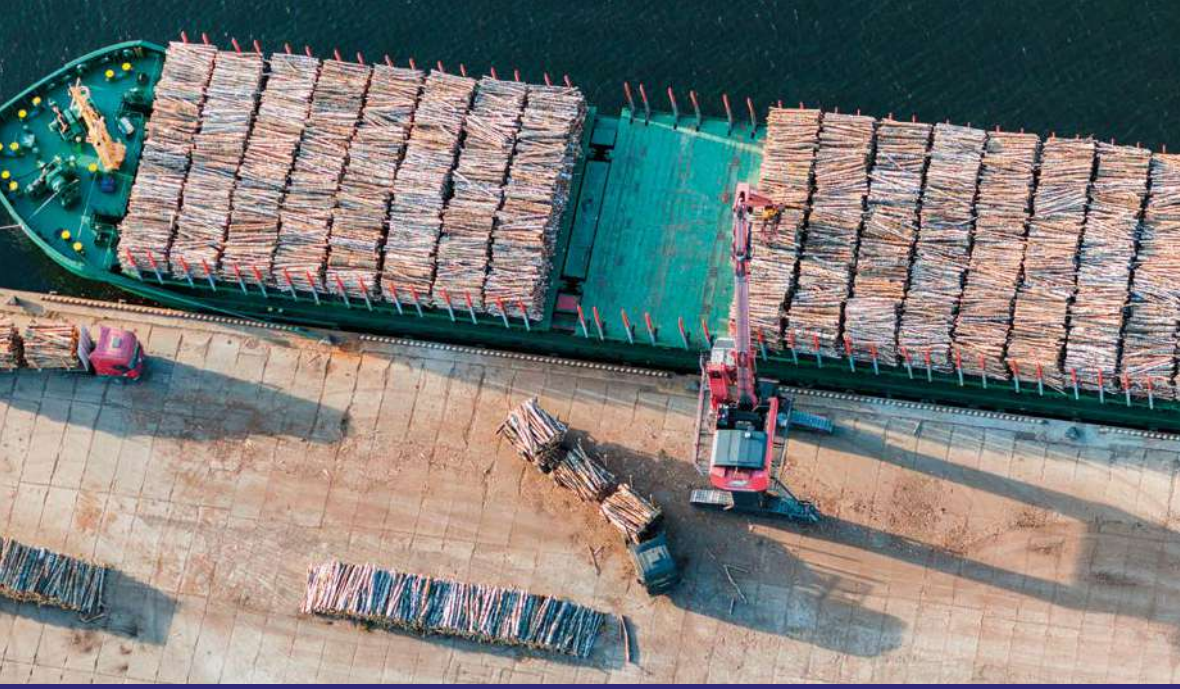

Chapter 14 – Timber Deck Cargoes

There are several incidences of timber deck cargoes being lost overboard, sometimes with catastrophic results for ship and crew. It is important to ensure that the carriage, stowage and securing of timber deck cargoes does not fall short of any currently accepted codes, rules, regulations or formal recommendations.

14.1 Regulations

The regulations that support the carriage of timber deck cargoes are contained within the following IMO Codes and guidelines:

- *Code of Safe Practice for Cargo Stowage and Securing* (CSS Code) (Reference 22)
- *Code of Safe Practice for Ships Carrying Timber Deck Cargoes* (TDC Code) (Reference 23)
- *Revised Guidelines for the Preparation of the Cargo Securing Manual* (MSC.1/Circ.1353/Rev.2) (Reference 24)
- Regulation 44 of the *International Convention on Load Lines, 1966* (Reference 25).

The provisions in these codes and guidelines are recommended for all vessels of 24 m or more engaged in the carriage of timber deck cargo (ie timber cargo carried on an

uncovered part of a free board of superstructure deck). It includes logs and sawn timber, either loose or packaged.

This chapter should be read in conjunction with Chapter 54, Lashing and Securing Deck Cargoes.

14.2 Types of Timber Cargo

Figure 14.1: Ship preparing to load logs.

Timber (also referred to as 'lumber') cargoes come in many forms and sizes that may consist of logs, cants, ragged end packages, packages that are square (or flush) both ends, etc.

Packaged timber should not be stowed on deck if the bundles are ragged at both ends. Generally, only bundles square at both ends should be used for weather-deck stows, although the Asia trade region usually requires stowage of a proportion of packages that are square at one end and ragged at the other. Wherever possible, care should be taken to ensure that ragged ends are kept to a minimum, are stowed inboard of the perimeter and that broken stowage is avoided.

