

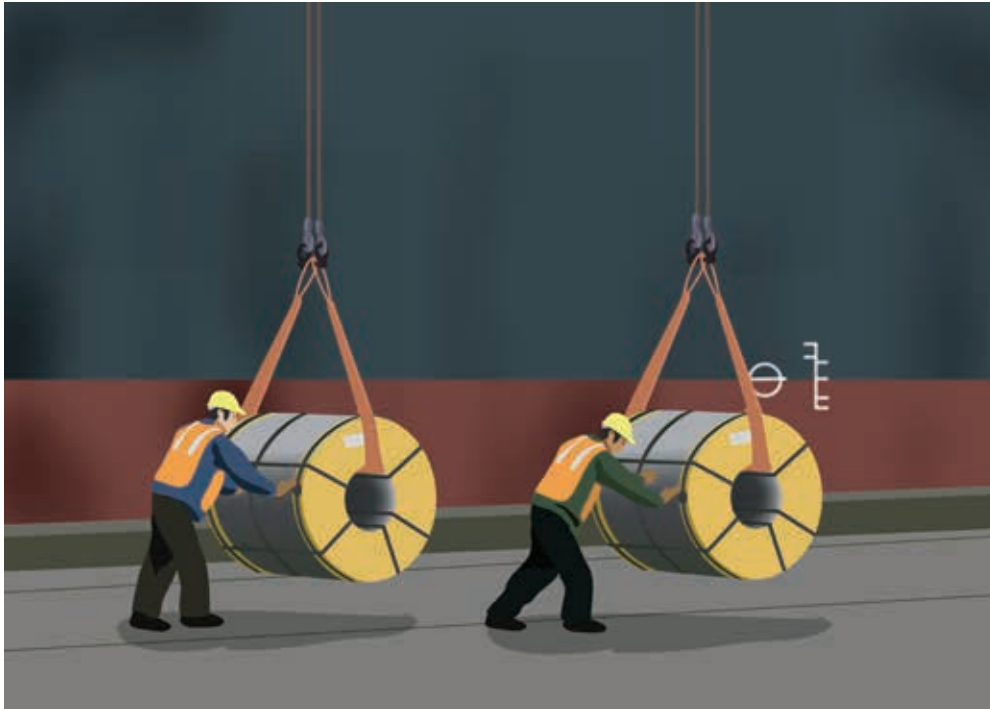


# Transport Guidance for Steel Cargoes

THE AMERICAN CLUB



# Transport Guidance for Steel Cargoes





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The handling of steel cargoes has been a perennial focus of P&I loss prevention activity. Their susceptibility to pre-loading, stowage and post-discharge damage, and the difficulties of dealing with attendant claims, has been a special concern for clubs from at least the 1970s.

As my colleagues Dr. Bill Moore and George Tsimis observe in their preface, the volume of finished and semi-finished steel products carried by sea has grown considerably over the years. Claims in respect of such cargoes have long represented a significant element of the American Club's overall exposure, circumstances shared by other marine insurers.

In earlier times, initiatives to deflect or mitigate losses arising from damage to steel were more rudimentary than they are today. Many of these precautionary measures – a requirement for pre-loading surveys, for proper clausung of bills of lading and so on – are still part of best practice. However, in expanding on the principle of prevention being better than cure, this *Transport Guidance for Steel Cargoes* seeks to provide a comprehensive overview of how to avoid claims arising from the carriage of these cargoes from a variety of related perspectives.

Thanks are due to all those who have labored so diligently, and to such considerable effect, in the production of this guidance. It adds to the substantial body of loss prevention material available from the American Club as part of its overall mission to promote best industry practices.

It is hoped that it will be of assistance not only to Members, and to the Club's many other friends across the world, but also to the larger shipping industry as a valuable source of reference to all who have an interest in this important trade.

**Joseph E. M. Hughes**  
**Chairman & CEO**  
**Shipowners Claims Bureau, Inc.**  
**New York, New York**



Steel production has been at the core of industrial societies from the mid-19th century and into the 21st century. The industrial revolution has led to an exponential growth in global steel production from 189 million tonnes in 1950, to a peak of 1,621 million tonnes in 2014. In 2015, approximately 464 million tonnes of finished and semi-finished steel products were sent for export, the highest volume ever exported representing 31% of all steel produced that year.

As these trade figures demonstrate, steel and steel products continue to be key commodities of today's global economy. The importation and exportation of steel cargoes are needed to fuel economic growth. The shipping industry, of course, plays a central and pivotal role in safely and efficiently transporting steel cargoes around the world to meet the import and export needs of industrialized nations and emerging markets alike.

Cargo claims have comprised, on average, about 25% of the American Club's total claims exposure and, since 2002; steel cargo claims make up approximately 10% of this category. In 2002, the American Club took its first major step in the context of steel cargoes when it began sharing the costs of precautionary steel pre-load cargo surveys with its Membership and set forth extensive recommendations for conducting precautionary surveys of certain steel cargoes to minimize the prospect of spurious steel cargo claims.

Between 2002 and 2008, the average cost per steel cargo claim was US\$ 31,910 per incident. Since then, the average cost has dipped below US\$ 17,000 per incident. It would appear that the American Club's proactive and cooperative approach with its Membership during the post-2002 period yielded fruit, culminating in further loss prevention efforts for the Membership at large.

In 2014, the American Club updated its advice on steel cargo pre-load surveys and provided additional guidance for the prevention of steel cargo and claims. With this backdrop, the American Club is pleased to present, *Transport Guidance for Steel Cargoes*, which addresses the carriage and shipment of steel cargoes by sea. This guidance draws upon the knowledge and experience that the American Club has derived from its own claims, from those who are engaged in the operation and/or chartering of vessels for the carriage of steel cargoes, and from surveyors regularly instructed to attend steel cargo loadings and discharges.

It is our objective and hope that this guidance will increase awareness regarding all aspects of the carriage and shipment of steel cargoes, and that it will ultimately become a useful resource for all in this trade. Members are also encouraged to refer to the American Club's website at [www.american-club.com](http://www.american-club.com) where additional pictures, animations, circulars, alerts, and other relevant information can be found.

