/or for other consignees on the same vessel is absolutely prohibited.
c) Taxes, dues, levies on vessel to be at Owner's account at both ends. Taxes, dues, levies on cargo to be at Charterer's account and Consignee's account at load port and disport respectively.
d) Tally at shipside to be for Owner's account at both ends. Tally at dockside to be for Charterer's account at load port and for Consignee’s account at disport.
e) Should the vessel be detained by Authorities at loading/discharging port, the direct actual expenses incurred on vessel to be for Owner's account if the arrest caused by Owner and/or his employees. The same to be for Charterer/ Consignee account if the arrest caused by the Charterer/Consignee and/or their employees.
f) New Jason Clause, The General Paramount Clause, Voyar 1993, Both to Blame Collision Clause, Pollution Clause and P & I Club, Bunkering Deviation Clause deemed to be incorporated in this Fixture Note
g) General Average, if any, to be settled according to York-Antwerp Rules 1994.
h) Revised clause of ISM code for the cargo to be as per Cargo ISM Endorsement.

17. Law & Arbitration:

All disputes, controversies or differences which may arise between the parties out of or in relation to or in connection with this Fixture Note or for the breach therefore shall be finally settled in Economic Court under Ho Chi Minh City People's Court by Vietnamese Marine Code and Vietnam Civil Code 2005.

18. General Conditions:

Any amended of this F/N must be made out in writing and or fax confirm by both parties. The parties have signed this F/N in two (02) copies, both are valid and have equal legal power for the parties.

19. Address Commission: 1.25% on total freight shall be deducted on freight payment.

For and on behalf of For and on behalf of Owner Charterer

Demise Charter Law and Legal Definition

Demise charter is a contract whereby the ship owner leases its vessel to the charterer for a period of time during which the whole use and management of the vessel passes to the charterer. In such a situation, the charterer pays all expenses for the operation and maintenance of the vessel. Officers and crew become servants of the charterer. A demise charter whereby the charterer has the right to place its own master and crew on board of the vessel is called a bareboat charter. Demise charter is a contract whereby the ship owner leases its vessel to the charterer for a period of time during which the whole use and management of the vessel passes to the charterer. In such a situation, the charterer pays all expenses for the operation and maintenance of the vessel. Officers and crew become servants of the charterer. A demise charter whereby the charterer has the right to place its own master and crew on board of the vessel is called a bareboat charter.

What is non demise charter?

A **non**-**demise charter** arises when the ship owner provides the vessel and its crew, whilst the charterer merely supplies the cargo. It may be a voyage **charter** for a particular voyage, in which the ship owner agrees to carry cargo between specified ports for a prearranged freight.

What is the difference between bareboat charter and time charter?

A **bareboat charter** is also referred to as a demise **charter**. Under this the owner of the ship gives its possession to a **charterer** who hires his own crew and master. A **time charter** refers to a ship that has been hired by a person for carrying out a trade for a specific **period** of **time**.

More details about voyage charter party.

Notice of readiness

"Laytime" is the term used to refer to the time allowed to the charterers to load/discharge cargo in return for payment of freight to the owners. If the charterers are unable to load/discharge cargo within this allowed period, they will be obliged to pay demurrage (liquidated damages for break of contract) or detention (unliquidated damages for breach of contract) to compensate the owners for their loss of use of the vessel. Naturally, most charter parties contain provisions which suspend the running of laytime and/or demurrage in certain circumstances as may have been agreed between the parties. In addition, neither laytime nor demurrage will run if the loss of time is due to a breach on the owners' part.

It is clearly important to determine when laytime commences since this is the key to the division of responsibility for the time spent at the load and/or discharge port. Most charter parties require the owners to serve a notice of readiness at load or discharge port stating that the vessel is ready in all respects for cargo operations. Whilst the owners are also usually required to serve various approximate and definite notices of expected arrival at load or discharge port to enable the charterers to make all necessary arrangement in time, the notice of readiness constitutes the contractual step which is required to trigger the commencement of laytime. Due to this, charter parties usually contain provisions which stipulate a) when notice of readiness may be contractually served and b) when laytime commences once notice of readiness has been validly served (often a set period after tender of the notice of readiness, although commencement of laytime may be further suspended to make allowance for weekends and other periods when the port is not operative).

Text of Notice of readiness (NOR)

Name of Vessel:	**Port:**	**Voyage Number:**

NOTICE OF READINESS

To: _____

I herewith tender you this vessel, of which I am the Master, as being ready in all respect to **LOAD** her cargo of: **xxx MT of xxxxxxx**.

The notice is tendered this **8th** day of **JAN 2020** at **16:30** hours (**LT**), subject to the terms, conditions and exceptions of the charter party

Master

Date Acknowledged:

Time Acknowledged:

(Signature)

Name in Print:

(with block letters)

Representing:

(with block letters)

Sample Notice of Readiness NOR

Notice of Readiness (NOR) – Definition, Contents & Requirements

Requirements for a valid notice of readiness to be served:

1. The vessel is an arrived vessel
2. The vessel is ready to receive or discharge the cargo
3. The notice of readiness is tendered to and received by the proper person according to the charter party
4. The notice of readiness is tendered in a contractual way
5. The notice of readiness is tendered at a time that is allowed by the charter party.

a) "Arrived ship"

Notice of readiness cannot be validly served before the vessel qualifies as an "arrived ship". To be an "arrived ship", the vessel must have reached the place within the port where notice of readiness may be served. This place is specified, expressly or impliedly, by the charter party. Under a port charter party, the vessel must reach the place where vessels usually wait within the port unless, of course, she is able to proceed directly to the load/discharge berth in which case notice of readiness may be tendered as soon as she enters the port. Under a berth charter party, the vessel must reach the nominated load/discharge berth. These basic propositions may be varied by the inclusion of specific provisions such as "whether in berth or not" ("WIBON") or "whether in port or not" ("WIPON"), although the meaning of the latter phrase has not yet been determined by the Courts.

b) "WIBON"/"WIPON" provisions

The effect of a "WIBON" provision on the tender of notice of readiness under a berth charter party was considered by the House of Lords in the "Kyzikos"[1]. The Kyzikos had been fixed to carry a cargo of steel and/or steel products from Italy to Houston. The charter was on the Gencon form and provided, inter alia, as follows: "Discharging port or place – 1/2 safe always afloat, always accessible berth(s) 1/2 SP SB AA) each port …. Time lost in waiting for berth to count as laytime …. Wipon/Wibon/Wifpon/ Wccon." The vessel arrived at Houston to discharge. When notice of readiness was tendered, and at all material times thereafter, the berth was available. However, the vessel could not proceed to the berth for three days because fog had closed the pilot station. The owners argued that, by virtue of the "WIBON" provision in the charter party, a valid notice of readiness could be tendered as soon as the vessel arrived at the customary waiting place within the port of Houston and that the "WIBON" provision effectively converted the charter party into a port charter party. The charterers argued that, at most, the phrase had the effect of allowing a valid notice of readiness to be tendered at the customary waiting place if the nominated berth was unavailable due to congestion and not if it was available but could not be reached for some other reason.

The House of Lords conducted an extensive review of the relevant authorities and observed that the argument that a "WIBON" provision converted a port charter party into a berth charter party was based upon the following passage:

"The phrase "whether in berth or not" was designed to convert a berth charter party into a port charter party and to ensure that under a berth charter party Notice of Readiness could be given as soon as the ship had arrived within the commercial area of the port concerned so that laytime would start to run on its expiry. It has no proper place in a port charter party".

The House of Lords felt, however, that these observations applied only if no berth was available for the vessel on her arrival at the port and not if a berth was available but the vessel was prevented from proceeding to it by bad weather. The long line of authority on the use of the phrase "WIBON" in berth charter parties dealt exclusively with the problem of congestion in ports, and not with bad weather preventing the vessel from proceeding to a vacant berth.

On this basis, The House of Lords held that the phrase had for a long time been treated as shorthand for "whether in berth (a berth being available) or not in berth (a berth not being available).

As indicated above, the "WIPON" provision does not appear to have been tested in the Courts. It seems reasonable to suppose, nevertheless, that this will be interpreted in a similar fashion so as to allow notice of readiness to be tendered as soon as the vessel reaches the customary waiting place for the port in the case of congestion within the port even if this is outside port limits.

c) "Ready in all respects"

Even if the vessel has reached the place within the port which is required by the charter party, notice of readiness cannot be served unless she is also physically and legally ready in all respects to load or discharge the cargo. It is possible to accelerate the tender of a valid notice of readiness by the inclusion of a "whether customs cleared or not" ("WCCON") or a "whether in free pratique or not" ("WIFPON") provision.

Tender of notice of readiness before the vessel is an arrived ship and/or ready in all respects.

In the "Mexico I", the English Court of Appeal reaffirmed the proposition that a notice of readiness, which is invalid when tendered because the vessel is not an arrived ship and/or ready to load or discharge, does not automatically become valid when these requirements are subsequently satisfied.

The "Mexico I" was chartered to carry a part cargo of 5,000 tonnes of bagged maize to Angola with the owners retaining the right to complete with other cargo. The maize cargo was partially over stowed by the owners' own cargo and 500 tonnes of alubia beans which they had agreed to carry for the charterers under a separate contract. The ship arrived at the discharge port on 20th January and tendered notice of readiness the following day by telex, although the maize cargo was not totally freed from over stowed cargo until 10:25 hours on 6th February. Discharge of the maize cargo did not begin until 1435 hours on 19th February. The owners conceded that the notice of readiness was defective when tendered, but argued that it automatically triggered laytime when the ship subsequently became ready to discharge the maize cargo at 10:25 hours on 6th February. The Court of Appeal disagreed, holding that the master should have tendered a fresh, valid notice at that time to start laytime running, and that an invalid notice of readiness could not operate as a delayed-action device to trigger laytime.

The owners also argued that the charterers were bound to acknowledge that the invalid notice of readiness triggered laytime as soon as the ship became ready to discharge, because they had accepted the invalid notice. This argument was based upon the following alternative propositions:

a) The charterers had expressly or impliedly surrendered their right to enforce the strict terms of the contract (waiver); or

b) The charterers could not rely on the strict terms of the contract because these terms had been varied by agreement of the parties, as evidenced by a mutual course of dealing (variation of contract); or
c) The charterers were estopped from enforcing the strict terms of the contract because both parties had acted in reliance upon a mutually shared assumption that their legal relationship operated in a different manner (estoppel by convention).

The Court found that the charterers had initially accepted the invalid notice of readiness only because they had relied upon the master's implied assurance that the ship was ready to discharge the maize cargo. The Court also found that the charterers had not expressly or impliedly accepted that laytime began once the ship was ready to discharge the maize cargo. Thus, none of the grounds put forward by the owners was established. The Court did not, however, have to decide when laytime commenced because the charterers conceded that it had commenced as soon as discharge commenced. If the charterers had not made this concession, the Court might have decided that, in the absence of a fresh valid notice of readiness being tendered by the owners, laytime had never commenced.

The decision in "The Mexico I" was applied by the English Commercial Court in the "Agamemnon". The "Agamemnon" was chartered on the Gencon form for a voyage from one good and safe berth Baton Rouge to one good and safe berth Brisbane. The relevant terms of the charterparty were as follows:

"Time lost in waiting for berth to count as loading or discharging time …." (clause 8);

"If the loading/discharging berth is not available on vessel's arrival at or off the port of loading/discharging or so near thereto as she may be permitted to approach, the vessel shall be entitled to give notice of readiness on arrival there with the effect that laytime counts as if she were in berth and in all respects ready for loading/discharging …." (clause 32) and

"Time to count whether in berth or not, whether notice accepted or not …." (clause 33)

The master gave notice of readiness at the South West Pass, which was a customary waiting area for vessels wishing to enter the Mississippi river to proceed to one of the upriver ports. Baton Rouge has its own anchorage is about 170 miles from the South West Pass. The Court of Appeal held that a notice of readiness given before the vessel arrived at the Baton Rouge anchorage was not a valid notice and the subsequent arrival of the vessel at the Baton Rouge anchorage could not validate it.

Tender of notice of readiness at a non-contractual time when the vessel is an arrived ship and ready in all respects

As indicated above, voyage charter parties frequently provide that notice of readiness must be tendered within office hours or some other specified period. It is also common for masters to tender notice of readiness on arrival even if this means that the notice of readiness is tendered outside the period specified in the governing charter party. In the "Petr Schmidt"[5] the English Court of Appeal had an opportunity to consider the validity of a notice of readiness tendered outside the hours stipulated by the charter at a time when the vessel was ready in

all respects and in the place provided for by the charter party. The "Petr Schmidt" was chartered on an amended Asbatankvoy form charter party. Clause 30 provided that *"notice of readiness at loading and discharging port is to be tendered within 06.00 and 17.00 hrs. Local time"*. Clause 6 of the charter party provided, inter alia, that *"laytime …. shall commence upon the expiration of six (6) hours after receipt of such notice or upon the vessel's arrival in berth …. whichever first occurs".* The master tendered notice of readiness at the load port and both discharge ports outside the period specified in clause 30. On each occasion, the vessel was an arrived ship and was physically and legally ready to load or discharge.

The Court of Appeal held that a notice of readiness which is tendered at a non-contractual time in respect of a vessel which is an arrived ship and is in all respects ready to load or discharge is valid. However, the Court also ruled that, although valid, such a notice of readiness could only become effective to trigger the commencement of laytime under clause 6 at the earliest moment it could have been contractually tendered under clause 30.

Conflict between notice of readiness provisions and "reachable on arrival" clauses in berth charter parties

In the "Laura Prima", the House of Lords considered the meaning of the words "reachable on arrival" in the context of a charter party on the Exxonvoy 1969 form. The vessel was chartered for a voyage from one safe berth in Libya to two safe ports in Italy. The charterparty provided, inter alia, as follows:

"6. Notice of readiness. Upon arrival at customary anchorage at each port of loading …. the master …. shall give the charterer …. notice …. that the vessel is ready to load …. cargo, berth or no berth, and laytime …. shall commence upon the expiration of 6 hours after receipt of such notice or upon the vessel's arrival in berth whichever first occurs. However, where delay is caused to vessel getting into berth and after giving notice of readiness for any reason over which charterers has no control, such delay shall not count as used laytime."

and

"9. Safe berthing – shifting. The vessel shall load …. any safe place or wharf, or along side vessels …. reachable on her arrival, which shall be designated and procured by the Charterer…."

The vessel arrived at her loading place in Libya and tendered notice of readiness but was unable to proceed to a loading berth since all possible berths were occupied by other vessels. This remained the situation for almost two weeks. The charterers sought to rely on clause 6 to prevent the running of laytime on the grounds that the delay in berthing was beyond their control. The owners countered this argument by pointing out that the charterers were in breach of clause 9 as they had not procured a berth which was reachable on arrival of the vessel. The House of Lords held that clause 9 did prevail over clause 6 and that clause 9 therefore required the charterers to nominate a berth which was reachable on the vessel's arrival. If the vessel was unable to proceed to the berth on arrival charterers were in breach of their obligations under the charter party and could not rely on the exception to laytime contained in clause 6. In delivering his judgment, Lord Brandon said;

"Reachable on arrival" is a well-known phrase and means precisely what it says. If a berth cannot be reached on arrival, the warranty is broken unless there is some relevant protecting exception … The berth is required to have two characteristics: it has to be safe and it has also to be reachable on arrival."

"The Laura Prima" was later applied in the "Sea Queen"[7](berth not reachable due to unavailability of tugs) and the "Fjordaas"[8] (berth unavailable due to bad weather). The fact that the principle established by the Laura Prima applies when a berth is not reachable on arrival for any reason and not just congestion was thus affirmed by these two judgments. This was clearly demonstrated by London arbitration No. 16/98 (LMLN). In this case, the vessel was chartered on an amended Asbatankvoy form charter party which contained clauses 6 and 9 which were identical to those quoted above from the Laura Prima charter party. Additional clause 13 also provided as follows:

"Suspension of Running Time Clause: Time shall not count as laytime, or if on demurrage as demurrage, when spent or lost: (a) for and on an inward passage moving from anchorage to first berth, including awaiting tugs, pilot .... until the vessel is securely moored at the berth...."

