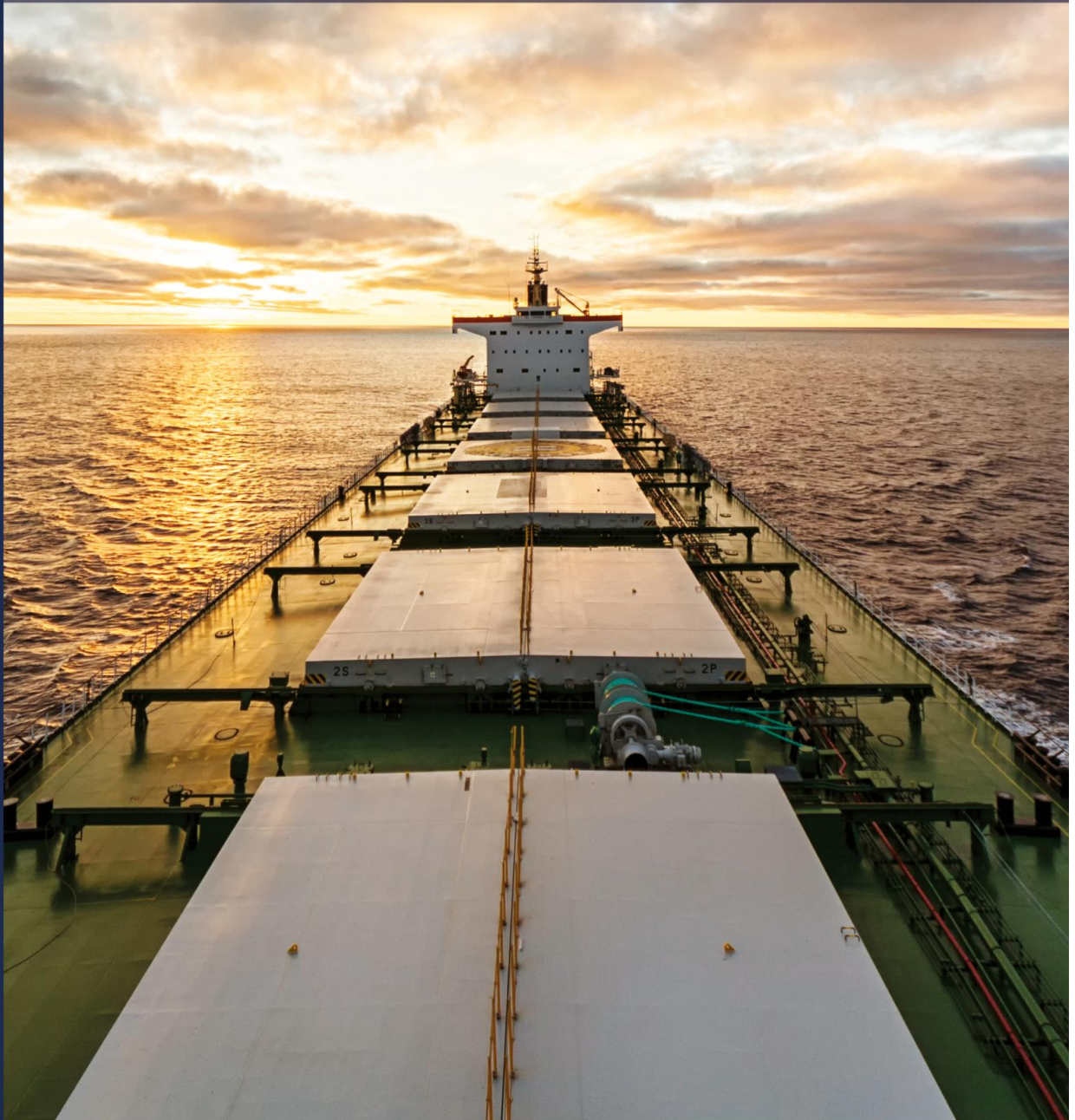


BULK CARRIER PRACTICE

Third edition



Published by

By Captain Jack Isbester ExC FNI MCMS



Revised by Captain Hemant Gupta FNI

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Captain Hemant Gupta FNI

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This book has been prepared to address the subject of bulk carrier practice. This should not, however, be taken to mean that this document deals comprehensively with all the concerns that may need to be addressed, or even that this document sets out the only definitive view for all situations when a particular need is addressed. The opinions expressed are those of the authors only and are not necessarily to be taken as the policies or views of any organisation with which he has any connection.

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It has been my good fortune to be the technical editor of the revised edition of this book for The Nautical Institute, a body with an unrivalled wealth of experience among its membership in the operation of bulk carriers.

A few articles and MARS reports written by me have either been referred to in the text or included as appendices, adding more safety and operational value to the book. Some inputs have also been taken from The Nautical Institute's *A Guide to Bulk Carrier Operations*.

I have been fortunate in receiving generous assistance from a number of very capable and experienced professionals. First and foremost, special thanks are due to Paul Markides, Marine-Quality Manager of Intercargo, for assisting in the difficult task of arranging for the review of each and every chapter. The interest, enthusiasm and commitment shown by him over a number of months have been a comfort and inspiration to me.

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My debt to all those mentioned above, and to any others I may have forgotten, is considerable. If the book contains errors, my sincere apologies; your feedback is always welcome.

Captain Hemant Gupta FNI
September 2023

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Foreword

It is 30 years since the first edition of Bulk Carrier Practice was published and some 13 years since the second edition left the printing presses. While it is true to say that this publication has survived in its current format remarkably well, a number of changes both of a technical nature and more latterly on the regulatory front have meant that the time was right for a new edition.

This edition contains a lot of new and updated information on a variety of topics with appropriate references to practical examples, case studies and legal issues, all of which provide the reader with up-to-date and relevant information thus helping to ensure safe and efficient operations.

Chapter 21 Safety Considerations draws the reader's attention to incidents involving pilots embarking and disembarking a vessel. This is an area that is often neglected when considering the safety of others. Further case studies within this chapter highlight common concerns about personal safety.

Recent cargo-related incidents involving liquefaction and dynamic separation require the addition of information on the carriage of cargoes with high moisture content and the precautions to be taken before loading such cargoes. This material in Chapter 19 is a welcome addition to the book, which should give the reader a better understanding of the dangers associated with such cargoes.

As the book was being prepared for press, the global COVID-19 pandemic had been with us for over two years, and so it is appropriate to include information on remote inspections and surveys along with an explanation on the use of drones for such work.

Many other new areas are now covered in the book – it would take too many pages to identify them all individually. However, if you are looking for best practice guidance on handling multiple bulk cargoes in the same hold and on the high moisture of dunnage in steel cargo, then you have come to the right place.

There is also a section on new charterparty clauses such as Slow Steaming, Just in Time and Sea Cargo Charter. More details are added on International Navigation Limits (INL, formerly IWL) and also on NAABSA clause for safely aground at berth.

