



Carefully to Carry

Timber deck cargoes

This article makes reference to the vessel's Cargo Securing Manual, which is required by the IMO; the IMO Code of Safe Practice for Cargo Stowage and Securing, and; the IMO Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 1991, with the included interpretation of Regulation 44 of the International Convention on Load Lines.

Introduction

There continues to be a steady incidence of timber deck cargoes being lost overboard, sometimes with catastrophic results for ship and crew. It is therefore more important than ever 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, including the IMO Cargo Securing Manual regulations mandatory since 1 January 1998 for all ships other than exempted ships. Those involved with the carriage of timber deck cargoes should have a full knowledge of the IMO Code and be alert to the ongoing probability of future amendments.

The practical applications

The provisions contained in the IMO Code are recommended for all vessels of 24m or more in length engaged in the carriage of 'timber deck cargoes' – a phrase defined as meaning a timber cargo carried on an uncovered part of a freeboard or superstructure deck, and includes logs and sawn timber whether loose or packaged. Basically, the following factors need to be considered:

- Type and compactness of timber cargo, e.g., logs, cants, ragged end packages, square (or flush) both ends, etc.
- Type of vessel – timber load line or not.
- Strength, pitch and tending of lashings.
- Height of cargo and stability considerations.
- Measures to deliberately jettison cargo.
- Keeping clear all sounding and air pipes necessary for the working of the ship, ensuring means of safe access to all parts of the ship, keeping cargo hold ventilators clear for operation.
- 'Under-deck' and 'on-deck' bills of lading.
- Hatchcovers and other openings below decks should be securely closed and battened down.
- Hatches and decks, and the cargo itself, should be kept free of any accumulations of ice and snow.
- All deck lashings, uprights, etc, in position before loading commences.
- The cargo must not interfere in any way with the navigation or necessary working of the ship.



"The carrier shall properly and carefully load, handle, stow, carry, keep, care for and discharge the goods carried."

Hague Rules,
Articles iii, Rule 2

Carefully to Carry Advisory Committee

This report was produced by the Carefully to Carry Committee – the UK P&I Club's advisory committee on cargo matters. The aim of the Carefully to Carry Committee is to reduce claims through contemporaneous advice to the Club's Members through the most efficient means available.

The committee was established in 1961 and has produced many articles on cargoes that cause claims and other cargo related issues such as hold washing, cargo securing, and ventilation.

The quality of advice given has established Carefully to Carry as a key source of guidance for shipowners and ships' officers. In addition, the articles have frequently been the source of expertise in negotiations over the settlement of claims and have also been relied on in court hearings.

In 2002 all articles were revised and published in book form as well as on disk. All articles are also available to Members on the Club website. Visit the Carefully to Carry section in the Loss Prevention area of the Club website www.ukpandi.com for more information, or contact the Loss Prevention Department.

Type of timber cargo

Packaged timber should not be stowed on deck if the bundles are ragged at both ends. Generally speaking only bundles square at both ends should be used for weather-deck stows. It is recognised, however, that the Far East trade demands the stowage of a proportion of packages that are square at one end and ragged at the other.

Wherever possible every care should be taken to ensure that ragged ends are kept to a minimum, stowed inboard of the perimeter, and that broken stowage is avoided. The IMO timber deck cargo Code does not allow the transverse stowage of packages to the outer sides of the deck stowage – any packages stowed athwartships must be within a perimeter of square-ended packages stowed fore-and-aft.

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

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

Any omissions from the lashing arrangements recommended in the IMO Code could lead to loss of cargo.

Timber load lines

Many vessels are marked with special timber load lines in addition to the normal load lines. The timber load lines are calculated on the premise that a full timber deck cargo will be carried, and an entirely separate set of cross-curves of stability is produced for the full timber deck cargo condition. The timber load lines allow the vessel to load to a deeper draught (and hence a larger displacement) than would otherwise be the case.

Disputes have arisen between shipmasters and charterers, as to the strict application of the timber load lines. The following guidelines should be applied:

- When a ship is assigned a timber load line, in order to load to those marks the vessel must be loaded with a timber deck cargo which is correctly stowed in accordance with the deck cargo regulations and the IMO Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 1991.



An example of a full timber deck cargo, compactly stowed, ends butted prior to securing with chain lashings 1.5m apart

- These regulations require that the timber be stowed as solidly as possible to at least the standard height of the superstructure. For instance, in ships of 125m or more in length, this equates to a uniform height of not less than 2.3m. In ships under 125m 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 than indicated above or is not correctly stowed in any other way, i.e., 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 as referred to above, the ship may load to the timber load line irrespective of the quantity or type of cargo stowed below decks. The reduction in freeboard enjoyed by a ship which is assigned timber load lines, is permitted because of the buoyancy contribution of the timber deck cargo to the ship's stability characteristics.