When the vessel arrived at the discharge port on 31st December, the berth to which she had been consigned was vacant. On the previous day, another vessel chartered by the same charterers had arrived at the port and they wished her to berth first for commercial reasons. Bad weather initially prevented the other vessel from berthing on 31st December and she was unable to berth as no tugs were available due to holidays until 2nd January. The other vessel berthed on 2nd January and sailed on 3rd January. The first vessel then berthed. The Tribunal was asked to consider if time ran from 31st December or from 2nd January. The charterers contended that a berth had been available upon arrival and that the proximate cause preventing berthing was not congestion (as in the "Laura Prima") but adverse weather and the unavailability of tugs. The Tribunal held that the "Laura Prima" applied not only when congestion meant that the berth was not reachable on arrival but also when the berth was not reachable on arrival for any other reason (as in the "Sea Queen" and the "Fjordaas"). Accordingly, the owners' claim succeeded in full.

Normally in Genco 94 charter party there is a clause stating as "Noon clause"

If vessel tenders NOR before 06:00 HRS on working day the laytime commence at 12:00 HHS same same, but if NOR tendered after 12:00 HRS on working days the laytime commences 06:00 HHR the following days. The terms WWD (Weather working day Sundays holidays is also important in considering counting the laytime.

Definition

The **Notice of Readiness (NOR)** is the document used by the Ship Master, to notify his ship readiness, in every respect, to load and/or unload the goods during the period of his charter. NOR is an extremely important document as it triggers the commencement of laytime. "Laytime" is the term used to refer to the time allowed to the charterers to load/discharge cargo in return for payment of freight to the owners. In a case of invalid NOR, the vessel might

not be considered as arrived ship and therefore all waiting time until berthing will be refuted in the demurrage claim.

The Notice Of Readiness (NOR) is always to be tendered in accordance with the terms of the Governing Charter Party. Unless otherwise advised, the NOR should be tendered to all parties as per voyage orders, stating that vessel is in all respects ready to load or discharge her cargo. If the vessel becomes not ready, then NOR will be tendered when the vessel has corrected whatever was the cause of her not being ready to present NOR.

Contents of NOR

The notice of readiness is the notice to the charterer, shipper, receiver or another person as may be required under the charter-party that:

1. The vessel has arrived at the specified destination where the notice of readiness can be given. It can be said briefly that the specified destination will depend on the terms of the contract. Various clauses in the charter party may advance the time that the vessel may tender the notice even though she may not be at the specified destination. The most familiar are the WIBON ("whether in berth or not") provision which means that under a berth charter party, if the berth is not immediately accessible, the notice of readiness may be given when the vessel is in the port in which the berth is situated. Similarly a WIPON ("whether in port or not") provision will enable the notice in certain circumstances to be tendered even if the vessel has not yet entered the port area.
2. The vessel is ready to load or discharge the cargo as the case may be. This means that the vessel must be both physically ready in that the holds are ready to receive the cargo and legally ready in that all documentation necessary to enable her to commence loading is in order. If, however, the vessel is ready to subject only to a mere formality then the notice may still be able to be tendered. For example, if customs clearance is only obtainable on berthing but the notice can be tendered when the vessel is off berth then this will not affect the vessel's readiness.
3. All other requirements under the charter party concerning the form, timing and the party to whom the notice is to be tendered have been complied with.

Requirements for a valid notice of readiness to be served

1. The vessel is an arrived vessel.
2. The vessel is ready to receive or discharge the cargo.
3. The notice of readiness is tendered to and received by the proper person according to the charter-party.
4. The notice of readiness is tendered in a contractual way.
5. The notice of readiness is tendered at a time that is allowed by the charter-party.
6. The original NOR is to be confirmed by a NOR in writing, which is to be submitted to and signed by an authorized person when the vessel is all fast. The written NOR should clearly state that NOR was first sent by email, telex, … and should show the date and hour of the initially sent NOR. If you have been instructed to tender NOR prior commencement of laydays and your vessel is still awaiting berth upon commencement of laydays, it is advised to re-tender NOR upon commencement of laydays, adding the wording "without prejudice to first

NOR tendered at 'date / Time". For multiple berth cargo operations, an NOR should be tendered for each berth using the time of hose disconnection from the previous berth as NOR tendering time for next berth. If the discharge is part ship to ship (STS) transfer or lightering with balance alongside a berth, two NOR's are to be tendered (one for lightering and one for berth discharge).

Case Study

Port charter party – "*within port limits*" defined.

The Facts

A fixture recap contained the following clause:

"*15. Notice of readiness to be tendered at both ends even by cable/telefax on vessel's arrival at load/discharging ports within port limits. The notice of readiness not to be tendered before the commencement of lay days.*

35. … Otherwise, Gencon 94 printed form charter party with logical amendments on the terms as per fixture recap.

Clause 6(c) of Gencon 94 included the following under the sub heading "commencement of laytime (loading and discharging)".

If the loading/discharging berth is not available on the vessel's arrival at/off the port of loading/discharging, the vessel shall be entitled to give notice of readiness within ordinary office hours on arrival there … laytime or time on demurrage shall then count as if she were in berth and in all respects ready for loading/discharging provided that the master warrants that she is, in fact, ready in all respects. Time used in moving from the place of waiting to loading/discharging berth shall not count as laytime".

Due to congestion, the vessel anchored outside the port limits of Krishnapatnam as depicted on the relevant Admiralty Chart.

Despite this, owners tendered notice of readiness and claimed demurrage.

Findings

Messrs Williamson and Schofield found for the charterers.

Owners were given permission to appeal on the definition of "*port limits*"

Mr Justice Knowles CBE upheld the arbitrators' award.

He held that where there is a national local law that defines the limits of the port in question, those are the limits that will apply in the case of that port. Where there is not such a law, then

a good indication of what the port limits are is given by the area of exercise by the port authority of its powers to regulate the movements of the conduct of ships.

Here the arbitrators did the best they could with material offered to them: the Admiralty Chart.

Commentary

The outcome seems fairly obvious.

The value of "*port limits*" as a criterion for an arrived ship remains questionable.

All that should matter is the quality of the vessel's position and the readiness of access to a berth when one becomes available. – as seen on Charter Party Cases.

Laytime calculation in a voyage charter party agreement for cargo ships employment

Purpose, stages in calculations

The purpose of laytime calculations is to determine whether on completion of loading or discharge operations despatch is payable to the charterers or demurrage is due to the owners.

The port agent is normally responsible for calculating the sum due and rendering accounts, but the master should also keep a tally of laytime used as he may be required to confirm the agent's figures. The master should also be aware, at any given moment, of whether laytime has commenced, is still running, is interrupted or has expired. Laytime calculations are recorded on a laytime statement.

There are seven stages in a laytime calculation:

1. Read relevant clauses in the charter party.
2. Obtain Statement of Facts from agent.
3. Determine duration of laytime allowed.
4. Establish time of commencement of laytime.
5. Allow for interruptions to laytime as per the charter party.
6. Establish time of expiry of laytime.
7. Calculate despatch or demurrage payable.

The Statement of Facts is an extract from the port operations log kept by the charterer's agent, and contains times of all relevant events, including:

• arrival of ship;
• tendering of Notice of Readiness;
• commencement of laytime;
• commencement of cargo operations;
• periods of suspension of laytime, with reason in each case (so that risk of stoppage can be apportioned);
• termination of cargo operations;

• termination of laytime.

The Statement of Facts should be approved by all parties involved (master, stevedore, agent, etc.), and will normally be presented by the agent to the master for his signature and return; the master should retain a copy. It is important before signing to compare the times stated with those recorded on board the ship, since the charterer's agent may have obtained inaccurate times from his terminal supervisor, or may, for example, have recorded a period of rain in the vicinity of his office that did not affect the ship for the same period. For a ship on a demurrage rate of USD24,000 per day, 6 minutes of time on demurrage is worth USD100; it is therefore important that all times are accurately recorded.

The Statement of Facts is used by the agent in drafting up the Laytime Statement, from which any amount of demurrage or despatch money payable will be calculated.

The duration of the laytime allowed depends on whether the laytime is:

• definite, e.g. "2 running days";
• calculable, e.g. where there is a given tonnage of cargo and a given rate of loading or discharging; or
• indefinite, e.g. on "FAC" ("fast as can") terms - which are unusual.

Where calculable, the allowed laytime for the operation involved (loading or discharging) should be calculated to the nearest minute.

Interpretation of the contract laytime terms should be in accordance with the law governing the contract (which is determined from the Jurisdiction Clause), or, if expressly provided for, the internationally recognized **Voyage Charter party Laytime Interpretation Rules 1993.** As a result of court rulings, definitions of certain laytime expressions under English law differ from those given in the Laytime Interpretation Rules.

Statement of Facts (SOF):

Blank form of state of fact

LAY TIME STATEMENT

NAME OF VESSEL		ARRIVAL DATE	
C/P DATE		ARRIVAL TIME	
PORT OF LOADING		N.O.R TENDERED	
PORT OF DISCHARGE		N.O.R. ACCEPTED	
CARGO		VSL BERTHED	
QUANTITY IN M.T		LOADING STARTED	
DAILY LOAD RATE		LOADING COMPLETED	
DAILY DISCHARGE RATE		RATE OF DEMURRAGE	
TOT. TIME ALLOWED		VESSEL SAILED	

DATE & DAY	REMARKS	TIME ALLOWED			TIME USED			TIME SAVED/LOST		
		D	H	M	D	H	M	D	H	M
TOTAL										

TIME LOST / SAVED D H M

DEMURRAGE / DISPATCH: USD

PREPARED BY:
APPROVED BY:

Statement of Facts (SOF) is a detailed chronological description of the activities of the vessel during the stay in a port: taking the sea pilot onboard, hailing in, locking through (if applicable), mooring, preparing the loading and unloading operations, the actual loading and unloading operations, the amount of load transfer, unmooring and departure.

The SOF further states whether or not tugs were used and the amount of fuels onboard when mooring and departing.

In the event of voyage chartering, the periods during which no work can be carried out due to weather conditions (e.g. in the event of rain) must also be clearly stated. After all, this time is not counted as lay days when the lay days are “weather lay days” or “weather working days”.

A statement of fact concerning an actual voyage charter party;

Laytime Calculation Calculated at 06/02/2017 Page 1

M.V. Atlantic Explorer CP Date : 24/11/2017

Loading at	**Santos**		
Cargo	**HSS**		
Owner	Reinhardt		
Charterer	ADM		
Terms	non revers.	work.time saved	always on dem.
Weekend Clause	Fri. 17:00 - Mon. 08.00		even if used
Charter Party Type	Gencon		
Demurrage	USD	5,000.00/day	
Despatch	USD	2,500.00/day	
Cargo Quantity		15,000.000 mts	
Loading Rate		3,000.000 mts/d	

Thu	12/01/17	08:00	Arrival
Thu	12/01/17	08:00	Notice tendered
Thu	12/01/17	08:30	Berthed
Thu	12/01/17	12:50	Loading commenced
Thu	19/01/17	20:30	Loading completed

Day	Date / Time		Remarks	Rate	Used	Total
Thu	12/01/17	12:50 - 16:00	**Laytime Commenced**	100 %	0d 03:10	0d 03:10
		16:00 - 24:00	Rain	0 %	0d 00:00	0d 03:10
Fri	13/01/17	00:00 - 05:00	Rain	0 %	0d 00:00	0d 03:10
		05:00 - 17:00	full	100 %	0d 12:00	0d 15:10
		17:00 - 24:00	weekend	0 %	0d 00:00	0d 15:10
Sat	14/01/17	00:00 - 24:00	weekend	0 %	0d 00:00	0d 15:10
Sun	15/01/17	00:00 - 24:00	weekend	0 %	0d 00:00	0d 15:10
Mon	16/01/17	00:00 - 08:00	weekend	0 %	0d 00:00	0d 15:10
		08:00 - 08:30	full	100 %	0d 00:30	0d 15:40
		08:30 - 09:00	rain	0 %	0d 00:00	0d 15:40
		09:00 - 11:35	rain	0 %	0d 00:00	0d 15:40
		11:35 - 15:00	full	100 %	0d 03:25	0d 19:05
		15:00 - 24:00	Conveyor 1 Breakdown	50 %	0d 04:30	0d 23:35
Tue	17/01/17	00:00 - 18:30	Conveyor 1 Breakdown	50 %	0d 09:15	1d 08:50
		18:30 - 24:00	full	100 %	0d 05:30	1d 14:20
Wed	18/01/17	00:00 - 24:00	full	100 %	1d 00:00	2d 14:20
Thu	19/01/17	00:00 - 22:23	full	100 %	0d 22:23	3d 12:43

Timesheets and Laytime calculation

Laytime Calculation

Date	*Day*	Time *Used*			Total time *Counted*			Time lost/ *Saved*			Remarks
		D	H	M	D	H	M	D	H	M	
32 Nov	Thu										14.00 NOR tendered 16.00: Commenced loading
22 Nov	Thu	0	08	00	0	08	00				Time used before L/T commences
23	Fri	1	00	00	1	08	00				08.00:L/T commences
24	Sat	0	21	30	2	05	30				0800-1030: rain
35	Sun	0	04	00	2	09	30				0800-1200:1oading
26	Mon	0	00	00	2	09	30				Public Holiday; no cargo work
27	Tue	1	00	00	3	09	30				Normal
28	Wed	1	00	00	3	10	30	0	23	00	0100: L/T expires
29	Thu	0	10	30				0	10	30	10.30: Completed loading
Totals:		**4**	**20**	**00**	**3**	**10**	**30**	**1**	**09**	**30**	**Time lost**

Timesheets and Laytime calculation. After a fixture has been made and the vessel has commenced performance of the charter, “post-fixture activities” become important.

These include liaison between the shipowner and the charterer on various issues but most important, on issues concerning laytime calculation. Laytime calculating requires a familiarity with a Timesheet and perhaps also a statement of facts. The purpose of calculating laytime is not only to calculate the time during which the vessel is made available to the charterer for loading and/or discharging but also to calculate demurrage or despatch if there is time lost or saved. The laytime calculation also provides evidence should a dispute arise, which has to go to arbitration or to a court for solution.

An introduction will be given here to laytime calculation, based on different charter party terms and for dry cargo and oil cargo. A standard method should be used but it should be mentioned here that various parties-owners, charterers, shippers and cargo receivers-may have methods and forms that suit each party. If standard forms were used, perhaps some areas of dispute may be reduced. Accordingly, the BIMCO standard form of Timesheet can be employed in calculations. In the examples below, headings similar to those in the BIMCO format are used, without the “boxes” above the “laytime computation” and the columns for “Hours worked”, but in addition to the columns on the standard form, additional columns are used for “Laytime allowed” and for “Total time counted” which should add up to the laytime allowed.

It should be remembered that laytime could be fixed or calculated by reference to the rate of loading and/or discharging. For example, in tanker voyage charters, the daytime allowed under the “Worldscale” system of freight is 72 hours for loading and discharging. It is in these circumstances that laytime, demurrage and despatch calculations are significant. When laytime is not fixed or calculable, such as clauses present in the charter party that the cargo

is to be discharged “as customary” or “as fast as the vessel can deliver”, the variables of “customary”, “reasonable time” and so on, are uncertain so that although demurrage and despatch may become payable, to calculate these amounts would have to depend on the various parties’ opinion of “reasonable”, “customary”, etc.

Apart from the significance of fixed or calculable laytime, the accuracy of timesheets also depends on a number of other factors. For example, the quantity of cargo is important if laytime is to be calculated. If the charter party states that the cargo to be loaded is “ . . . x metric tons plus or minus 5 percent in owners’ option . . .” (” x mt 5pct MOLOO”) when the master gives the Notice of Readiness he will usually have completed his calculations of deadweight that his vessel can lift, taking into account the fuel, water, stores, etc. on board and in the notice he may state the quantity of cargo he is prepared to lead within the percentage limits. When the charterer or shipper accepts this Notice of Readiness the cargo quantity is the quantity that will be used for the calculation of laytime allowed.

