



木材甲板货物运输 安全指南

Loss Prevention Brochure
A Guide to Safe Carriage of Timber Deck Cargoes

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中国船东互保协会 华洋海事中心
联合编制

简介

船舶装载木材甲板货, 由于木材本身特性和甲板积载的特殊性, 其运输会面临更多的风险, 易出现货物移动落海, 严重的会发生危及船舶和人员安全的事故。发生事故的原因主要在于船舶装运木材时积载、绑扎、强度和稳性没有严格遵守国际海事组织 (IMO) 对船舶装载木材制定的各公约、规则和指南的要求和规定, 如《2011年木材甲板货运输船的安全操作规则》《2008年国际完整稳性规则》《货物积载和系固安全操作规则》等。所以从事木材甲板货物运输的人员应充分了解木材安全运输各公约、规则和指南的要求和规定, 并根据本船的《船舶装载手册》《船舶稳性报告书》《货物系固手册》和《木材系固布置方案》等具体要求进行运输、积载、绑扎, 以保证木材运输过程中船舶、人员和货物的安全。

本手册由中国船东互保协会与华洋海事中心联合编制, 旨在给会员、船东、船员提供木材安全运输的通用指南和建议, 而非取代任何公约和规则、国家规范、以及公司安全操作程序。

Introduction

Given the feature of timber cargoes, carriage of them on deck is often associated with perceivable risks, especially incidence of them being lost overboard and some with catastrophic results for ships and crews. Most of the incidents involve failure to comply with current codes, rules and regulations, including the IMO Code of Safe Practice for Ships Carrying Timber Deck Cargoes 2011, the International Code on Intact Stability 2008, and the Code of Safe Practice for Cargo Stowage and Securing. It is therefore important for those involved with the carriage of timber deck cargoes to have a full knowledge of these codes and to ensure the safety of ship, personnel and cargo during the voyage by following the requirements as documented in the ship's cargo loading and securing manual, stability booklet and lashing plan.

This guide is a collaboration between Huayang Maritime Center and the China P&I Club, and is intended to provide Members, shipowners and seafarers with guidance and suggestions related to safe carriage of timber deck cargoes, in addition to existing conventions, regulations and company safe cargo operation procedures.

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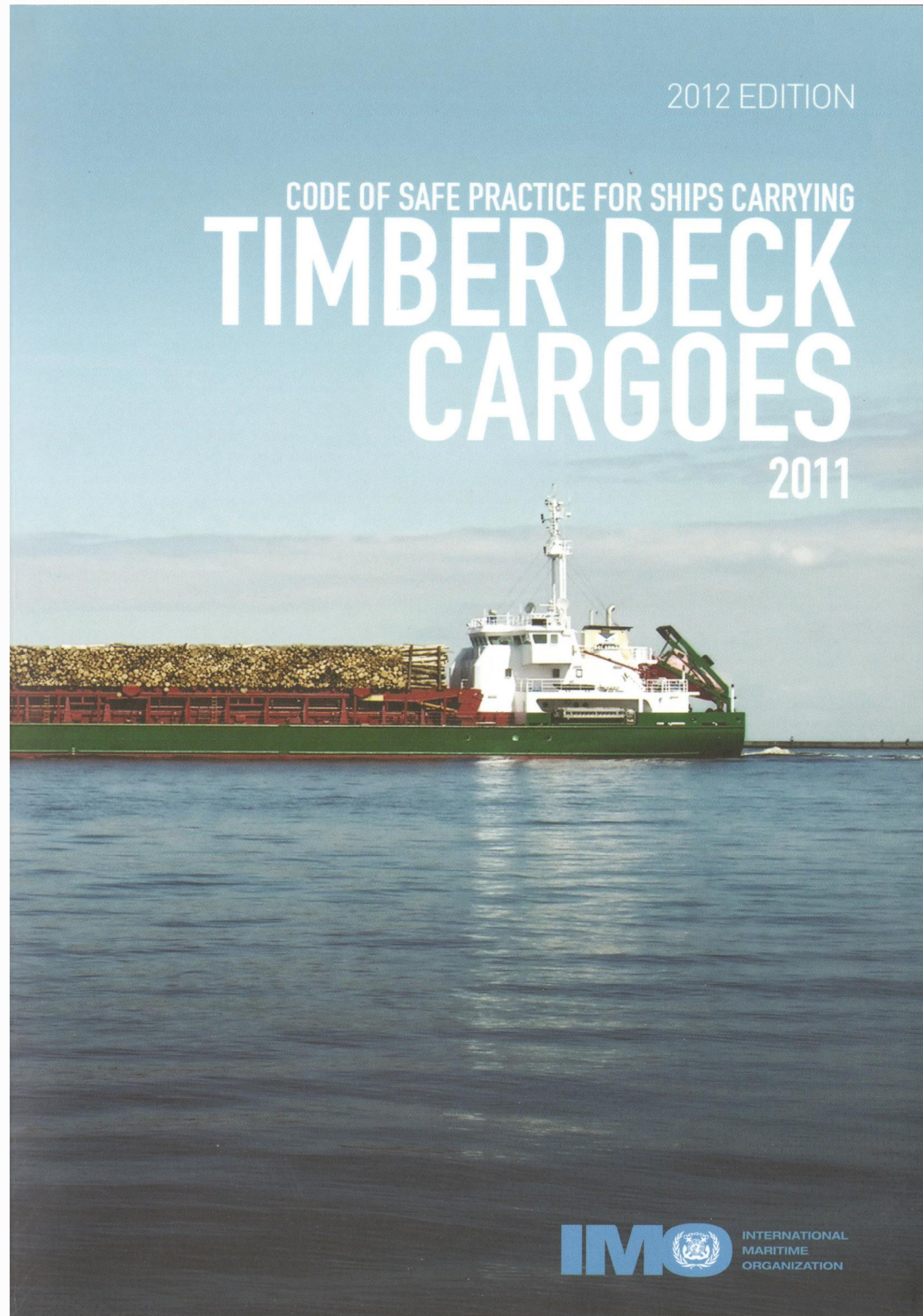
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公约规则

Conventions and regulations



Code of Safe Practice for Ships Carrying Timber Deck Cargoes 2011

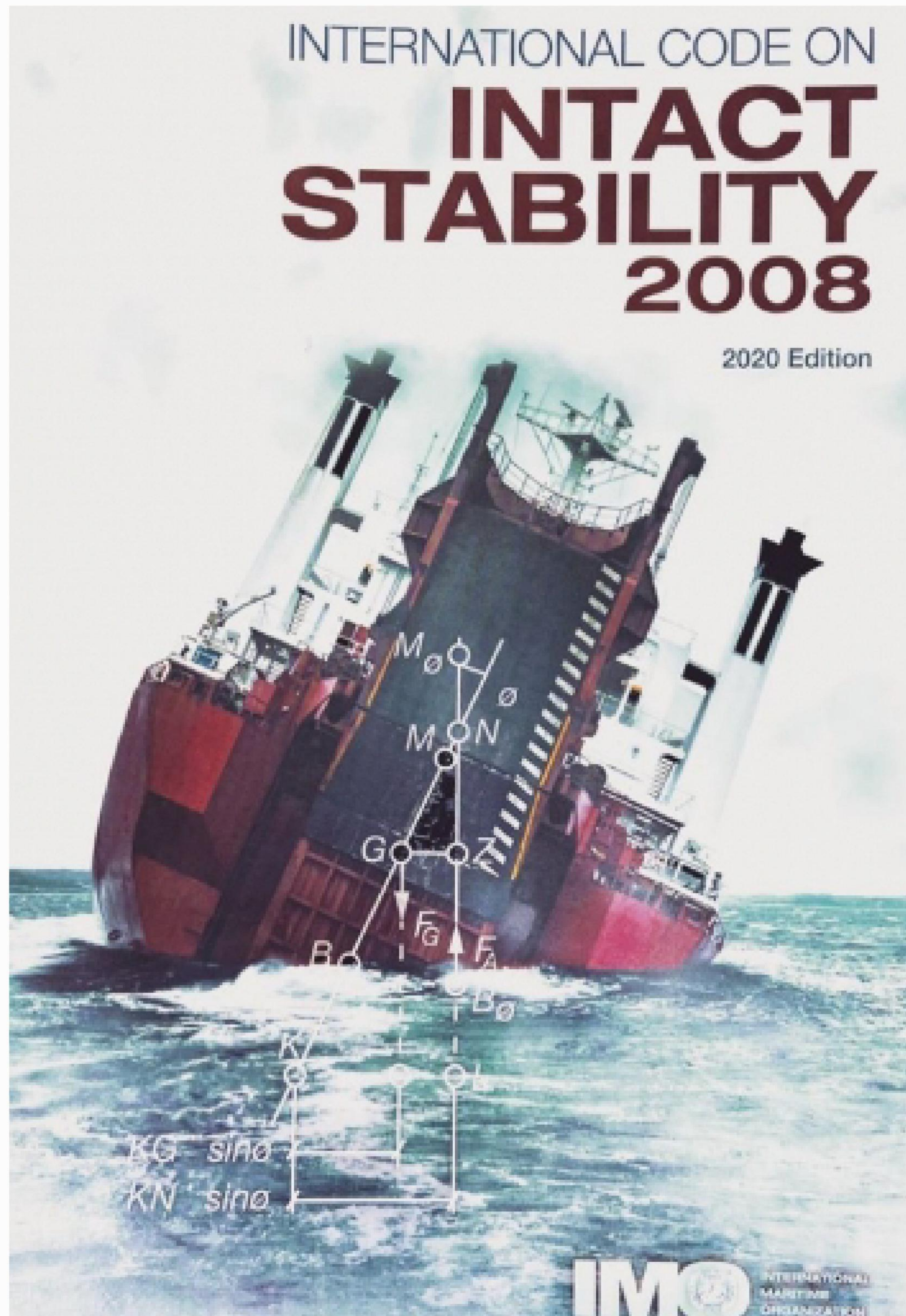
2011年木材甲板货运输船舶安全操作规则

适用所有船长24米或以上载运木材甲板货的船舶。本规则对安全运输操作方式、安全积载和系固方法、系固系统设计原则、船舶《货物系固手册》所应包括的程序和须知的制定导则、以及安全积载和系固抽样检查表等方面进行了详细规定，以确保木材甲板货的装载、积载和系固尽实际可能在整个航程中防止对船舶和船上人员造成损害或危险并防止货物落水灭失。

每艘装载木材甲板货物的船舶应备有《2011年木材甲板货运输船舶安全操作规则》的最新版本，船长和驾驶员应熟悉此规则的内容。负责木材甲板货物运输的岸上管理人员也应该对该规则有充分的了解或相当的经验。

The purpose of the Code is to ensure that timber deck cargoes are loaded, stowed and secured to prevent, as far as practicable, throughout the voyage, damage or hazard to the ship and persons on board as well as loss of cargo overboard. The Code applies to all ships of 24 metres or more in length, carrying a timber deck cargo, and provides 1) practices for safe transportation, 2) methodologies for safe stowage and securing, 3) design principles for securing systems, 4) guidance for developing procedures and instructions to be included in ships' cargo securing manuals on safe stowage and securing, and 5) sample checklists for safe stowage and securing.