I commend this publication to those of you who are new to the industry and also to those who may be somewhat longer in the tooth and probably know more about bulk carrier operations than most but can nevertheless still learn something new.

This third edition, like those before, has benefitted enormously from suggestions and advice obtained from many seafarers and ship managers and will, I hope, benefit all readers with the knowledge that has been combined to develop these 'best practices' for the bulk carrier industry.

There is always room for improvement in a book such as this and any constructive comments or criticisms from users are always welcome.

Dr K G Gkonis

Secretary General, INTERCARGO

September 2023

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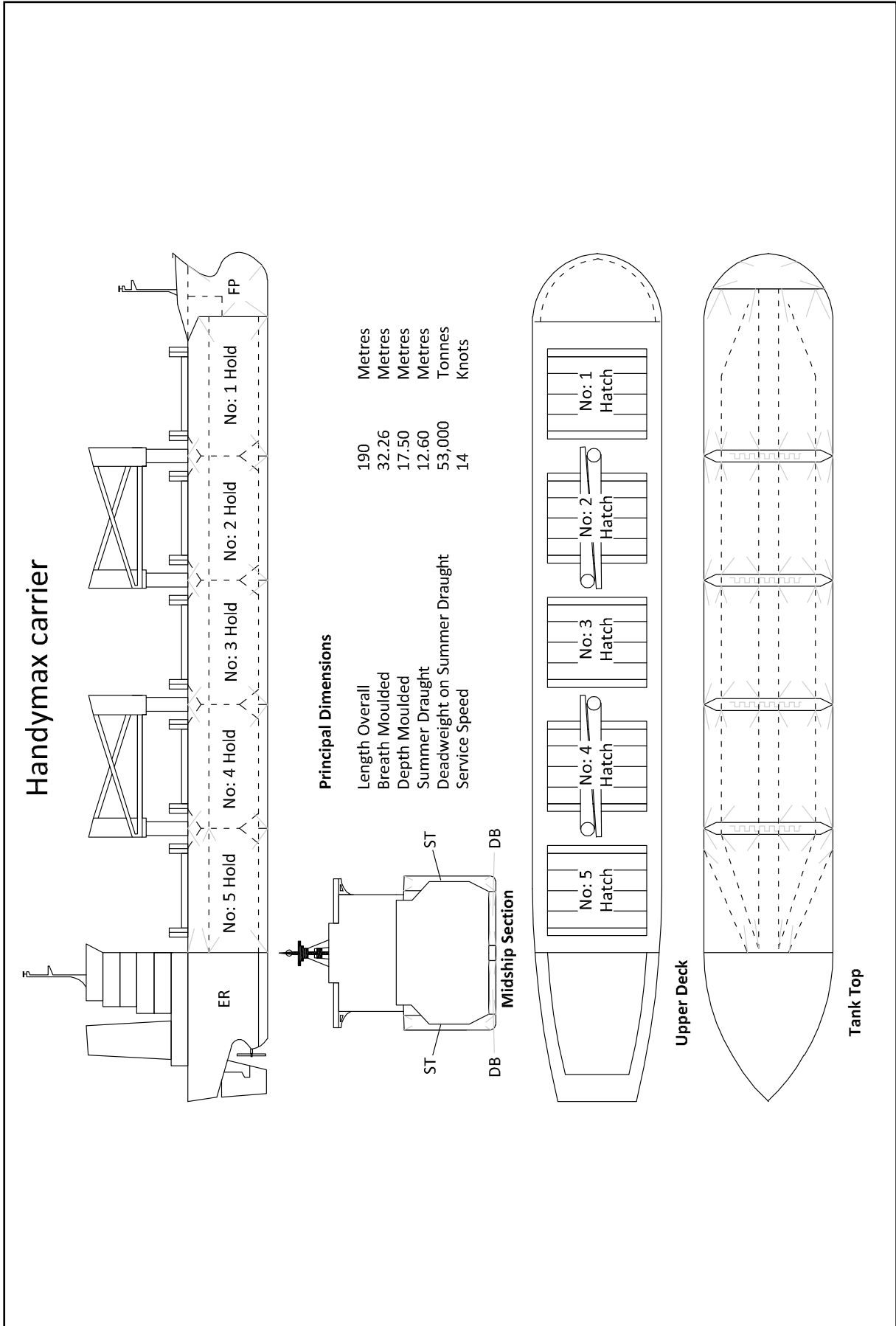
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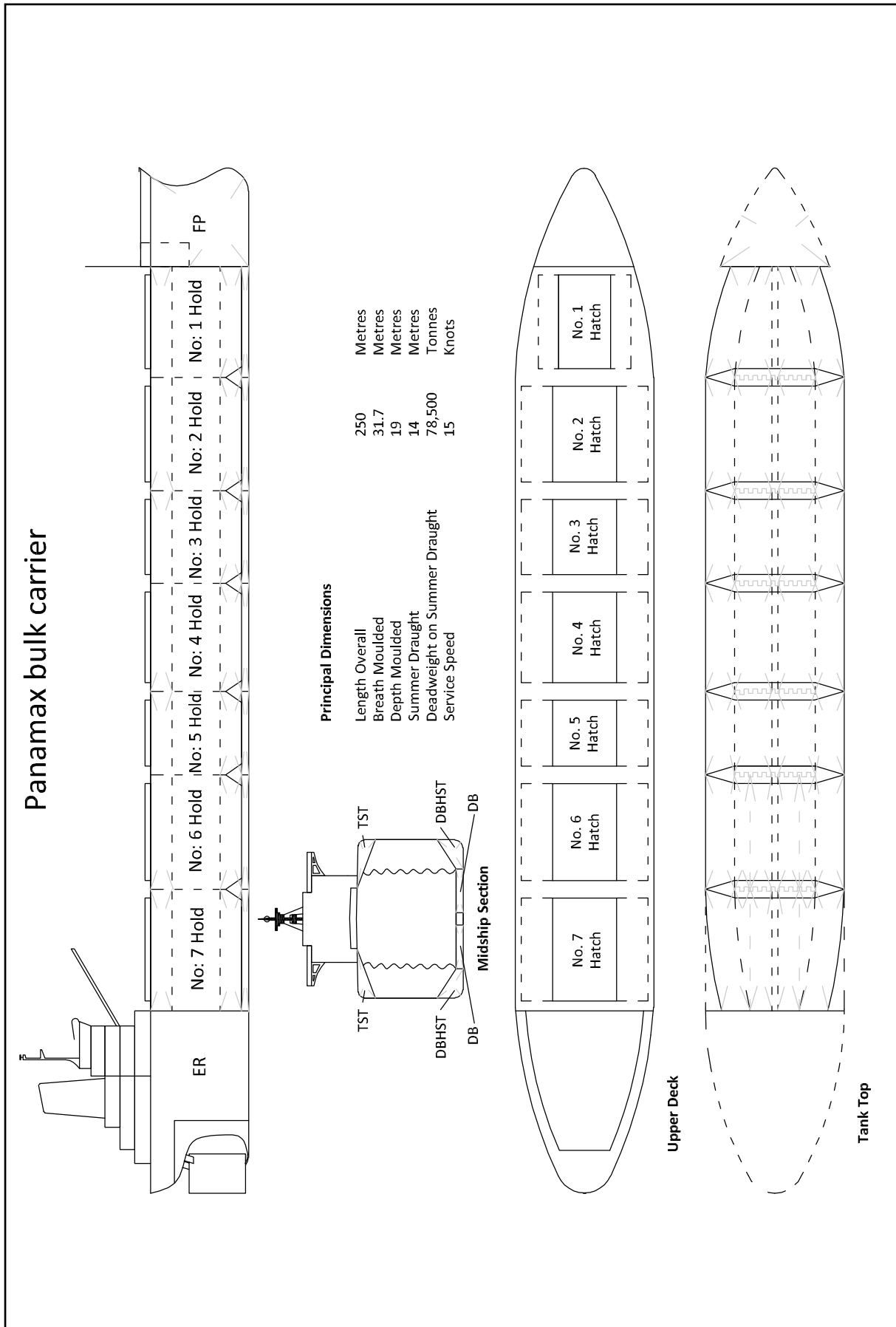
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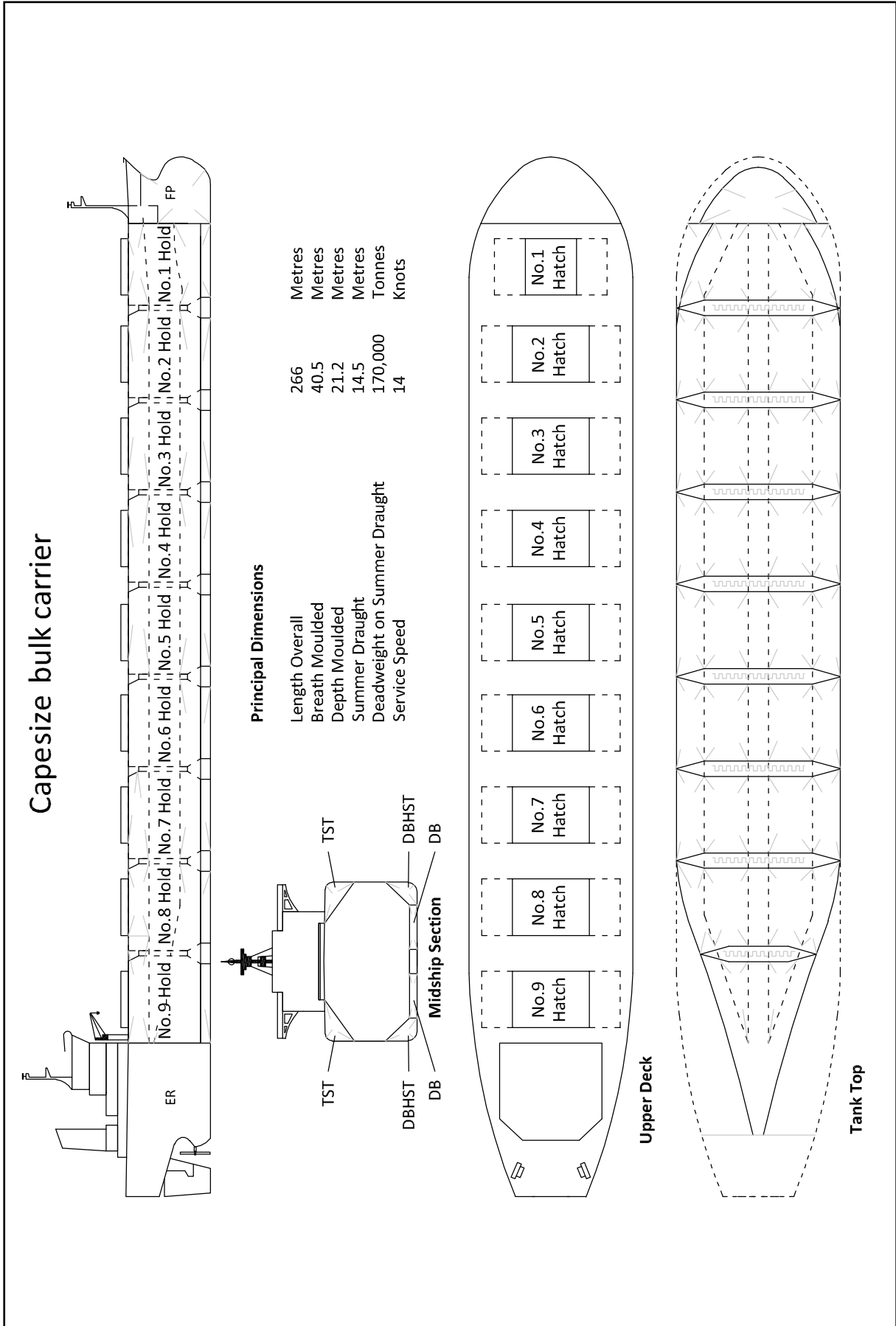
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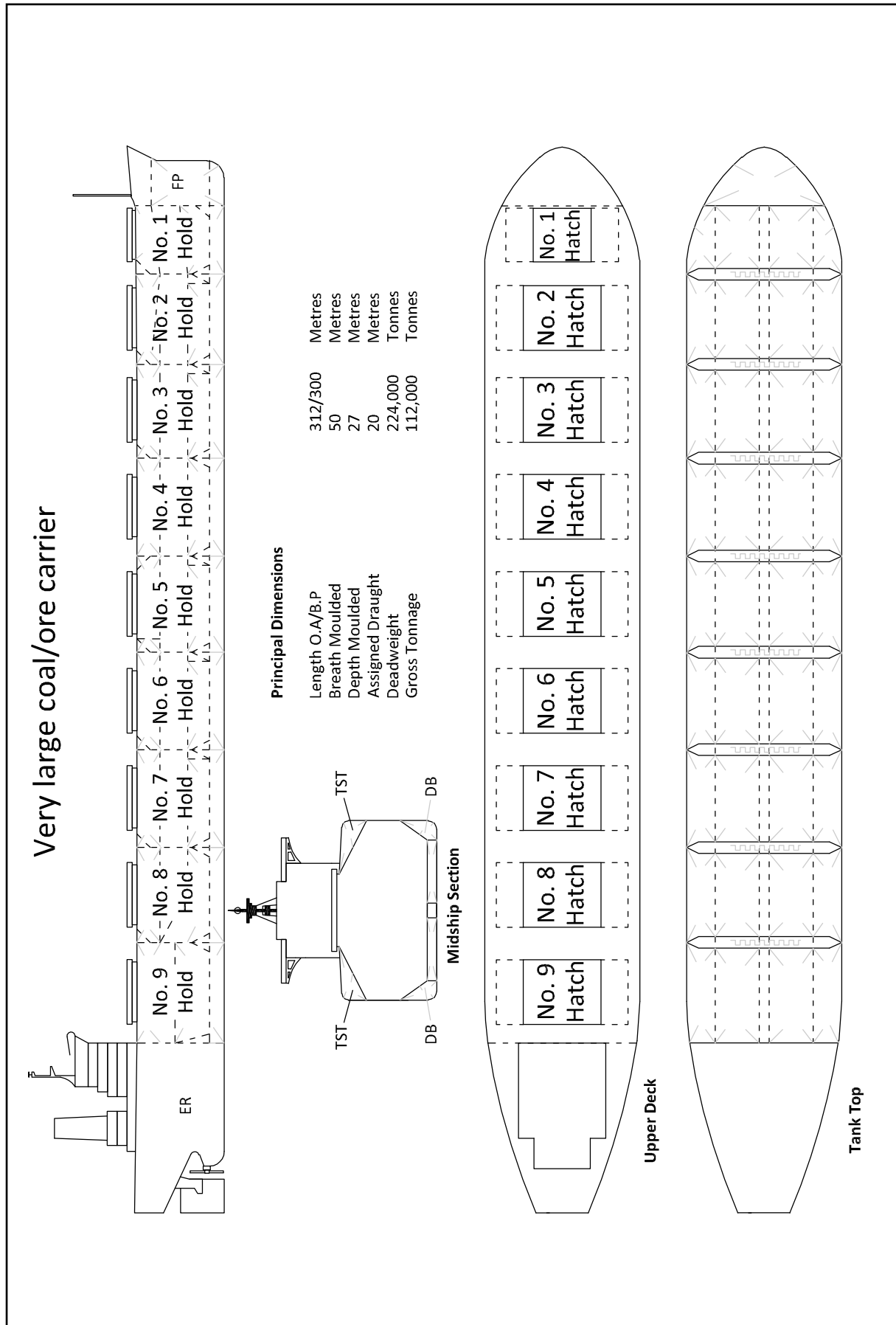
Drawing 1.2 Handymax carrier