**William H. Moore, Dr. Eng.**  
**Senior Vice President -- Loss Prevention**  
**Shipowners Claims Bureau, Inc.**  
**New York, New York**

**George J. Tsimis**  
**Senior Vice President -- Claims Director**  
**Shipowners Claims Bureau, Inc.**  
**New York, New York**

## Contributors & Acknowledgments

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The title page and cover art: Mr. John Steventon

## Disclaimer

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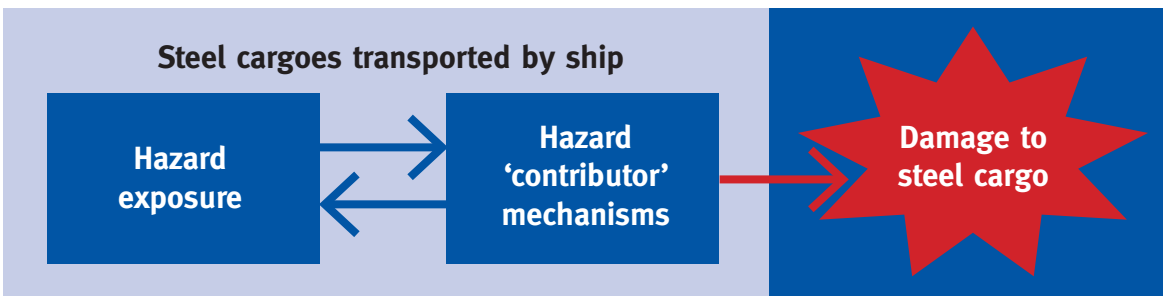
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## 1. Introduction

**1.1 Objectives:** *To define and specify the hazards, causes, contributing factors and damages associated with the transportation of steel cargoes by ship.*

### 1.2 Hazards and types of damages and claims for steel cargoes

1.2.1 The primary focus of attention of this guidance is from when a cargo is surveyed by vessel owner's interests at the loading port, until discharge into the hands of cargo receivers at the discharge port. Depending on the applicable law or contract involved, the period of responsibility for a vessel owner may commence anywhere from "tackle to tackle" (as per the Hague Rules or U.S. Carriage of Goods By Sea Act (COGSA)) to periods before the loading and after the discharge (as per certain bill of lading clauses). During these time periods, the steel cargo is exposed to various hazards and hazard 'contributing mechanisms' (e.g. poor condition of a vessel cargo hold) that can lead to damages to cargo as seen in **Figure 1.1**. This guidance provides loss prevention recommendations that have been applied based upon best practices from many years of industry experience.



#### Loss prevention & best practices

**Figure 1.1** | Exposure of steel cargoes to hazards and hazardous contributing mechanisms leads to damages controlled by loss prevention practices.

1.2.2 **Table 1.1** provides an inventory of significant hazards, causal factors/mechanisms and consequential damages to steel cargoes while being transported in ships by sea that are addressed by this guidance.

### 1.3 P&I claims profile for steel cargoes (2000 to 2015)

- 1.3.1 The frequency and costs of steel cargo related claims experienced by the American Club between 2000 and 2015 have been substantial. During this period, steel cargo claims have accounted for US\$ 15.4 million in financial losses to the Association.
- 1.3.2 As summarized in **Table 1.2**, shortages in landed quantities accounted for the largest frequency of claims incidents, but were generally not as costly. Wetness and contamination related damages accounted for 23% of the frequency of steel cargo claims and 40% of the cost of steel cargo claims. Also, cargo shift, stowage and inclement weather were significant contributors to damages to steel cargo which led to claims incidents accounting for almost 30% of the frequency and 32% of the cost of steel cargo claims during this same time period.
- 1.3.3 **Figures 1.2** through **1.17** show examples of various types of damages sustained by steel cargoes while transported by sea.

### 1.4 Objectives of the Transport Guidance for Steel Cargoes

- 1.4.1 *Transport Guidance for Steel Cargoes* provides loss and claims prevention guidance to vessel owners, ship managers, seafarers, shippers, charterers and others engaged in the trade of transporting steel cargoes by ship. This guidance excludes the transport of steel cargoes carried on deck, steel products carried as required by the International Maritime Solid Bulk Cargoes (IMSBC) Code and steel cargoes carried in containers.
- 1.4.2 The Guidance focuses specifically on hazards and hazard contributors/mechanisms that lead to damages to steel cargoes, and to other situations arising, that are described and summarized in **Table 1.1**.

**Table 1.1: A summary of hazards, contributing causal factors, and types of damages/claims**

Hazards	Contributing factors/mechanisms to damage/claim of steel cargoes	Types of damages/claims
<p><i>Water causing wetting of cargo</i></p> <ul style="list-style-type: none"> <li>• Fresh water</li> <li>• Salt water</li> <li>• Humidity/condensation</li> </ul>	<p><i>Condition of vessel</i></p> <ul style="list-style-type: none"> <li>• Hatch covers</li> <li>• Cargo hold access hatch and ventilation hatch</li> <li>• Main deck and hatch coaming</li> <li>• Cargo hold condition</li> <li>• Ballast, bilge and piping systems</li> <li>• Insufficient or excessive ventilation of cargo holds as per external and internal environmental/humidity conditions</li> </ul>	<p><i>Water damage</i></p> <ul style="list-style-type: none"> <li>• Rust</li> <li>• Pitting</li> <li>• Discoloration</li> <li>• Residual odor</li> </ul>
<p><i>“Foreign bodies” in the cargo hold that contaminate or otherwise damage the cargo</i></p> <ul style="list-style-type: none"> <li>• Salts</li> <li>• Corrosive, combustive or radioactive materials or chemicals</li> <li>• Odors</li> <li>• Incompatible cargoes in same hold</li> </ul>	<p><i>Condition of holds, stow and cargo</i></p> <ul style="list-style-type: none"> <li>• Cleanliness of cargo hold</li> <li>• Improper stowage or cargo separation</li> <li>• Improper cargo packaging or protection</li> </ul>	<p><i>Chemical damage</i></p> <ul style="list-style-type: none"> <li>• Rust</li> <li>• Pitting</li> <li>• Discoloration</li> <li>• Residual odor</li> <li>• Contamination</li> </ul>
<p><i>Improper cargo handling leading to damage to vessel and cargo during loading and discharge</i></p>	<p><i>Improper or insufficient stowage handling, lashing and/or securing methods</i></p> <ul style="list-style-type: none"> <li>• Dunnage</li> <li>• Lack of consideration of tank top strength and point loading weight</li> <li>• Stacking/stowage</li> <li>• Lashing/securing</li> <li>• Rough handling in cargo hold</li> <li>• Spatially placed with “incompatible” cargoes</li> <li>• Use of improper/poor cargo handling gears</li> <li>• Neglect the safe working load (SWL) of the cargo gear and cranes</li> <li>• Ignore the cargo lifting points and gravity center during lifting</li> </ul>	<p><i>Damage to the vessel</i></p> <ul style="list-style-type: none"> <li>• Impact the vessel’s seaworthiness</li> <li>• The vessel’s structures and fittings</li> <li>• External structures (from damage by deck cargoes)</li> </ul> <p><i>Damage to the cargo</i></p> <ul style="list-style-type: none"> <li>• Loss of deck cargo overboard during voyage</li> <li>• Collapse of cargo stow in holds</li> <li>• Physical damage to other cargoes already in stowage, being handled and/or other cargoes in holds</li> </ul>