Other important factors include

Category of laytime – separate calculations for loading and discharging ports or options to the charterer for reversing or averaging laytime; two time sheets may still be required.

Method of calculating laytime – for example, “per workable hatch per day”, “Sundays and holidays excepted, unless used” .

Exceptions to laytime – for example, weather working days, Sundays and Holidays excepted and strikes, winch breakdowns.

Commencement of laytime – the laytime clause in the charter party will state the notice period (if any) after the valid Notice of Readiness is given.

The charterparty clauses stipulating laytime, demurrage and despatch are of extreme importance. Extracts from actual charter parties will be used in the examples, with modifications of quantities and loading and discharging rates in order to round off the calculations as far as possible.

Example 1. “Sundays and Holidays excepted unless used (SHEX u.u.)” and “Weather working days (WWD)”.

A GENCON charterparty, with modifications and rider clauses, provides for:

Cargo: minimum 5000 metric tons (mt) up to full load capacity of the vessel at charterers’ option.

Laytime for loading: 1600 mt per WWD SHEX u.u.

Laytime for discharging: 1200 mt per WWD SHEX u.u.

Laytime clause: “Laytime for loading and discharging shall commence at 1 p.m. if Notice of Readiness is given before noon and at 8 a.m. next working day if notice given during office

hours after noon. Notice at loading port to he given to the shippers named in Box 17. Time actually used before commencement of laytime shall count. Time lost in waiting for berth to count as loading or discharging time as the case may be."

Demurrage and despatch clause: "Demurrage to be paid at the rate of USD 1,800 per day/pro rata for all working time lost. Despatch money to be paid at half the rate of demurrage for all working time saved. Demurrage/ despatch, if any, to be settled directly between Owners and Charterers."

Statement of facts

Vessel arrived: 14.00, Thursday 22 November

Vessel berthed: 15.30, 22 November

Notice of Readiness tendered: 14.00, 22 November

Notice of Readiness accepted: 14.00, 22 November

Cargo weight/quantity: 5,500 mt

Loading commenced: 16.00, 22 November

Loading completed: 10.30, 29 November

Laytime allowed for loading: 3d. l0h. 30m. (5500/1600)

Time to count from: 0800, 23 November

Working hours /meal hours of the port: Midnight. to midnight each day except on Sundays, and holidays unless required.

Laytime Calculation

Date	*Day*	Time *Used*			Total time *Counted*			Time lost/ *Saved*			Remarks
		D	H	M	D	H	M	D	H	M	
32 Nov	Thu										14.00 NOR tendered 16.00: Commenced loading
22 Nov	Thu	0	08	00	0	08	00				Time used before L/T commences
23	Fri	1	00	00	1	08	00				08.00:L/T commences
24	Sat	0	21	30	2	05	30				0800-1030: rain
35	Sun	0	04	00	2	09	30				0800-1200:1oading
26	Mon	0	00	00	2	09	30				Public Holiday; no cargo work
27	Tue	1	00	00	3	09	30				Normal
28	Wed	1	00	00	3	10	30	0	23	00	0100: L/T expires
29	Thu	0	10	30				0	10	30	10.30: Completed loading
Totals:		**4**	**20**	**00**	**3**	**10**	**30**	**1**	**09**	**30**	**Time lost**

Demurrage: 1d 9h 34m @ $ 1800.00 per day and pro rata = $2512.50

The rain on 28 November occurred after laytime expired and the principle of “Once on demurrage, always on demurrage” applies.

Example 2. “Sundays and Holidays excepted (SHEX)” and “Weather working days (WWD)”.

Same as Example 1 with changes to clauses as follows:

Laytime for loading: 1600 mt per WWD SHEX.

Laytime clause: “Laytime for loading and discharging shall commence at 1 p.m. if Notice of Readiness is given before noon and at 8 a.m. next working day if notice given during office hours after noon Notice at loading port to be given to the shippers named in Box 17”.

Statement of facts:

Vessel arrived: 14.00, Thursday 22 November

Vessel berthed: 15.30, 22 November

Notice of Readiness tendered: 14.00, 22 November

Notice of Readiness accepted: 14.00, 22 November

Cargo weight/quantity: 5,500 mt

Loading commenced: 16.00, 22 November

Loading completed: 10.30, 29 November

Laytime allowed for loading: 3d. l0h. 30m. (5500/1600)

Time to count from: 08.00, 23 November

Working hours/meal hours of the port: Midnight to midnight each day except on Sundays and holidays as required

Exceptions to laytime (and reasons): 24 November, 08.00 to 10.30-rain 26 November-Public holiday; no work 28 November, 16.30 to 23.15-rain

Laytime Calculation

Date	*Day*	Time *Used*			Total time *Counted*			Time lost/ *Saved*			Remarks
		D	H	M	D	H	M	D	H	M	
22 Nov	Thu										1400: NOR tendered/accepted 1600: Commence loading
23 Nov	Fri	0	16	00	0	16	00				0800: Laytime commences
24 Nov	Sat	0	21	30	1	13	30				0800-1030:Rain; no work
25 Nov	Sun	0	00	00	1	13	30				0800-1200: Loading; not counted
26 Nov	Mon	0	00	00	1	13	30				Public Holiday; no work
27 Nov	Tue	1	00	00	2	13	30				Normal
28 Nov	Wed	0	07	15	3	06	45				1630-2315:Rain; no work
29 Nov	Thu	0	10	30				0	06	45	0345: Laytime expired 1030: Completed loading
Totals:		**3**	**17**	**15**	**3**	**10**	**30**	**0**	**06**	**45**	**Time lost**

Demurrage: 06h 45m @ $1800.00 per day and pro rata = $506.25

Example 3. Time lost in waiting for berth to count as loading or discharging time, as the case may be.

A GENCON Berth charterparty, with modifications and rider clauses, provides for:

Cargo: Full cargo bulk maize subject to vessel's capacity; expect vessel to load about 14,250 metric tons.

Laytime for loading: 1,500 mt per WWD, SHEX, u.u.

Laytime clause: "Laytime for loading and discharging shall commence at 1 p.m. if Notice of Readiness is given before noon and at $ a.m. next working day if notice given during office hours after noon. Time actually used before commencement of laytime shall count. Time lost in waiting for berth to count as loading or discharging time as the case may be."

Demurrage and despatch clause: "At loading and discharging ports demurrage at the rate of US$2,400 per day or pro rata for any pan of a day to be paid by Charterers. Despatch at the

rate of US$1,200 per day or pro rata for any part of a day to be paid by Owners for working time saved."

Total Commission: 2.5 percent

Statement of facts:

Vessel arrived: 0918 hours on Friday 14 June

Pilot boarded to berth vessel: 0700 hours on Sunday 21 July

Vessel berthed: 0912 hours on Sunday 21 July

Notice of Readiness tendered: 0918 hours on Friday 14 June

Cargo weight/quantity: 13,782.90 mt

Loading commenced 1120- hours- On Sunday 21 July

Loading completed 1050 hours on Friday 26 July

Laytime allowed for loading: 9d 4h 32m

Laytime Calculation

Date	*Day*	Time *Used* D	H	M	Total time *Counted* D	H	M	Time lost/ *Saved* D	H	M	Remarks
14 Jun	Fri	0	14	42	0	14	42				0918: Arrived; *Waiting for Berth*
15	Sat	1	00	00	1	14	42				
16	Jun	0	00	00	1	14	42				
17	Mon	1	00	00	2	14	42				
18	Tue	1	00	00	3	14	42				
19	Wed	1	00	00	4	14	42				
20	Thu	1	00	00	5	14	42				
21	Fri	1	00	00	6	14	42				
22	Sat	1	00	00	7	14	42				
23	Sun	0	00	00	7	14	42				
24	Mon	1	00	00	8	14	42				
25	Tue	0	13	50	9	04	32	0	10	10	1350: Allowed Laytime expires
26 Jun to 21 Jul		26	07	00				26	07	00	0700: Pilot boarded; "Time lost waiting for berth" expired at 0700 on 21 July
21 jul	Sun	0	12	40				0	12	40	11.20: Commenced ldg.
22	Mon	1	00	00				1	00	00	
23	Tue	1	00	00				1	00	00	
24	Wed	1	00	00				1	00	00	
25	Thu	1	00	00				1	00	00	01.00-06.00: Rain; no work 08.00-10.00: Rain; no work 18.30-20.30: Rain; no work
26	Fri	0	10	50				0	10	50	1050:Loading completed
Totals:								**31**	**16**	**40**	**Time lost**

Demurrage for 31d 16h 40m @ $2,400 per day and pro rata = $76,066.66

Less total commission @ 2.5 percent = – $ 1,901.66

Net demurrage due to Owners: $74,165.00

Example 4. Despatch payable on “working time saved”.

A GENCON Berth charter party, with modifications and rider clauses, provides for:

Cargo: Full cargo bulk maize subject to vessel’s capacity; expect vessel to load about 14,250 metric tons and to discharge 5,000 mt at first discharging port with remainder at second discharging port.

Laytime for loading: 1,500 mt per WWD, SHEX, u.u.

Laytime for discharging: 1,500 mt per WWD, SHEX, u.u.

Laytime clause: “Laytime for loading and discharging shall commence at 1 p.m. if Notice of Readiness is given before noon and at 8 a.m. next working day if notice given during office hours after noon. Time actually used before commencement of laytime shall count. Time lost in waiting for berth to count as loading or discharging time as the case may be.”

Demurrage and despatch clause: “At loading and discharging ports demurrage at the rate of US$2,400 per day or pro rata for any part of a day to be paid by Charterers. Despatch at the rate of US$1,200 per day or pro rata for any part of a day to be paid by Owners for working time saved.”

Statement of facts-first discharge port:

Vessel arrived at Pilot station: 0900 hours on Friday 9 August

Vessel berthed: 1240 hours on Friday 9 August

Notice of Readiness tendered: 0900 hours on Friday 9 August

Notice of Readiness accepted: 0900 hours on Friday 9 August

Cargo weight/quantity: 5,000 tons

Discharging commenced: 1630 hours on Friday 9 August

Discharging completed: 1615 hours on Friday 12 August

Laytime allowed for loading: 3d 08h 00m

Laytime Calculation

Date	*Day*	Time *Used*			Total time *Counted*			Time lost/ *Saved*			Remarks
		D	H	M	D	H	M	D	H	M	
9 Aug	Fri										0900:Vessel arrived; NOR tendered
9	Fri	0	11	00	0	11	00				1300:Laytime commenced 1630:Discharging commenced
10	Sat	1	00	00	1	11	00				Normal
11	Sun	0	00	00	1	11	00				No work;no counted
12	Mon	0	15	30	2	10	15	0	07	45	Time saved 0000-1615:Discharged cargo 1345-1430:Winch breakdown time not counted
13	Tue				3	08	00	0	21	45	2145:Laytime expires.
Totals:		**2**	**02**	**30**	**3**	**08**	**00**	**1**	**05**	**30**	**Working time saved**

Despatch: 1 d 05h 30m @+ $1,200.00 per day and pro rata = $1475.00 Example

Example 5. Despatch payable on "working time saved".

A GENCON Berth charterparty, with modifications and rider clauses, provides for:

Cargo: Full cargo bulk maize subject to vessel's capacity; expect vessel to load about' 14,250 metric tons and to discharge 5,000 mt at first discharging port with remainder at second discharging port.

Laytime for loading: 1,500 mt per WWD, SHEX, u.u.

Laytime for discharging: 1,500 mt per WWD, SHEX, u.u.

Laytime clause: "Laytime for loading and discharging shall commence at 1 p.m., if Notice of Readiness is given before noon and at 8 a.m. next working day if notice given during office hours after noon. Time actually used before commencement of laytime shall count.

Time lost in waiting for berth to count as loading or discharging time as the case may be."

Demurrage and despatch clause: "At loading and discharging ports demurrage at the rate of US$2,400 per day or pro rata for any part of a day to be paid by Charterers. Despatch at the rate of US$1,200 per day or pro rata for any part of a day to be paid by Owners for working time saved."

Statement of facts – second discharge port:

Vessel arrived at anchorage: 0548 hours on Wed-14 August

Vessel berthed: 1800 hours on Thu. 15 August

Notice of Readiness tendered: 1230 hours on Wed. 14 August

Cargo weight/quantity: 8,782.90 metric tons 14 Aug Wed (Remainder)

Discharging commenced: 1950 hours on Thu. 15 August

Discharging completed: 2250 hours on Sat. 17 August

Laytime allowed for discharging: 5d 20h 32m (8782.90/1500)

Laytime Calculation :

Date	*Day*	Time *Used*			Total time *Counted*			Time lost/ *Saved*			Remarks
		D	H	M	D	H	M	D	H	M	
14											0548: Vessel arrived, 1230: NOR tendered
15	Thu	0	16	00	0	16	00				0800: Laytime commenced 1950:Discharge commenced
16	Fri	1	00	00	1	16	00				Normal
17	Sat	0	22	50	2	16	00	0	01	10	2250: Discharging completed
18	Sun	0	00	00	2	16	00	0	00	00	Not counted; not working time
19	Mon	0	00	00	3	16	00	1	00	00	Working time saved
20	Tue	0	00	00	4	16	00	1	00	00	Working time saved
21	Wed	0	00	00	5	16	00	1	00	00	Working time saved
22	Thu	0	00	00	5	20	32	0	04	32	Working time saved 0432: Laytime expires
Totals:		**2**	**14**	**50**	**5**	**20**	**32**	**3**	**05**	**42**	**Working time saved**

Despatch: 3d 05h 42m @ $1,200.00 per day or pro' rata = $3885.00

Example 6. Despatch payable on "all time saved".

A GENCON Berth charterparty, with modifications and rider clauses, provides for:

Cargo: Full cargo bulk maize subject to vessel's capacity; expect vessel to load about 14,250 metric tons and to discharge 5,000 mt at first discharging port with remainder at second discharging port.

Laytime for loading: 1,500 mt per WWD, SHEX, u.u.

Laytime for discharging: 1,500 mt per WWD, SHEX, u.u.

Laytime clause: "Laytime for loading and discharging shall commence at 1 p.m. if Notice of Readiness is given before noon and at 8 a.m. next working day if notice given during office hours after noon. Time actually used before commencement of laytime shall count. Time lost in waiting for berth to count as loading or discharging time as the case may be."

Demurrage and despatch clause: "At loading and discharging ports demurrage at the rate of US$2,400 per day or pro rata for any part of a day to be paid by Charterers. Despatch at the rate of US$1,200 per day or pro rata for any part of a day to be paid by Owners for all time saved."

Statement of facts-second discharge port:

Vessel arrived at anchorage: 0548 hours on Wed. 14 August

Vessel berthed: 1800 hours on Thu 15 August

Notice of Readiness- tendered: 0548 hours on Wed. 14 August

Cargo weight/quantity: 8,782.90 metric tons (Remainder)

Discharging commenced: 1950 hours on Thu. 15 August

Discharging completed: 2250 hours on Sat. 17

August Laytime allowed for loading: 5d 20h 32m (8782.90/1500)

Laytime Calculation

Date	*Day*	Time *Used*			Total time *Counted*			Time lost/ *Saved*			Remarks
		D	H	M	D	H	M	D	H	M	
14 Aug	Wed										0548: Vessel arrived; NOR tendered
15	Thu	0	16	00	0	16	00				0800:Laytime commenced 1950:Discharge commenced
16	Fri	1	00	00	1	16	00				Normal
17	Sat	0	22	50	2	16	00	0	01	10	2250: Completed discharge
18	Sun	0	00	00	2	16	00	1	00	00	Working time saved
19	Mon	0	00	00	3	16	00	1	00	00	Working time saved
20	Tue	0	00	00	4	16	00	1	00	00	Working time saved
21	Wed	0	00	00	5	16	00	1	00	00	Working time saved
22	Thu	0	00	00	5	20	32	0	04	32	0432: Laytime expires Working time saved to 0432
Totals:		**2**	**14**	**50**	**5**	**20**	**32**	**4**	**05**	**42**	**All time saved**

Despatch: 4d 05h 42m @ $1,200.00 per day and pro rata = $5085.00

Example 7. Tanker charter party.