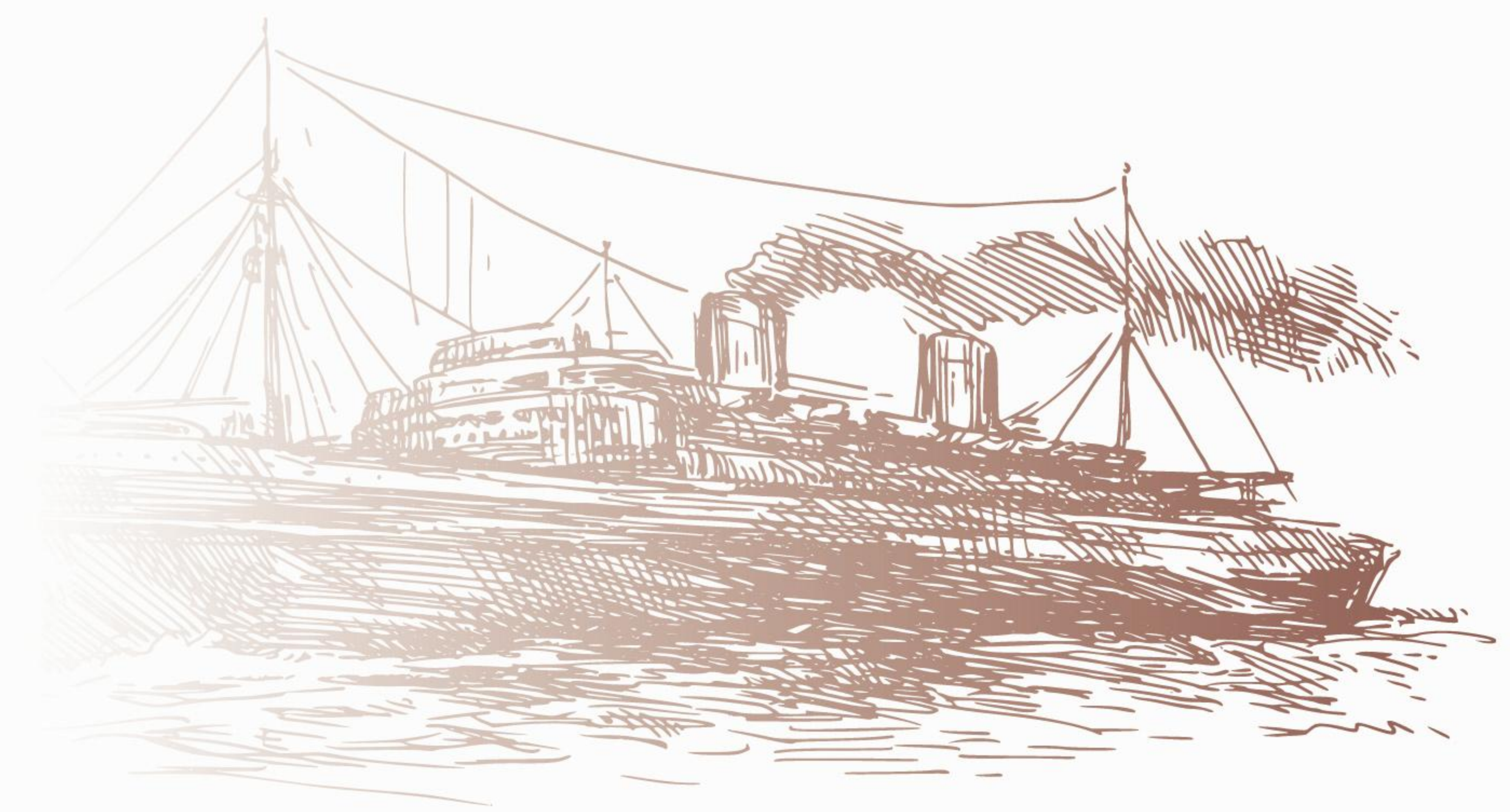
Each ship carrying timber deck cargoes should have on board the latest edition of the Code, with which the master and the OOW should be familiar. It is preferable that the shore management also have a good understanding of the Code or have considerable experience in this regard.

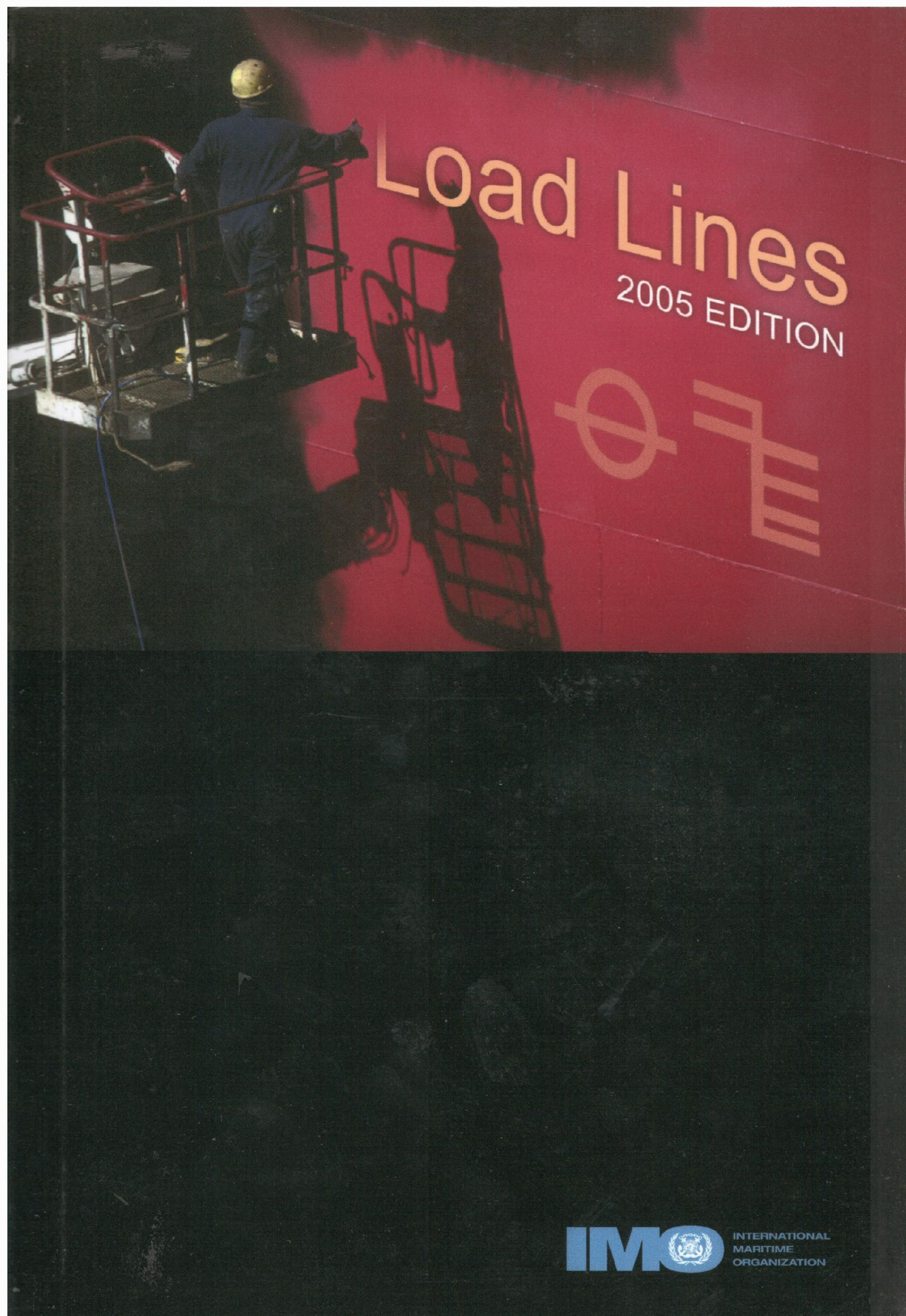


International Code on Intact Stability 2008
2008年国际完整稳性规则

A部分第3.3章“载运木材甲板货的货船”和B部分第3.6.3章“稳性手册(载运木材甲板货的货船)”以及第3.7章“载运木材甲板货的船舶的操作措施”对木材船的稳性和操作措施进行了规定。

The Code sets out requirements relating to carriage of timber deck cargoes in Section A, Chapter 3.3 “Cargo ships carrying timber deck cargoes”, Section B, Chapter 3.6.3 “Stability booklet”, and Chapter 3.7 “Operational measures for ships carrying timber deck cargoes”.





International Convention on Load Lines 1966

1966年载重线公约及1988议定书

附则I《载重线核定规则》第II章《核定干舷的条件》第16条, 第IV章《船舶核定木材干舷的特殊要求》第44条和第45条对木材船的干舷计算和积载、立柱、绑索、稳性、船员的保护、出入机器处所等进行了规定。

The Convention sets out provisions relating to calculation of timber freeboards, stowage of timber deck cargoes, uprights, lashings, stability, protection of crew, access to machinery spaces, etc. in regulation 16 of Chapter II “Conditions of assignment of freeboard”, and regulation 44 and 45 of Chapter IV “Special requirements for ships assigned timber freeboards”, Annex I “Regulations for determining load lines”.





船舶要求

Requirements for vessels

文书要求 Documentation

稳性文书

Stability booklet

船舶装运木材甲板货应确认船上经主管机关批准或认可的《船舶稳性计算书》和/或《船舶装载手册》等相关文书中有载运木材甲板货的相关甲板货标准工况和对完整稳性、破舱稳性、以及纵总强度的校核结果。

The ship should be provided with an approved stability booklet and/or an operating manual for loading of timber deck cargoes, which contains the standard operating conditions and verified data on intact and damage stability together with longitudinal strength.



系固文书

船舶装运木材甲板货应确认船上有经主管机关批准或认可的包含有木材甲板货积载和系固具体要求的《货物系固手册》，以及《木材系固布置方案》。

局部强度文书

甲板和舱盖允许最大载荷的计算。

体系文书

包含木材装运的详细流程。

Securing manual

The ship should be provided with an approved cargo securing manual and a lashing plan that contains specific requirements regarding stowage and securing of timber deck cargoes.

Local strength assessment

The maximum permissible loads on deck and hatch covers.

Safety Management System

Should contain procedures for loading and carrying timber deck cargoes.

硬件要求 Equipment

船上应配备完全符合本船《货物系固手册》和《木材系固布置方案》要求经相关船级社认证的固定和移动系固装置, 并得到良好的保养。

Lashing and securing equipment should be provided in accordance with the ship's cargo securing manual and lashing plan with certification of a classification society, and in the meantime, be maintained in a good condition.

人员要求 Crew

船长和大副应熟悉《船舶装载手册》或《船舶稳性报告书》关于稳性的要求, 能熟练使用装载仪或手动计算正确判断船舶完整稳性、破舱稳性、以及纵总强度和局部强度是否符合要求; 船长、大副、水手长等主要船员应有足够的经验熟悉木材的安全运输、积载、绑扎等操作。

The master and chief officer of the ship should a) be familiar with stability requirements as prescribed in the ship's cargo securing manual and lashing plan; b) be able to check the accuracy of the stability instrument or calculate the ship's intact and damage stability, longitudinal and local strength as required. Senior officers including the master, the chief officer and the bosun should have adequate experience relating to the safe carriage, stowage and securing of timber cargoes.

船 名
Name of Ship

船舶番号
Official number

信号符号
Call letter

I M O 番号
IMO Number

船籍港
Port of Registry

貨物固縛マニュアル Cargo Securing Manual



PURSUANT TO the provisions specified in
IMO MSC/Circ.745 under the authority of
the Government of the Hong Kong
Special Administrative Region
of the People's Republic of China
NIPPON KAIJI KYOKAI





木材知识

Understanding timber cargoes



原木 (LOG)

木板 (CANTS)

木杆 (POLE)

纸浆用木材 (PULPWOOD)

定义

“木材”系指原木、木板、木杆、纸浆用木材等木质材料,但不包括木浆和类似货物。主要以散装或包装方式进行船舶运输。

Definition

“Timber” refers to sawn wood or lumber, log, cants, poles, pulpwood, and all other type of timber in loose or packaged forms. The term does not include wood pulp or similar cargo.



计量单位 Measurements

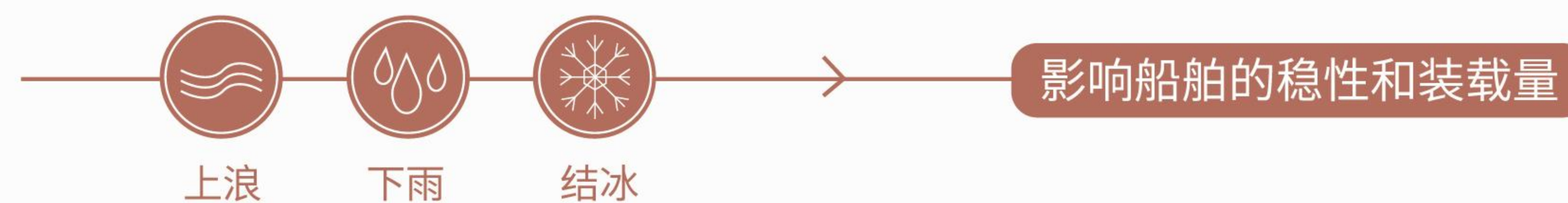
木材的计量单位各出口国不尽相同, 主要有CBM/MT(大多数国家如所罗门群岛、巴布亚新几内亚、阿根廷等)、1000SCR(美国、加拿大等)、JASCBM(澳大利亚、新西兰等)、根数(印度尼西亚、马来西亚等)。其中1000SCR约为2.8-4.0MT, 1JASCBM约为1.8-2.2CBM或0.8-1.2MTS。

Timber measurements are various around the world depending on the wood shipping country. The unit of measurement in use in the Solomon Islands, Papua New Guinea, Argentina and many other countries is CBM/MT. In North America the unit of measurement is 1,000 SCR, which is about 2.8-4.0 MT. Australia and New Zealand use a JAS scaling method, and 1 JAS CBM equals 1.8-2.2 CBM / 0.8-1.2 MTS. In Indonesia and Malaysia, the cargo is measured in the number of logs.