**Table 1.1 (cont.): A summary of hazards, contributing causal factors, and types of damages/claims**

Hazards	Contributing factors/mechanisms to damage/claim of steel cargoes	Types of damages/claims
<p><i>Cargo moves/shifts during loading, transit or discharge</i></p>	<p><i>Improper or insufficient stowage, lashing and securing</i></p> <p><i>Insufficient routine checking of the lashings and securing during the voyage</i></p> <p><i>Maneuvering of the vessel</i></p> <p><i>Severe inclement weather and sea conditions</i></p>	<p><i>Damage to other cargoes in hold</i></p> <p><i>Damage to the vessel's structure</i></p> <p><i>Loss of vessel stability</i></p> <p><i>Impact to the vessel's seaworthiness and delay of the vessel</i></p> <p><i>Large costs to rectify the cargo stow and dispute</i></p>
<p><i>Severe inclement weather and sea conditions adversely impacting vessel motions and accelerations</i></p> <ul style="list-style-type: none"> <li>• Shifting of cargo in hold</li> <li>• Shifting of cargo on deck and wave loads</li> </ul>	<p><i>Insufficient or improper stowage and/or securing</i></p> <ul style="list-style-type: none"> <li>• Dunnage</li> <li>• Stacking/stowing</li> <li>• Securing/lashing</li> </ul> <p><i>Improper passage plan or insufficient inclement weather forecast information</i></p> <p><i>Improper vessel maneuvering</i></p> <p><i>Loosening of cargo securing and lashing</i></p> <p><i>Engine failure</i></p>	<p><i>Damage to the vessel</i></p> <ul style="list-style-type: none"> <li>• Vessel's structures</li> <li>• Loss of vessel's stability</li> <li>• Impact to the vessel's seaworthiness and delay to the vessel</li> </ul> <p><i>Damage to the cargo</i></p> <ul style="list-style-type: none"> <li>• Damage or loss of deck cargo overboard during the voyage</li> <li>• Collapse of cargo stow in holds</li> <li>• Physical damage to cargoes                             <ul style="list-style-type: none"> <li>o Bending</li> <li>o Fracturing</li> <li>o Deformation</li> <li>o Abrasive damages</li> </ul> </li> </ul> <p><i>Personal injury</i></p>

**Table 1.1 (cont.): A summary of hazards, contributing causal factors, and types of damages/claims**

Hazards	Contributing factors/mechanisms to damage/claim of steel cargoes	Types of damages/claims
<p><i>Improper and insufficient documentation clausings, dating and/or describing for the cargo quantity and/or condition</i></p> <ul style="list-style-type: none"> <li>• Bills of lading (Bs/L)</li> <li>• Mate's Receipt</li> <li>• Contractual dispute</li> <li>• Retla clause</li> </ul>	<p><i>Insufficient cargo surveying by crew or third party surveyor</i></p> <ul style="list-style-type: none"> <li>• Cargo condition (pre-loading)</li> <li>• Reviewing the stowage plan, monitoring of cargo loading and/or discharge, lashing and securing</li> <li>• Incorrect tally report</li> <li>• Improper or incomplete wording on the bill of lading or Mate's Receipt clause</li> </ul> <p><i>Pressure from charterers to carry excessive cargo due to market/commercial reasons</i></p>	<ul style="list-style-type: none"> <li>• Delay of vessel's departure from port</li> <li>• Potential arrest of vessel</li> <li>• Exposure to claims that may or may not be covered by P&amp;I or other insurance cover</li> <li>• Alleged cargo damage and/or shortage claims</li> <li>• Misdescription claims</li> </ul>
<p><i>Oxygen depletion/gas in hold</i></p> <ul style="list-style-type: none"> <li>• Corrosive or combustive materials or chemicals</li> <li>• Water ingress</li> <li>• Humidity/condensation</li> </ul> <p><i>Safety of access and working in hold</i></p>	<p><i>Condition of holds</i></p> <ul style="list-style-type: none"> <li>• Cargo hold condition, cleanliness</li> <li>• Insufficient or excessive ventilation of cargo holds as per external and internal environmental/humidity conditions</li> <li>• Failure to follow enclosed/confined space entry procedures</li> <li>• Unsafe cargo hold access and lighting</li> </ul>	<p><i>Injury to personnel/crew safety</i></p> <ul style="list-style-type: none"> <li>• Injury/death due to inappropriate enclosed/confined space entry</li> <li>• Crew injury/death</li> <li>• Third party personnel injury/death</li> <li>• Risk of fire or explosion</li> </ul>
<p><i>Pre-shipment damage ashore</i></p>	<p><i>Mishandling of cargo ashore</i></p> <ul style="list-style-type: none"> <li>• Handling and transport at pier side</li> </ul> <p><i>Stowage of cargo at pier side</i></p> <ul style="list-style-type: none"> <li>• Exposure to elements</li> <li>• Improper dunnaging</li> </ul>	<p><i>Damage to the cargo</i></p> <ul style="list-style-type: none"> <li>• Physical damage to cargoes <ul style="list-style-type: none"> <li>o Bending</li> <li>o Fracturing</li> <li>o Deformation</li> <li>o Abrasive damages</li> </ul> </li> </ul> <p><i>Water damage</i></p> <ul style="list-style-type: none"> <li>• Rust</li> <li>• Pitting</li> <li>• Discoloration</li> </ul>