An ASBATANKVOY charterparty, with modifications and rider clauses, provides for:

Cargo: Crude oil

Laytime for loading and discharging: 72 hours (3d 0h 0m)

Notice of Readiness and Laytime clause: “Upon arrival at customary anchorage at each port of loading or discharge the Master or his agent shall give the Charterer or his agent notice by letter, telegraph, wireless or telephone that the vessel is ready to load or discharge cargo, berth or no berth, and laytime, as hereinafter provided, shall commence upon the expiration of six (6) hours after receipt of such notice, or upon the vessel’s arrival in berth (i.e. finished mooring when at a sealoading or discharging terminal and all fast when loading or discharging alongside a wham, whichever first occurs. However, where delay is caused to vessel getting into berth after giving Notice of Readiness for any reason over which Charterer has no control, such delay shall not count as laytime”

Demurrage clause: World scale demurrage rate: US$23,500 daily

Vessel fixed at World scale 52.5

Statement of facts:

Vessel arrived at anchorage: 2100 hours on Tuesday 6 November

Notice of Readiness tendered: 2100 hours

Notice of Readiness accepted: 2100 hours

Time to count from: 0300 hours on Wednesday 7 November

Vessel berthed: 1100 hours on Monday 12 November

Hoses connected 1330 hours

Loading commenced: 1336 hours

Loading completed: 0530 hours on Tuesday 13 November

Hoses disconnected: 0900 hours

Vessel sailed: 0930 hours

Vessel arrived at discharging port: 0330 hours on Saturday 17 November

Notice of Readiness tendered: 0330 hours Notice of Readiness accepted 0330 hours

Vessel berthed: 0630 hours

Time to count from: 0630 hours

Hoses connected: 0840 hours

Discharging commenced: 1040 hours

Discharging completed: 1040 hours on Sunday 18 November

Hoses disconnected: 1130 hours

Vessel sailed: 1525 hours

Laytime Calculation

Date	*Day*	Time *Used*			Total time *Counted*			Time lost/ *Saved*			Remarks
		D	H	M	D	H	M	D	H	M	
7 Nov	Wed	0	21	00	0	21	00				0300: Laytime commenced
8	Thu	1	00	00	1	21	00				Waiting berth
9	Fri	1	00	00	2	21	00				
10	Sat	0	03	00	3	00	00				0300: Total laytime expired
10	Sat				3	21	00	0	21	00	
11	Sun				4	21	00	1	00	00	
12	Mon				5	00	18	0	08	18	0818: Pilot aboard; berthing 1100: Vessel berthed
12	Mon				5	18	18	0	13	00	
13	Tue				6	03	18	0	09	00	0900: Hoses disconnected
17 Nov	Sat				6	20	48	0	17	30	0630: Berated; laytime resumed
18	Sun				7	08	18	0	11	30	1130: Hoses disconnected

Demurrage: 4d 08h 18m @ 52.5 percent of $23,500.00 per day and pro rata = $61,276.25

Summary

A Guide to Laytime, Charter party Agreement and Voyage Charter

The word “Charterer” is probably as old as the word “Ship” itself.

Do you keep hearing this word so regularly?

Well, who doesn’t?

From seafarer’s point of view, it is so much important to understand these terms.

Why?

From commercial point of view, it is the moral responsibility of the seafarers to ensure that the ship owner profits from the ship operation.

And for this reason, we must understand when and where our loyalties lies.

But sometimes it becomes difficult to get a hang of all of it.

Not anymore.

In this blog, we will discuss about the terms charterer and charter party agreement.

Concept of Charter party agreement

It is all business.

And like in all kind of business, there are at least two parties involved, one of which provide a service or product to the other for a price.

With respect to carrying the cargo onboard the ships, these two parties are,

1. Ship owner who has the ship and provide the space on the ship to carry the cargo.
2. Shipper who has the cargo and wants a ship to transport the cargo

Then where does the term charterer fits into this?

Charterer is the party that has chartered (think of simple word “hired”) the ship.

If the shipper has chartered the entire ship then shipper will also be the charterer.

In most of the cases, charterer is a kind of middle man between shipper(s) and shipowners

This is particularly the case if there are more than one shippers.

For example, if the vessel is to load 50000 tons of cargo, there could be 10 shipper, say each of them with 5000 tons of cargo.

Alone none of the shipper would want to hire the entire vessel of 50000 tons capacity for their 5000 tons of cargo.

So they contact a charterer for transporting their cargo.

The charterer’s job is to find a vessel for the cargoes they have from different shippers and maximizing the space on ship they plan to hire.

Charterers may not be the only person involved in filling the gap between ship-owner and shipper.

Sometime there are some other companies or persons who help shipper, charterer and ship-owner to connect with each other for a fees.

They are called “Brokers”.

So the shipper’s broker is the person or company that help shipper find a charterer for a fees called brokerage.

And charterer’s broker is the person that help charterer find a ship to hire.

The charterer may even have brokers for different purpose. For example charterer may have a broker to find a cargo for the ship they want to hire and they may have another broker to find a ship for the cargo they have in hand.

Broker or no broker, the charterer and ship-owner would agree on the terms and conditions which would form “Charter party agreement“.

Charter party agreement is a detailed document which, apart from various clauses, has information such as

- When and where the vessel is required to be
- the freight agreed
- If the broker was used, who need to pay the brokerage fee and how much

Even though ship-owners is primarily dealing with the charterer, it does not mean that the ship-owner would have no relation with the shipper.

Shipper and ship-owner are connected by the "carriage of cargo at sea act", also called COGSA.

And one of the main point of it is that ship-owners is required to issue bill of lading to the shipper for the cargo loaded onboard.

And with that each of the shipper have entered into an agreement with the ship owner which is called "Contract of carriage".

While the "charter party agreement" is a formal agreement, the contract of carriage is governed by various laws and regulations such as Hague-Visby rule.

Charter party agreement supplement the contract of carriage.

Usually you would find a mention of the charter party agreement in the bill of lading. The wording in the bill of lading could be something like this.

This shipment is carried pursuant to charter party agreement between "*Charterer's name*" and "*Carrier's name*" and all the terms, clauses, conditions, liberties and exceptions whatsoever contained therein are incorporated into this bill of lading.

But do the ship-owners and charterers do this exercise of negotiating the format of the charter party agreement each time they do the business together.

Absolutely not. Hell, it would take a lot of time.

Instead they use pre-defined forms. These forms are developed by Independent International stakeholders such as BIMCO and INTERTANKO and are widely used in the shipping business.

There are different forms for different trades.

For example there is form SHELLVOY 6 for use in tanker trade and then there is form AMWELSH 93 for coal dry cargo chartering.

Also if a charterer and ship owner have done the business before, they use the same charter party agreement for the future shipments too.

For this reason, many a times even for a voyage in 2019, you may find the mention of charter party dated in 2016 or even before. In the bill of lading issued even in 2019, it may read something like,

The shipment is carried pursuant to charter party agreement between "*Charterer's name*" and "*Carrier's name*" dated 01 January 2016…..

Now that we understand the concept of chartering, let us understand the different ways in which the ships can be chartered.

Voyage Charter, Time charter, Demise charter

There are different ways in which a charterer can charter (Hire) the vessel.

Charterer can charter the vessel for one voyage (Voyage charter), for a particular time period (time charter) or they can hire and run the vessel as if they are the owner of the vessel (Demise or bareboat charter).

In each type of charter, charterers and ship-owners have different area of responsibilities.

Each type of charter is a subject in itself. So in this blog we will explore the voyage charter.

Voyage Charter

It should be clear from the name.

Under the voyage charter, the ship is hired from the ship owner for one voyage.

One voyage could consists of multiple load ports and multiple discharge port.

The best analogy to the term voyage charter is that with hiring an Uber for a ride from one place to the other, sometimes with multiple stops in between.

So when we hire an Uber, we hire just the cab. The cab driver is still under the instructions of Uber.

Similarly, under the voyage charter, the charterer has hired the ship's cargo space. But the Master and crew still remains under the disposal and instructions of ship owner and ship managers.

When we hire a cab for a ride, we just pay the hire (pre-agreed or by the meter). We do not pay for or are not concerned about the fuel costs or the amount of fuel consumed.

Similarly, under the voyage charter, charterer is not concerned about the fuel consumption. The fuel costs are for the ship owners.

And when we hire an Uber, we do not pay for maintenance of the cab.

Similarly, under the voyage charter it is the ship owner who pays for the maintenance of the ship.

Whenever we have any doubt about anything under voyage charter, just think of this analogy of hiring the cab.

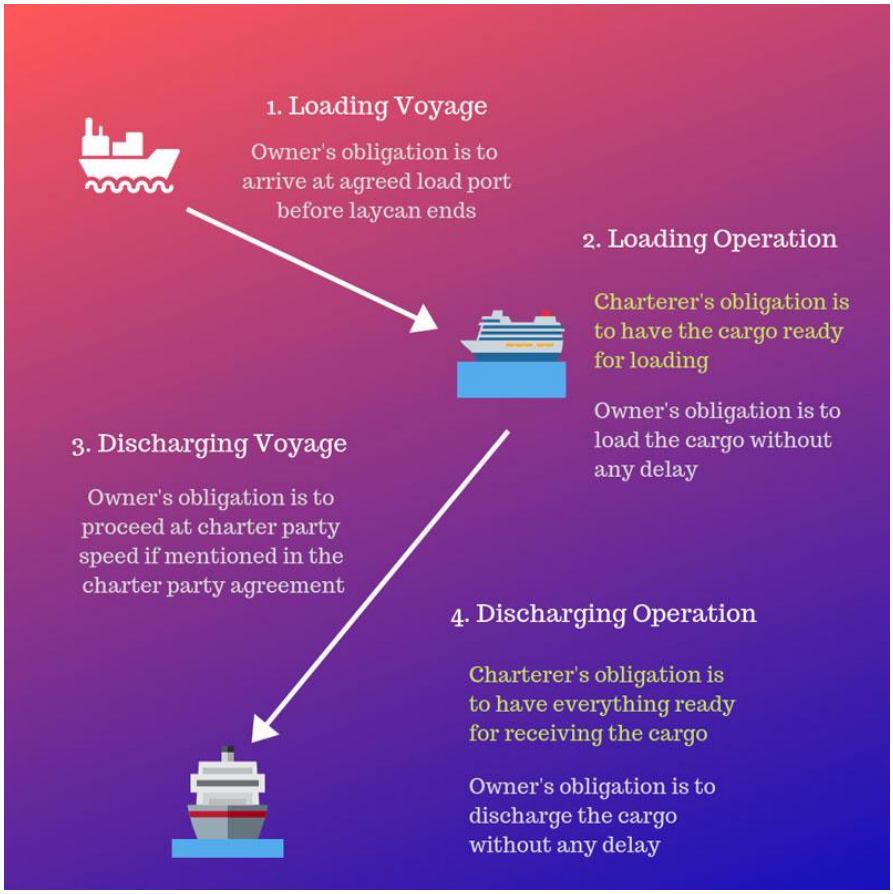
Most likely you will get the answer.

Laytime, Demurrage and despatch

Lord Diplock during one of the leading cases on Laytime described the voyage charter party comprising of four stages.

- Stage 1 is the loading voyage: The voyage from wherever the ship is to the loading port specified in the voyage charter party
- Stage 2 is the Loading operation: The loading of the cargo at the port of loading
- Stage 3 is the carrying voyage: The voyage from load port to the discharge port specified in the voyage charter party.
- Stage 4 is the discharging operation: The discharging of the cargo from the ship to the port of discharging as specified in the voyage charter party.

In the first and third stage, it is only the ship owner that need to perform. For example. Ship-owner is required to adjust the speed of the ship to arrive at the loading port within the agreed dates (Laycan).



And in the third stage, the ship owner is required to instruct the vessel to maintain the charter party speed.

However, it is the second and fourth stage where most of the disputes take place.

Because in these two stages it is mutual responsibility of the two parties to ensure that cargo loading and discharging is done without any delays.

In case of delays, each one can accuse the other for delays.

It is definitely not commercially profiting for the ship-owners if the voyage is extended beyond their expectations.

For example, what if the loading of the cargo took 15 days in comparison to just 2 days that shipowner had expected?

Or what if the ship could not berth at load port or discharge port for many days because of other ships ahead in line up?

Too many uncertainties.

But ship owner's freight (and profits) cannot depend upon so many uncertainties.

So the ship-owners and charterers agree on the factors like allowed number of days for loading and discharging.

In chartering terms this is called "Laydays" or "Laytime".

The laydays is mentioned in the voyage charter party agreement between ship owner and charterer.

It could be mentioned as number of days and hours or as tons per hours or per day.

If the charterer uses more time for loading and discharging than the allowed laydays as per charter party agreement, then charterer is supposed to pay for extra time used.

The chartering term for this additional payment is "Demurrage".

So we can say that if charterer uses more time for loading/discharging than laydays, they need to pay demurrage to the ship owner.

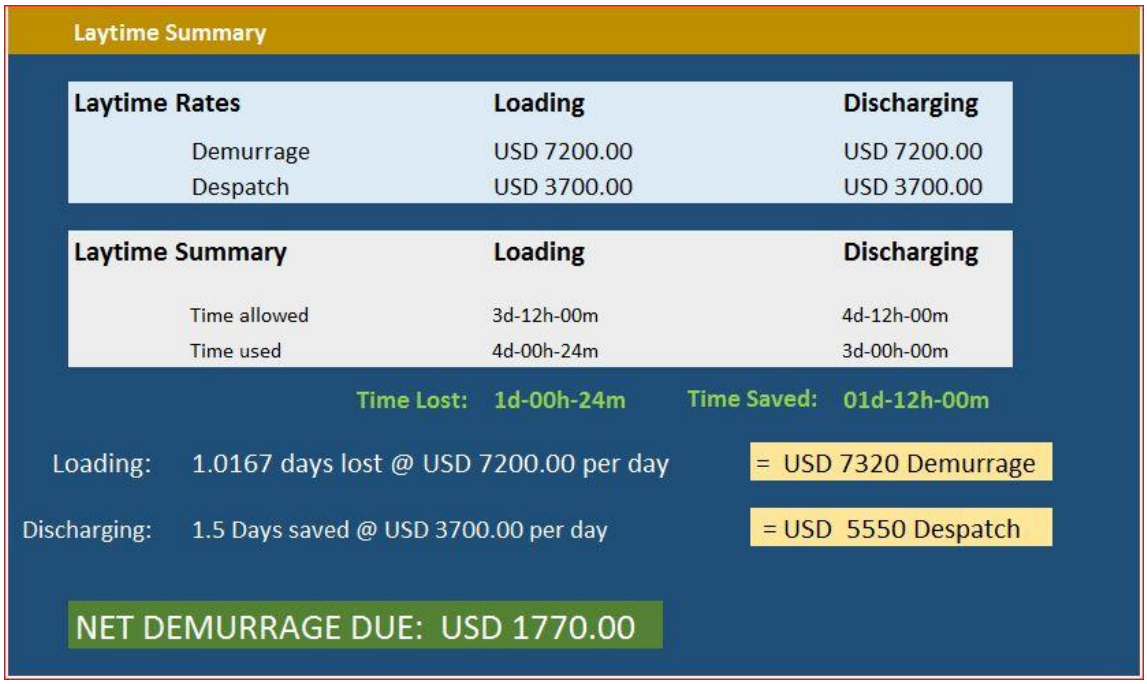
But if the charterer uses less time than laydays then ship owner need to pay the charterer for the time saved.

The chartering term for this is "despatch".

Usually the agreed amount of despatch is about half of the agreed amount for demurrage.

Finally at the end of the voyage, a statement is made to shows the time saved and/or extra time taken at different ports.

Below is the simplified version of the laytime summary calculated at the end of the voyage.



This statement would also show the final amount due and to whom it is due. Means if the final amount is demurrage or despatch and how much.

Notice of readiness and statement of facts

For calculation of laytime, it is important to know when the laytime counting and calculation would start.

This information is also provided in the charter party agreement.