As far as possible, timber should be stowed fore and aft. On some ships, it may be common practice for the ragged ends to face the aft direction. However, this is not a requirement. As such, all deck officers should consult their ship-specific Cargo Securing Manual and the relevant provisions of the TDC Code when stowing timber cargoes.

The IMO *Code of Safe Practice for Ships Carrying Timber Deck Cargoes* (TDC Code) (Reference 23) does not allow the transverse stowage of packages to the outer sides of the deck and any packages stowed athwartships must be contained within a perimeter of square-ended packages that are stowed fore and aft.

Logs come in a variety of lengths and may be of widely varying diameter. It is essential that uprights are used correctly, supported by transverse hog wires, with wiggle wires, securing wires or chains pitched at the correct distance apart.

Cants are logs that are 'slab cut', ie ripped lengthways so that the resulting thick pieces have two opposing parallel flat sides. In some cases, a third side is sawn flat as well. Cant cargoes require similar arrangements to those for logs.

Some timber cargoes are precut, for example a manufacturer of kitchen cupboards would import precut timber pieces in pallets in order to fix the pieces together to make cupboard carcasses. These pallets should be stowed under deck for protection. Generally, palletised timber cannot be treated as a timber deck cargo, as the pallets are too small to allow securing.

Any deviation from the lashing arrangements recommended in the IMO Code may lead to a loss of cargo and threaten the stability of the ship.

14.3 Loading

Before loading timber cargoes, the holds and hatch covers should be cleaned to a reasonable standard to prevent damage to the timber. This should include the removal of oil, grease, ore remnants and similar residues that may stain the timber. Appropriate dunnage should be used to protect timber and keep it clear of metal structures. Timber should be stored away from, or covered to protect from, rust which may also stain the timber. Where fork lift trucks are used, the underlying timber should be protected by a steel plate.

14.4 Timber Load Lines

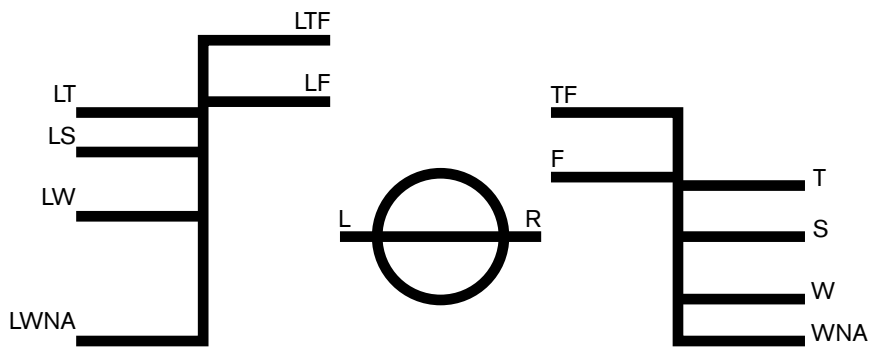

Figure 14.2: Typical timber load lines.

Ships that carry timber cargoes are marked with timber load lines, in addition to the normal load lines, which are calculated on the premise that a full timber deck cargo will be carried. An entirely separate set of cross curves of stability is produced for this full timber deck cargo condition. The timber load lines allow the vessel to load to a deeper draught (and so a larger displacement) than would otherwise be the case because of the overall buoyancy effect from loading timber.

Disputes have arisen between Masters and charterers about the strict application of timber load lines. The following guidelines should be applied:

- When a ship is assigned a timber load line, in order to load to this mark the vessel must be loaded with a timber deck cargo that is correctly stowed in accordance with the deck cargo regulations and the TDC Code

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Figure 14.3: Timber logs being loaded in the fore/aft direction.

- the *International Convention on Load Lines, 1966* (Reference 25) requires that the timber is stowed as solidly as possible and to at least the standard height of the superstructure. For example, in ships of 125 m or more in length, this equates to a uniform height of not less than 2.3 m. In ships under 125 m in length, the stow should reach a uniform height of not less than the height of the break of the forecastle head
- if the timber is stowed to a lesser height, or is not correctly stowed in any other way, such as not the full length of the well or not from side to side, then the ship is not permitted to load to the timber line
- when timber is correctly stowed on deck, the ship may load to the timber load line, regardless of the quantity or type of cargo stowed below decks. The reduction in freeboard on a ship that is assigned timber load lines is permitted because of the buoyancy contribution of the timber deck cargo to the ship's stability characteristics
- ships using a timber freeboard assignment should be aware of the load line changes that occur with seasonal zones, as specified in Regulation 6, Annex I of the Load Line Convention. These include Summer Timber Load Line (LS), Winter Timber Load Line (LW), Winter North Atlantic Timber Load Line (LWNA), Tropical Timber Load Line (LT), Fresh Water Timber Load Line (LF) and Tropical Fresh Water Timber Load Line (LTF). For example, it should be noted that the LWNA is the same as the standard Winter North Atlantic Load Line (WNA) for all ships, as this season warrants no additional allowance for timber cargoes.