**Table 1.2: Frequency and cost of steel cargo claims (2000 to 2015)**

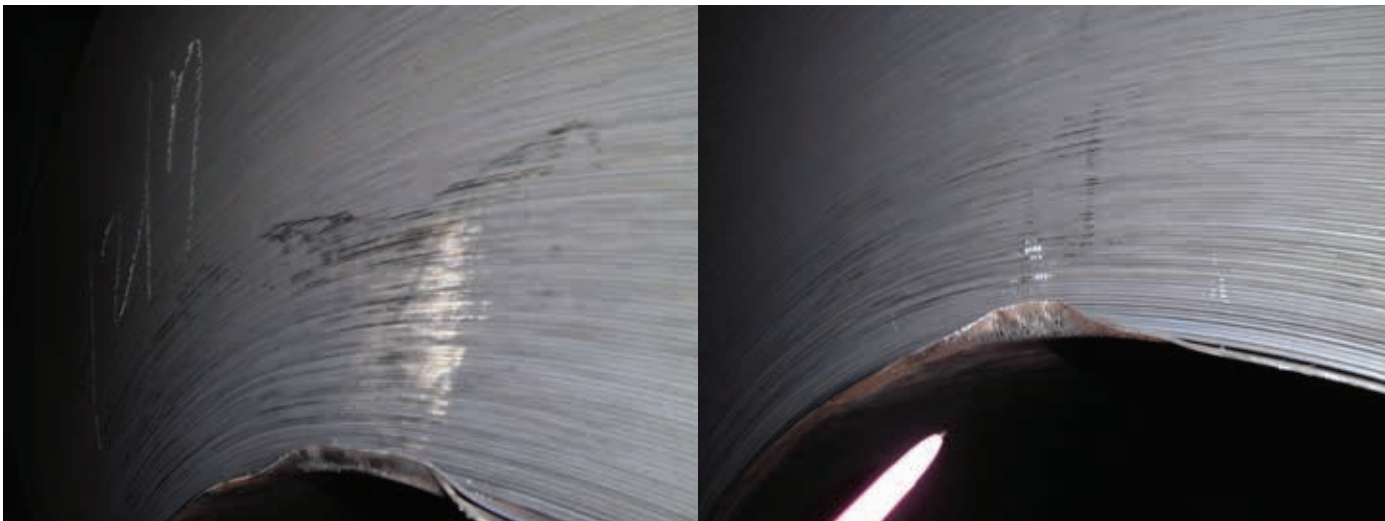
	#incidents	US\$ (million)	% frequency	% cost
wet damage-contamination	140	\$6.17	23%	40%
shortage	186	\$1.08	30%	7%
dispute	28	\$1.12	5%	8%
handling	69	\$1.76	11%	11%
shift-stowage-heavy weather	178	\$4.90	29%	32%
other-unknown	16	\$0.26	3%	2%



**Figure 1.2** | Stowed steel wire and small diameter pipe. Note the deformation of the far left steel coil in the background as it is pressed against the side shell frame. This is particularly a concern for higher stacks of coils where lower tiers are pressed out towards the vessel's external bulkheads.



**Figure 1.3** | Steel coil packaging damage resulting from cargo sweat during the voyage.



**Figure 1.4** | Steel coils damaged by a cylindrical coil lifting tine of fork lift.



**Figure 1.5** | Fork lift fitted with a tine specially designed for carriage of steel coil.



**Figure 1.6** | Steel rebar stowed aboard the vessel at discharge port with bundles stowed on top and rusted due to water ingress through the hatchcovers while the vessel was in transit.



**Figure 1.7** | Heavily rusted steel slabs.



**Figure 1.8** | Collapsed cast iron pipe due to crushing from other cargoes aboard the vessel.



**Figure 1.9** | Deformed steel plates due to non-vertically aligned dunnage.



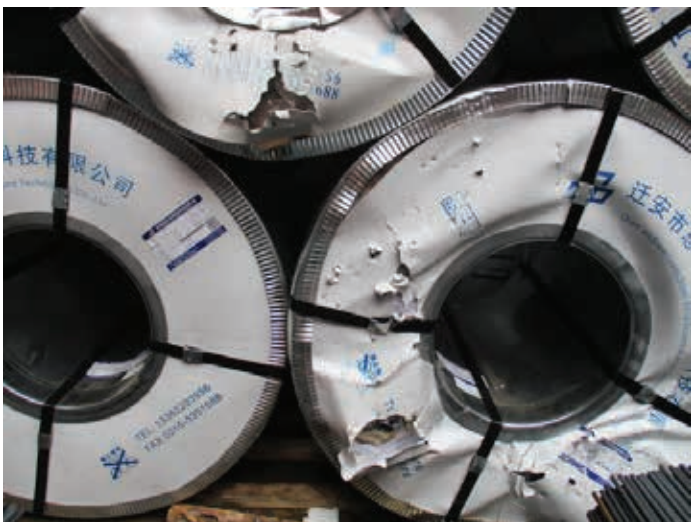
**Figure 1.10** | Damage to coils due to cargo shifting.



**Figure 1.11** | Deformation to cold rolled coils due to excessive weight of loads on top.



**Figure 1.12** | Pipe cut due to contact with steel project cargo.



**Figure 1.13** | Damage to steel coils due to rough handling by stevedores.



**Figure 1.14** | Stowage of heavy cargo on top of steel case causing the cargo stow failure and damage to steel case cargo.



**Figure 1.15** | Damage to steel products due to improper stowage and dunnage.



**Figure 1.16** | Collapse of a cargo stow of coiled wire rods due to improper stowage and lashing.



**Figure 1.17** | An assortment of steel cargoes that has been improperly stowed and can cause delays in the vessel's discharge.

## 2. Condition of the vessel

**2.1 Objectives:** *To ensure clean, dry, water and condensation free cargo holds aboard the vessel for steel cargoes to be loaded, transported and discharged in an undamaged condition.*

### 2.2 General

2.2.1 There are a number of types of damages that steel cargoes can experience as specified in **Table 1.1**. The hatch covers, hold structures, ventilation systems, bilge systems and relevant piping systems that may affect the integrity of the cargo holds as a whole should be in a satisfactory condition, as appropriate.

### 2.3 Hatch covers, cranes, ventilation and other systems

2.3.1 The condition of the hatch covers and other systems should be checked in advance of loading. In this regard, specific items should be checked to ensure their good working order as follows below.

2.3.1.1 *Hatch cover rubber sealing.* All sealings (gasket packing) should be in good condition. Any replacements or renewals should be made in complete lengths only. Sealings should not be repaired in short lengths, and there should be no gaps. Sealings should not be permanently or unevenly imprinted by more than 0.4 inches (10 mm), and should not be hardened, worn, or delaminated as seen in **Figure 2.1**.