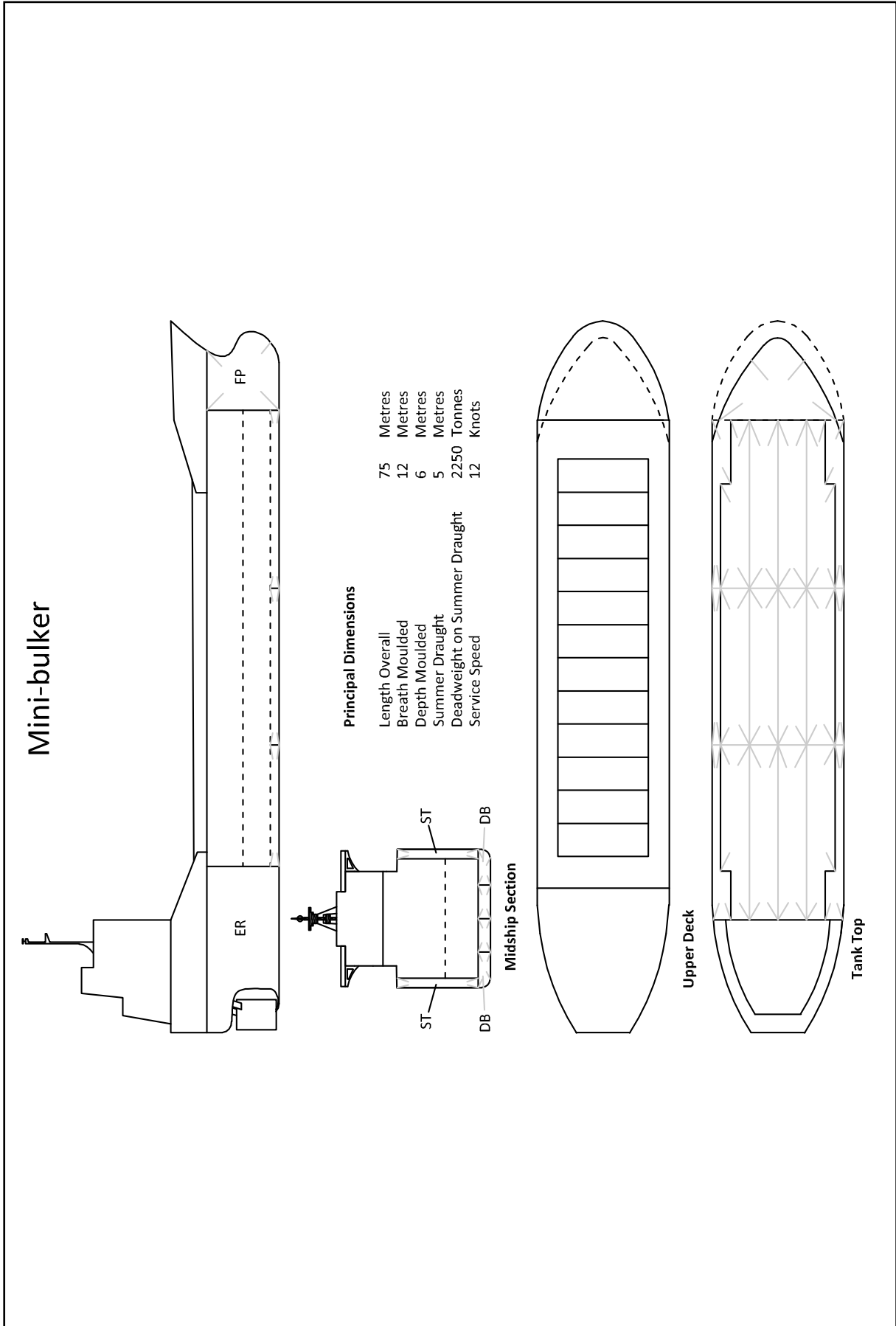
Drawing 1.3 Panamax bulk carrier



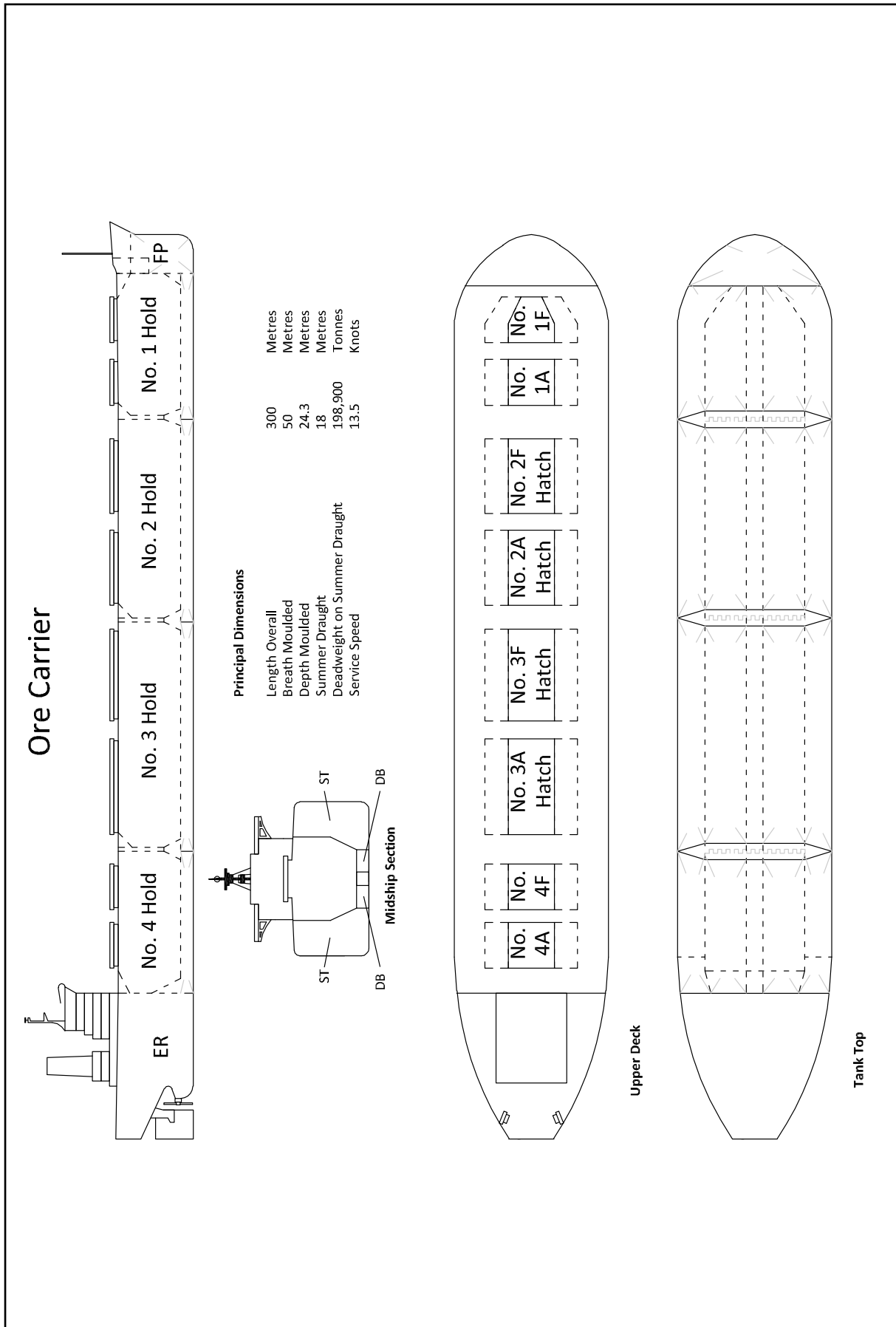
Drawing 1.4 Capesize bulk carrier



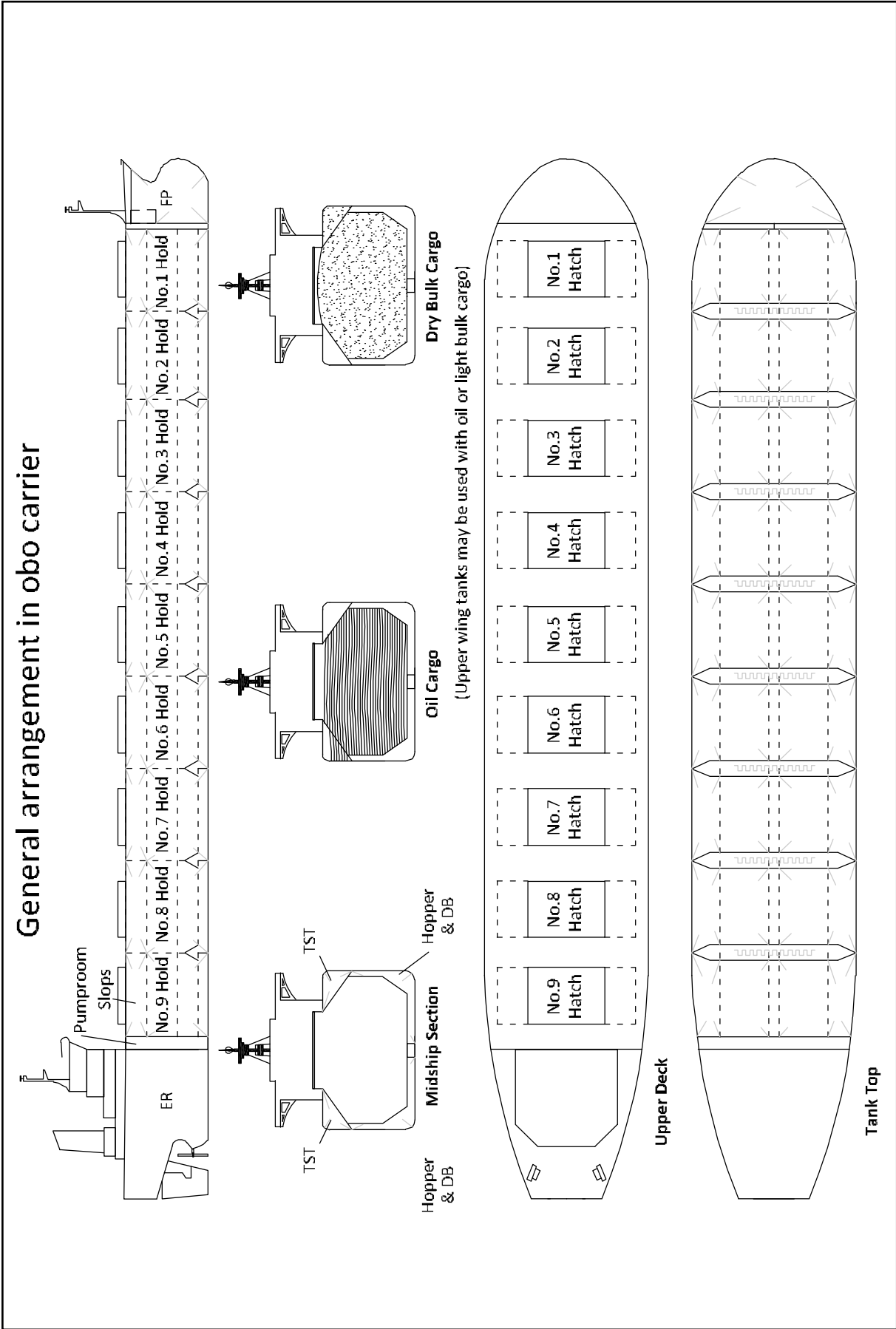
Drawing 1.5 Very large coal/ore carrier



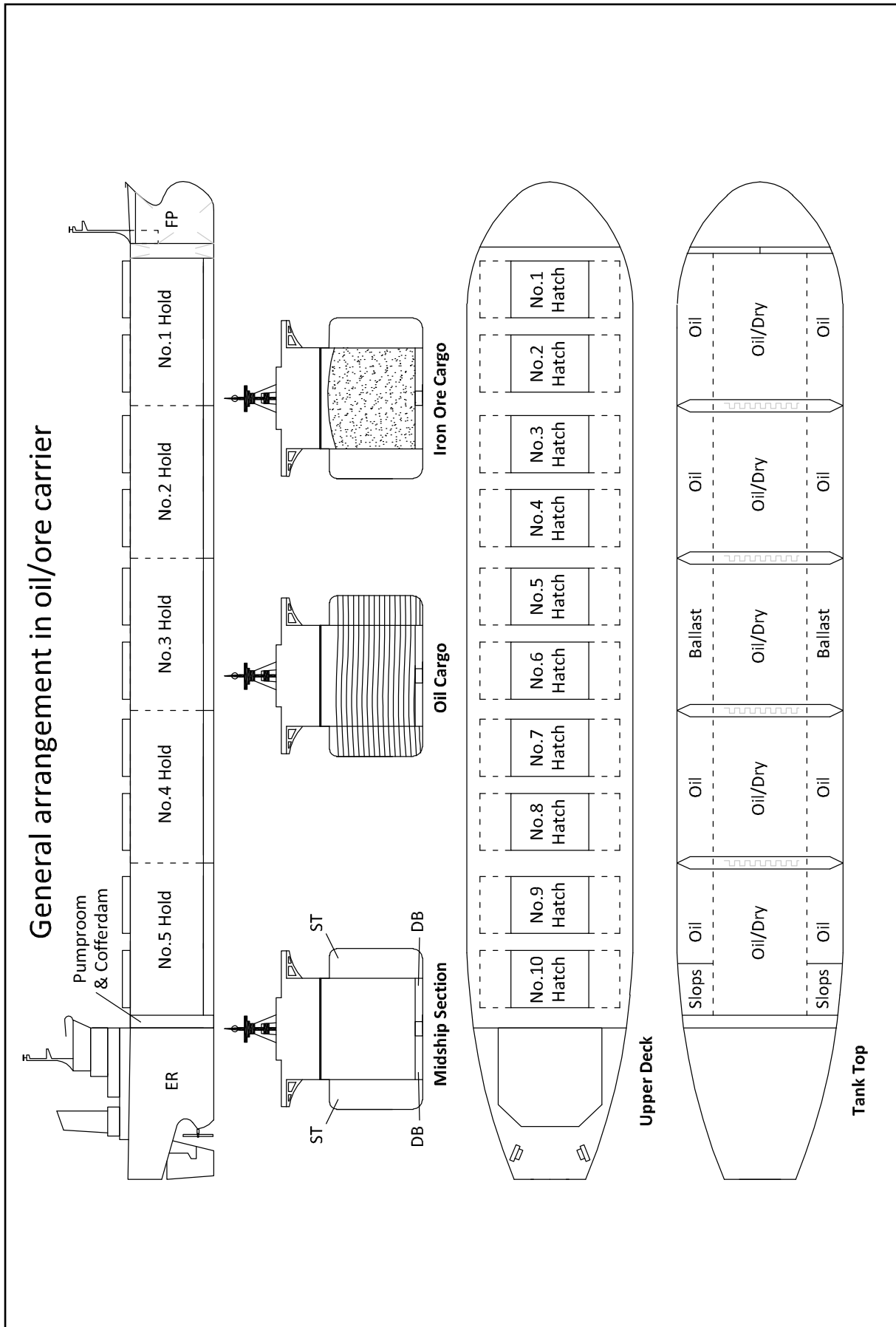
Drawing 1.6 Mini-bulker



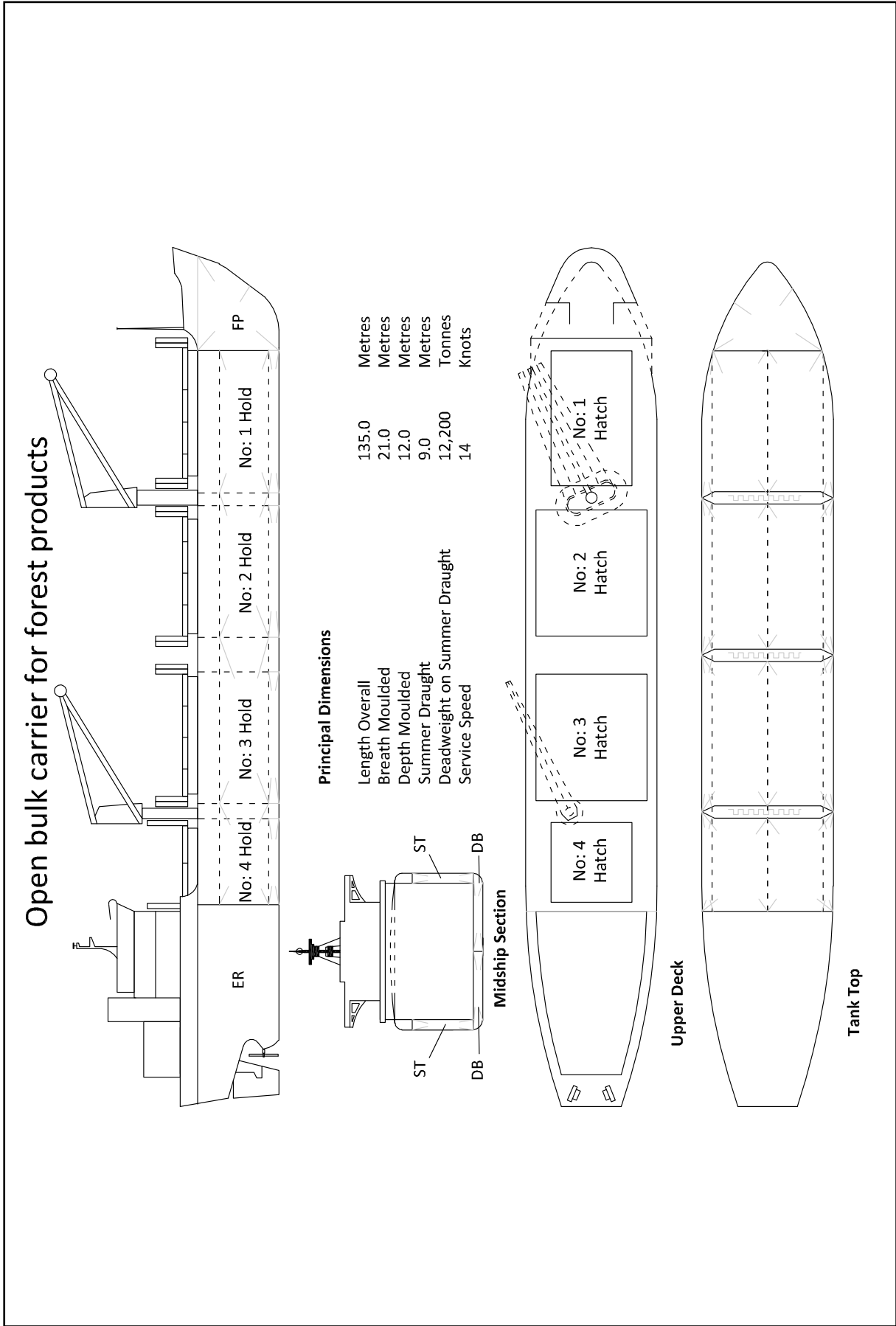
Drawing 1.7 Ore carrier



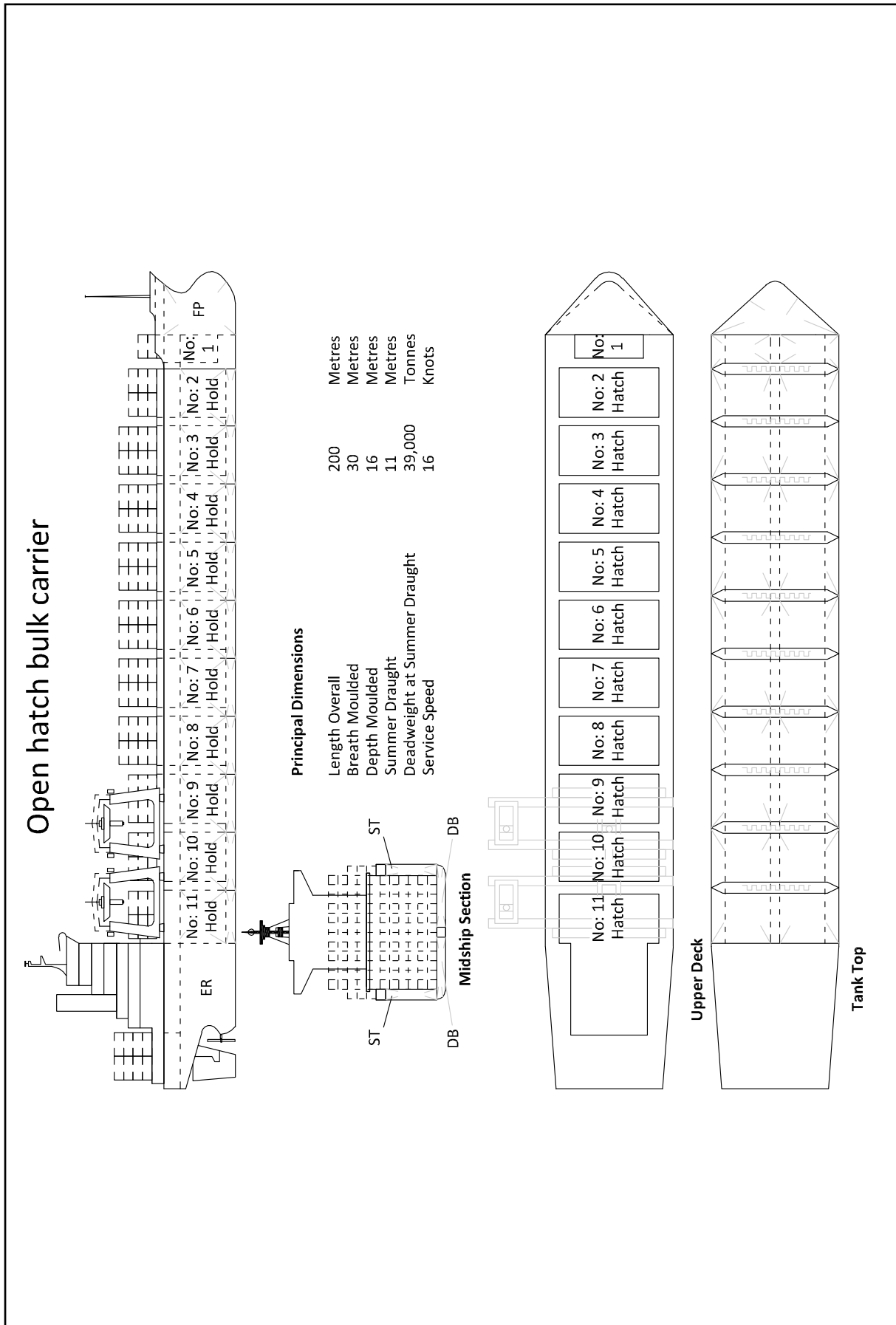
Drawing 1.8 OBO carrier



Drawing 1.9 Oil/ore carrier



Drawing 1.10 Forest products carrier



Drawing 1.11 Open-hatch bulk carrier

Chapter 1

Bulk carriers past, present and future