Figure 14.4: Timber cargo poorly stowed and improperly secured.

When a full timber cargo is carried on deck and the ship is loaded to the timber load line, the static stability curve may be derived from the cross curves of stability, which have been computed taking into account the timber deck cargo. When the timber deck cargo is not correctly stowed, due to deficient height or other reason, the static stability curve must be derived from the cross curves that are computed for the ship without timber deck cargo.

14.5 Strength, Pitch and Tending of Lashings

Once loaded, deck cargoes must be correctly secured. Full details of the exact securing arrangements are provided in the Cargo Securing Manual. Methods include chain lashings, wire lashings and web lashings. However, fabricated web lashings must not be used in conjunction with chains or wires.

It is important to remember that Regulation 44 of the *International Convention on Load Lines, 1966* (Reference 25) still applies to the 2011 IMO *Code of Safe Practice for Ships Carrying Timber Deck Cargoes*, 2011 (TDC Code) (Reference 23), but that the spacing of the transverse lashings within the Code, although still determined by height, does not permit an interpolation between cargo heights of 4 and 6 m. The straightforward interpretation of such spacing applies to a compact stow of square-ended bundles (flush at both ends), or near square-ended bundles, in the following manner:

- Each package (along the sides) shall be secured by at least two transverse lashings spaced 3 m apart for heights not exceeding 4 m above the weather deck at the sides
- for heights above 4 m, the spacing shall be 1.5 m above the weather deck at the sides
- when timber in the outboard stow is in lengths less than 3.6 m, the spacing of the lashings shall be reduced as necessary (to comply with the requirement for each package to be secured by at least two transverse lashings)

- the stowage of timber deck cargo should be tight and compact. Where packages are involved, they should be square-ended (flush) at both ends so far as this is possible. Broken stowage and unused spaces should be avoided. There is no absolute requirement for uprights to be used for packaged timber cargo, although some national administrations may insist on their use when lashing arrangements are not otherwise fully satisfactory. Bundles of regular form when stowed in 'stepped-in' truncated, pyramid fashion will not benefit from uprights, even if they are fitted. The TDC Code (Reference 23) does not allow uprights to be used instead of lashings. Where uprights are used, they are in addition to the full number of lashings, properly pitched and of full strength
- the use of uprights when carrying logs on deck is necessary and it is most important always to rig and attach hog wires between such uprights. The uprights' strength relies upon the weight of logs above the hog wires. This rule applies whenever hog wires are rigged, even with packaged timber. Never use uprights without rigging hog wires

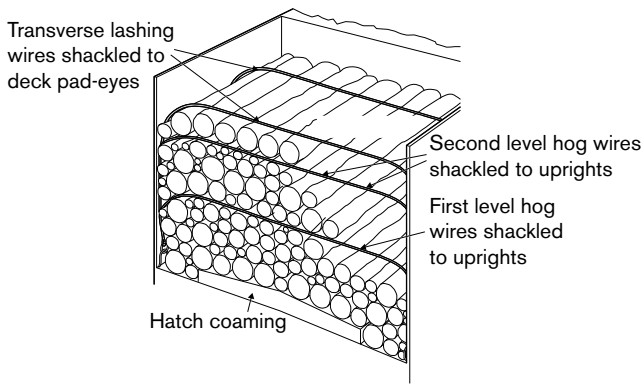

Figure 14.5: Always rig hog wires when using the deck side uprights for logs, packages and loose timber.

Figure 14.6: Rigging hog wires for deck-stowed log cargo, as required by the TDC Code.

Figure 14.7: The correct use of wiggle wires through snatch blocks, which are used to bind and consolidate the log stow and are independent of the number and pitch of cross lashings required. Photo shows chain cross lashings pitched 3 m apart for a stow not exceeding 4 m in height above the weather deck at the ship's side.