2.3.1.2 *Hatch cover compression bars.* Compression bars should have an even surface, and should be free of damage and significant deformation as seen in **Figure 2.2**.

2.3.1.3 *Hatch cover sealing channels.* Sealing channels should be clear of corrosion and free of damage and deformation.

2.3.1.4 *Alignment of hatch covers.* Cargo hatch covers should be correctly aligned.

2.3.1.5 *Hatch cover wheels, rollers, hinges, etc.* Wheels, rollers, hinges and other operational parts and mechanisms should be in a fully operational condition, free of rust, free of damage and deformation, and properly adjusted and greased.

2.3.1.6 *Coaming non-return valves.* Coaming non-return valves should be checked to be operational, ensuring they are not blocked, are free of corrosion and, where appropriate, have caps available for use (see **Figure 2.3**).

- 2.3.1.7 *Cargo hatch cover wedges, clamps and quick acting cleats.* All hatch cover wedges, clamps and quick acting cleats (see **Figure 2.4**) should all be present, well maintained and greased, properly adjusted with good washers and resilient packing rings, and free of damage and deformation. The rubber washers of cleats should be sound, flexible, not dried out and free from paint. If different tensions are applied when closing cleats, it is an indication that the hatch panels may be misaligned.
- 2.3.1.8 *Hatch cover landing pads.* Hatch cover landing pads should have minimal wear to avoid over-compression of the sealings.
- 2.3.1.9 *Hatch covers and coamings.* Hatch covers and coamings should be free from holes, cracks, unsealed penetrations or significant damage (see **Figure 2.5**). Sampling points (if any) are to be clearly marked, with caps in place and operational. The importance of ensuring the proper working condition of hatch covers to prevent water or condensation damage cannot be overstated. Any repairs to hatch covers and coamings should be conducted in accordance with the manufacturer's instructions.
- 2.3.1.10 *Hatch cover hydraulics.* Hatch cover hydraulics should be clear of corrosion, and free of damage, deformation and leakage. They should be fully operational and adjusted. Special attention should be paid to the condition of hatch cover control hydraulic systems (e.g. pipes, valves, control boxes, etc.). The systems should be in a sound and leak-tight condition to prevent any spillage or spray of oil into the cargo hold and possibly damaging any cargo within.
- 2.3.1.11 *Drainage channels.* All drainage channels should be free from previous cargo residue, rust scale, significant corrosion or damage.
- 2.3.1.12 *Vents.* Fitted vents should be clear of corrosion and free of damage and deformation. The hatch lids are to be in good condition and are able to move freely.
- 2.3.1.13 *Mechanical ventilator flaps and ventilation hatches.* Ventilator flaps and hatches should be in good working condition so they can be properly sealed and secured when closed as seen in **Figures 2.6** and **2.7**.
- 2.3.1.14 *Ballast, top side and other tanks.* The double bottom ballast tanks, hopper tanks, side tanks and top-side tanks (if any) should be hydrostatically pressed up prior to loading to ascertain their watertight integrity as seen in **Figure 2.8**. During the pressure test, attention should be given to any water entering into the bilge wells as this may indicate damaged bilge well plating or bilge piping. If pressure testing is unfeasible at berth, the internals of the cargo hold, including piping, should be checked for signs of water ingress.

- 2.3.1.15 *Bilge suctions and tank top openings.* These items, including the non-return valve function of the bilge wells, should be thoroughly examined, tested and proved fully operational. Bilge wells should be opened, their cleanliness ascertained and the strainer plate should be covered over with burlap. Any openings to the tank top should be examined to ascertain their watertight integrity and should be properly secured.
- 2.3.1.16 *Sounding pipes and other pipes passing through the cargo holds.* Piping systems should be examined and ascertained to be clear of any debris. Any pipes within the holds, including ballast pipes, sounding pipes and tank air pipes should also be closely examined to ensure they are free from holes, significant rust scale and properly protected. In addition, sounding pipe closures should be checked to ensure that they are watertight.
- 2.3.1.17 *Shipboard cranes.* Shipboard cranes to be engaged in cargo operations should be in a satisfactory structural condition with the safe working load clearly marked. The cranes should be tested/examined to ensure crane wires, hooks and sheaves are in a satisfactory condition and safety devices are fully operational.
- 2.3.1.18 *Manholes.* Manhole gaskets should be clean and free from debris and dirt which can cause leaks when manhole covers are refitted. In addition, all manhole covers should be checked to ensure they are tightened evenly.
- 2.3.1.19 *Tank tops.* Tank tops should be checked for structural integrity that may be due to simple wear and tear or cracks in the welds. Also refer to **Sections 5.3.3** and **5.3.4** for comments on requiring tank top strength and point loading.
- 2.3.2 *Maintaining reports on the condition of the hatch covers.* The owner should maintain up to date written reports on the condition of the hatch cover arrangement onboard that include details of:
- (1) scheduled maintenance and tests conducted as part of the vessel's planned maintenance system and any additional unscheduled maintenance and repairs performed;
  - (2) inspection and testing of the operability of the hatch cover arrangements, as specified in **Section 2.3.1** at both load and discharge ports;
  - (3) condition surveys; and
  - (4) hose and/or ultrasonic weather tightness testing as seen in **Figures 2.9** and **2.10**.
- 2.3.3 It is prudent for the vessel owner to maintain cargo hatch covers in good operable condition and to establish an effective inspection and maintenance program. Such efforts will assist with establishing due diligence in the event of any cargo claim.



- 2.3.4 Other reports and inspections regarding the condition of the hatch covers can also be used to assist with and/or complement the vessel owner's inspection and maintenance program. Reports from classification society inspections, shipyard surveys, condition surveys performed by third parties, including ultrasonic and hose testing, can potentially assist with ascertaining the actual condition of the cargo holds and hatch covers. Similarly, charterer's inspections and "on-hire" surveys may also yield additional information but should only be considered in conjunction with the vessel owner's overall hatch cover maintenance program.

## **2.4 Use of marine tape**

- 2.4.1 The use of marine tape (e.g. Ram-Nek®), on cargo hold hatch covers should be avoided.
- 2.4.2 There are generally two situations whereby charterers request that marine tape may be applied, when:
- (1) the supercargo or the charterer's representative notices that the hatch covers are in a poor condition and that repairs might interfere with the vessel's intended sailing schedule; or
  - (2) it is mentioned in the charter party that the hatch covers need to be sealed with marine tape upon completion of loading operations. This should only be considered as an extra level of protection.
- 2.4.3 It is important to note that if and when charterers request to use marine tape, such a request may not relieve the vessel owner from its duty under the charter party to present the vessel in seaworthy and cargo worthy condition.