In most of the cases, the laytime would commence to start when the vessel has arrived at the port. In chartering term, this is called “Arrived Ship“.

Legally, a ship is considered as an ‘Arrived Ship” only when

- Ship has arrived at the port of loading or discharging (port voyage charter) or at the designated berth (Berth Voyage charter).
- Ship is ready in all respects to commence loading (or discharging) or the cargo, and
- Master has sent the notice of readiness to the all parties concerned



The charter party agreement contains the information if the voyage charter is a port voyage charter or a berth voyage charter.

Irrespective if it is port or berth voyage charter, from the ship's point of view it is important that the master of the vessel send the notice of readiness.

Notice of readiness need to state that the vessel has arrived and she is ready in all respect to commence loading (or discharging) of the cargo.

The laytime would start to commence at this time or sometimes few hours later if specifically mentioned in the charter party agreement.

Since one of the condition for the laytime to start is for the master to send the notice of readiness, it makes it so much of an important aspect.

Statement of Facts

The vessel and the master of the ship are the owner's representative at the action site (loading port or discharging port).

Ship Owner would know only know the information that we provide them. They would use this information for calculation of any demurrage due to the charterers.

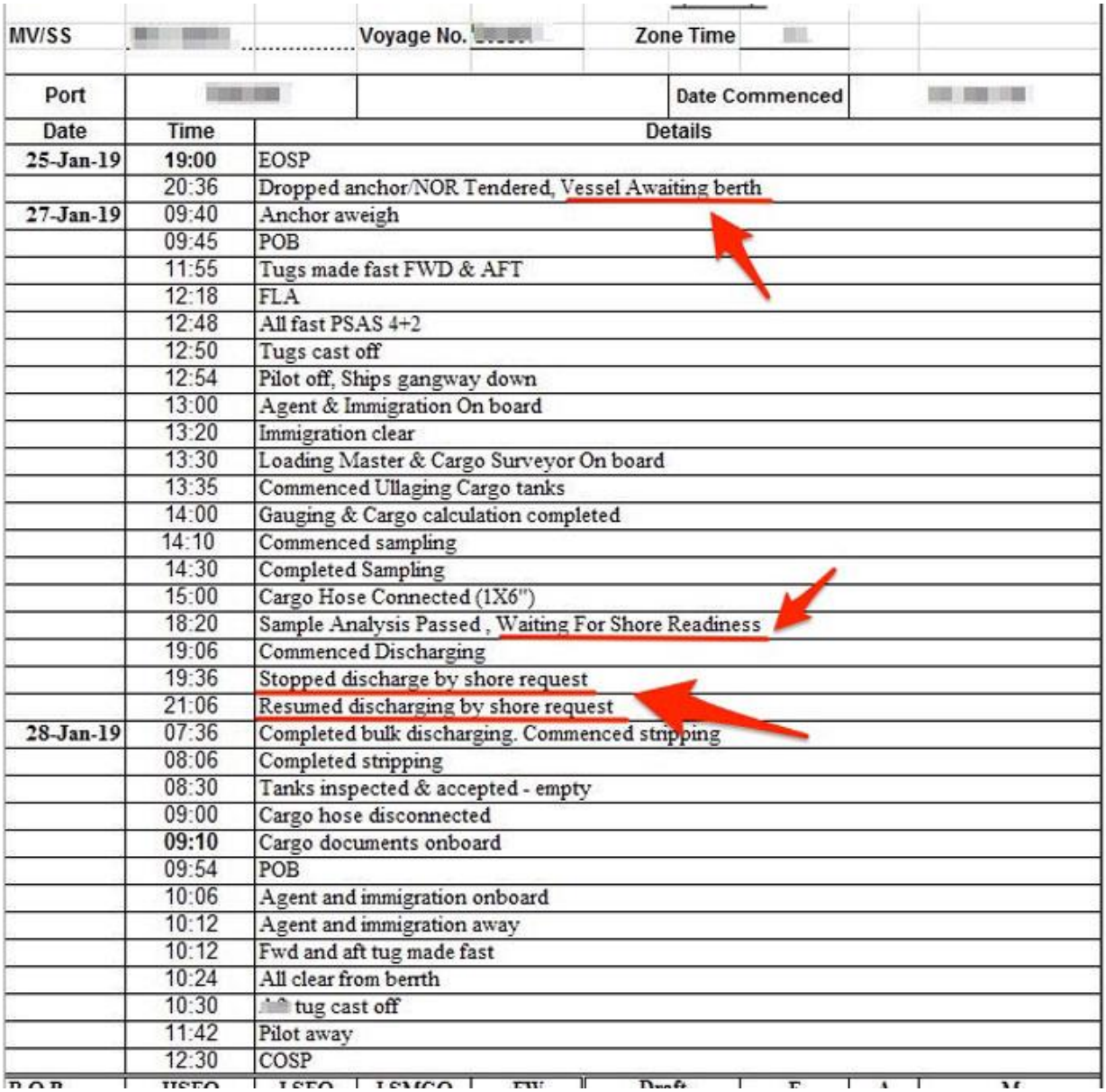
But for the correct demurrage calculation, the information we provide must be correct and we must not miss any important information such as any delays.

That make the statement of facts (commonly called SOF) an important document.

At the least, statement of facts must include

- Any delays from shore side or from ship's side and reason of delay
- Any delays because of weather conditions
- Timings for the movement of the ship (such as times for anchoring, anchor aweigh, pilot onboard, NOR Tendered etc.)
- Timings related to cargo operations (Commenced cargo operation and completed cargo operation

MV/SS		Voyage No.		Zone Time	
Port			Date Commenced		
Date	Time	Details			
25-Jan-19	19:00	EOSP			
	20:36	Dropped anchor/NOR Tendered, Vessel Awaiting berth			
27-Jan-19	09:40	Anchor aweigh			
	09:45	POB			
	11:55	Tugs made fast FWD & AFT			
	12:18	FLA			
	12:48	All fast PSAS 4+2			
	12:50	Tugs cast off			
	12:54	Pilot off, Ships gangway down			
	13:00	Agent & Immigration On board			
	13:20	Immigration clear			
	13:30	Loading Master & Cargo Surveyor On board			
	13:35	Commenced Ullaging Cargo tanks			
	14:00	Gauging & Cargo calculation completed			
	14:10	Commenced sampling			
	14:30	Completed Sampling			
	15:00	Cargo Hose Connected (1X6")			
	18:20	Sample Analysis Passed , Waiting For Shore Readiness			
	19:06	Commenced Discharging			
	19:36	Stopped discharge by shore request			
	21:06	Resumed discharging by shore request			
28-Jan-19	07:36	Completed bulk discharging. Commenced stripping			
	08:06	Completed stripping			
	08:30	Tanks inspected & accepted - empty			
	09:00	Cargo hose disconnected			
	09:10	Cargo documents onboard			
	09:54	POB			
	10:06	Agent and immigration onboard			
	10:12	Agent and immigration away			
	10:12	Fwd and aft tug made fast			
	10:24	All clear from berth			
	10:30	tug cast off			
	11:42	Pilot away			
	12:30	COSP			



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	12:30	COSP			

Master's actions during voyage charter

Master and ship staff may not see the actual charter party agreement between the charterer and the ship owner.

And it is for their own benefit too.

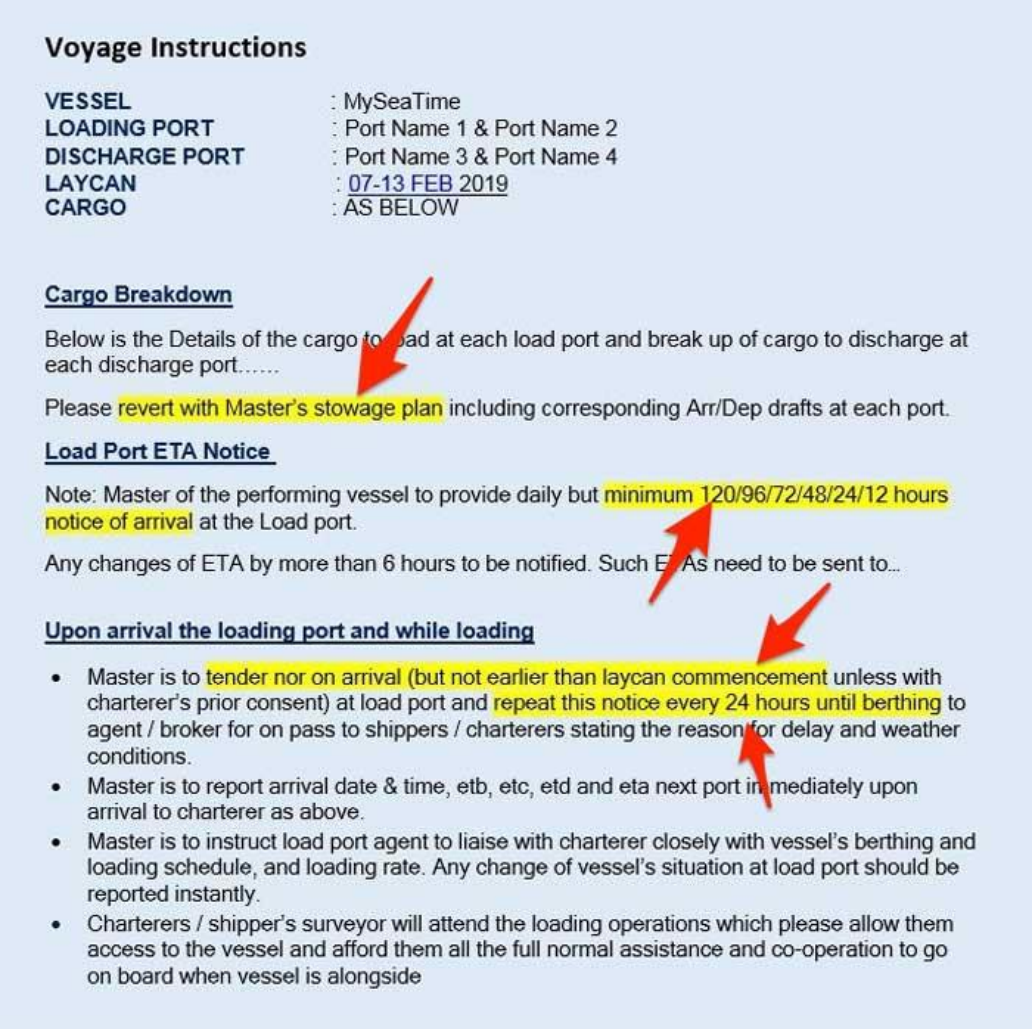
Because there would be so many things in that which we seafarers are not concerned about.

But when the ship is fixed for the voyage charter, master will receive "Voyage instructions" from the charterer through the ship owner's commercial team.

The voyage instructions contains the information from the charter party agreement that requires master's attention and subsequent actions.

Master must not miss the points in the voyage orders that requires his actions.

One of the way to do it is to highlight the text of the voyage instructions that require his attention for easy follow up.



Voyage Instructions

VESSEL	: MySeaTime
LOADING PORT	: Port Name 1 & Port Name 2
DISCHARGE PORT	: Port Name 3 & Port Name 4
LAYCAN	: 07-13 FEB 2019
CARGO	: AS BELOW

Cargo Breakdown

Below is the Details of the cargo to load at each load port and break up of cargo to discharge at each discharge port……

Please revert with Master's stowage plan including corresponding Arr/Dep drafts at each port.

Load Port ETA Notice

Note: Master of the performing vessel to provide daily but minimum 120/96/72/48/24/12 hours notice of arrival at the Load port.

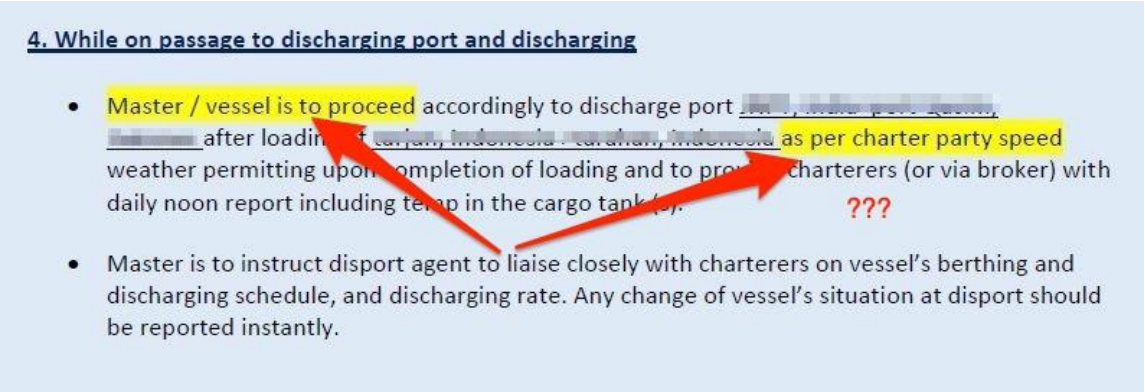
Any changes of ETA by more than 6 hours to be notified. Such ETAs need to be sent to…

Upon arrival the loading port and while loading

- Master is to tender nor on arrival (but not earlier than laycan commencement unless with charterer's prior consent) at load port and repeat this notice every 24 hours until berthing to agent / broker for on pass to shippers / charterers stating the reason for delay and weather conditions.
- Master is to report arrival date & time, etb, etc, etd and eta next port immediately upon arrival to charterer as above.
- Master is to instruct load port agent to liaise with charterer closely with vessel's berthing and loading schedule, and loading rate. Any change of vessel's situation at load port should be reported instantly.
- Charterers / shipper's surveyor will attend the loading operations which please allow them access to the vessel and afford them all the full normal assistance and co-operation to go on board when vessel is alongside

Once Master reads the voyage instructions, he may come across insufficient information that need more information or clarification.

Like this one in one of the voyage orders.

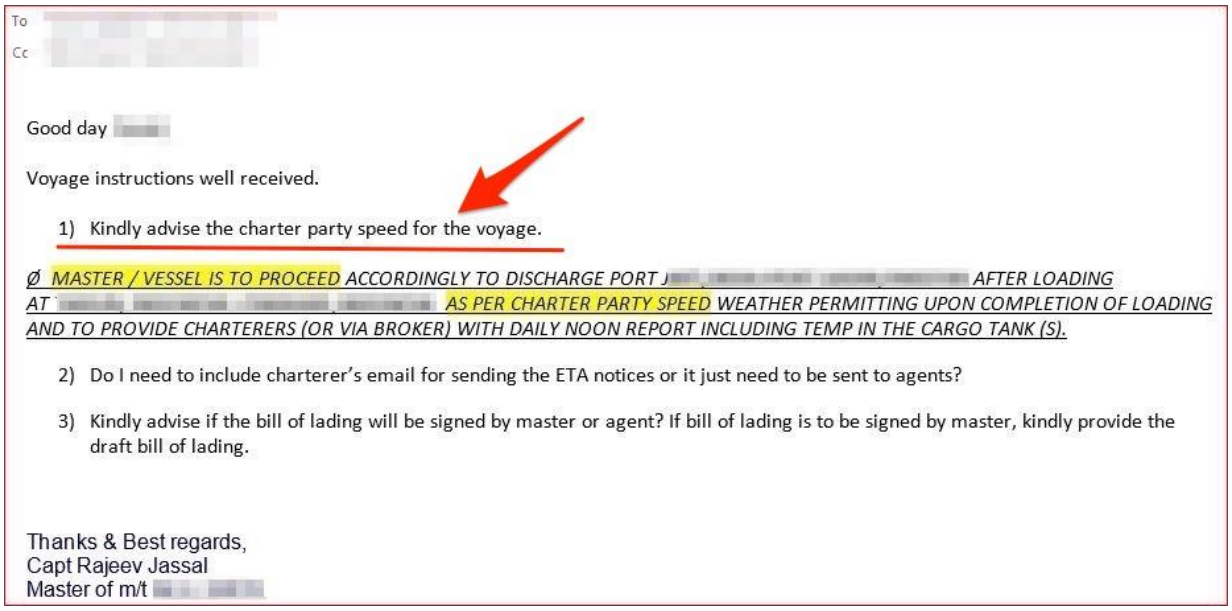


4. While on passage to discharging port and discharging

- Master / vessel is to proceed accordingly to discharge port [redacted] after loading [redacted] as per charter party speed weather permitting upon completion of loading and to provide charterers (or via broker) with daily noon report including temp in the cargo tank(s). ???
- Master is to instruct disport agent to liaise closely with charterers on vessel's berthing and discharging schedule, and discharging rate. Any change of vessel's situation at disport should be reported instantly.