吸水量和结冰 Cargo properties

木材甲板货物在运输途中因上浪、下雨或结冰会造成重量的增加, 从而影响船舶的稳性和装载量。通常船舶的《装载手册》以重量增加10%来核算船舶的稳性和装载量, 实践中如北美及前苏联木材于冬季运输, 因装载及运输途中往往有冰雪覆盖及大量雨水, 就必须考虑10%甲板吸水量。但澳大利亚、新西兰到北亚航线甲板木材的重量通常会减少2%左右而非增加。所以木材甲板货因吸水和结冰而增加的重量值, 应按2008年IS规则和2011TDC附件C的专门须知予以考虑。

Sea spray, rainfall and ice during the voyage can add the weight of the timber deck cargo and thus influence the stability. The ship's loading manual normally allows a 10% increase of weight in calculations of stability and loading capacity, especially for transportation of wood from the US and the USSR during wintertime. For shipping lines between Australia/New Zealand and North Asia, the weight of cargoes would reduce 2% and water absorption should not be considered in the ship's stability calculations. Therefore, the mass change of a timber deck cargo due to water absorption and ice aggregation should be taken into account, referring to the 2008 IS Code and Annex C of the 2011 TDC Code.





主要风险

Principal hazards

船舶装载木材甲板货,由于积载、绑扎不当,稳性不足,常常导致货物移动、落海,严重的会发生船舶倾覆造成船沉人亡的恶性事故,主要原因有:

船舶由于货舱水密问题、船体结构破损等原因进水后,排水不畅易形成自由液面影响船舶稳性和船舶发生倾斜

低标准船从事木材甲板货运输;
从驳船装木材时,驳船和木材易撞击船壳导致船体损伤;
工人野蛮操作时常撞击舱壁、舱底、肋骨等货舱结构,易导致船体结构破损或强度减弱;
长时间装运原木使船舶的应力、剪力等集中在某一部位,极易出现该部位结构疲劳;
舱内管阀由于保养不善或装卸木材时受损未及时修复,进行排压水操作时导致压载水从破损处泄露进货舱内;
原木在装货港一般都长时间浸泡在海水中,海水和树皮腐烂常常对船体造成严重腐蚀;
树皮污泥等极易堵塞污水井,导致货舱的污水不能及时快速的排出。

木材甲板货发生移位和落海通常是由积载和绑扎不当所导致

立柱、绑扎索具等保养不到位,强度不符合要求;
绑扎不符合系固手册要求;
甲板积载不当。

船舶在整个航程中稳性不符合要求

据资料统计,超半数的沉船事故是由于稳性过小,遇大风浪时回复力矩不足而倾覆。
《2008年国际完整稳性规则》对装运木材的替代稳性要求,除初稳性高度外,复原力臂曲线(GZ曲线)下的面积,复原力臂(GZ)的最大值,抵抗横风和横摇的组合影响的能力,都有相应的要求,但在实际操作中,特别是船上没有配载电脑情况下,船员为避免计算麻烦,通常只考虑稳性高度的要求,而忽略了其他稳性要求,特别是抵抗横风和横摇的组合影响的能力的核算。

There have been a number of marine incidents involving shift or loss of timber deck cargoes overboard, or ship listing towards capsizes in severe cases, mostly due to bad stowage or securing or poor stability. These common causal factors are identified and further analyzed as follows.

The ship's stability is reduced and list happens when water enters due to poor watertightness condition and/or hull structure damage and free surface effect occurs:

Sub-standard vessels are engaged in carriage of timber deck cargoes.
Cargo and barge can easily crash and damage the hull structure when transferring cargo from the barge to the ship.
Crashes on bulkheads, hold bottoms and frames during cargo operations can lead to damaged hull structure or reduction in strength.
Repetitive log shipment can lead to localized fatigue due to concentration of stress and sharing force over a period.
Pipes and valves are not well protected or repaired when damaged, which leads to entry of water into cargo holds during deballasting operations.
Lumber cargoes are usually immersed in seawater in the loading port for a long time, and seawater and bark decay often cause serious corrosion to the ship's hull.
Water cannot be discharged properly when the bilge well is clogged by barks and sludges.

Cargo shift and loss of cargo overboard are often caused by improper stowage and/or slack lashings:

Uprights and lashing equipment are not well maintained or with adequate strength.
Cargoes are not secured as required by the cargo securing manual.
Cargoes are not properly stowed on deck.

Inadequate stability during the voyage:

It was reported that over half of ship capsizes incidents are due to inadequate stability and no righting moment can develop to bring the vessel upright in severe wind and sea waves. The 2008 IS Code has provided specific criteria for the metacentric height, the area under the righting lever curve (GZ curve), the maximum value of the righting lever (GZ), and the ability of the ship to withstand the combined effects of beam wind and rolling for carriage of timber deck cargoes. However, the crew may only calculate the GM value, and won't bother to calculate other stability criteria including the ability of the ship to withstand the combined effects of beam wind and rolling, especially when a loading computer is not equipped on board.



人员安全

中毒窒息

货舱内由于木材的呼吸作用会消耗氧气并释放出大量的一氧化碳，同时潮湿的环境易导致木材发生腐烂而散发有毒气体，再加上熏舱时在舱内残留有毒气体，常常在货舱发生密闭舱室事故。另外熏舱气体进入生活区和机舱也会发生人员中毒事故。

滑到跌落

人员在湿滑、高低不平且可移动的木材表面行走工作极易发生滑倒、跌落的危险。

撞击受伤

木材装卸作业时，由于体积大而不易控制，容易出现所吊木材大幅度摆动甚至木材摔落时撞击人员发生伤亡事故。



Work safety

Intoxication and suffocation

With the consumption of air and release of carbon monoxide due to the respiration of lumber, in addition to the release of toxic gas in humidity and the remaining fumigant gas, the cargo holds can be an enclosed space that poses great danger. The crew may also suffer from poisoning if fumigant gases seep into living quarters and machinery spaces.

Slips and falls

There is a substantial risk of slips and falls for the crew to walk on the wet, slippery, and uneven surface of lumber cargoes.

Hits and crashes

Logs are huge, difficult to control, and can potentially swing or collapse when hoisted during loading and unloading, and therefore cause personal injuries.



起货设备损坏

船舶木材装卸使用船吊常常发生工人违章、粗暴作业，如超重、拖关、拉关等，极易造成吊货钢丝和千斤钢丝的断裂、打结，或从滑车内滑出。不但会造成设备损坏、时间延误，还会威胁人身安全。

Damage to deck lifting equipment

Cranes operators may handle the cargoes violently which can easily cause the hoisting/luffing wire to break, twist or run out from the sheaves, and may further lead to damage to equipment, loss of time as well as personal safety hazards.



稳性要求

Stability

Stability requirements as provided in the 2008 IS Code (2020 Edition)

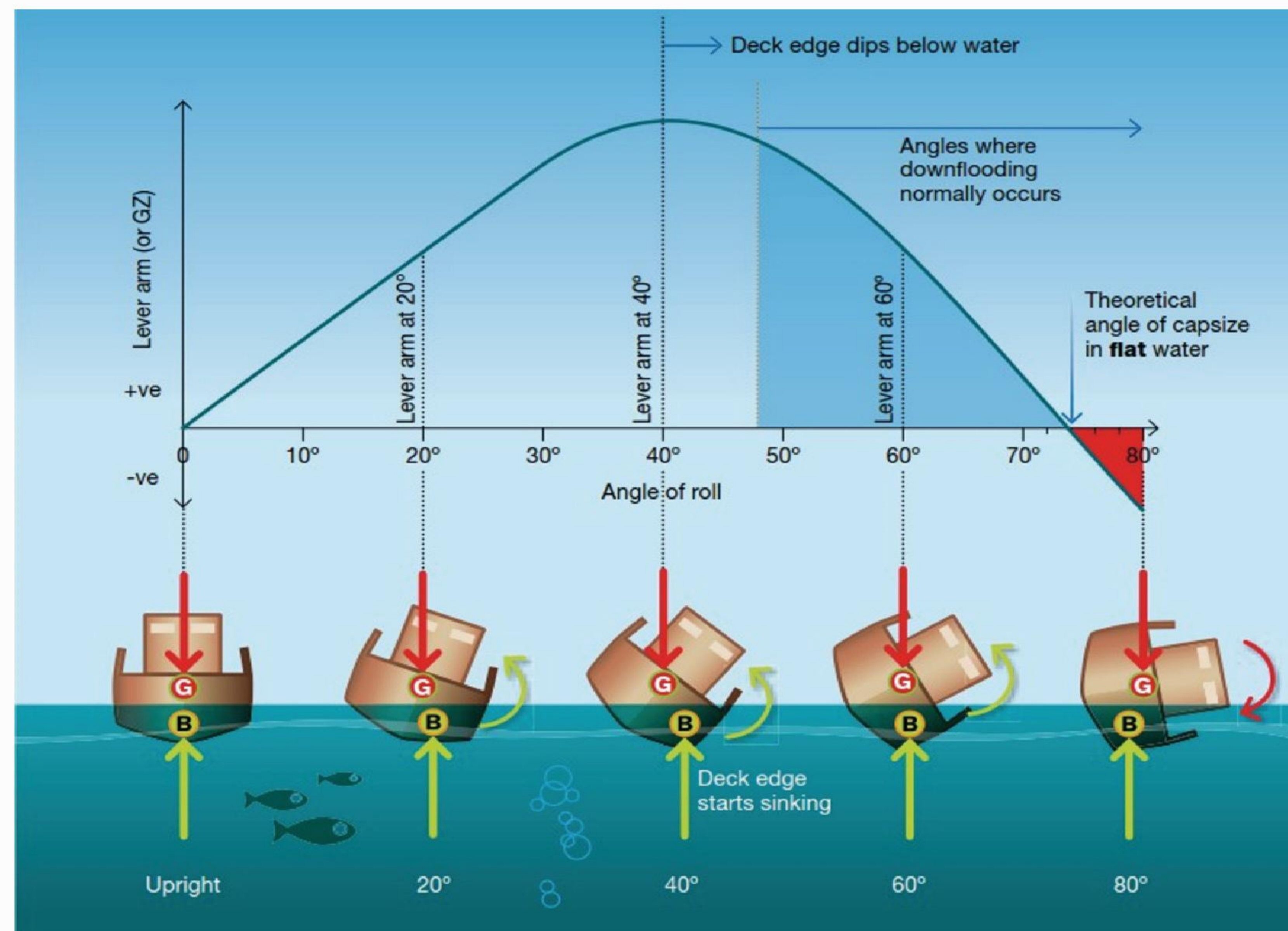
2008国际完整稳性规则 (2008IS) 规则 对木材船的稳性要求 (2020版)

载运木材甲板货的货船应符合2.2和2.3的规定,除非主管机关确信能适用替代的3.3.2稳性衡准。

适用范围:船长为24m及以上从事木材甲板货运输的所有船舶。设有并使用其木材载重线的船舶还应符合《1966年载重线公约》第41条至45条的要求。

Cargo ships carrying timber deck cargoes shall comply with the requirements of 2.2 and 2.3 unless the Administration is satisfied with the application of alternative provision 3.3.2.

Scope: all ships of 24 m in length and over engaged in the carriage of timber deck cargoes. Ships that are provided with, and make use of, their timber load line shall also comply with the requirements of regulations 41 to 45 of the 1966 Load Lines Convention.