An example of typical timber load lines



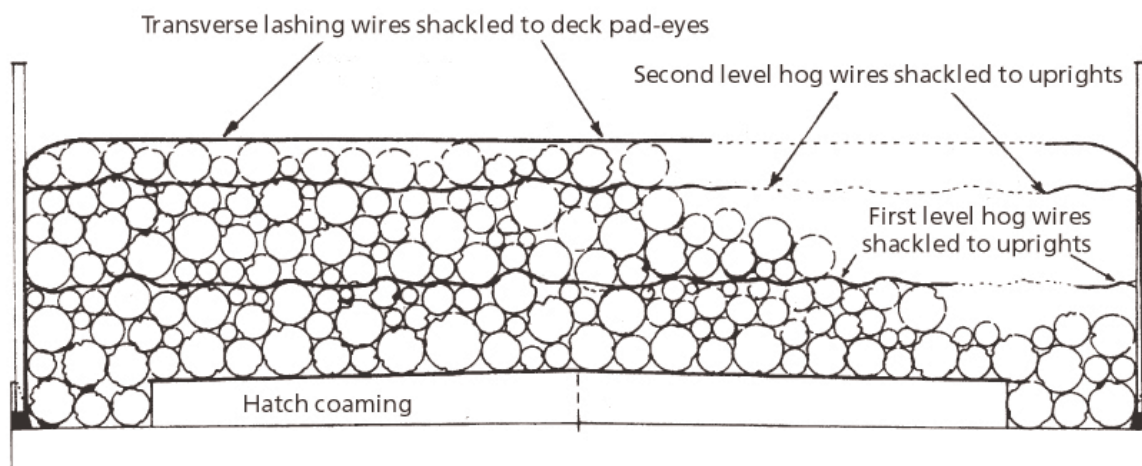
Similar cargo, poorly stowed, improperly secured, widespread gaps in cargo. Total collapse of stowage, 50% deck cargo bundles lost overboard, widespread structural damage to vessel

- 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 computed for the ship without timber deck cargo.

Strength, pitch and tending of lashings

It is important to realise that Regulation 44 of the International Convention of Load Lines 1966, still applies to the 1991 IMO timber deck cargo Code, but the spacing of the transverse lashings within the Code, although still determined by height, does not permit an interpolation between cargo heights of 4m and 6m. 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, that is) shall be secured by at least two transverse lashings spaced 3m apart for heights not exceeding 4m above the weather-deck at sides.
- For heights above 4m the spacing shall be 1.5m above the weather-deck at sides.
- When timber in the outboard stow is in lengths less than 3.6m 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 IMO Code 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 a necessary requirement, 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.



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



Rigging hog wires for deck-stowed log cargo, as required by the IMO Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 1991



The correct use of wiggle-wires through snatch blocks – used to bind and consolidate the log stow – independent of the number and pitch of cross-lashings required. Photo shows chain cross-lashings pitched 3m apart for stow not exceeding 4m in height above the weatherdeck at the ship's side

- Wires or chains used for lashings should have a break load of not less than 13.6 tonnes force (133kN). With wire and grips the IMO Code of Safe Practice for Ships Carrying Timber Deck Cargoes recommends that four grips per eye are used, and 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% NBL, so a 6x24 galvanised wire rope of 19mm diameter will fully comply with the Code's strength requirements. (For the correct method to make up bulldog-gripped wire rope terminations, refer to the article – Lashing and securing deck cargoes).
- 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 D of the IMO Code.
- At sea, all lashing and securing arrangements should be tended daily, adjusting as necessary to take up any slack which 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 re-secured in accordance with the Code.

Weight and height of cargo – stress and stability aspects

Weight factors

As mentioned earlier, the weight of the deck cargo should not exceed the maximum permissible loading of weather-decks and hatchcovers. 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 IMO Code of Safe Practice for Ships Carrying Timber Deck Cargoes and the ship's 'standard conditions' stability book. The following additional comments may be of assistance.

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 wrongly based and has serious consequences.

For instance, when the Code was drawn up, it may have been assumed that all timber, including logs and packaged timber, would have densities less than 1000 kg/m³ (broadly speaking, an SG of 1.0), but following losses of packaged timber deck cargoes from Brazil (see, also 'Packaged timber deck cargo – dangerous densities') investigations revealed that the density of the timber involved was greater than 1,000kg/m³. 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 from 14 different types of timber confirmed that 78% of the deck cargo, by weight, had specific gravities in the range 1.0 to 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 as compared with SG 1.033 for oceanic salt water.

The average SG of a more normal packaged timber deck cargo is 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 tends to underline the technical philosophy of the Code, namely, 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 capsizes.