Clarification must be sought from the ship operator for any of such information in the voyage orders.

After all it just takes a simple email to get everything in place.



To
Cc

Good day

Voyage instructions well received.

1) Kindly advise the charter party speed for the voyage.

Ø MASTER / VESSEL IS TO PROCEED ACCORDINGLY TO DISCHARGE PORT J AFTER LOADING AT AS PER CHARTER PARTY SPEED WEATHER PERMITTING UPON COMPLETION OF LOADING AND TO PROVIDE CHARTERERS (OR VIA BROKER) WITH DAILY NOON REPORT INCLUDING TEMP IN THE CARGO TANK (S).

2) Do I need to include charterer's email for sending the ETA notices or it just need to be sent to agents?

3) Kindly advise if the bill of lading will be signed by master or agent? If bill of lading is to be signed by master, kindly provide the draft bill of lading.

Thanks & Best regards,
Capt Rajeev Jassal
Master of m/t

And once everything is clear and in place, it is just about following that.

Conclusion

There are may be only a handful of ship-owners that do not rely on the charterer to find the cargo for their vessel.

Having the vessel on charter is so common.

And vessel can be chartered in different ways. Vessel can be on a voyage charter, time charter or demise/bareboat charter.

With respect to voyage charter, master and ship staff must understand few thing

First, when is the laycan for the vessel? This is period in which vessel must arrive at the load port.

If master thinks that vessel may not be able to make it to the load port in laycan period, the commercial operator must be informed who can then try to extend the laycan.

Second, when the notice of readiness need to be tendered.

If the voyage charter is a port charter, NOR can only be tendered when vessel is at least within the port limits. Usually in this case NOR is tendered when pilot boards the vessel.

If the voyage charter is berth charter, the NOR can only be tendered when the vessel is alongside the designated berth.

Wrong tendering of NOR can make the Notice of readiness null and void and shipowner may loose tons of money.

Lastly, the ship staff need to be make sure that a correct record of statement of facts is kept. This is the document that is used for laytime calculations.

If the charterer uses more time than agreed for loading or discharging the cargo, the ship owner is supposed to get a pre-agreed compensation called demurrage.

Incoterms and business

Incoterms facilitate commerce around the world, the International Chamber of Commerce (ICC) publishes a set of Incoterms, officially known as international commercial terms. Globally recognized, Incoterms prevent confusion in foreign trade contracts by clarifying the obligations of buyers and sellers. Parties involved in domestic and international trade commonly use them as a kind of shorthand to help understand one another and the exact terms of their business arrangements. Some Incoterms apply to any means of transportation; others apply strictly to transportation across water.

If you're new to international trade, you might feel overwhelmed when discussing which Incoterm you should use for your export sales. Using the wrong term could mean you are liable for transportation and other fees you hadn't built into the price of your goods.

The International Chamber of Commerce (ICC) developed Incoterms in 1936 and updates them periodically to conform to changing trade practices. The ICC's mission is to promote open markets and ensure global economic prosperity through trade. Because it is a networked business organization that reaches over 6 million businesses in 100 countries, the ICC is seen as having unparalleled expertise in establishing rules to guide international trade. While the adherence to its Incoterms is voluntary, the ICC-established rules are commonly used by buyers and sellers as a regular part of trade transactions.

Incoterms provide a universal set of rules and guidelines that help facilitate trade. In essence, they provide a common language traders can use to set the terms for their trades. Buyers and sellers can use Incoterms in a variety of activities necessary to conduct business. Typical activities that call for the use of Incoterms include filling out a purchase order, labeling a shipment for transport, completing a certificate of origin, or documenting a free carrier agreement (FCA).

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Because the ICC regularly updates Incoterms, contracts should specify which version they are using—e.g., Incoterms 2020. Also, be aware that trade terms used in different countries may

appear identical on the surface, but they can have different meanings when used domestically.

Some common examples of Incoterms rules for any mode of transportation include Delivered at Terminal (DAT), Delivered Duty Paid (DDP), and Ex Works (EXW).

DAT indicates the seller delivers the goods to a terminal and assumes all the risk and transportation costs until the goods have arrived and been unloaded. After that, the buyer assumes the risk and transportation costs of the goods from the terminal to the final destination.

DDP indicates the seller assumes all the risk and transportation costs. The seller must also clear the goods for export at the shipping port and import at the destination. Moreover, the seller must pay export and import duties for goods shipped under DDP.

Under Incoterm Ex Works (EXW), the seller is only required to make the goods available for pickup at the seller's business location or another specified location. Under EXW, the buyer assumes all the risk and transportation costs.

Real World Examples of Incoterms

In 2010, the two main categories of Incoterms were updated and classified by modes of transport. The first classification applies to any mode of transport, while the second classification only applies to sea and inland waterway transport.

Group 1 Incoterms: Apply to Any Mode of Transport

- EXW Ex Works
- FCA Free Carrier
- CPT Carriage Paid To
- CIP Carriage and Insurance Paid To
- DAT Delivered at Terminal
- DAP Delivered at Place
- DDP Delivered Duty Paid

Group 2 Incoterms: Apply to Sea and Inland Waterway Transport

- FAS Free Alongside Ship
- FOB Free on Board
- CFR Cost and Freight
- CIF Cost, Insurance, and Freight

The ICC has specific Incoterms rules for inland waterway and sea transport such as cost, insurance, and freight (CIF) and free on board (FOB). Free on board shipment terms indicate

the seller delivers the goods on board a designated vessel named by the buyer. The buyer or seller may assume all the risk and transportation costs depending on whether the goods are sold under FOB shipping point or FOB destination point.

Cost, insurance, and freight (CIF) terms indicate the seller must deliver the goods to a designated port and load them on a specified vessel, assuming responsibility for paying all transportation, insurance, and loading costs. After that, the buyer assumes the cost and risk associated with transporting the cargo from the designated port to its warehouse or business.

Incoterms 2020 Rules are used today by practitioners and traders, anyone involved in the supply chain of delivering goods overseas will probably come across incoterms, including:

- Traders
- Producers
- Buyers
- Sellers
- Governments
- Banks

The language that was agreed by incoterms guidance covers the following areas of international commerce and trade by the International Chambers of Commerce:

- Tasks involved in shipping
- Which parties hold contract
- Responsibility of risk
- Delivery of goods (buyers and sellers)
- Insurance duties
- Customs and taxes

The main purpose of Incoterms is to provide a **uniform, constant and authentic interpretation of the commercial terms of delivery of goods**, most frequently used in International transactions, and, by means of their application, removing any uncertainty due to divergent interpretations.

Operators from different countries, with different legislations, can, at last, rely on the uniform, unambiguous and authentic interpretive sources for properly and fairly sharing the costs and the risks arising from the delivery of the goods.

The use of such clauses is discretionary and, for the sake of their validity, both parties of a sales contract have to agree upon in advance through a specific mention on such a contract.

The field of action and the function of Incoterms is identified through the acknowledgement of four “moments”:

- Who pays for the main transport?
- Where does the delivery take place?
- Where and when the risk is transferred from the Seller to the Buyer?
- Who bears all the fees arising from transportation? Issue of documents, unloading of goods at destination, customs clearance when necessary, insurance of goods etc.

Seven Key Changes & Updates

What are the seven key changes and updates for Incoterms 2020 Rules? The substance of Incoterms 2020 has not changed considerably, but the small subtle changes are absolutely crucial for trade specialists.

Here are the key differences between Incoterms 2010 and Incoterms 2020:

1. DAT Incoterm changed to DPU (Delivery at Place Unloaded)

Following on from several rounds of consultation, the Drafting Group made the choice of removing the word ’terminal’ as it often caused confusion.

DAT required Delivery at Terminal (unloaded), however, following on from feedback to the drafting committee, it was decided to change the term to DPU (Delivery at Place Unloaded), to broadly cover ‘any place, whether covered or not’.

2. Insurance cover differs between CIF and CIP

Under CIF / CIP, the seller buys insurance for the buyer. In Incoterms® 2010, insurance is required under clause C, but in Incoterms® 2020, CIP requires insurance complying with Institute Cargo Clause (A) whereas CIF requires insurance under Clause C.

Why? Because Clause A covers a more comprehensive higher level of insurance (e.g. for the manufactured goods), whereas a lower level of cover from Clause C would probably apply to the commodities world.

3. The Listing of Costs

All costs are now listed in the ‘Allocation of Costs’ sections for each rule, to avoid confusions. Because the ordering of articles within the Incoterms 2020 rules have also changed, these now appear in the A9/B9 section of each rule.

Costs were a big issue in the 2010 Incoterms®. Carriers often changed their pricing structure to deal with add ons and sellers were often surprised by being back charged terminal handling charges. The A9 sections in the Incoterms rules guide now collects together the costs, with the principle aim of clearly stating the costs to each party.

4. Security Requirements

Cargo security has been particularly important since 9/11, and the 2020 rules now address many of the security-related requirements that became so prevalent in the early part of this century. From a carriage requirements perspective, security related allocations have been added to A4 and A7 of each Incoterms rule, and the necessary costs associated have been added to A9/B9 (see 3).

5. Own transport

Incoterms 2010 rules assumed that goods carried from the seller to the buyer were via a 3rd party. Incoterms 2020 allows for own means of transport by the buyer in the FCA rules and by the seller in the D rules.

6. FCA and Bills of lading

According to FCA, part B4, 'The buyer must contract or arrange at its own cost for the carriage of the goods'. There is a gap in delivery between FCA and FOB. If you're selling FCA, your delivery point is different to FOB. The difference between FCA and FOB to the seller is a significant cost and risk. In the 2010 Incoterms rules, exporters of goods in containers were encouraged to use FCA, which seemed best for both parties. However, many people were using FOB when they should've really been using FCA.

Why? Even sophisticated sellers said they wanted to use FOB, because a standard Letter of Credit requires an onboard Bill of Lading to be presented. Therefore the sellers were often taking the risk and using FOB instead, because they wanted to get paid under the LC. The Incoterms 2020 FCA extra provision now states that if the parties have so agreed, the buyer must instruct the carrier to issue to the seller, at the buyers cost and risk, a transport document stating that the goods have been loaded (such as a Bill of Lading with an on board notation)'

7. Presentation and design

Incoterms 2020 rules have much more extensive explanatory notes, with better diagrams, a different structure for users and a reordering of rules to make delivery and risk more obvious. Maritime related rules still haven't changed and remain at the back of the rule book as they still might be used for bulk commodities.

Incoterms®2020 Rules Responsibility Quick Reference Guide



	Freight Collect Terms		Freight Prepaid Terms								
Groups	Any Mode or Modes of Transport		Sea and Inland Waterway Transport				Any Mode or Modes of Transport				
Incoterm®	**EXW** Ex Works (Place)	**FCA** Free Carrier (Place)	**FAS** Free Alongside Ship (Port)	**FOB** Free On Board (Port)	**CFR** Cost and Freight (Port)	**CIF** Cost Insurance & Freight (Port)	**CPT** Carriage Paid To (Place)	**CIP** Carriage & Insurance Paid to (Place)	**DAP** Delivered at Place (Place)	**DPU** Delivered at Place Unloaded (Place)	**DDP** Delivered Duty Paid (Place)
Transfer of Risk	At Buyer's Disposal	On Buyer's Transport	Alongside Ship	On Board Vessel	On Board Vessel	On Board Vessel	At Carrier	At Carrier	At Named Place	At Named Place Unloaded	At Named Place
Obligations & Charges:											
Export Packaging	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Loading Charges	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Delivery to Port/Place	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Export Duty, Taxes & Customs Clearance	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Origin Terminal Charges	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Loading on Carriage	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Carriage Charges	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Insurance	Negotiable	Negotiable	Negotiable	Negotiable	Negotiable	*Seller	Negotiable	**Seller	Negotiable	Negotiable	Negotiable
Destination Terminal Charges	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller
Delivery to Destination	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller
Unloading at Destination	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Buyer
Import Duty, Taxes & Customs Clearance	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller

INCOTERMS 2020

RULES FOR ANY MODE(S) OF TRANSPORT			TERMS											
			Seller Location	Export Formalities	Pre-Carriage Not Unloaded	Delivery at Named Place Port/Terminal	Loading Alongside Vessel	Onboard Ship/Aircraft	Main Carriage	Discharge at Port of Destination	Delivery at Named Place Port/Terminal	Onward Carriage Not Unloaded	Import Formalities & Duties	Buyer Location Unloaded
EXW	Ex Works	Cost	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
		Risk	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
FCA	Free Carrier	Cost	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
		Risk	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
FAS	Free Alongside Ship	Cost	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
		Risk	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
FOB	Free on Board	Cost	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
		Risk	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
CFR	Cost & Freight	Cost	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer
		Risk	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
CIF	Cost, Insurance & Freight	Cost	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer
		Risk	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
CPT	Carriage Paid To	Cost	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer
		Risk	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
DPU	Delivered at Place Unloaded	Cost	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer
		Risk	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer
DAP	Delivered at Place	Cost	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer
		Risk	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer
DDP	Delivered Duty Paid	Cost	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer
		Risk	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer

Shipping Glossary

A

A/B

Able bodied seaman, a member of the crew who is able to perform all duties of an experienced seaman.

A/S

Alongside

AA

Always afloat

AAAA

Always accessible always afloat

AAOSA

Always afloat or safely aground

AARA

Amsterdam-Antwerp-Rotterdam Area

Abaft

Toward the rear (stern) of the ship. Behind.

Aboard

On or within the ship

Above deck

On the deck (not over it – see ALOFT)

ABT

About

Ad valorum

Means “at Value” a rate of freight based on the value of the goods.

ADCOM

Address Commission

Addendum

Additional chartering terms at the end of a charter party

Affreightment

The hiring of a ship in whole or part

Aframax

American Freight Rate Association – appr. 80 000 – 105 000 dwt – term for a tank ship of standard size

AFSPS

Arrival First Sea Pilot Station (Norway)

Aft

At or towards the stern or rear of a ship

AG

Arabian Gulf – also called PG – Persian Gulf

Agent or Ship's Agent

Person looking after the interests of a ship whiøe in port. Duties include organising pilotage, towage and berth for the ship, collecting freight and signing bills of lading

Aground

Touching or fast to the bottom

AGW

All going well

AHL

Australian hold ladders

Aids to navigation

Artificial objects to supplement natural landmarks indicating safe and unsafe waters

Aloft

Above the deck of the ship

Amidships

In or toward the centre of the ship

Anchor Piling

Mooring point on the sea bed

Anchorage

A place suitable for anchorage in relation to the wind, seas and bottom

ANTHAM

Antwerp-Hamburg range

Antifouling

Normally contains toxic compounds to prevent marine growth. Non-toxic products are gradually being introduced to the market

APS

Arrival pilot station

Aquabreak PX

Product name for an environmentally-adapted cleaning agent which can be used throughout the ship

Aquatuff

Product name for an environmentally-adapted cleaning agent used in cargo holds

AR

Accounts receivable

ARAG

Amsterdam-Rotterdam-Antwerp-Gent range

Arbitration

Method of settling disputes which is usually binding on parties concerned. A clause usually in a charter party

ASBA

American Shipbrokers Association

ASPW

Any safe port in the world

Astern

In the back of the ship, opposite of ahead

ATDNSHINC

Any time day/night Sundays and holidays Included

Athwartships

At right angles to the centreline of the ship

ATUTC

Actual times used to count

B

B/C

Bulk carrier. Single deck ship carrying homogenous unpackaged cargoes. Loaded through large hatchways

B/L

Bill of lading. A document signed by the carrier which acts as a Contract of affreightment, a receipt and evidence of title to the cargo.