3.3.2替代的稳性衡准

Alternative stability criteria

- (1)复原力臂(GZ)曲线下的面积,当横倾角到达 $\phi = 40^\circ$ 或进水角时(如进水角小于 40°)应不小于 $0.08\text{m} \cdot \text{rad}$ 。
- (2)复原力臂(GZ)的最大值至少应为 0.25m 。
- (3)考虑到甲板货吸水和/或露天表面结冰影响,在航程中任何时候的初稳性高度 GM_0 应不小于 0.1m 。
- (4)当按2.3确定船舶抵抗横风和横摇联合作用的能力时,在定常风作用下的横倾角应不大于 16° ;但可不考虑甲板边缘浸水角80%的附加衡准。

- (1) The area under the GZ curve shall not be less than 0.08 metre-radians up to $\phi = 40^\circ$ or the angle of flooding if this angle is less than 40° .
- (2) The maximum value of the GZ shall be at least 0.25m.
- (3) At all times during a voyage, the GM_0 shall not be less than 0.1m, taking into account the absorption of water by the deck cargo and/or ice accretion on the exposed surfaces.
- (4) When determining the ability of the ship to withstand the combined effects of beam wind and rolling according to 2.3, the 16° limiting angle of heel under action of steady wind shall be complied with, but the additional criterion of 80% of the angle of deck edge immersion may be ignored.

General principles
稳性原则

- 1

船长应确保船舶状况始终与船舶稳性手册相符

The master should ensure that the ship meets the requirements contained in the stability booklet throughout the voyage.
- 2

木材甲板货运输船舶必须符合破损稳性要求以及2008年IS规则的适用部分。由于GM值过大会引起大的加速度, GM应如2008年IS规则的3.7.5所示, 不宜超过船宽的3%

Ships carrying timber deck cargoes should meet the damage stability criterion and the applicable requirements as set out in the 2008 IS Code. As exceptionally large GM values could lead to excessive accelerations, the 2008 IS Code indicates in Chapter 3.7.5 that the metacentric height should preferably not exceed 3% of the breadth.
- 3

整个航次中应按最不利状况核算船舶稳性

The ship's stability should be calculated considering the least favorable condition.
- 4

计算静稳性力臂GZ时, 可以计入木材甲板货入水体积的75%的浮性, 即木材甲板货的渗透率为25% (渗透率为甲板货所占体积中的空档的百分比)

The calculation of GZ may allow account to be taken of the 75% buoyancy of the deck cargo assuming that. such cargo has a permeability of 25% of the volume occupied by the cargo.
- 5

同时应考虑船期国、港口国对木材甲板货运输的稳性要求

The stability requirements on carriage of timber deck cargoes by the flag state and port states should also be taken into account.

Calculation of Stability
稳性估算和测试方法

摇摆试验(ROLLING TEST)
Test and assessment of stability

摇摆试验测得的GM值相比通过木材的重心高度计算出的GM值更接近实际稳性值, 所以木材甲板货运输通常在完货前通过摇摆试验来测算GM值。

具体方法: 当甲板木材装至计划装载量的80%左右和接近结束时, 各进行一次。用两部克令吊吊起一捆原木至离码头(或水面) 高度约3-4米时停下, 准备好秒表, 听从口令同时快速落下, 船舶开始横摇, 测出5个完整摇摆的时间, 即为摇摆周期。测得摇摆周期T后, 查稳性计算书中摇摆周期曲线图, 以吃水和周期为引数, 查出未经自由液面修正的初稳性值GM₀, 也可按照以下公式计算求得。

The GM value determined by means of a rolling period test is often more accurate than the value calculated from the height of centre of gravity, and therefore a rolling period test is often performed before completion of loading of the timber deck cargoes.

The test can be performed in the following way: perform two times – one when 80% of planned cargoes are loaded and another one upon the completion of loading. The vessel should be made to roll by lowering a bundle of lumber from 3-4 metres above the water or the quay at one side of the ship. The time should be taken by means of a stopwatch which it takes the vessel to go five complete oscillations (T). Having calculated the T seconds, the initial stability GM₀ can be checked in the rolling period table by referring to the draughts and T seconds, or be calculated from the following formula:

$$GM = \left(\frac{C \times B}{T_0} \right)^2$$

式中:

-- T为实测摇摆周期 (单位S)

-- C为系数, 一般取0.7-0.8

-- B为船宽 (M)

-- GM稳性高度 (M)

Where:

-- T = time for a full rolling period in seconds;

-- C = factor for the rolling period, value between 0.7 – 0.8;

-- B = breadth of the ship in metres;

-- GM = metacentric height in metres.

34

同时可利用以下公式计算出剩余木材装船后的初稳性高度

And the ship's initial metacentric height after completion of rest cargo loading can be calculated from the formula:

$$GM_1 = GM + \frac{P \times (KG - KP)}{\Delta + P}$$

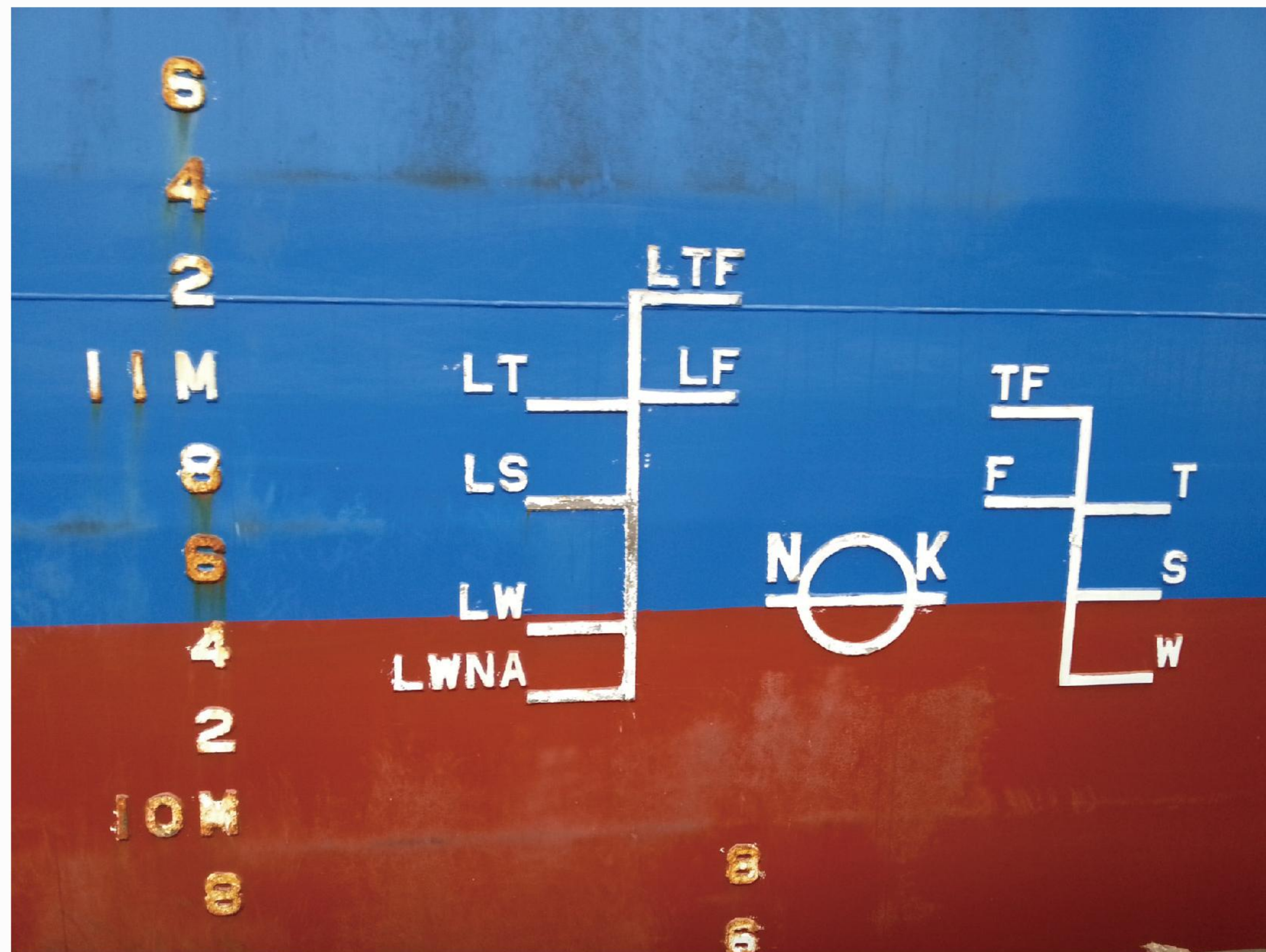
式中/Where:

P为剩余货物重量/P = mass of the rest unloaded cargo;

KG为装载剩余货物前船舶重心高度/KG = the original height of the centre of gravity before loading the rest cargo;

KP为剩余货物重心高度/KP = the height of the centre of gravity of the rest cargo;

△为船舶装载剩余货物前排水量/KG = the original displacement before loading the rest cargo.



GM值不足的情形

Situations where the GM value can be inadequate

装货时由于吊重、货物不均匀或装载机械移动导致船舶突然向一侧倾斜;

船舶在移泊或离港作业中,拖轮在一侧顶推、拖带时,船体即出现较长时间的横倾而难以复原;

操舵转向时,船体发生明显倾侧并回复缓慢;

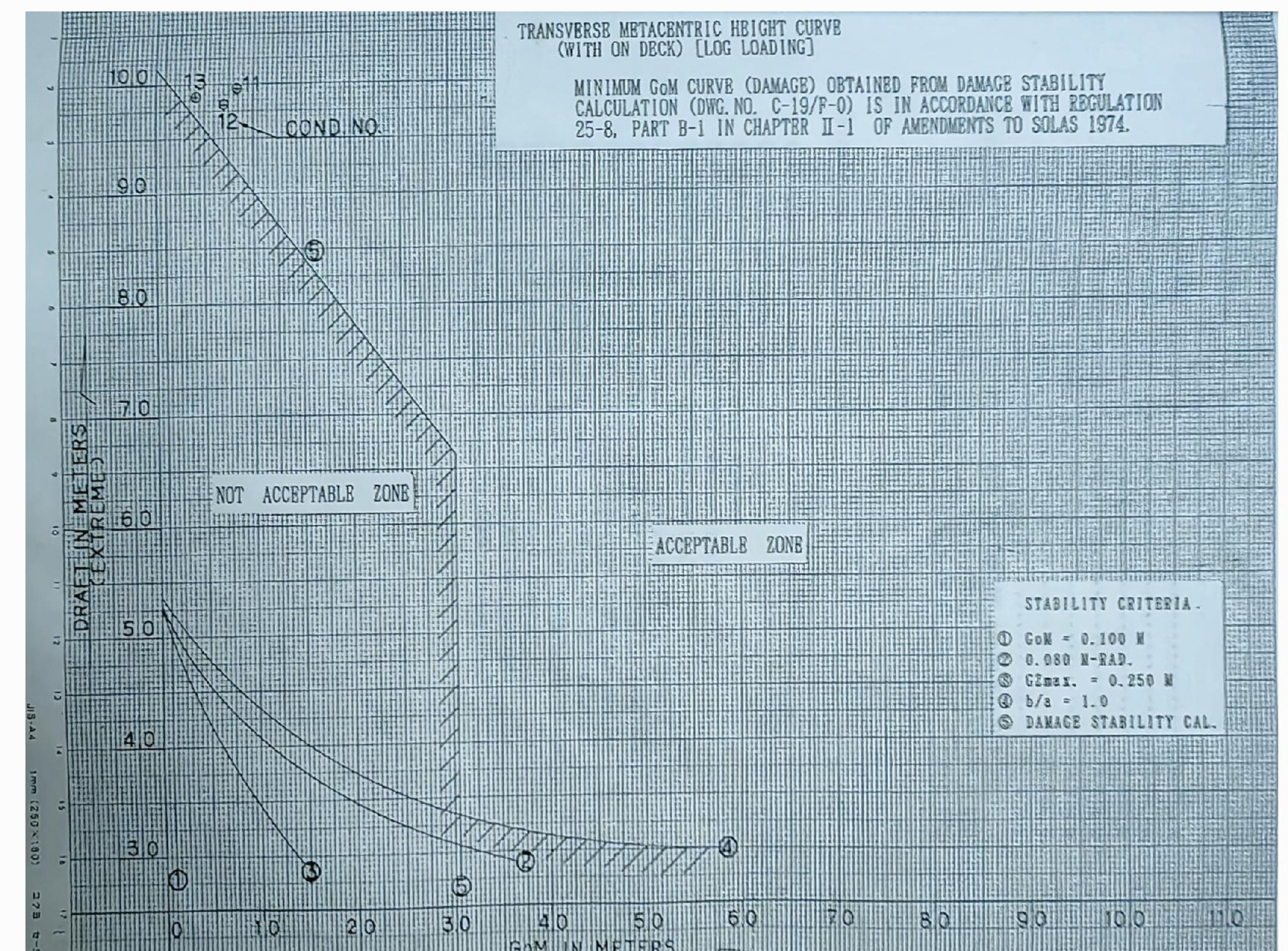
航行途中受较小横风时就发生明显的倾侧,且横摇缓慢,待风停止后才缓缓回复。

The ship suddenly tilts to one side during loading due to weight lifting, unbalanced rest cargo weight or movement of loading equipment.