## **2.5 Cleaning of the vessel cargo holds**

- 2.5.1 The conditions of the cargo holds can be adversely affected by a number of contributing factors that may make the holds unsuitable for the carriage of steel cargoes. Depending upon the cargo hold conditions, and if requested by the charterer or charter party requirements, holds should also be disinfected, deodorized and/or ventilated.
- 2.5.2 Damage can also be caused by contamination from foreign bodies or substances, or when there is inadequate segregation between cargo consignments. With this in mind, the following precautions should be taken in preparation of the cargo hold before the loading of steel cargoes.
- 2.5.2.1 Cargo holds should be properly swept, cleaned, washed, mopped, well ventilated and dried, including sides, stringers, pockets, brackets, etc. to minimize or avert the prospect of having residues from previous cargoes, other debris and water or moisture anywhere in the holds.

- 2.5.2.2 Rust, rust scale, and loose and flaking paint that can contaminate the cargo should be removed.
- 2.5.2.3 All residual gases should be thoroughly ventilated as their odor may taint the consignments of steel cargo and, of course, for crew and/or stevedore safety (see **Sections 2.6.2** and **2.6.3**).
- 2.5.2.4 If there is any sign of insect or rodent infestation, the use of insecticides may be considered by sealing the holds and fumigating. Such operation should be performed by an approved professional in a safe manner. It should be noted that, if the vessel is to load in, or for, certain countries such as Australia, all traces and evidence of insect/larvae should be removed.
- 2.5.2.5 During the cleaning process, close attention should be paid to tank top plating, ceiling boxes, beams, frames, spar ceiling, hatch beams, pipework, ladders, etc.
- 2.5.2.6 Double burlap wrapping should be applied on the bilge cover plates and adhered with tape.
- 2.5.2.7 Hatch covers should be fully weather tight to avoid any chance of water ingress. The backsides of hatch covers should be carefully inspected to ensure that they are free of cargo residue, rust, rust scale, or other contaminants.
- 2.5.2.8 *Certificate of cleanliness.* It is highly recommended that a qualified third party inspection should be performed after the cargo holds have been cleaned before accepting any steel cargoes. The inspection should also result in the issuance of a certificate confirming fitness for loading.

## 2.6 Safety of vessel cargo hold access and workspaces

- 2.6.1 The safe access for personnel within a cargo hold is essential to prevent injury to the crew, stevedores, surveyors, etc. The company's safety management system (SMS), as required under the International Safety Management (ISM) Code, should be followed for the safe entry requirements for the cargo spaces.
- 2.6.2 *Safety first.* Safe access within the cargo holds is important to ensure prevention of injury to the crew, stevedores and any other third parties (e.g. port State control inspectors, surveyors, customs officials, etc.). The crew should be familiar with the company's shipboard SMS procedures before entry into cargo spaces. However, some basic rules should be considered as follows:

- (1) prior to entry into the cargo hold (see Figure 2.11), the crew should check if there are any reports of damages to ladders and any permanent or temporary railings (see **Section 2.6.3**);
- (2) at least one crew member should be positioned at the cargo hold access point with a handheld transceiver to maintain direct contact with any crew members entering the cargo space who should also be in possession of handheld transceivers to maintain communications at all times;
- (3) ensure the safety of the atmosphere of the cargo space being entered as set forth in chapter 2, Reg. 2.7 of the CSS Code, as amended. As of July 1, 2016, as set forth in SOLAS Chapter 11, regulation 1/7 – Atmospheric Testing Instrument, all cargo vessels over 500 GT are required to carry atmospheric testing instruments capable of measuring concentrations of oxygen, flammable gases and vapors, hydrogen sulfide (H<sub>2</sub>S) and carbon monoxide (CO). The instrument should be used before any person is allowed to enter the cargo space; and
- (4) ensure that for those accessing the holds, they have sufficient handheld and/or temporary lighting equipment rigged in order to inspect the cargo, as well as to ensure the crew members' safety while working within the cargo hold space.

2.6.3 *Ladders, standing platforms, grip bars, rungs/treads and railings.* At a minimum, all ladders and any permanent/temporary railings in all cargo holds should be regularly inspected to ensure that they are in satisfactory condition. Such inspections should be conducted prior to loading and discharging where access is not hindered by cargo placement or operations and should be properly recorded to ensure that any identified conditions to these structures or apparatuses are addressed and that any persons accessing these spaces are made aware of their potential risks to safety. In particular:

- (1) the crew should inspect cargo hold access areas prior to cargo operations and only present the vessel in a reasonably safe condition. Ladder's standing platforms, grip bars, rungs/treads, and railings should be free of dust, cargo debris, oily or greasy surfaces or any other condition that can cause a slippery condition;
- (2) the crew should correct any potentially unsafe conditions and should make repairs prior to commencement of cargo operations. If any of the ladder's standing platforms, grip bars, rungs/treads, railings, etc. are found in disrepair, the ladder should not be used until it is fully repaired;

- (3) if the hazards are not adequately repaired at the commencement of cargo operations, then the crew should mark and identify these areas with proper signage, and these areas be pointed out to all stevedores by the mate or hatch boss on duty; and
- (4) the crew should endeavor to ensure adequate lighting is in place in the access areas to cargo hold ladders and in the ladderwell. Portable lights should be properly suspended and secured by separate lines and not by the lighting power cord. The lights should be rigged so that they do not hinder the climber when using the ladder.