Backletter

Where a seller/shipper issues a 'letter of indemnity' in favour of the carrier in exchange for a clean bill of lading

BAF

Bunker adjustment factor. A fuel surcharge expressed as a percentage added or subtracted from the freight amount, reflecting the movement in the market place price for bunkers.

Bale capacity

Cubic capacity of a vessels holds to carry packaged dry cargo such as bales/pallets

Ballast

Heavy weight, often sea water, necessary for the stability and safety of a ship which is not carrying cargo

Ballast bonus

Compensation for relatively long ballast voyage

Ballast water

Contains micro-organisms which can cause harm outside their home environment. Ballast water is taken on board during the discharge of a cargo to improve a vessel's stability, changed while at sea and pumped out when the next cargo is loaded

Bareboat

Charterers hire a vessel without crew. Charterers are responsible for commercial and technical management.

Bareboat chtr

Bareboat charter – Owners lease a specific ship and control its technical management and commercial operations only. Charterers take over all responsibility for the operation of the vessel and expenses for the duration.

Barnacles

Organisms which grow on the underwater hull and increase its resistance to the water

BBB

Before breaking bulk. Refers to freight payments that must be received before discharge of a vessel commences

BDI

Both dates inclusive

Beam

The maximum breadth or the greatest width of a ship

Below

Beneath the deck

Benchmarking

To compare someone or something with the best that can be achieved within a specified field

BENDS

Both ends (load & discharge ports)

BI

Both inclusive

Bilge water

Dirty water which collects in a ship's bilges and may be contaminated with small quantities of oil from engine room drains, etc.

Bilge water flocculant

Chemical used to separate oil from waste water

BIMCO

The Baltic and International Maritime Council

BL1

Bale

BM

Beam

BN

Booking note

BOB

Bunker on board

Boffer

Best offer

Bow

The forward part of a ship

Box

A term used for a container

BPM

Bridge procedure manual

Break-Bulk Cargo

Goods shipped loose in the vessel's hold and not in container

BROB

Bunkers remaining on board

Brokerage

Percentage of freight payable to broker. (by owners in C/P's) or applicable to sale or purchase.

BSM

Barber Ship Management

BSS

Basis

BSS 1/1

Basis 1 port to 1 port

BT

Berth terms

Bulk-oil carrier

Multipurpose vessel built to carry cargoes of coal as well as oil. Most bulk-oil carriers are reinforced to carry ores and are called OBO-ship (ore/bulk/oil)

Bulkhead

A vertical partition separating compartments

Bundling

This is the assembly of pieces of cargo, secured into one manageable unit. This is relevant to items such as structural steel, handrails, stairways etc. Whilst this is a very flexible description, a rule of thumb is to present cargo at a size easily handl

Bunkers

Name given for vessels fuel and diesel oil supplies (Originates from coal bunkers)

Buoy

An anchored float used for marking a position on the water or a hazard or a shoal and for mooring

BWAD

Brackishw water arrival draft

C

C/P

Charter Party

C/SNEE (or Consignee)

Name of agent, company or person receiving consignment

Cabotage

Coastal trade, i.e. the movement of goods by ship between ports on the same coast or between ports within the same country

CAF

Currency adjustment factor

Capesize

Vessel which is too large to navigate the Panama Canal – appr. 80 000 – 175 000 dwt with a beam of between 42 and 46 metres (the Panama Canal has a max. width of 32 metres), therefore being forced to voyage around the Cape Horn.

CAR

Corrective action request

CBA

Collective bargaining agreement (Salary scales for different nationalities of seamen) Used by crewing.

CBFT (or CFT)

Cubic feet

CBM

Cubic metres

CBT

Clean ballast tanks

CEO

Chiefe executive officer

CFC

Chlorofluorocarbon compounds. See HCFC

CFO

Chief financial officer

CFR

Cost and freight. Cost and freight means that the seller delivers when the goods pass the ship's rail in the port of shipment. The seller must pay the costs and freight necessary to bring the goods to the named port of destination BUT the risk of loss of

Chart

A map used by navigators

Chartering agent

Shipbroker acting on behalf of charterer in negotiations leading to the chartering of a ship

CHENG

Chief engineer

CHOF

Chief officer or chief mate, second in command of the vessel

CHOPT

Charterers option

CHTRS

Charterers

CIF

Cost, insurance and freight. Means that the seller delivers when the goods pass the ship's rail in the port of shipment. The seller must pay the costs and freight necessary to bring the goods to the named port of destination BUT the risk of loss of or dam

CIP

Carriage and insurance paid to… Means that the seller delivers the goods to the carrier nominated by him but the seller must in addition pay the cost of carriage necessary to bring the goods to the named destination. This means that the buyer bears all

CKD

Completely knocked down

Class

Means the vessel has its construction made according to the rules of a given Classification Society

Classification society

Organisation which carries out surveys of newbuildings and at regular intervals when in commission, setting and maintaining quality standards for ships and their equipment. Acts on behalf of the flag state's maritime authorities

Clean (CPP)

Refined petrolium products with light color (gas, parafin, gas oil, naphta)

CM

Contingency manual

CO2

Carbon dioxide – a combustion product from burning all types of fuel. The amount of carbon dioxide in the atmosphere may increase the temperature at the Earth's surface – known as the greenhouse effect

COA

Contract of affreightment – Owners agree to accept a cost per revenue tonne for cargo carried on a specific number of voyages.

COACP

Contract of affreightment charter party

COB

Closing of business

COBLDN

Closing of business London

COD

Cash on delivery

COGSA

Carriage of goods by Sea act

Commision

Shipbroker's remuneration, normally 1.25 per cent of gross freight. Calculated also for sales and purchases of vessels at one per cent of purchase price

Conference

Organization of a group of lines operating in one trade where the companies agree to use a common tariff. See also Liner Conference.

Congestion

Port/berth delays

CONS

Consumption

Consignee

Name of company or person receiving consignment

Container vessel

Ship specially designed to carry standard containers (TEUs). Generally called Cellular container ship. The larger part of the cargo-carrying capacity consists of containers carried on deck or in cells in the hold. Containers are lifted on and off with spe

COP

Custom of port

CP (or C/P)

Charter party

CPD

Charterers pay dues

CPT

Carriage paid to… Means that the seller delivers the goods to the carrier nominated by him but the seller must in addition pay the cost of carriage necessary to bring the goods to the named destination. This means that the buyer bears all risks and any

CQD

Customary quick despatch

CR

Current rate

CRN

Crane

CROB

Cargo remaining on board

CRT

Cargo retention clauses, introduced by charterers based on shortage of delivered cargo because of increased oil prices

Crude (oil)

Un-refined oil directly from the well

CST

Centistoke

CTR

Container fitted

Cubic capacity

The most important commercial measurement when the cargo is so lightweight that the ship is filled to capacity without being loaded to the load line (freeboard). Capacity is measured in cubic metres or cubic feet (cu.ft.)

CVS

Consecutive voyages

D

D&A

Drug & Alcohol

D/A

Disbursement account

DAF

Delivered at frontier. Means that the seller delivers when the goods are placed at the disposal of the buyer on the arriving means of transport not unloaded, cleared for export, but not cleared for import at the named point and place at the frontier, but

Damage for detention

Compensation for delays beyond or instead of demurrage

DAMFORDET

Damages for detention. Penalty if cargo is not ready when ship arrives for working (1st day of Laycan). This is not detention which is charged for ships time on delay. If the cargo is ready there is no DAMFORDET.

DAPS

Days all purposes (Total days for loading & discharging)

Data entry user

Reporting unit responsible in Magnitude

DDP

Delivered duty paid. Means that the seller delivers the goods to the buyer, cleared for import, and not unloaded from any arriving means of transport at the named place of destination. The seller has to bear all the costs and risks involved in bringing th

DDU

Delivered duty unpaid. Means that the seller delivers the goods to the buyer, not cleared for import, and not unloaded from any arriving means of transport at the named place of destination. The seller has to bear the costs and risks involved in bringing

Dead freight

Freight payable by charterers in case they do not supply the agreed quantity of cargo

Deck

A permanent covering over a compartment, hull or any part thereof

DEM

Demurrage (quay rent). Money paid by the shipper for the occupying port space beyond a specified “free time period.

Demurrage

The money payable to the owner for delay for which the owner is not responsible in loading or discharging after the laytime has expired.

DEQ

Delivered ex quay. Means that the seller deliveres when the goods are placed at the disposal of the buyer not cleared for import on the quay (wharf) at the named port of destination. The seller has to bear costs and risks involved in bringing the goods to

DES

Delivered ex ship. Means that the seller delivers when the goods are placed at the disposal of the buyer on board the ship not cleared for import at the named port of destination. The seller has to bear all the costs and risks involved in bringing the goo

DESP

Despatch. Time saved, reward for quick turnaround, in dry cargo only

DET

Detention (See DAMFORDET)

DEV

Deviation. Vessel departure from specified voyage course

DFRT

Deadfreight. Space booked by shipper or charterer on a vessel but not used

DHDATSBE

Despatch half demurrage on all time saved both ends

DHDWTSBE

Despatch half demurrage on working time saved both ends

Disbursement

Cost, expenditure, payment

DISCH

Discharge

Despatch

The money payable by the shipowner to the charterer if the ship completes loading or discharging before the laytime has expired as detailed in a charter party. Also referred to as despatch money.

DK

Deck

E

Ebb

A receeding current

EC

East Coast

EIU

Even if used

ELVENT

Electric ventilation

EMM

Environmental management manual

Enviro Return Management

System for legal and environment-friendly management of used ozone-depleting refrigerants

Enviroclean

Product name for an environmentally-adapted degreasing agent for engine rooms and tank cleaning

Environmental system inspections

Inspection of refrigeration systems to ensure optimum operating conditions and prevent leaks

EPA

Environmental Protection Agency

ERT

Emergency response team

Escalation clause

A clause allowing for an adjustment

ETA

Estimated time of arrival

ETC

Estimated time of completion

ETD

Estimated time of departure

ETS

Estimated time of sailing

EXW

Ex. works. Means that the seller delivers when he places the goods at the disposal of the buyer at the seller's premises or another named place (i.e. works, factory, warehouse, etc.) not cleared for export and not loaded on any collecting vehicle.

F

FAC

Fast as can (loading or discharging)

FAS

Free alongside ship. Means that the seller delivers when the goods are placed alongside the vessel at the named port of shipment. This means that the buyer has to bear all costs and risks of loss or damage to the goods from that moment. The FAS term requi

FCA

Free to carrier. Means that the seller delivers the goods, cleared for export, to the carrier nominated by the buyer at the named place. It should be noted that the chosen place of delivery has an impact on the obligations of loading and unloading the goo

FD (FDIS)

Free discharge

FDD

Freight demurrage deadfreight

FDEDANRSAOCLONL

Freight deemed earned, discountless and non-returnable (refundable) ship and or cargo lost or not lost

FDESP

Free despatch

Feeder

A loading system for distribution of cargo loaded, or a vessel that is transshipping cargo – e.g. cars or containers

Feeder Vessel

A short-sea vessel used to fetch and carry goods and containers to and from deep sea vessels.

Fender

A cushion, placed between ships, or between a ship and a pier, to prevent damage

FEU

Standard 40’ Container

FHEX

Fridays and holidays excepted

FHINC

Fridays and holidays included

FI

Freight interest insurance

FILO

Free in/liner out. Seafreight with which the shipper pays load costs and the carrier pays for discharge costs.

FIO

Free in/out. Freight booked FIO includes the seafreight, but no loading/discharging costs, i.e. the charterer pays for cost of loading/discharging cargo.

FIOS

Free in/out stowed. As per FIO, but excludes stowage costs.

FIOST

Free in/out and trimmed. Charterer pays for cost of loading/discharging cargo, including stowage and trimming.

FIOT

Free in/out and trimmed. As per FIOS but includes trimming, e.g. the levelling of bulk cargoes. FIOS includes seafreight, but excludes loading/discharging and stowage costs.

FIT

Free in trimmed

FIW

Free in wagon

Fixing

Chartering a vessel

Fixture

Conclusion of shipbrokers negotiations to charter a ship – an agreement

Flatpacking

Cargo to be presented stacked and secured as an integral unit.

FLT

Full liner terms

FMC

Federal Maritime Commission

FME

Force Majeure excepted

FMS

Fathoms

FO1

For orders

FO2 (IFO)

Fuel oil/intermediate FO

FO3

Free out

FOB

Free on board. Means that the seller delivers when the goods pass the ship's rail at the named port of shipment. This means that the buyer has to bear all costs and risks of loss of or damage to the goods from that point. The FOB term requires the seller

G

g/t-km

Denotes emissions in grams per tonne of cargo shipped over a kilometre

GA

General average or general arrangement plan

GA plan

General arrangement plan

Gamazymes

Bioactive cleaning agents used in galleys, crew quarters and passenger sections on cruise liners

GEAR

A general term for ropes, blocks, tackle and other equipment

General cargo

Goods unpackaged or packaged, but not shipped in bulk

GEOROT

Geographical rotation

GL

General ledger

GLS (GLESS)

Gearless

GM

General manager; head of local entity

GN (or GR)

Grain (Capacity)

GNCN or Gencon

General conditions

GO

Gas oil

GP

Grain capacity. Cubic capacity in ‘grain’

GR

Geographical rotation. Ports in order of calling

GRD

Geared

Green Passport

A certificate which confirms which materials have been used in a vessel’s construction

Gross Tonnage

(0.2+0.02*log10V)*V, where V is the volume in cubic metres of all enclosed spaces on board

GRT

Gross registered tonnage

GSB

Good, safe berth

GSP

Good, safe port

GTEE

Guarantee

Gunwale

The upper edge of a ship's sides

H

H&M

Hull and machinery insurance

HA

Hatch

Hague rules

Code of minimum conditions for the carriage of cargo under a Bill of lading

Hallmarks

A mark indicating quality or excellence.

Halon

Previously used on ships as an effective fire-extinguishing medium, harmful to the ozone layer in the atmosphere

Handymax

Dry bulk vessel of appr. 35 000 – 50 000 dwt.

Handysize

Dry bulk vessel or product tanker, 15 000 – 50 000 dwt.

Hatch

An opening in a ship's deck fitted with a watertight cover

HBF

Harmless bulk fertilizer

HCFC

Hydro-chlorofluorocarbon compounds, such as freon 22 (R22)

HDLTSBENDS

Half despatch lay time saved both ends

HDWTS

Half despatch working (or weather) time saved

HFC

Hydrofluorocarbon

HFO

Heavy fuel oil. Used in ship's engines and boiler systems

HHDW

Handy heavy d.w. (scrap)

HI

Hull interest insurance

Hire

T/C remuneration

Hire-purchase Charter-Party

C/P where the charterer gets ownership of the vessel at the conclusion of the C/P

HMS

Heavy metal scraps

Hold or HO

A compartment below deck in a large vessel, used solely for carrying cargo

Hull

The main body of a ship

HW

High water

I

IAS

International Accounting Standards. (Former name for IFRS.)