The ship heels and can hardly return to the upright when tugs are involved in its berth shifting or departure.

The ship lists and slowly return to the upright when maneuvered to turn.

When encountering small crosswinds during navigation, a significant tilt occurs and the roll is slow. It only recovers slowly after the wind stops.





积载要求

Stowage

良好的木材积载既利于多装货物，也利于绑扎系固，同时保证维持适度的稳性和强度

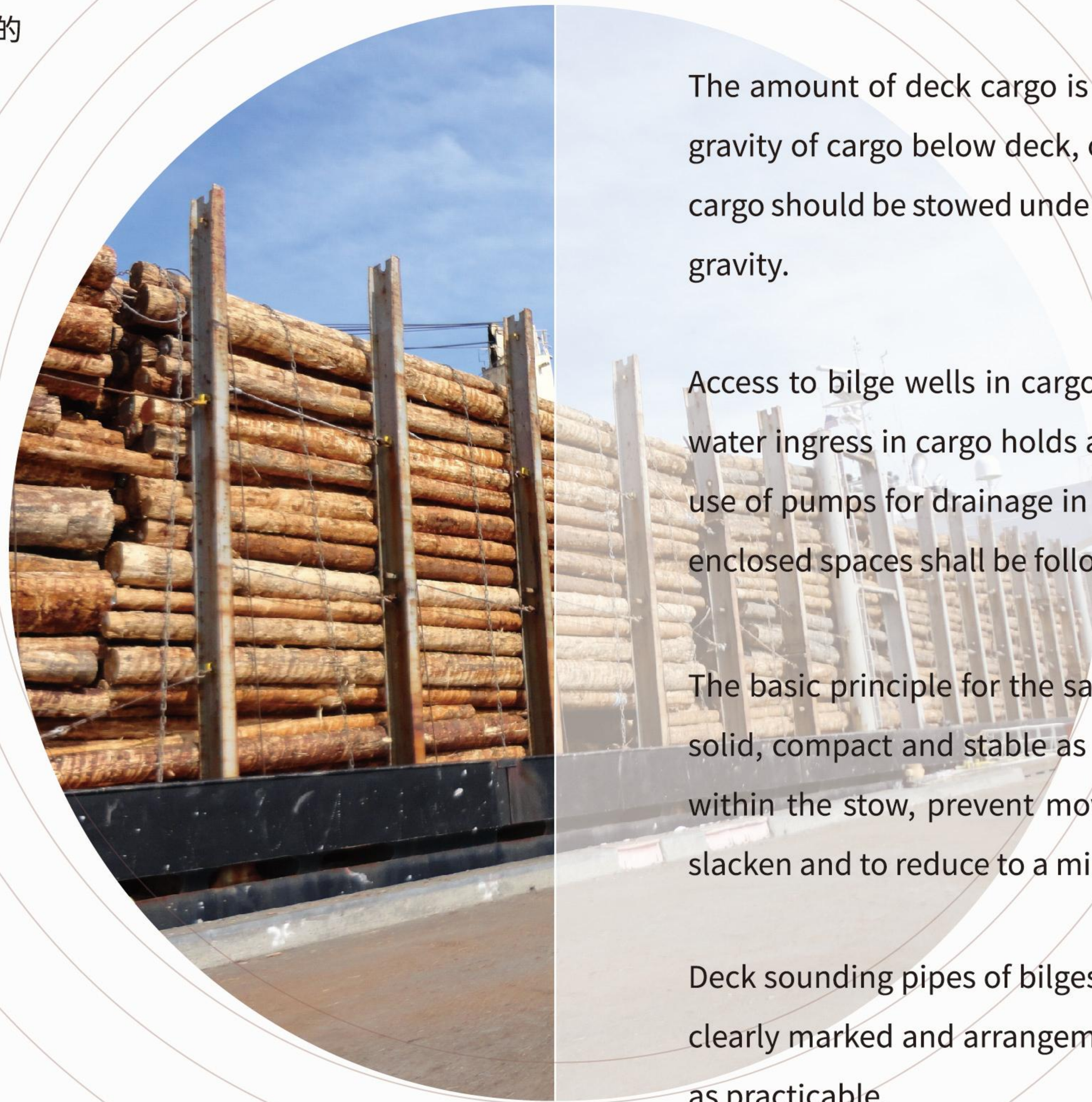
装货期间，值班驾驶员须亲临现场监督装货，以保证货舱内的货物堆装整齐密实，充分利用舱容，减少亏舱，以达到把尽量多的货物装在舱内的目的；

舱内原木的装载量及垂直重心高度将支配和决定甲板木材的装载量，通常甲板货量是舱内货量的1/2，所以应在舱内装载尽量多的货物，并遵循下重上轻的原则；

货舱内后部下舱梯子应留出空间及至污水井通道，供航行途中下舱检查、清理污水井杂物，以及在货舱进水紧急情况下放置潜水泵排水。（下舱需严格遵守密闭舱室进入程序）；

安全运输木材甲板货的基本原则，是使货堆尽可能密实、紧凑和稳定，在货堆内产生约束效应，以防止因货堆的移动造成绑索松弛，并最大限度降低货堆的渗透率；

甲板上各污水井、压载舱、油舱和淡水舱测量孔应清晰标识，并明确告诉工头需留出的测量通道；



Proper stowage of lumber allows loading of more cargoes and effective securing while ensures adequate stability and strength.

The OOW should personally keep watch on the loading operation to ensure maximum utilization of hold spaces and that as many cargoes as possible can be compactly stowed within cargo holds.

The amount of deck cargo is determined by the amount and the height of centre of gravity of cargo below deck, often in a proportion of 1 to 2, and therefore the timber cargo should be stowed under deck as far as practicable in order to lower the centre of gravity.

Access to bilge wells in cargo holds bottom should be provided in order to monitor water ingress in cargo holds and clean clogged bilge well during the voyage and the use of pumps for drainage in the event of water ingress (procedures of entrance into enclosed spaces shall be followed at all times).

The basic principle for the safe carriage of timber deck cargo is to make the stow as solid, compact and stable as practicable. The purpose is to produce a binding effect within the stow, prevent movement in the stow which could cause the lashings to slacken and to reduce to a minimum the permeability of the stow.

Deck sounding pipes of bilges as well as ballast, fuel and fresh water tanks should be clearly marked and arrangements should be made that access to these remain as far as practicable.



甲板上的装载应纵向从头到尾连续装, 不要因有各舱桅房而隔断, 以最大程度利用甲板空间, 且有利于原木的加固绑扎;

尽可能将较长的原木紧贴舷边立柱装载, 以能跨接三根或以上立柱为佳;

甲板货的积载应留出往来于指定脱险路线和船舶操作的重要处所 (机器处所和船员住处等) 的通道以及安全设备、消防设备和测深管的通道;

最上层木材应尽可能平整, 为有利于木材的加固绑扎, 船中部位的木材可适当高于两舷侧木材高度, 并成平滑弧形状态。应避免任何纵向的横截面出现“两舷高中间低”的装载状态;

甲板货物的高度应满足:

SOLAS公约第V章第22条“驾驶室可视范围”的规定;

木材甲板货的重量应不超过露天甲板和舱盖的设计最大允许负荷;

IMO公约规定在冬天位于季节性冬季区内的船舶, 木材甲板货在露天甲板以上的高度不应超过船舶最大宽度的1/3;

稳性满足规范要求及船舶最低安全稳性要求。



Continuous deck stow from stem to stern should be ensured to make the best of deck spaces and to facilitate effective lashing and securing.

As far as practicable, longer wood should be stowed in the outer rows next to the uprights, preferably be supported by at least three uprights.

Deck cargo should be stowed so that access is provided to and from designated escape routes and spaces essential to operation of the vessel, such as machinery spaces and crew's quarters, as well as to safety equipment, fire-fighting equipment, and sounding pipes.

The top layer should be as flat as possible to ensure effective lashing and securing. Deck cargo on both sides can be moderately lower, not higher, than the stow along the centreline of the ship.

Deck cargo should be stowed at a height in accordance with applicable requirements:

Solas chapter v regulation 22 (navigational bridge visibility);

Cargo weight shall not exceed the designed maximum permissible loading on weather decks and hatch covers;

According to the imo convention, 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 weatherdeck should not exceed one third of the extreme breadth of the ship;

The stability of ship should be positive and in compliance with the minimum requirements.



绑扎要求

Securing

- 1 船舶装运木材甲板货应熟悉并能严格按《货物系固手册》和《木材系固布置方案》要求进行绑扎系固;
- 2 所有绑扎索具均应符合系固手册的要求,并保存有检验标记和相关证书;
- 3 专用木材船的绑扎系固工作可参照船上的“木材系固布置方案”来确定系索的生根、走向以及其他绑扎器材的设置,且要考虑每一系索都应从甲板木材上绕过,尽量做到系索在整个货堆顶部与木材有效接触,使系索收紧时能把木材压住绑牢;
- 4 每一系索均应配备收紧装置或系统(如收紧花兰螺丝、滑轮组合等)。其放置位置应使其能安全有效地收紧该装置或系统;在张紧和初步系固后,张紧装置或系统的螺杆的剩余螺纹长度应不少于一半或剩余张紧能力不少于一半,以供以后使用;
- 5 系索的间距:如果木材的长度较短,系索的间距应作适当调整。要做到每根木材最少有两道系索约束;
- 6 木材甲板货的系固一般包括立柱、中绑钢丝系固、封顶系固、以及波形钢丝系固,船舶根据不同木材的特点及装载的具体情况,应选用适当的系固方式,或由以上系固方式组成系固系统。系固方式不排除已为实践检验有效的船员通常做法:

- 1 The timber deck cargo should be stowed and secured according to the ship's cargo securing manual and lashing plans.
- 2 All lashing equipment should be tested, marked, and certified as per the requirements of the cargo securing manual.
- 3 Lashing and securing of timber deck cargoes should be carried out according to the lashing plan, which determines the type of lashing arrangements and fitting of lashing equipment. Take into account that every lashing should pass over the timber deck cargo and be installed in such a manner as to be in contact with the cargo as far as practicable throughout its full height and to secure the stow when tightened.
- 4 Every lashing should be provided with a tightening device or system (turn-buckles, shackles...) so placed that it can safely and effectively operate when required. Upon completion and after the initial securing, the tightening device or system should be left with not less than half the threaded length of screw or of tightening capacity available for future use.
- 5 The spacing of the lashings should be reduced as necessary to suit the length of timber. Each log should be secured by at least two lashings.
- 6 Lashing arrangements for timber deck cargoes generally include the use of uprights, hog lashings, top-over lashings, and wiggle wire lashings. Arrangement with one or more of the lashings should be determined by factors such as the character of the timber carried and the stowage plan, with crew experience and common practice taken into consideration.



中绑钢丝 系固

铺设在甲板货堆中间和/或四分之三处呈“S”型走向连接左右舷立柱用于在整个货堆中产生尽可能均匀的张力,从而在各立柱上向舷内产生拉力。中绑钢丝铺放时不宜拉得太紧,再堆放其他原木时可自行收紧。

HOG LASHING

Should be installed in the middle and/or at approximately three quarters of the height of the stow, the hog wire should be rove through a padeye and shackle attached to the uprights at this level so as to run transversely, connecting the respective port and starboard uprights. The hog lashing wire should not be too tight when laid so that it becomes taut when overstowed with other logs.