1.1 Bulk carriers and bulk cargoes

1.2 Categories of bulk carrier

1.3 Characteristics of a bulk carrier

1.4 Typical bulk carrier layout and equipment

1.5 Features of larger bulk carriers

1.6 Bulk carriers in the future

1.7 Sources

1.1 Bulk carriers and bulk cargoes

Bulk carriers carry a considerable variety of cargoes, including the basic elements that drive world trade such as iron ore, coal, grain, bauxite/aluminium and phosphate rock, along with substantial quantities of concentrates, petroleum coke, steel, ores, cement, sugar, quartz, salt, fertilisers, sulphur, steel scrap, aggregates and forest products.

According to Drewry Maritime Advisors, the world trade in dry bulk cargo was 4,165 million tonnes in 2020. The trade in iron ore was about 1,538 million tonnes, coal amounted to some 1,211 million tonnes and about 355 million tonnes of grain were shipped. Seaborne trade in minor bulks such as steel, cement, sugar and fertilisers totalled about 1,041 million tonnes.

1.2 Categories of bulk carrier

The general trend is that bulk carriers are increasing in size and the limits to what are considered handysize, handymax and Panamax have all been raised in the last 10 years. In April 2021, the world fleet of bulk carriers of 10,000dwt and above totalled 12,384 vessels.

Handysize bulkers: Handysize vessels are now considered to be 10,000–40,000dwt and most have four or five holds.

Handymax and supramax bulkers: There are growing numbers of vessels in the 40,000–65,000dwt

range and, while similar in layout and fittings to the handysize bulk carriers, they have come to be recognised as a separate category. Handymax bulkers (Drawing 1.2) typically have five holds and a dwt of 40,000–49,999. Vessels between 50,000dwt and about 65,000dwt, also with five holds, are called supramax.