From this it follows that, when timber of excessive density is involved, lashings approved for cargoes of x metres³ volume and y tonnes weight will be required to hold the same volume but the weight may be as much as 2.7 y tonnes, an increase of 270% in weight, such that the cargo itself cannot 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 necessary particularly when all the under deck cargo has been loaded and before 'on-deck' cargo loading commences. Such draught surveys although subject to all their associated vagaries will, if affected carefully, provide acceptable information for stability purposes. To do this the master needs to know the correct density (or correct SG) of the timber being loaded and, since July 1996, it has been a SOLAS requirement for such information to be supplied to the master by the shipper. So beware of the dangerous densities and act accordingly.

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.

The Committee's attention has been drawn to written instructions issued by some charterers or shippers requiring that the "metacentric height (GM) should be maintained at one and a half per cent of the vessel's beam and should never exceed 2ft (61cm)". The Committee considers such instructions to be poorly worded and incomplete, and positively dangerous in the instance of vessels of less than 10m beam where 1.5% would produce a GM of less than 0.15m when 0.15m is the statutory minimum. Ships' masters should call for expert advice if they face instructions to the contrary, and follow the IMO Code which says, inter alia:

"Operational experience indicates that metacentric height should preferably not exceed 3% of the (vessel's) breadth in order to prevent excessive accelerations in rolling provided that the relevant stability criteria are satisfied. This recommendation may not apply to all ships and the master should take into consideration the stability information obtained from the ship's stability manual."

Height factors

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 does not restrict or impair visibility from the bridge. (In this connection the Committee would refer the attention of Members to M. Notice no. 1264 of January 1987 – Navigation Bridge Visibility).
- For any given height of cargo, its weight shall not exceed the designed maximum permissible loading on weather-decks and hatchcovers.
- Any forward facing profile of the timber deck stowage does 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 instance, if the extreme breadth of the vessel was 15m, the height of the timber deck cargo should not exceed 5m. Similarly, a vessel of extreme breadth 21m could stow the cargo to 7m above the weather-deck, providing this did not contravene any of the other requirements of the Code. (See, also, under 'Timber load lines,' earlier).
- It is important to appreciate that the 'weather-deck' means the level of the main deck measured at its junction with the sheer strake. It is not permitted to commence the vertical measurement at hatchcover level.

Disasters follow excessive cargo heights

There are a few anomalies in the IMO Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 1991, one of which relates to the lack of firm, clear, guidance as to the closing down of lashings spacing where cargo heights become excessive.

Earlier in this article it was explained that the 1991 Code requires that lashings shall be pitched 3m apart for cargo heights up to 4m and 1.5m apart for cargo heights above 4m, measured above the weather-deck at sides. Hence, as it now stands, for heights above 6m the lashings can remain at a 1.5m spacing with no hint that closer spacing and/or increased lashing strength should be considered.

The Committee considers this to be a most unsatisfactory situation, and it is salutary to consider the additional weight effects as timber cargo heights increase on a large, modern, timber carrier in which the horizontal hatchcovers are, say, 2.8m above the weather-deck at sides.

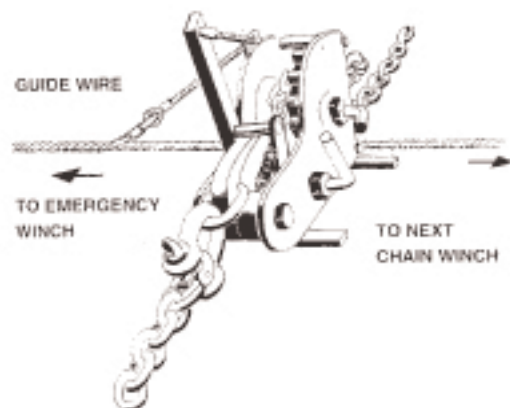
In such instance, and assuming all the timber is of more-or-less the same density, when the upper surface of the cargo is 4m above the deck, only 1.2m of that height is cargo, and the lashings need be no closer spaced than 3m. Going to 6m height gives 3.2m of cargo with the lashings closed down by a factor of 2, to 1.5m spacing, yet cargo weight has increased by a factor of 2.66. Going to, say, 8.9m gives 6.1m of cargo, with the lashings remaining at 1.5m, yet cargo weight has increased by a factor of 5.08. When cargo height goes to 10m – a not unknown occurrence – the weight of cargo has increased by a factor of 6. There appears to be little or no common-sense rationale that explains this unreasonable reliance on under-strength lashings.