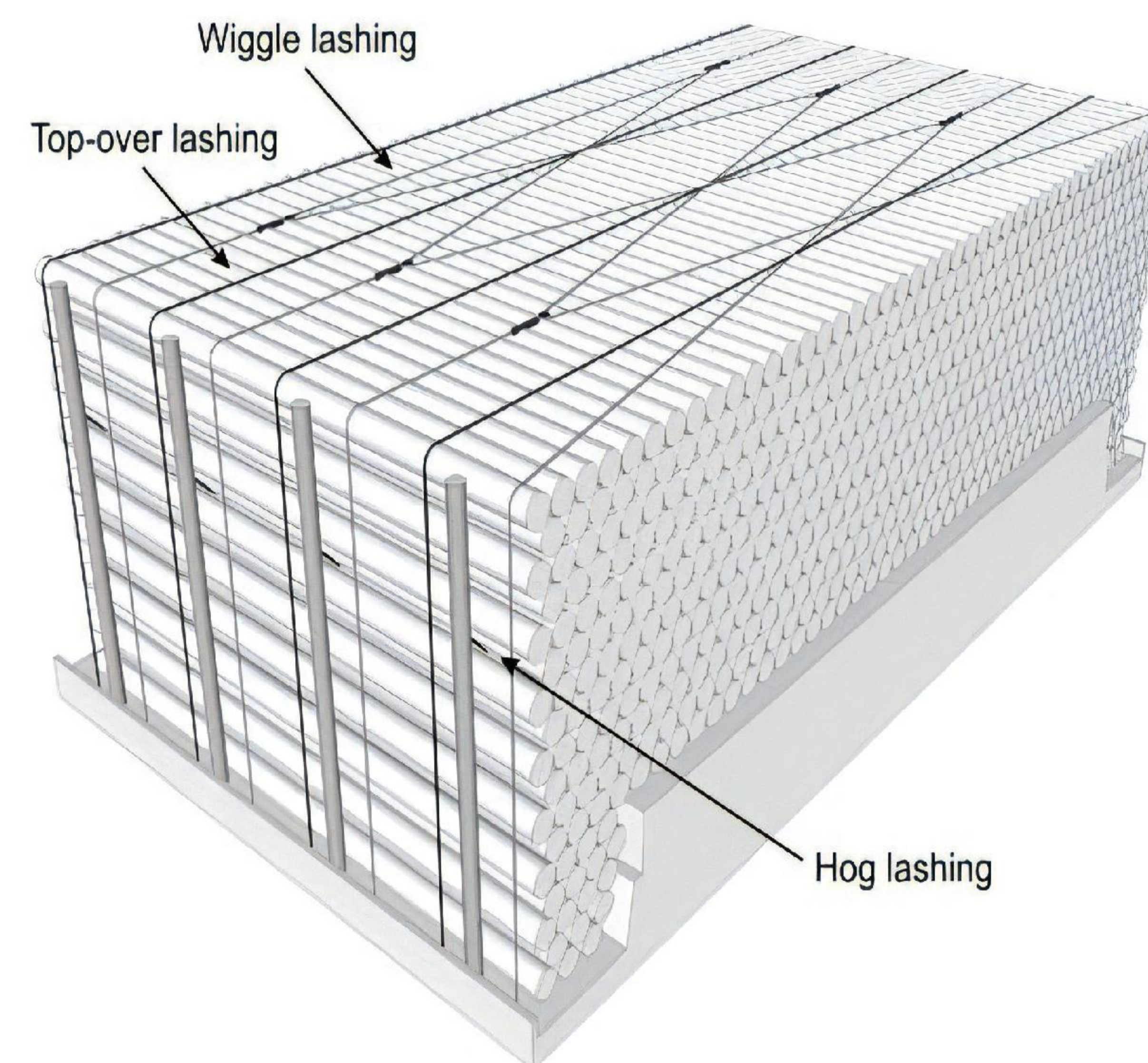


封顶系固

每一系索上安装松紧花兰螺丝,以便在海上张紧系索。系索间距要求不超过1.5米,如配合波形钢丝,系索间距可增加到不超过3米。

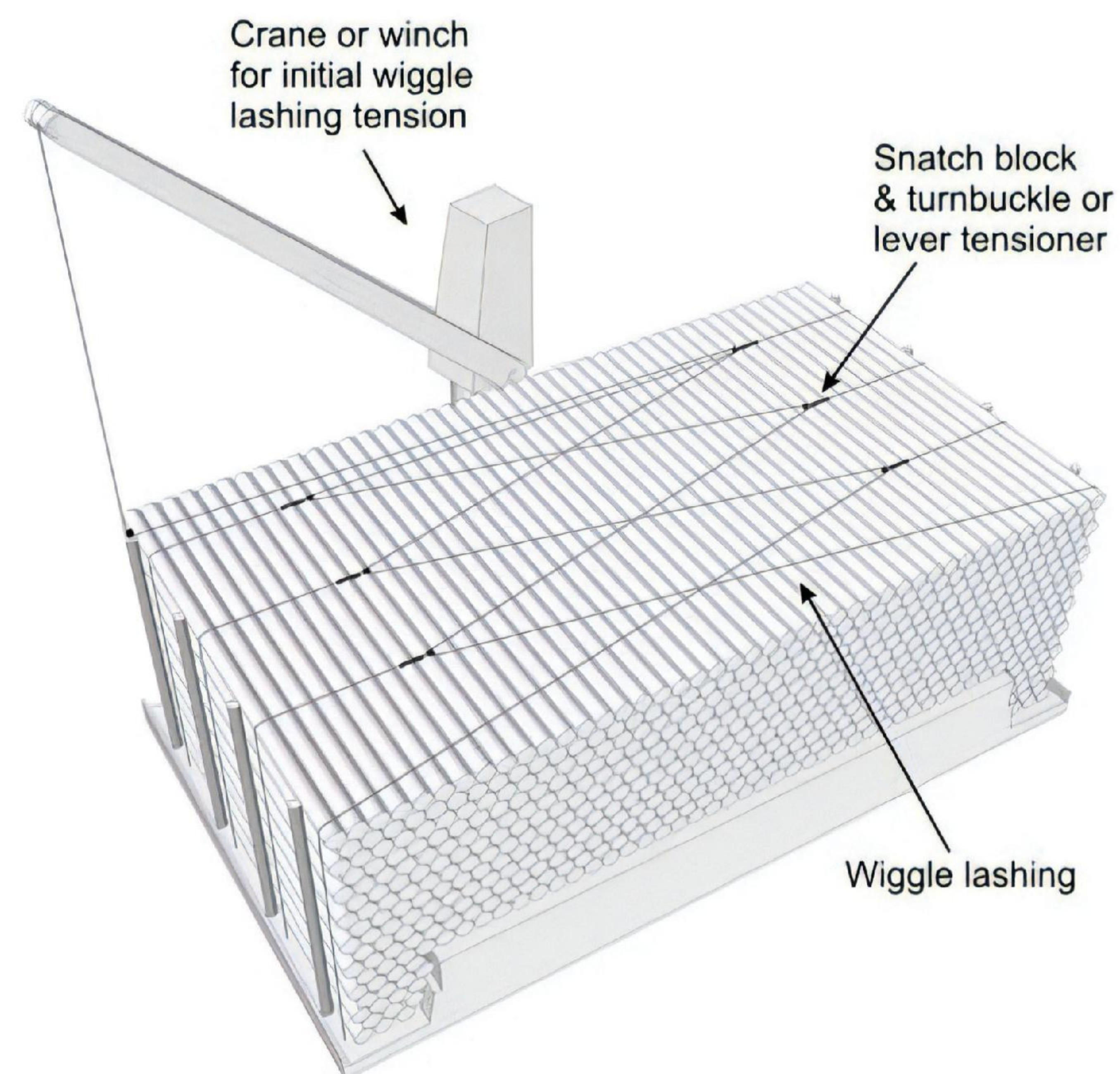
TOP-OVER
LASHING

Turnbuckles should be installed on all lashings so that they can be tightened during the voyage as needed. The spacing between top-over lashings should be maximum 1.5m and maximum 3m if used in combination with wiggle wire lashings.



波形钢丝 系固

所有底索和波形钢丝之间附设滚轮卸扣，每侧（左、右舷）波形钢丝和底索之间至少连接两个松紧花兰螺丝，以便使系固在整个航程保持收紧。



WIGGLE WIRE LASHING

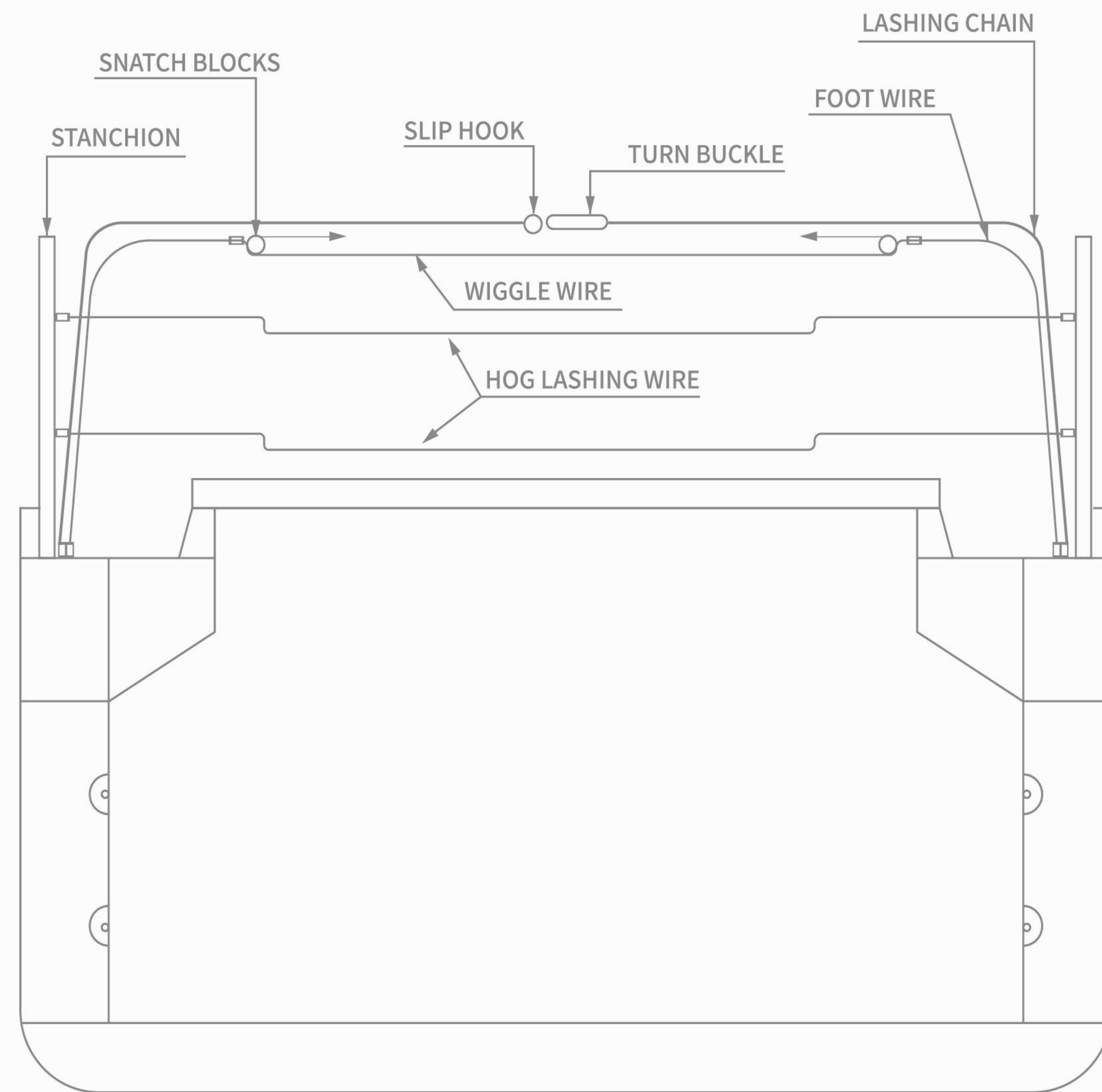
Roller shackles should be affixed between all foot wires and at least two turnbuckles should be fitted between the foot wire and the wiggle wire on each side (port and starboard) to keep the lashings tight at sea.