Panamax bulkers: Panamax bulk carriers (Drawing 1.3) are so named because their dimensions, particularly their breadth, are the maximum that can be accommodated in the Panama Canal. Panamax bulkers usually have seven holds, are in the 65,000–78,999dwt range and are extensively employed in the transport of large volumes of bulk cargoes such as coal, grain, bauxite and iron ore in the longhaul trades.

The fact that most US ports cannot accept ships with draughts greater than Panamax draught is an important factor in their continued popularity.

Kamsarmax bulk carriers: Kamsarmax bulk carriers are a variation of Panamax bulkers. With a dwt of 79,000–99,999 and a beam less than 32.2 metres they are the biggest ships that can load at the world's largest bauxite port, Port Kamsar in Equatorial Guinea. These vessels can transit the newly opened larger locks on the Panama Canal fully laden.

Capesize bulkers: Capesize bulk carriers (Drawing 1.4) have deadweights greater than 100,000dwt. They are further split into Mini Capes with dwt of 100,000–129,000, Standard Capes with dwt of 130,000–199,999 and Large Capes with dwt above 200,000 and capable of carrying ores and coal.

Capesize vessels, with loaded draughts usually in excess of 16.5 metres, can be accepted fully laden at only a small number of ports worldwide and are engaged in the longhaul iron ore and coal trades. The range of ports that they visit is increased by the use of two port loadings and two port discharges, the ship being only part-laden when departing the first loading port and on reaching the second discharge port.

Very large ore carriers (VLOC) are similar to Large Capes, with dwt above 200,000, but only carry ores.



Figure 1.1 Double skin with integral topside and hopper tanks. The after hold of a Diamond 53 vessel

The VLOC category includes Valemax, which were built from 2011 for carriage of iron ore from Vale, in Brazil, to China.

Mini-bulkers: In addition to the bulkers grouped into the categories described above a considerable number of small bulk carriers, less than 10,000dwt, are employed chiefly in coastal, shortsea and middle trades, carrying smaller consignments of bulk cargoes to smaller ports. Such vessels may have a conventional bulk carrier hold configuration with topside tanks and hopper tanks, or the hold or holds may be rectangular and bounded by side tanks. They may be known as mini-bulkers (Drawing 1.6), dry cargo vessels or multipurpose vessels. The rules and practice governing the classification of these vessels are complicated, so they may not necessarily be classed as bulk carriers or governed by rules written specifically for bulk carriers.

1.3 Characteristics of a bulk carrier

Reasons for varied sizes of bulk carriers: Receivers of bulk cargoes have varied requirements for amounts of cargo delivered per month or per year. The size of vessel that they choose to carry their cargoes and the frequency that such vessels are employed will be influenced by factors that include the receivers'



Figure 1.2 Double-skin construction. A midships hold of a Diamond 53 vessel (Both photos courtesy of Niels Bjørn Mortensen)

storage capacity, depth of water in the berth, regularity of the demand for the commodity, and the financing of its purchase. Less frequently, the size of vessel chosen is governed by the size limitations of the loading port. This variety in demand has created a versatile world fleet of varied ship sizes.

Geared bulk carriers: Many handysize, handymax and mini-bulkers and a small number of Panamax vessels are equipped with shipboard cranes for the loading or discharge of cargo. Such vessels are described as geared bulk carriers.

Self-unloaders: Unlike geared bulkers, self-unloaders (Figures 1.3 and 18.29) are equipped with conveyor belt discharging systems with booms, which can be swung out from the ship to discharge directly ashore. Such systems can achieve discharging rates similar to those of shore-based unloading equipment. This equipment is expensive to install and reduces the space available for cargo, but these disadvantages can be outweighed in the shortsea trades by the ability to substantially reduce time spent in port.



Figure 1.3 A self-unloader



Figure 1.4 Hold of conventional bulk carrier. Anticlockwise from top left: topside tank side plating; shell plating with vertical framing; DB hopper side tank; tanktop plating; bulkhead stool; corrugated bulkhead

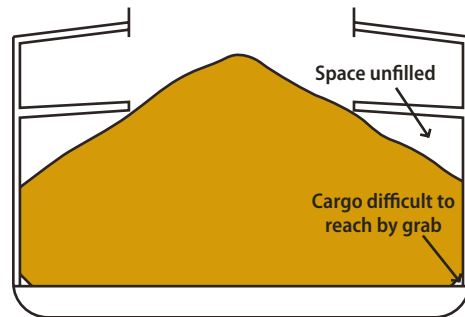
Ore carriers: These vessels (Drawing 1.7) form a diminishing part of the Capesize fleet. They are single-deck vessels designed specifically for the carriage of heavy ores. They are characterised by small holds with high centres of gravity. Few ore carriers have been built in recent years, but they are among the largest bulk carriers afloat.

Bulk/oil carriers: Bulk/oil carriers (Drawing 1.8), are designed with dual-purpose holds that can be used for the carriage of both dry and liquid bulk commodities. Most vessels of this type are also strengthened for the carriage of ore and are referred to as ore/bulk/oil carriers (OBOs). Most bulk/oil carriers are Panamax or Capesize.

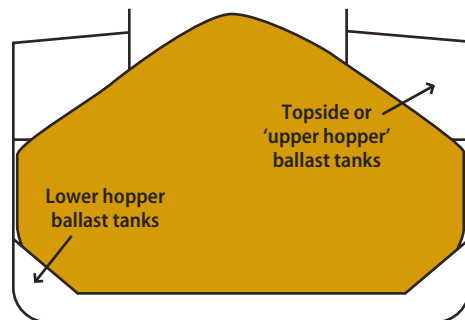
Ore/oil carriers: Ore/oil carriers (Drawing 1.9) have centre and side compartments. When carrying oil both centre and side compartments can be used, whereas only the centre compartments are used when carrying ore.

Combination carriers: Ore/oil carriers and OBOs, known collectively as combination carriers, were developed to allow the vessel to trade in either the bulk carrier or tanker trades, according to seasonal or commercial demand, and to allow the proportion of time spent in non-revenue-earning ballast legs to be minimised. Over the past 10 years the decline in the number of these vessels has continued. The number built during this period is negligible.

Bulk cargo loaded in a traditional tweendeck vessel: Trimming is required and discharge is difficult



Low-density bulk cargo loaded in a bulk carrier: Little trimming is required and all the cargo is accessible for grab discharge



High-density bulk cargo loaded in a bulk carrier: No trimming may be required, but this depends upon the properties of the cargo. Cargo is accessible for grab discharge

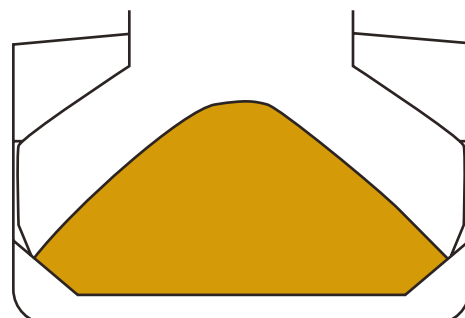


Figure 1.5 Trimming