- wires or chains used for lashings should have a break load of not less than 13.6 T force (133 kN). With wire and grips, the TDC Code (Reference 23) recommends that four grips per eye are used. If that recommendation is followed, with the eye made up around a thimble, the holding power of the eye will be not less than 90% MBL. Therefore, a 6 × 24 galvanised wire rope of 19 mm diameter will fully comply with the Code's strength requirements (see Section 54.11)
- where thimbles are not used, the slip load of an eye properly made up will be about 70% of the wire's nominal strain. More complex additional securing arrangements are required for cants and reference should be made to the drawings and illustrations given in Annex B of the TDC Code
- at sea, all lashing and securing arrangements should be tended daily, adjusting as necessary to take up any slack that may occur as the cargo settles. Where intermediate ports of discharge are involved, great care must be taken to ensure that the remaining deck cargo is levelled out and resecured in accordance with the Codes.

If necessary, to reach the focsle or to inspect the lashings, it may be possible to rig a walkway over the stow. This should be done carefully, with safety handlines either side in order to prevent injury in case of any cargo movement. Due regard should be made to the relevant chapters of the *Code of Safe Working Practices for Merchant Seafarers* (COSWP).

14.6 Weight and Height of Cargo – Stress and Stability Aspects

14.6.1 Weight

The weight of the deck cargo should not exceed the maximum permissible loading of weather decks and hatch covers. Everyone involved with the loading and safe carriage of timber deck cargoes should be fully conversant with the stability requirements, as set out in the TDC Code (Reference 23), and the ship's 'standard conditions' stability book.

It is important that the correct weight of the cargo is known and allowed for in the stability calculations. Instances have occurred where, because the standard stability booklet has indicated a given height of cargo as representing a given weight, the Master and charterers have assumed that any cargo of the same height will have the same weight. This assumption has proved to be incorrect and can have serious consequences.

An example of the issues with weight can be seen in the losses of packaged timber deck cargoes from Brazil (see UK P&I Club *Packaged timber deck cargo – dangerous densities* (Reference 26)). In this example, investigations revealed that the density of the timber involved was greater than 1,000 kg/m^3. In other words, the timber as a whole, and as loaded dry, was heavier than fresh water. Samples cut from the cargo and scientifically analysed confirmed that 78% of the deck cargo, by weight, had specific gravities between 1.0 and 1.4, and that the remaining 22% had an average SG of 0.93. The overall average SG for this deck cargo was 1.080 (compared to SG 1.033 for oceanic salt water).

The average SG of packaged timber deck cargo is generally about 0.6. The data for timber conditions in most standard ship stability books indicates an SG of 0.4 where 'condition volume' is set against 'condition weight'. This underlines the technical philosophy of the TDC Code (Reference 23), which is that a timber deck cargo should float and that if it shifts and causes a severe transverse list, it will provide buoyancy to prevent the ship listing further towards capsize.

It follows, therefore, that lashings approved for cargoes of x metres^3 volume and y tonnes weight will be required to hold the same volume when timber of excessive density is involved, but the weight may be as much as 2.7 y tonnes, an increase of 270% in weight. It follows that the cargo itself could not be assumed to provide buoyancy.

The ship's officers should conduct draught surveys at regular intervals to check the weights of cargo coming on board. This is particularly important when all the under-deck cargo has been loaded and before on-deck cargo loading commences. Such draught surveys will, if carefully carried out, provide acceptable information for stability calculations. To enable this, the Master needs to know the correct density (or correct SG) of the timber being loaded. As such, it is a SOLAS requirement for such information to be supplied to the Master by the shipper.

Stability calculations should take into account the changes expected during the duration of the voyage. Annex C of the TDC Code contains instructions on the calculation of the mass change of a timber deck cargo due to water absorption. This is done using a formula involving the planned duration of the voyage in days, and extracting the relevant figure from a table of daily wood mass change (depending on port area and wood type).

GM calculations

The calculation of the metacentric height (GM) of a ship provides some measure of transverse stability, but additional calculations need to be made to produce the curve

of statical stability (the GZ graph). The ship's dynamical stability characteristics can then be established for various angles of heel and can be compared with the minimum characteristics required by the load line rules and the vessel's stability booklet.