**Figure 2.1** | Rubber sealing with excessive permanent grooving is to be renewed.



**Figure 2.2** | Water drainage channel, compression bar and the landing pads as shown in good condition.



**Figure 2.3** | Fire cap for the water draining non-return pipe is missing.



**Figure 2.4** | Hatch cover securing cleat.



**Figure 2.5** | Hatch coaming and deck piping in poor condition.



**Figure 2.6** | Cargo hold mechanical ventilator.



**Figure 2.7** | Ventilation hatch on the side of hatch cover panel.



**Figure 2.8** | Ballast tank hydro-testing.



**Figure 2.9** | Hose testing.



**Figure 2.10** | Ultrasonic testing.



**Figure 2.11** | Cargo hold access hatch in poor condition.

### 3. Types of steel cargoes

**3.1 Objectives:** *To identify and describe steel and metal products commonly transported by ship.*

#### 3.2 Types of steel cargoes, descriptions and general stowage considerations

- 3.2.1 Steel products are presented for shipment in a variety of ways including single, loose individual items, bundled, packaged in paper or metal protective covers, unpackaged, crated and parceled. In addition, some steel products are coated in oil (e.g. hot rolled and pickled steel) while others may be paint coated (e.g. some types of pipe) to protect the cargo from moisture and other corrosive materials.
- 3.2.2 **Table 3.1** provides a summary of steel products commonly transported by ship. The best practices applied to the stowage of these products are governed by a number of factors as detailed in **Section 5.5**.
- 3.2.3 Products such as steel scrap metal, pig iron and swarf are not included in **Table 3.1** as the mandatory requirements for carriage of these cargoes is governed by, and set forth in Appendix 1 of the IMSBC Code.
- 3.2.4 Examples of various stowage arrangements as set forth in **Table 3.1** are seen in **Figures 3.1** through **3.15**.

**Table 3.1 | Common steel products transported by ship, descriptions and general stowage considerations**

Product	Description	Additional comments	Stowage
<b>Finished steel products</b>			
Cold-rolled steel coil	Steel forged or rolled into coil and packaged. Weights of this product vary up to a maximum of 40 tons. <sup>1</sup>	Cold-rolled steel is a finished product that is unwound for immediate use.	Hot and cold rolled steel coil is a product that is stowed at the bottom of the cargo hold with the 'eye' pointing in a fore and aft direction. Rows of steel coils should be stowed at least 4 to 6 inches (10 to 15 cm) apart to ensure the sides of coils are not damaged during loading, transit or discharge.
Hot rolled steel coil	Semi-finished steel forged and rolled into coil. Weights of this product can vary up to a maximum of 40 tons.	Hot-rolled steel is normally unwound and processed into cold-rolled steel.	




**Table 3.1 (cont.) | Common steel products transported by ship, descriptions and general stowage considerations**

Product	Description	Additional comments	Stowage
<b>Finished steel products (cont.)</b>			
Steel wire rods (coiled)	Long, thin steel rods produced by either hot or cold rolling.	Coiled wire rods can be damaged through compression, e.g. due to high stowage or compression against tank top and vessel sides or bulkheads.	Coiled steel wire rods are normally stowed in athwartships rows with the axis fore and aft. Coils should be stowed upright so that each coil rests against an adjacent coil. The coils in successive tiers should be stowed so that each coil overlaps the coil below.
Steel plate	Elongated, thick flat cold rolled steel plate generally of up to 2 inches (5 cm) in thickness.	Steel plate is of multipurpose use for a variety of steel based products and structures.	Steel plate is usually stowed with the longer axis stowed fore and aft but is sometimes stowed athwartships when bundled.
Steel/cast iron pipe (large diameter)	Large diameter steel or cast iron pipe whereby ends may be, for example, threaded, beveled, swaged or flanged.	The ends of large diameter pipes are prone to damage (e.g. swaged ends). Pipe ends may be shipped with protective coverings or inserts to prevent handling damage.	Steel and cast iron pipe should be stowed fore and aft. The shipper/manufacturers should be consulted as to the maximum allowable tiers for stacking large diameter pipes.
Steel pipe (small diameter)	Finished steel product. Ends may be beveled, swaged or flanged and may have protective covering.	Small diameter pipes in single unit or bundled in groups. Ends of pipes are susceptible to damage.	Small diameter steel pipe is usually packed in bundles and should be stowed in a fore and aft direction.
Steel piling and column	Long, finished cold rolled molded steel sheet products.	Primarily used for construction purposes.	Steel pilings and column are usually packed in bundles and should be stowed in a fore and aft direction.

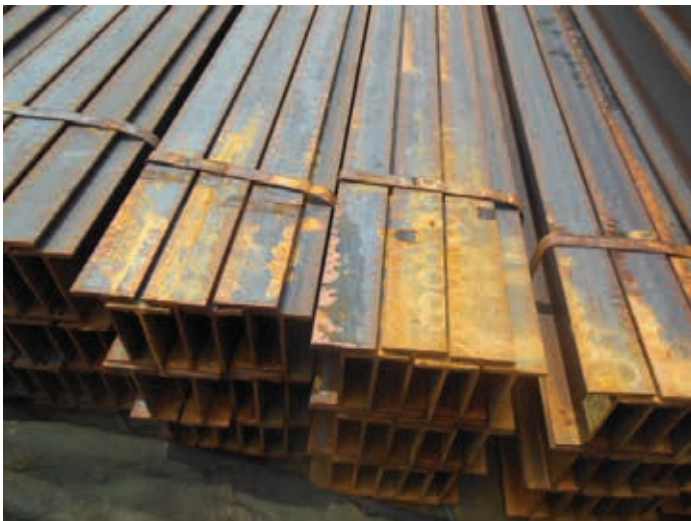
<sup>1</sup> A ton is a unit of measurement equaling 2,000 pounds. In non-U.S. measurements, a ton equals 2,240 pounds. A tonne, also known as a metric ton, is a unit of mass equaling 1,000 kilograms.

**Table 3.1 (cont.) | Common steel products transported by ship, descriptions and general stowage considerations**

Product	Description	Additional comments	Stowage
Finished steel products (cont.)			
Steel girder and beam	Long, finished, cold rolled “I” and “T” girders and beams.	Primarily used for construction purposes. Some beams and girders have finished ends for ease of assembly.	Steel beams and girders should be stowed fore and aft. The beams should be stowed with flanges arranged in an “in and out” position and usually packed in bundles as seen below (also see <b>Figure 3.1</b> ).  
Steel profile	Long, cold or hot rolled, shaped steel bars.	Primarily used for reinforcement in the construction of steel structures.	Steel profile are usually packed in bundles and stowed fore and aft.
Steel angle and bulb	Long, cold or hot rolled, shaped steel bars.	Product is multi-purpose for use in construction for reinforcement of steel structures.	Steel angle and bulb are usually packed in bundles and stowed fore and aft.
Steel mesh	Finished steel mesh products that are either rolled or in sheet form.	Product is normally in form for final use and is primarily used for fencing or grating purposes.	Wire mesh rolls should be stowed athwartships. Grating sheets can be stowed fore and aft or athwartships. Usually stowed on the top of other cargoes.
Steel reinforcement straight or folded bar (i.e. rebar)	Long, roughly finished hot rolled steel bars of small diameter.	Product is used for reinforcing concrete structures. Rebar is transported in single units or bundled in groups with 1 inch (2.5 cm) width steel bands or tie wire.	Stowage is usually dependent upon the geometry of the cargo hold. However, the product is usually stowed fore and aft or athwartships.