7 绑扎完成后，主管船员需亲自检查确认绑扎情况，在得到满意结果前，船舶不得离港；

8 如果多港装卸，应确保港口间航行期间甲板货物也按系固手册得到良好的系固。



7 Upon completion of cargo securing, a thorough inspection should be carried out by the officer in charge and the ship shall not sail until he confirms a satisfactory condition.

8 If the cargoes are to be loaded/unloaded in several ports, make sure the cargoes are secured in accordance with the cargo securing manual when sailing between the ports.



装前管理

Pre-loading operation



- 1 船舶装载前,应要求托运人按SOLAS公约第VI章第2条和IMSBC规则第4节要求的资料,以及航运惯例提供详细的货物资料如货物总量、积载因数、密度、典型尺寸等;
- 2 仔细研究货物资料,根据《木材甲板货运输船的安全操作规则》和船舶《货物系固手册》规定的货物妥善积载、系固和安全运输所需的预防措施。并核算稳性和强度在整个航程保持在规定限度内;
- 3 装载前,应让装卸公司知晓船舶《货物系固手册》关于木材甲板货积载和系固的具体要求;
- 4 根据系固计划和《货物系固手册》仔细检查货物系固设备,发现有缺陷的设备应及时修理或更换;清点,活络及用油漆标识不同用途的绑扎锁具;并按照不同的用途要求分散摆放和安装各种钢丝和锁具,切记绑扎钢丝不可涂油;



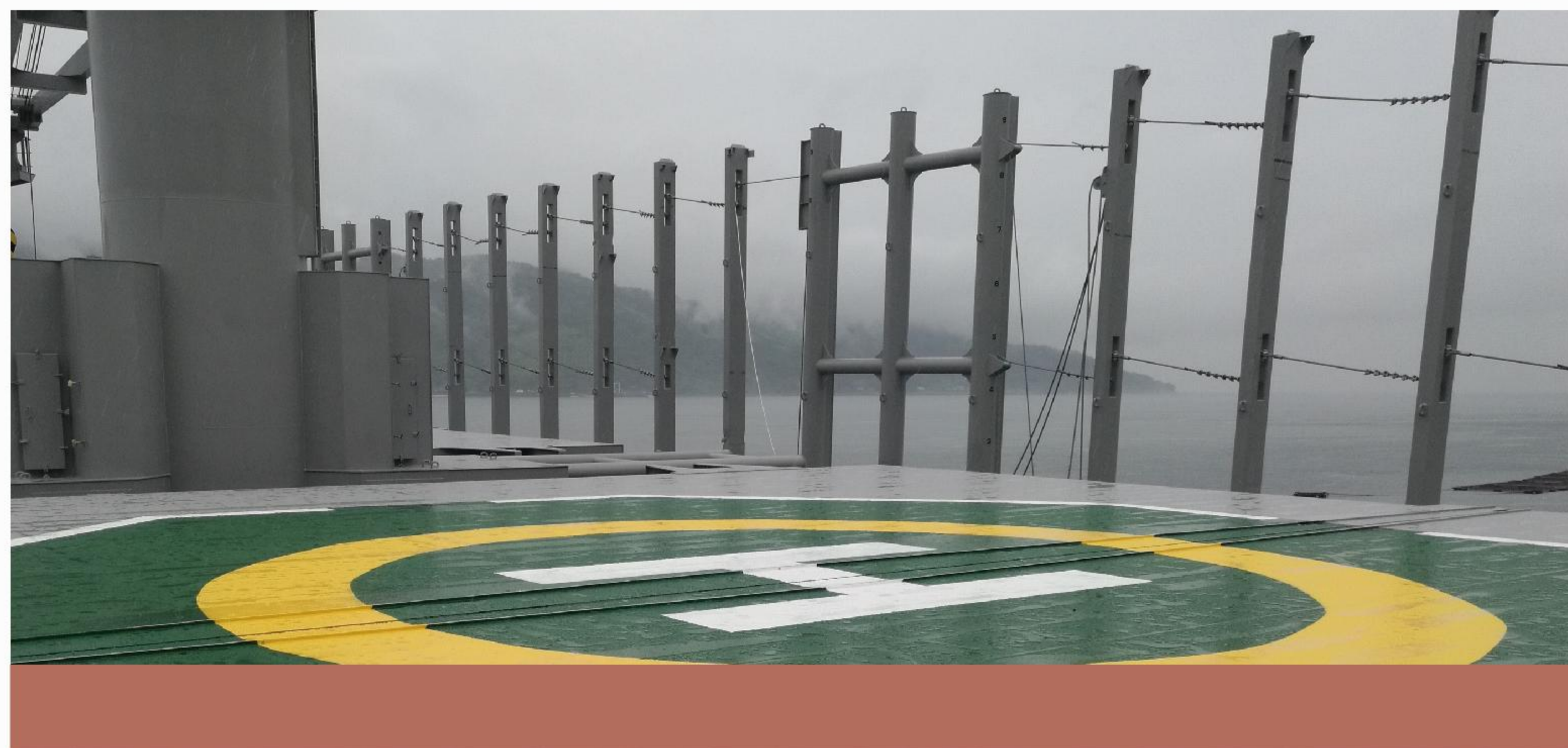
- 1 Prior to loading the vessel, relevant cargo information, including the total quantity, the stowage factor, the bulk density, and typical size of the cargo, as required by SOLAS Chapter VI, regulation 2 and Section 4 of the IMSBC Code, should be provided by the shipper, according to the custom of the trade.
- 2 The master of the vessel should study the relevant cargo information and take the precautions necessary for proper stowage, securing and safe carriage of the cargo as defined in the TDC Code and as prescribed in the vessel's cargo securing manual, and ensure the ship's stability and strength are within prescribed limits throughout the voyage.
- 3 Prior to loading, the stevedoring company should be made aware of specific requirements according to the ship's cargo securing manual regarding stowage and securing of timber deck cargoes.
- 4 Cargo securing equipment should be examined in accordance with the lashing arrangement and the ship's cargo securing manual, and any defective equipment found should be removed from service, tagged for repair and replaced. Lashing equipment for different purposes should be checked, marked with paints, and separated for use. Make sure the lashing wires are not lubricated.

5 露天甲板的任何区域装载木材甲板货前, 应确认:

舱口盖和该区域以下处所的其他开口都应牢固关闭并用压条封住;
有效保护空气管和通风筒, 并检查止回阀或类似装置以确定其防水有效性;
甲板上可能妨碍货物积载的物体应移除, 并在适于堆放处安全系固;
如设有增大摩擦的装置, 应核查其状况;
该区域的积冰和积雪应消除;
通常最好在该特定区域装载前, 使所有甲板绑索、立柱等处于随时可用状态;
应详查甲板上的所有测深管, 并尽实际可能作好安排保留其通道。

Before timber deck cargo is loaded on any area of the weather deck:

Hatch covers and other openings to spaces below that area should be securely closed and battened down;
Air pipes and ventilator should be effectively protected and check-valves or similar devices should be examined to ascertain their effectiveness against entry of water;
Objects which might obstruct cargo stowage on deck should be removed and safely secured in places appropriate for storage;
The condition of friction-enhancing arrangements, where fitted, should be checked;
Accumulations of ice and snow on such area should be removed;
It is normally preferable to have all deck lashings, uprights, etc., readily available before loading on the specific area;
All sounding pipes on the deck should be reviewed and arrangements made that access to these remain as far as practicable.



6 合理编制压载水压排计划, 应确保所有液舱均保持在自由液面最大限度减少的状况。并尽可能在开航前完成所有压载水的操作;

The master should properly develop the ballast water management plan and ensure that all tanks are maintained in such a condition that free surface effects are minimized. Ballast tanks should as far as practicable be either full or empty, and ballasting operations should be completed as far as possible before sailing.

7 提前收集航经海域气象预报, 合理编制航行计划。

The master should gather weather information and plan the voyage accordingly so as to avoid potential severe weather and sea conditions.



装卸管理

Loading and unloading



1

加强值班和巡视,督促工人按配载计划和良好工艺进行装卸,如发现有任何不符合情形、违规操作或损坏发生,及时交涉和/或通知相关各方,并要求签署确认;

Keep up watchkeeping and inspections on cargo operations to ensure that the stevedores load and unload cargoes in accordance with the ship's stowage plan. In the event of any negligence or violation of rules that can cause damage, negotiate with and/or notify the relevant parties immediately and demand a signed acknowledgment.

2

装货期间,如发现原木重击船体及舱内各管路等设备时,应及时检查是否损伤。舱内装完后,应再次检查确认船体结构、管路等状况良好,并对每一舱污水井再进行测量,以确实了解船舶水密性的完整状态;

If timber cargoes are found to have crashed with the hull or with the pipelines or other cargo hold structures during loading operations, ascertain if there is any damage at once and carry out examinations again upon completion of loading, and hold bilges should be sounded to test the ship's watertight integrity.

3

装货期间,如木材从水中吊装进舱,需保持监测舱内污水井,向外排放舱内污水需满足港口防污染规定;

If the timber cargoes are to be loaded into cargo holds from the water, carefully watch the hold bilges, and discharge the bilge water complying with applicable pollution prevention requirements of port authorities.

4

如木材通过驳船装船,需注意监控驳船碰撞船体的情况;

If the timber cargoes are to be loaded from barges, carefully watch the barge's contact with the ship's hull.

5

若使用船吊进行装卸作业, 装卸期间应加强对吊货设备的检查, 保证吊货设备的工况良好;

If deck cranes are to be used during loading and discharging operations, the equipment should be examined to ensure good working conditions.

6

装货过程中, 大副应每天做好水尺计量, 获取装货重量, 并根据岸上提供的货物体积计算粗略的积载因数, 以估算货舱内的可装货数量; 货舱内的货物装完, 应根据水尺计量的重量和岸方提供的装货数量, 再次计算积载因数, 并根据甲板装货的最大高度及甲板容积概算出甲板可装货重量;

Draught checks should be regularly carried out during the course of loading and stowage factor (SF) of the cargo should be calculated according to information provided by the shipper to estimate the volume of cargo that can be loaded in hold spaces. SF should be calculated again upon completion of cargo loading in the holds to estimate the weight of cargo that can be loaded on deck.

7

根据卸货计划, 仔细编制解绑流程。在没有准确进港卸货计划之前, 不可把所有的绑扎系索全部解掉, 尤其是在经常受台风影响的港口或锚地不遮蔽的港口;

Prepare cargo unlashng procedures carefully according to the discharge plan. Do not remove all the lashings secured to the cargoes if a discharge plan is not determined upon arrival, especially when berthing at ports that are vulnerable to the effects of typhoons or at an unsheltered anchorage.

8

卸货舱木材前, 要对货舱进行充分通风, 没有确认安全前, 应严控货舱出入口通道, 避免密闭舱室事故的发生;

Cargo holds loaded with timber should be properly ventilated before discharging, and access to holds should be controlled unless the spaces are secured for entry.



9

装卸货时,应均匀装卸,以保持船舶正浮,应防止横倾过大;

Make sure that the cargo is evenly loaded/unloaded to maintain the ship's positive buoyancy and to prevent a list during the operations.

10

卸货完毕后,应尽早组织船员对船体结构进行一次全面检查,以便及时发现船体结构被损坏的情况。

A complete examination on the hull structure should be carried out upon completion of the discharge operation so that any damage to the ship's hull can be reported immediately.



航行管理

During the voyage



1 应每天两次测量油水舱、货舱污水井, 以便尽早发现进水等异常情况;
Soundings of cargo hold bilges, fresh water and oil tanks should be carried out twice a day in order to find out signs of water ingress in early stages.

2 船舶航行期间, 由于震动和摇摆等因素会使甲板货物下沉, 导致绑扎钢丝/链条变得松弛, 所以保持对绑扎的检查和紧固非常重要。对绑索的所有检查和调整都应录入船舶的航海日志;
Since vibrations and working of the ship will cause the cargo to settle and compact, lashing equipment should be regularly examined and retightened and all such operations should be recorded in the ship's log.