There have been examples of written instructions, issued by some charterers or shippers, requiring that 'the metacentric height (GM) should be maintained at 1.5% of the vessel's beam and should never exceed 2 ft (61 cm)'. These instructions could be considered as poorly worded and incomplete, and potentially dangerous for vessels of less than 10 m beam, where 1.5% would produce a GM of less than 0.15 m when 0.15 m is the statutory minimum. Masters should call for expert advice if they face instructions to the contrary, and follow the IMO *International Code on Intact Stability* (IS Code), which says:

"for ships loaded with timber deck cargoes, and provided that the cargo extends longitudinally between superstructures (...) transversely for the whole ship after due allowance for a rounded gunwale not exceeding 4% of the breadth of the ship ..." (Reference 27).

14.6.2 Height

If the timber deck cargo is to be carried through tropical or summer zones only, the following points should be observed:

- The height of the cargo must not restrict or impair visibility from the bridge
- for any given height of cargo, the weight should not exceed the designed maximum permissible loading on weather decks and hatch covers
- any forward facing profile of the timber deck stowage should not present overhanging shoulders to a head sea.

If a timber deck cargo is to be carried through a winter zone, or a seasonal winter zone in winter, the height of the cargo above the weather deck should not exceed one third of the extreme breadth of the ship. For example, if the extreme breadth of the vessel is 15 m, the height of the timber deck cargo should not exceed 5 m. Similarly, a vessel of extreme breadth 21 m could stow cargo to 7 m above the weather deck, providing this does not contravene any of the other requirements of the TDC Code.

It is important to appreciate that the 'weather deck' means the uppermost complete deck exposed to weather and sea. It is not permitted to commence the vertical measurement at hatch cover level.

14.7 Measures to Jettison Cargo

The present regulations for the jettison of cargo involve the use of senhouse slips or equivalent fittings and require personnel to stand on top of the stow to release the individual lashings (see Figures 14.8 and 14.9 for the two systems typically used). This is a dangerous undertaking and serves to emphasise the importance of ensuring, at the outset of the voyage, that the cargo will not shift. If, despite that care, the timber does shift to a dangerous degree, great caution must be exercised in any attempt made to jettison all or part of the cargo.

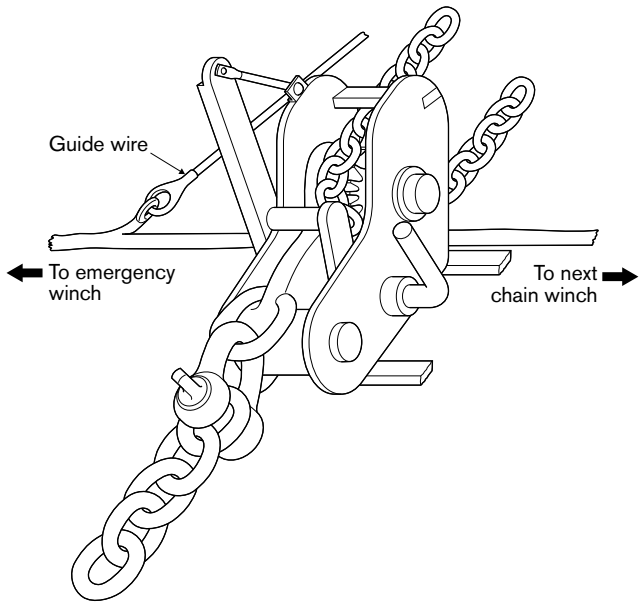

Figure 14.8: All the chain winches are connected by a rope system. In case of emergency, the guide wire has to be pulled by means of a rope winch or warping head. The slip hook will be released and the timber load will be set free at once.

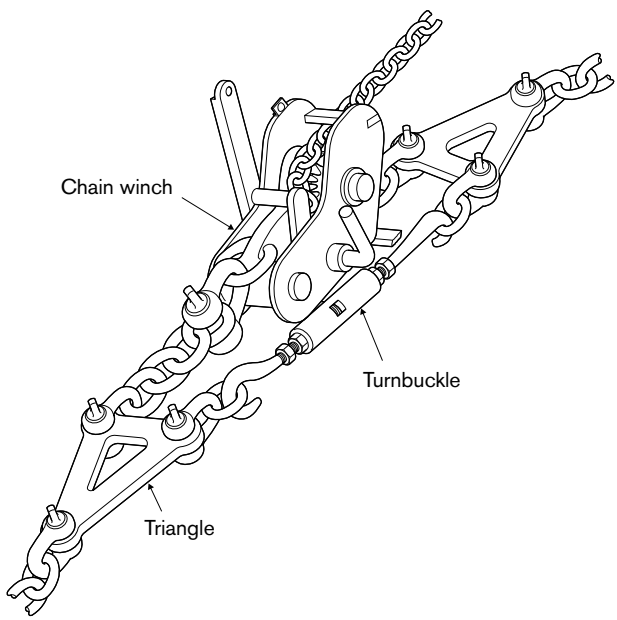

Figure 14.9: A turnbuckle fitting to a triangle plate allows ongoing tightening of lashing. Emergency remote release cannot operate with the turnbuckle fitted as shown.