There have been several catastrophic failures of packaged timber deck cargoes where the cargo height was 8.9m and the standard transverse lashings were pitched at 1.5m. In general terms, the overall breaking strength of the combined lashing system amounted to 560 tonnes. The static weight of the cargo was roughly 3,490 tonnes – that is 6.2 times greater than the lashings' strength, yet such arrangement apparently complied with the Code. (It is worth noting that if the 3-times rule for securing other deck cargoes had been applied the breaking strength of the lashings would have been about 10,400 tonnes.)

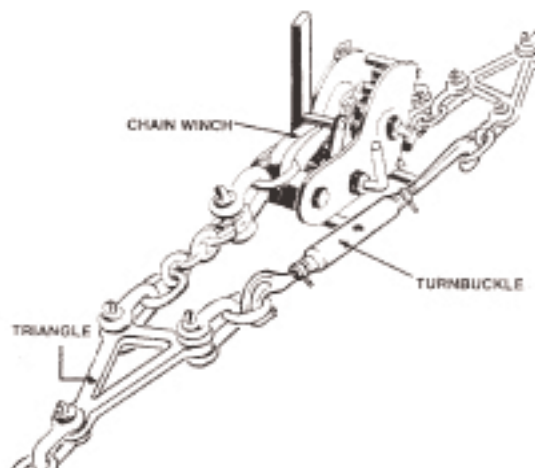
There is nothing in the Code to prevent increasing the lashings' strength and/or decreasing the pitch. Some traders do, indeed, weld additional interspaced pad-eyes or D-rings before loading commences, thereby reducing the lashings' pitch to 0.75m and doubling the holding power of the 1.5m spacing; but the majority do not.

Also, at 10m height, and with 7.2m of that height made up of cargo, the down-acting force on the hatchcovers may well exceed the vessel's designed permissible hatchcover load. This, in turn, will create a deflection in the hatchcover panels greater than that for which they were designed; excessive flexing may occur, causing the cargo to vibrate towards slackness, and may thus be a contributory factor in the overall loss of the cargo.

So far as the Committee is aware, there is no record of any national administration enforcing a reduced lashing pitch even in instances where packaged timber cargo height has achieved 10m. Combined with other adverse factors, during the years 1982 to 1994 this had resulted in not less than 21 traceable vessel incidents of loss of, or severe shift of, packaged timber deck cargoes shipped from west coast Canadian and/or United States ports – certainly more if all were known and had been reported. This can hardly be considered a satisfactory state of affairs so far as cargo interests and their insurers are concerned.



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.



Turnbuckle fitting to triangle plate allows on-going tightening of lashing. Emergency remote release cannot operate with turnbuckle fitted as shown.

Measures to jettison cargo

The present regulations for the jettison of cargo involve the use of senhouse slips or equivalent fittings, and require personnel standing on top of the stow to release the individual lashings. This can only be achieved at considerable personal risk and may cause serious damage to the structure of the ship. In Carefully to Carry No.13 of April 1989, the Committee remarked that it would be interested to hear of any simple method of deliberately and safely jettisoning cargo. The Committee is pleased to report that MacGregor-Conver OSR makes and markets such equipment as illustrated on the previous page. It is for the trade to decide whether or not to take advantage of this system without waiting for mandatory requirements to do so.

All the foregoing comments, however, only serve 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.

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 should not be stowed over such pipes nor interfere with safe access to them, and that safe and efficient means of access be provided for all working parts of the ship, as required by the Code. Numerous instances continue to arise where ships and seamen are placed in danger because it is not possible to walk safely across the cargo to sound tanks, bilges, or to effectively close off the upper apertures of air pipes as required by the Load Line Rules. Care, also, must be taken to ensure that all ventilators of whatever type serving the cargo holds are kept clear and free for operation in the normal manner.

Hatchway coaming drainage channels

The Committee would also draw Members' attention to the fact that hatchways fitted with steel covers are provided, more often than not, with drain holes from the coaming channels, which, in turn, exit through drainage pipes. The lower open ends of these pipes are sometimes provided with loose canvas socks which close-off with the pressure of seas shipped onboard, thereby acting as simple (and effective) non-return valves, so long as they remain supple and not painted. Similarly, drainpipes are just as 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, therefore, 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.

Bills of lading

The continuing 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 for a voyage to Europe and elsewhere. Masters must ensure that all such timber – even if wrapped, sheeted or otherwise fortuitously covered – is afforded below decks stowage.

Where shippers and 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 clausured accordingly, accept no letters of indemnity, and instruct the local agents to clause the bills and act accordingly.

Masters who allow themselves to be persuaded to do less than is necessary in the line of stowage and securing arrangements – for whatever reason – become everybody's scapegoat when cargo is lost overboard, the ship's structural seaworthiness is breached, and the port of refuge/re-stowage /ship repair/deviation delay and legal costs come home to roost. Stand your ground, and have things done properly.