3 航行期间每天至少一次测算船舶摇摆周期来核算船舶的稳性并记入航海日记。如发现稳性变化较大时, 尤其是当稳性明显变小时, 应给予高度重视, 认真查找原因并及时采取相应的应对措施;

The rolling period of the ship should be checked at least once every day to establish that the metacentric height is still within the acceptable range and notes should be kept in the ship's log. Whenever there is a drastic change, especially reduce of stability during the voyage, causes of such change should be identified with prompt measures taken.



4 注意观察船舶的横倾情况,遇到船向一侧倾斜,应马上查清原因。根据不同原因及时排除:

If a list occurs that cannot be attributed to normal use of consumables the matter should be immediately investigated. This should consider that the cause may be due to one or more of the following:

货物移位:甲板木材大幅度移位,易于发觉,甲板货的小幅移位或舱内货移位不易觉察。可调整航向航速减轻船舶摇摆后再对移动部分的木材进行绑扎加固处理,防止货物移动加大,危及船舶安全。要慎重采用以加压载水或转移压载水及燃油的办法来减少和校正货物移位造成的船舶横倾;

Cargo shift: major shift of the deck cargo can be apparent while slight shift of deck cargo or cargo below deck is not likely to be noticed. Lashings should be retightened on the moving cargo when the list is corrected by means of reducing speed or altering course. Be prudent to correct the list by ballasting and transferring of oil or water.

进水:通过对各油水舱进行测量可迅速确定进水的可能性和部位,及时排水并采取措施控制进水;

Water ingresses: the possibility of water ingress can be determined by sounding throughout the vessel. All available pumps should be used to drain water and to bring the situation under control in the event that unexplained water is detected.

负稳性横倾角:如果横倾之前,发现船舶摇摆格外慢,船舶徐缓地恢复至正浮位置,说明这时船舶的稳心高度很小或已为零,横倾原因是已没有复原力臂。这时应先向船舶最低处的一个舱内压水或把高位的油水移到双层底舱,如必要,可在船的上部卸载部分木材甲板货。利用压载或卸载纠正横倾时应特别谨慎,要防止造成船舶向另一侧更大的横倾;

An angle of loll (inadequate GM): if the ship rolls and slowly returns to the upright position, it means that the ship's GM is very low or is further reduced to zero, and a list will occur if there is no positive righting arm to bring the ship back upright. Then the tank on the lower side of the ship should be ballasted, or shift liquid to the double bottom tank, and release some deck cargo on top if necessary. Beware that a greater list may rapidly develop to the opposite side if ballast has been shifted to counteract the list.



5 航行期间船长应及时接收气象预报, 避开潜在的恶劣气候和海况。当遭遇恶劣天气时, 船长应根据本船的实际情况适当调整航向、航速, 除应提前对安全设备、应急设备、船体结构、压载状况、锚及锚链设备等进行检查外, 还应对水密门、舷窗、货舱舱口、人孔道门以及所有通风筒等设备进行严格检查; 同时对稳性进行仔细核算, 必要时提前调整压载水, 以减小自由液面和增加GM值, 以便最大限度地减小货物、系固系统的受力; 在恶劣气候中的船舶驾驶可参考IMO通函MSC.1/Circ.1228《经修订的船长在不利气象条件和海况下避免危险状况的导则》;

The master should obtain weather forecast information during the voyage and avoid potential severe weather and sea conditions. In cases where severe weather and sea conditions are unavoidable, the Master should be conscious of the need to reduce speed and/or alter course at an early stage. Examination should be carried out on the ship's safety equipment, emergency equipment, hull structure, ballast condition, anchoring equipment, as well as on watertight doors and hatches, portholes, manhole covers and ventilators. Assess the ship's stability carefully and adjust the ballast to minimize free surface while providing adequate GM. MCS/Circ.1228 Revised guidance to the master for avoiding dangerous situations in adverse weather and sea conditions should be taken into consideration for navigation in unfavorable conditions.

6 如果通过投弃甲板货来修正横倾是所有其他选项都已用尽时的最后手段, 应注意人员和螺旋桨的安全, 并及时将执行投弃程序的地点和对航行的预估危害立即报告沿海当局。同时船长应以其能使用的一切手段将有关对航行的直接危险的信息向附近船舶发布。

As a final resort when all other options have been exhausted if the list is to be corrected by jettisoning deck cargo, safety of the personnel and integrity of the propeller should be considered. The position of the jettisoning procedure and estimated navigational hazard must be immediately reported to coastal authorities, and such information on a direct danger to navigation should be communicated by the master by all means at his disposal to ships in the vicinity.



保养检查

Maintenance and examination



1 专用的木材系固设备需按系固手册定期检查保养,及时换新损坏和锈蚀严重的设备,特别是绑扎钢丝如中绑钢丝、地脚钢丝、封顶钢丝受木材和卸货机械挤压易变形和损坏需特别注意;

Regular inspections and maintenance should be carried out on lashing equipment that are specially used for securing timber deck cargoes in accordance with the cargo securing manual, and damaged or corroded equipment should be replaced immediately. Special attention should be paid to hog wires, foot wires and top-over lashings which can be easily deformed under stress.



2 检查、确定船体结构和设备存在的问题并及时进行整改对木材船的安全至关重要。船上应根据体系要求和PMS保养计划规定,在每次卸完木材后、保养周期以及装运木材前,对货舱、舱盖、主甲板、立柱等设备和场所进行全面仔细检查;

It is of paramount importance for the safety of ships carrying timber deck cargoes that issues related with the ship's structure and equipment are identified and rectified without delay. Inspections should be carried out on cargo spaces and cargo securing equipment (holds, hatches, uprights, the main deck...) before loading and after discharging and each periodic maintenance, in accordance with requirements of the SMS and PMS.



3 木材船货舱的水密不应被疏忽，在装运前需对舱盖、舱内设备进行详细检，特别是舱盖的水密性，避免流水槽和流水阀被堵住，舱盖的压紧螺丝不应因装有甲板货而被疏忽。同时确认货舱排水系统正常，并备有污水井被树皮等杂物堵住时的应急排水计划；

Watertight integrity of cargo holds should never be overlooked. Hatch covers and cargo hold systems should be examined prior to loading to ascertain their effectiveness against the entry of water. Make sure drainage channels and valves are not blocked and hatch cover cleats should be tightly fastened. Check the bilge system for effectiveness and prepare ship flooding emergency procedures in case bilges are clogged by barks and other wastes.

4 货舱内的油漆保护涂层也会因木材撞击破坏使钢板直接暴露在腐蚀环境中，加上在长时间的航行途中货舱内部始终处于高温、潮湿状态下，从而易导致货舱内结构设备如肋骨、横舱壁、内地板、舱壁等的严重腐蚀，出现结构损坏。应对损伤部位及时维护和保养，以避免安全事故发生；

Cargo hold coatings may also be damaged by the impact of timber cargoes, leading to the exposure of steel plates to high temperature and moisture during the long period of the voyage and cargo hold structures including hold frames, bulkheads, and inner bottom, may be severely corroded. Early and proper maintenance should be in place to prevent further safety hazards.

5 装运木材前应全面仔细检查船上起货设备，保证各关键设备（钢丝、滑车、钩头、液压机械设备等）处于良好的状况，同时符合装港的特殊要求（特别是美国、加拿大、澳大利亚和新西兰的港口），并按要求备足备件。避免和减少设备损坏、延误和危及人员安全的事故发生：

Before loading timber, the ship's lifting equipment should be carefully inspected to ensure that all key equipment (wires, sheaves, hooks, hydraulic equipment, etc.) are in good condition and are following the special requirements of the loading port (especially for the ports of the United State, Canada, Australia and New Zealand), and that sufficient spare parts are available as required. In order to reduce damage to such equipment and prevent safety hazards:

吊货钢丝/千斤钢丝：磨损、断丝、锈蚀及变形情况超过厂家说明书要求，及时更换；

Hoisting/Luffing wires: should be replaced in time if there is any wear and tear, breakage, corrosion or deformation as prescribed in manufacturer's instructions;

钩头组/滑轮组：检查活路、磨损、变形以及铭牌钢印情况，有不合格情况及时调整维护；

Hooks/blocks: check for greasing condition, excessive wear, deformation and marking, and repair or replace defective ones in time;

吊臂：无明显磕伤、凹陷、严重划伤等，如有立即申请修理并申请验船师于修理完成后检验，合格后方可使用；

Jib: check for any sign of local indentation, unfairness or scratches, repair immediately if there is any and apply for survey on the appliance upon completion of repairs. Use of the appliance should be suspended until it is tested and certified;

电动/液压机械设备：严格按PMS计划检查、保养和化验，确保工况正常。

Electric/hydraulic power equipment: carry out tests, examinations and maintenance strictly according to the PMS to confirm that such equipment is in normal operating conditions.



人员安全

Work safety

参与装载过程的人员应按船舶和港口的要求配备个人防护设备，如工作服和反光背心、安全帽、工作鞋、手套、手电筒、钉鞋、安全带、安全绳和/或防坠落器等；

Personnel involved in the loading process should be equipped with PPE i.e. reflective vest, hardhats, proper footwear, gloves, flashlight, safety harness, fall arrester blocks, etc., according to ship's and harbour requirements.



应采取一切可能的行动最大限度减少在用塑料布或油布用作罩盖时的货堆上滑跤的风险；

Personnel should exercise caution and minimise the risk of slipping when working or moving on timber packages covered by plastic wrapping or tarpaulins.

在积载高度2m及以上的货堆上工作且距无防护边缘1m以内的人员，如认为必要则应有安全带之类阻跌装备或主管机关认可的其他阻跌装置来保护其不致跌落；

Personnel working on cargo stowed at heights 2m and above, within 1m of an unguarded edge, should if deemed necessary be protected from falls with fall restraint equipment such as a safety harness or other fall restraining devices approved by the Administration.



按木材甲板货运输船舶安全操作规则第2.8.6-2.8.9的要求设置救生索和/或猫道 (Catwalk) 的安全通道，以便安全通往货堆顶部和翻越货堆；

A lifeline and/or a catwalk above the deck cargo should be fitted, in accordance with 2.8.6 -2.8.9 of the TDC Code, to provide safe access to or over the stow.



随航或卸货期间熏舱时, 要严格参照IMO关于货舱熏蒸的药物安全使用建议 (MSC.1/Circ.1264& MSC.1/Circ.1396) 和熏舱安全规定, 防止人员中毒和/或火灾爆炸事故的发生。

熏舱前应获取熏舱药剂的MSDS、安全手册, 以及熏舱的安全培训;

应确保船上配备充足的呼吸器及气体探测设备, 并且确保船员能够正确地使用这些设备;

至少两名船员 (包括一名高级船员) 进行过适当的培训, 负责在熏蒸人员向船长移交责任后, 确保舱室、机舱和其他工作空间的安全条件得到维护; 熏蒸气体浓度检查频率至少为8小时一次;

按厂商建议及时正确处理熏蒸药剂及其包装用品。磷化铝熏蒸剂是一种遇水会释放易自燃剧毒气体的物质。由其引发的火灾, 严禁用水及泡沫进行灭火。



Requirements in MSC.1/Circ.1265 & MSC.1/Circ.1396 Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds should be followed for fumigation during the voyage or during discharge of cargoes to prevent intoxication and/or fire hazards.

Acquire the fumigant's MSDS and safety manual and conduct a safety training prior to loading;

The ship should carry adequate respiratory protective and gas-detection equipment, and the crew should be trained to properly use such equipment;

At least two members of the crew (including one officer) who have received proper training should be designated as the trained representatives of the master, responsible for ensuring that safe conditions in accommodation, engine room and other working spaces are maintained after the fumigator-in-charge has handed over the responsibility to the master; and gas concentration safety checks should be carried out at least every 8 hours;

Residual fumigant material and packages should be treated and disposed of as recommended by the manufacturer. Aluminum phosphide fumigation tablets react with moisture and release toxic and flammable gas, and fire caused by such tablets should never be dealt with water or foam.



船员参与绑扎,需提前计划给予船员休息调整时间,做好船员的疲劳管理;

Provide the crew with time to rest before they engage in cargo securing to prevent fatigue.

木材不仅能消耗舱内氧气同时也会散发一氧化碳和熏舱遗留的有毒气体,进入货舱应严格遵守密闭舱室进入程序。

Procedures of entry into enclosed spaces should be followed prior to entering any closed hold that contains timber, which not only depletes the atmosphere of oxygen but also produces CO. Toxic gas from fumigation may also be present.



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