14.8 Sounding Pipes, Air Pipes and Ventilation

The safe working of a vessel, whether in port or at sea, depends to a large degree upon the ability to obtain quick and safe access to all sounding pipe caps and air pipes. With this in mind, it is imperative that any deck cargo is not stowed over such pipes nor should it interfere with safe access to them.

Numerous instances have arisen where ships and crew have been placed in danger because it is not possible to walk safely across the cargo to sound tanks or bilges or to effectively close off the upper apertures of air pipes, as is required by the Load Line Rules.

Care must also be taken to ensure that all ventilators, of whatever type, serving the cargo holds are kept clear and free for operation.

14.8.1 Hatchway Coaming Drainage Channels

Hatchways fitted with steel covers are generally provided with drain holes from the coaming channels that, in turn, exit through drainage pipes. The lower open ends of these pipes are sometimes provided with loose canvas socks that close off with the pressure of seas shipped on board, acting as simple (and effective) non-return valves so long as they remain supple and unpainted.

Drainpipes are also frequently fitted with patent non-return valves of one form or another, which are designed to exclude water on deck from working back into the hatchway coaming channels. Before loading timber deck cargoes, Masters should ensure that all such non-return facilities are in efficient working order so that they do not require maintenance or supervision during the course of the voyage.

14.9 Bills of Lading (B/Ls)

The trade in timber from tropical countries has resulted in more and more packages being offered for shipment as ‘kiln-dried’ and requiring under-deck stowage. Serious claims have arisen against some vessels where kiln-dried timber has been stowed on the weather deck. Masters must ensure that all such timber, even if wrapped, sheeted or otherwise covered, is afforded below-deck stowage.

Where shippers or charterers insist on the vessel carrying such timber on the weather deck, Masters should issue a clear note of protest, ensure that all mate’s receipts are claused accordingly, accept no letters of indemnity and instruct the local agents to clause the bills.

A switched B/L may be used when a trader does not want their buyers to know the identity of the actual seller. This means that logs are often loaded in ports of Malaysia with B/Ls showing the Malaysian seller as the ‘Shipper or Consignor’ and the Trader (say in Singapore) as the ‘Consignee’. Later, the B/Ls are ‘switched’ showing the Trader as the ‘Shipper’ and the ultimate buyer in various countries as the ‘Consignee’. Sometimes, such ‘switching’ of B/Ls causes disputes over the quantity loaded.

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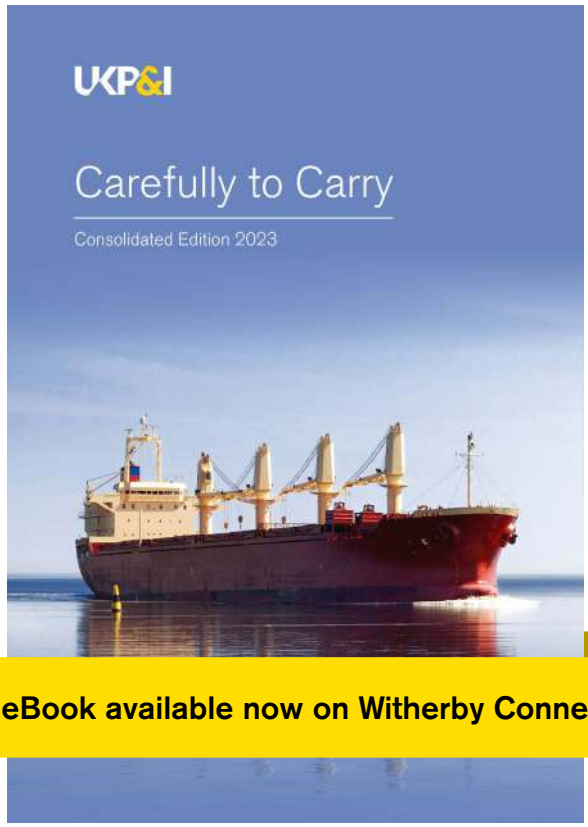

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