ICT

Information communication technology

ICW

Intercoastal waterway: bays, rivers, and canals along the coasts (such as the Atlantic and Gulf of Mexico coasts), connected so that vessels may travel without going into the sea

IFRS

International Financial Reporting Standards

ILO

International Labour Organization

IMDG

International Maritime Dangerous Goods code

IMO

International Maritime Organisation. Body created to regulate international maritime trade

IMO

International Maritime Organisation

In &/or over

Goods carried below and/or on deck

Incinerator

Used to burn waste and sludge

IND

Indication

Indemnity

Compensation for loss/damage or injury

INMARSAT

International Maritime Satellite System

INTERMODAL

Carriage of a commodity by different modes of transport, i.e. sea, road, rail and air within a single journey

ISM Code

International Safety Management Code. The objectives of the ISM Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property. The purpose

ISMA

International Ship Managers Association

ISO 14000

ISO standard for environmental management

ISO 14001

International environmental standard

ISO 9001

International quality standard

ISPS

International Ship and Port Facility Security Code. The Objective with the ISPS code is to establish an international framework involving co-operations between contracting governments, governement agencies, local administration and the shipping and port i

ITF

International Transport Federation

Itinerary

Route. Schedule

IU

If used

IUHTAUTC

If used. Half time actually used to count

IWL

Institute Warranty Limits

J

Joint service

Two or more shipping companies jointly operating a service

Joint Venture

A Joint Venture is a contractual arrangement whereby two or more parties control jointly an economic activity. The economic activity is carried through a separate enterprise (company or partnership, it is handled as a jointly controlled enterprise. Joint

K

Keel

The centreline of a ship running fore and aft; the backbone of a vessel

Knot

A measurement of speed equal to one nautical mile (6 076 feet) per hour

Kommanditтselskap (K/S)

Limited partnership. A form of shipfinancing

Kyoto protocol

International agreement, adopted under the UN Framework Convention on Climate Change (UNFCCC), which aims to reduce greenhouse gas emissions

L

L/C

Letter of credit

Lane meter

A method of measuring the space capacity of ro-ro ships whereby each unit of space (linear meter) is represented by an area of deck 1.0 meter in length x 2.5 meters in width.

Lash

To hold goods in position by use of ropes, wires, chains or straps etc.

LAT

Latitude. The distance north or south of the equator measured and expressed in degrees.

Laycan

Laydays/cancelling.

Laytime

Time at Charterers disposal for purpose of loading/discharging

LCR

Lowest current rate

Leasing

when a ship is leased, the owner may in fact utilize it as in a bareboat or hire-purchase-C/P, but without entering into a charter-party-contract. The price is agreed between the shipping company (lessee) and the vessel's legal owner – the leasing company

Lee

The side sheltered from the wind

Leeward

The direction away from the wind. Opposite of windward

Leeway

The sideways movement of the ship caused by either wind or current

LF

Load factor. Percentage of cargo or passengers carries e.g. 4 000 tons carried on a vessel of 10 000 capacity has a load factor of 40%

Lien

Retention of property until outstanding debt is paid

Liner

Vessel serving a regular defined route or trade, following a published sailing schedule

Liner conference

Two or more shipping companies operating a service in common between designated areas. Conference partners agree special freight rates and terms for the trade, in order to stabilize market and service

Liner service

Cargoships operating regular schedules between advertised ports

Liner terms

Ship responsible for all costs of loading and discharging

LNG

Liquefied natural gas (mostly methane)

LOA

Length overall (of ships hull)

LOA

Length overall of the vessel

Load line

See Plimsoll line

LOF

Lloyds Open Form

LOG

A record of courses or operation. Also, a device to measure speed

LOH

Loss of hire insurance

LOI

Letter of indemnity

LOLO

Lift on – lift off

Longitude

The distance in degrees east or west of the meridian at Greenwich, England

LOW

Last open water

Low NO x nozzles

Fuel valves specially developed to reduce formation of nitrogen oxides (NOx) from combustion

LPG

Liquefied petroleum gas – from refineries (motstly propane, butane)

LS (or LUMPS)

Lumpsum freight. Money paid to shipper for a charter of a ship (or portion) up to stated limit irrespective of quantity of cargo

LSD

Lashed secured dunnaged

LSFO

Low-sulphur fuel oil (bunkers)

LT1

Liner terms

LT2

Long tonne = 1 016.05 kilogram (2 240 lbs)

LTHH

Liner terms hook/hook

LW

Low water

LYCN

Laycan (Layday cancelling date)

M

M/V

Motor vessel/merchant vessel

Manifest

Inventory of cargo (Document discribing the cargo aboard)

Maritime lien

A right in the propery of a ship, conferred by law for seamens wages, salvage, etc.

Mark I

WW designation for ro-ro carriers built in 1978-79

Mark II

WW designation for ro-ro carriers built in 1984

Mark III

WW designation for ro-ro carriers built in 1996

Mark IV

WW designation for ro-ro carriers built in 2000-01

Marpol

IMO convention on the prevention of marine pollution. Regulates environmental pollution by ships

MB

Merchant broker

MDO (DO)

Marine diesel oil

MDO/MGO

Marine diesel oil/marine gas oil

MED

Mediterranean Sea

Merger

The joining of two or more (shipowning) companies

MHI

Car carriers built at Mitsubishi Heavy Industries in 2004-06

MIAP

Mortgagee interest additional perils pollution

Midship

Approximately in the location equally distant from the bow and stern

MII

Mortgagee interest insurance

MIN/MAX

Minimum/Maximum (cargo quantity)

MM

Marketing manual

MOA

Memorandum of agreement

MOLCHOPT

More or less charterers option

MOLOO

More or less owners option. (A margin for shipowner for how much the ship should carry: A moloo of 5% on a 30 000 ton ship gives a cargo between 28 500 and 31 500 tons

Montreal protocol

International agreement which aims to protect the ozone layer. Forms part of the UN Environmental Programme (UNEP)

Mooring

An arrangement for securing a ship to a mooring buoy or pier

MSM

Minimum safe manning (flag states minimum approved manning for a vessel)

MT

Metric tonne (1 000 kilos)

Multipurpose ship

General cargo ship which can also carry containers

N

NAABSA

Not always afloat but safely aground

Navigation

The art and science of conducting a ship safely from one point to another

NCB

National Cargo Bureau

Nesting

Implies that cargo is presented stacked in the contour of similarly shaped cargo, it may be likened to a stack of plates. This is particularly relevant in the presentation of tankage strakes for transport

NIS

Norwegian International Ship Register

Nitrogen oxides (NOx)

Environmentally-harmful gases formed by the engine's combustion process

NM

Nautical mile. One minute of latitude; approximately 6 076 feet – about 1/8 longer than the statute mile of 5 280 feet

NMD

Norwegian Maritime Directorate

Non-conformity

ISM definition of non-conformity: Non-conformity means an observed situation where objective evidence indicates the non-fulfilment of a specified requirement. Major non-conformity means an identifiable deviation that poses a serious threat to the safety

Non-reversible

Detention. If loading completed sooner than expected, then saved days will not be added to discharge time allowed.

NOR

Notice of readiness

NRT

Net register tonnage

NYPE

New York Produce Exchange

O

OBO

Ore/bulk/oil vessel

OCIMF

The Oil Companies International Marine Forum: OCIMF is a voluntary association of oil companies having an interest in the shipment and terminalling of crude oil and oil products. OCIMF is organised to represent its membership before, and to consult with,

Off hire

A chartering term indicating the time a chartered vessel is no longer attracting a daily fixture rate. It arises i.e. upon break down of machinery, equipment or when owing to poor performance such as slower speed than prescribed in the voyage charter, the

OO

Owners option

OPA 90

The Oil Pollution Act of 1990, a US law imposing far-reaching requirements on shipowners, vessels and crews when carrying petroleum products to the US and within the US Economic Zone (200 miles off the coastline). Intriduced after the Exxon Valdez-catastr

Ore/oil carrier

Ship with separate cargo holds for ore cargoes. When the ship is carrying oil, the ore holds may also be filled with oil, in order to utilize the deadweight capacity to the fullest

OSH

Open shelter deck

Overboard

Over the side or out of the ship

OWS

Owners

OWS

Oily water separator

P

P&I

Protection and indemnity (Responsibility insurance for the shipowner).

Panmax or Panamax

The largest bulk carrier which can pass through the Panama Canal fully loaded (appr. 80 000 dwt.)

PASTUS

Past Us

PC

Period of charter

PCC

Pure car carrier (vessel type)

PCGO

Part cargo

PCT

Percent

PCTC

Pure car and truck carrier (vessel type)

PDA

Proforma disbursement account

PDPR

Per day or pro rata (for part of a day)

Per diem

By the day

Per se

By itself

PG

Persian Gulf

PHPD

Per hatch per day

Plimsoll mark or line

An internationally recognised line painted on the side of merchant ships. When a ship is loaded, the water level is not supposed to go above the line. Water can reach different parts of the line as its temperature and saltiness varies with the season and

PMS

Port marine services

Pooling

Cargo or profit sharing by cooperating companies in lines or liner conferences

Port

The left side of a ship looking forward. A harbour.

ppm

Parts per million (1 ppm = 0,000001 or 1 mg/kg)

Pratique

Licence or permission to use a port

Preamble

Introduction to a charter party

Proforma

Estimated account

Proforma disbursement account

Preliminery overview of total port costs from agent

Protectionism

Flag state protection of own shipping by the elimination of certain competitive elements

PS&L

Port service & logistics which includes the product lines PMS, Liner, Logistics and HUB

PUS

Plus us

PWWD

Per weather working day

Q

QA

Quality assurance

R

RCVR

Receiver

RECAP

Recapitulation of the terms and conditions agreed

Recovery package

Advanced equipment package for secure recovery of refrigerants. Satisfies all relevant marine regulations

Reefer Vessel

Vessel with refrigerated cargo hold(s)

Refrigerants

Used in refrigeration and freezing plants

Reg (EC) 2037/2000

EU regulation covering ozone-depleting substances which seeks to protect the ozone layer

Reversible

Detention. If loading completed sooner than expected at load port, then days saved can be added to discharge operations.

Ro-ro

Roll-on, roll-off carrier tailored to transport heavy rolling cargo and static cargoes

ROB

Remaining on board

RT

Revenue Tonne (i.e. 1.0 metric tonne or 1.0 cubic meter, whichever greater). The overall RT is calculated on a line by line basis of the Packing List using the largest amount. The overall freight liability is calculated on the total RT amount, multiplied

RT43

Measure for capacity by a car which is 4.125 m long, 1.550 m wide and 1.420 m high

S

SAR

Search and Rescue

SATPM

Saturday P.M.

SB

Safe berth

SBT

Segregated ballast tanks

SD (or SID)

Single decker

Seafreight

Costs charged for transporting goods over the sea. This does not cover haulage or loading/discharging costs but the sea transport only

Seaworthiness

Statement of condition of the vessel (valid certificates, fully equipped and manned etc.)

Seca

Sulphur oxide emission control area – a sea area defined by the IMO where the sulphur content of bunkers must not exceed 1,5% or emissions of sulphur oxides to the air must be below 6 g/kWh

SELFD

Self discharging

Semi-trailers

Are usually 12.0 meter flat bed road trailers

SF

Stowage factor. Cubic space (measurement tonne) occupied by one tonne (2,240 lbs/1,000 kgs) of cargo

SHEX

Sundays and holidays excluded

SHINC

Sundays and holidays included

Shipbroker

Person who – on behalf of shipowner/shipper – negotiates a deal for the transportation of cargo at an agreed price. Shipbrokers are also active when shipping companies negotiate the purchasing and selling of ships, both secondhand tonnage and newbuilding

Short Sea Shipping

Short distance international trade. Commonly used for trading between countries in the European Union

Skids

Are bearers (timber or steel) positioned under the cargo to enable forklift handling at port, and for ease of rigging and lashing on board ship.

Slide valve

Fuel valves which are fully emptied on each stroke, and thereby counteract afterburning

Sludge

Mixture of water and oil formed during treatment of heavy fuel oil

SMC

Safety management certificate – ref. ISM Code

SN

Satellite navigation. A form of position finding using radio transmissions from satellites with sophisticated on-board automatic equipment

SOC

Shipper owned container

SOF

Statement of facts

SOPEP

Shipboard Oil Pollution Emergency Plan

SP

Safe port

Spidering

Is the strengthening of circular tanks for transport, this prevents the tanks from becoming warped. The tanks are strengthened with steel or wood crossbeams giving a "spider" appearance

Spot or spotrate

Rate for single voyage based on the market situation on the day

SQC

Special Qualification Certificate (issued by flag state)

SQM

Safety quality manager

SRBL

Signing and releasing Bill of lading

SSHEX

Saturdays, Sundays, holidays excluded

SSHINC (or SATSHINC)

Saturdays, Sundays, holidays included

SSMM

Ship Safety Management Manual

Stability

It is paramount that a vessel is stable in all aspects at all times. When cargo is loaded/discharged, the stability is monitored by a computer, which takes into account the weight and position of cargo within the vessel.

Starboard

Right side of a ship when facing the front or forward end.

STCW

Standards of Training, Certificates and Watchkeeping. Standard that crewing have to comply with. For more information please look at www.imo.org (Human Element – Training and Certification).

Stem

Subject to enough merchandise (availability of cargo). Also, the forward most part of the bow.

Stern

The foremost or after part of a ship

Stevedore

Dockworker handling loading/discharging. Term also used on companies delivering such services

SUB Subject (to).

Depending upon as a condition

Subsidiary

A subsidiary is an investee where the enterprise owns more than 50 per cent and the parent's power to govern the financial and operating policies or has control over the other enterprise.

Suezmax

The largest tank vessel which can pass through the Suez Canal fully loaded (120 000 -165 000 dwt.)

Sulphur oxides (SOx)

Sulphur in the bunkers oil combines with oxygen in the combustion process to form sulphur oxides. These react with moisture in the air to produce sulphurous and sulphuric acid

Supercargo

Person employed by a ship owner, shipping company, charterer of a ship or shipper of goods to supervise cargo handling operations. Often called a port captain.

SWAD

Salt water arrival draft

SWDD

Salt water departure draft

Swedac

Swedish Board for Accreditation and Conformity Assessment

T

T/C

Time charter (shipper controls the ship and pays a monthly rent, T/C-hire)

Tallyman

Controls the cargo going into and out of the vessel. Checks that volume and number tallies with the manifests

Tanker

Ship carrying liquid bulk cargoes

TBN

To be named/nominated

TBT

Tributyltin, used in tin-based antifouling

TC

Time charter. Owners agree to hire a particular ship for a set length of time and provide technical management, crewing etc.

TCP

Time charter party

Tender

Proposal, offer, bid for a contract

TEU

Standard 20’ Container

Thwartships

At right angles to the centre-line of the ship

Tide

The periodic rise and fall of water level in the oceans

Time bar

The number of days after comleted voyage before demands have to be stated

TMSA

Tanker Management and Self Assessment. The OCIMF's Tanker Management and Self-Assessment programme is a tool to help ship operators measure and improve their management systems. The programme encourages ship operators to assess their safety-management sys

Topside

The sides of a ship between the waterline and the deck; sometimes referring to onto or above the deck

Tramp shipping

Ships trading where they can get cargo

Transaction currency

The currency used on a single invoice/voucher

Trim

Fore and aft balance of a ship

TTL

Total

TW

Tween decker

U

UER

Undesired event report

ULCC

Ultra Large Crude Carrier – oil tanker of 300,000 + dwt

Unicool

Barwil Unitor's maritime refrigerants

USC

Unless sooner commenced

UTC

= GMT

UU

Unless used

UUIWCTAUTC

Unless used in which case time actually used to count

V

VCM

Vessel contingency manual

Viscosity

A liquid's resistance to flow

VLCC

Very Large Crude Carrier – oil tanker between 200,000 and 300,000 dwt.

VPD

Vessel pays dues

VRPP

Vessel resonse plan pollution

W

W or WS

Worldscale (Rating system for tanking. Basis rates for different voyages)

Waterline

A line painted on a hull which shows the point to which a ship sinks when it is properly trimmed

Way

Movement of a ship through water such as headway, sternway or leeway

WCCON

Whether customs cleared or not

Weather permitting

If the weather allows..

WIBON

Whether in berth or not

WIFPON

Whether in free pratique or not

Windward

Toward the direction from which the wind is coming

WIPON

Whether in port or not

WLS

Wilhelmsen Lines Shipowning

WLTOHC

Water line-to-hatch coaming

WMC

Wilhelmsen Marine Consultants

WMS

Wilhelmsen Maritime Services

WOG

Without guarantee

WP

Weather permitting. That time during which weather prevents working shall not count as laytime

WPD

Weather permitting day

WRIC

Wire rods in collis

WWD

Weather working day

WWD

Weather working day (days when loading/ discharging is not interrupted by the weather)

WWR

When, where ready

WWWW

WIBON, WCCON, WIFPON, WIPON

Y

YAR

York Antwerp Rules

YAW

To swing or steer off course, as when running with a quartering sea

YB

Yellow Book – onboard the ships on management

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