**Table 3.1 (cont.) | Common steel products transported by ship, descriptions and general stowage considerations**

Product	Description	Additional comments	Stowage
<b>Finished steel products (cont.)</b>			
Steel channel	Long, cold or hot rolled, shaped steel bar or plate.	Product is multi-purpose and can be used, for example, in construction, equipment, furniture and manufacturing.	Steel channel is usually packed in bundles and stowed fore and aft.
Steel forgings	Varying size and shapes of steel products.	Various industrial purposes for forgings, for example, engine parts and other industrial mechanical devices.	Steel forgings can be stowed athwartships or fore and aft. However, long steel forgings should be stowed fore and aft.
Steel strips and sections	Varying size and shapes of steel products.	Product is multi-purpose with uses in assembly of steel structures and manufacturing.	Stowage is dependent upon shape and size. Long steel strips and sections should be stowed fore and aft. Depending upon the geometry of smaller strips and sections, the product can be stowed fore and aft or athwartships.
Steel prefabricated structure	Pre-assembled steel structures assembled for immediate use. The product may be painted or coated.	Product is normally part of a project cargo along with items such as generators, engines, refrigeration units, oil and gas production equipment, etc. This product is prone to contact damages.	Stowage should be to charterer's specification.
<b>Unfinished steel products</b>			
Steel slab	Heavy and thick pre-rolled steel blocks.	Initial steel product before rolling.	Steel slab can be stowed fore and aft or in an athwartships direction.
Steel billet and bloom	Long, pre-rolled steel bars in rectangular and circular cross section form.	Initial steel product to be used to process and form steel bars, channels, etc.	Steel billet and bloom should be stowed in a fore and aft direction.



**Figure 3.1** | Steel “I” bar stowed in an “in and out” position and secured with steel band.



**Figure 3.2** | Combination of steel cargoes being stowed, secured and lashed by stevedores.



**Figure 3.3** | Large diameter steel pipe with swaged ends stowed in a fore and aft direction. Note the pipes are stowed such that each tier is laid in the opposite direction to ensure the swaged ends are not loaded on top of each other.



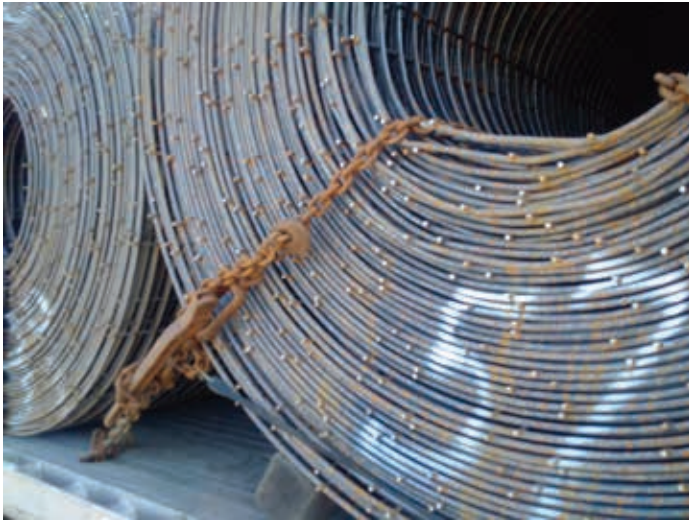
**Figure 3.4** | Packaged and banded large diameter steel pipes being lowered into cargo hold.



**Figure 3.5** | Coiled steel wire rod being discharged. Although not a normal dunnaging practice, note the canvas tarp on tank top with wooden dunnage placed on top of the tarp.



**Figure 3.6** | Cold rolled steel coils being stowed and lashed with 1 inch (2.5 cm) wide flat steel bands in a cargo hold.



**Figure 3.7** | Rolled steel mesh on a flatbed truck flatbed to be loaded aboard a vessel.



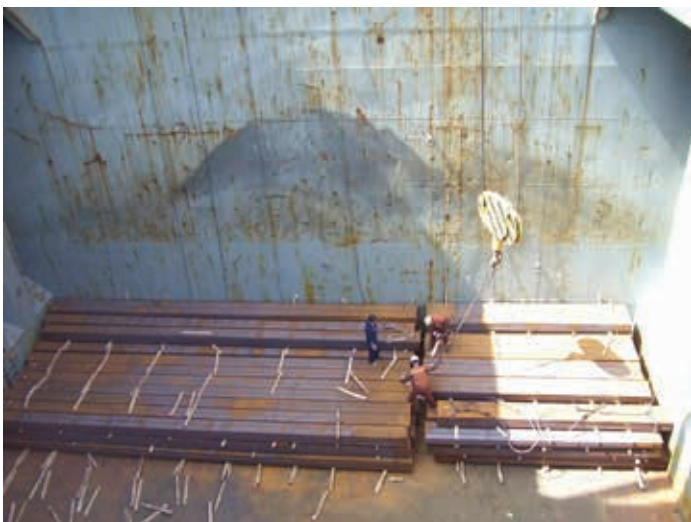
**Figure 3.8** | Steel plates and other steel products being loaded.



**Figure 3.9** | A mixed consignment of re-bar, small diameter steel pipes and other steel products in a cargo hold.



**Figure 3.10** | Packaged small diameter steel pipes are stowed in fore and aft direction.



**Figure 3.11** | Bundled steel channel are stowed in fore and aft direction inside cargo hold.



**Figure 3.12** | Steel angle and steel pipes are stowed in fore and aft direction inside cargo hold.



**Figure 3.13** | Steel plates are placed on the top of bagged cargo to support vehicles and machinery adjacent to large diameter steel pipe that have been loaded in a fore and aft direction.



**Figure 3.14** | A cargo hold full of prefabricated steel products.



**Figure 3.15** | Steel products stowed in the lower hold.

## 4. Dunnage for steel cargoes

**4.1 Objectives:** *To ensure that steel cargoes are properly protected during transport by ship by the use of fit-for-purpose dunnage materials.*

### 4.2 Purpose of dunnage for steel cargoes

4.2.1 Dunnage should always be used to provide a protective ‘buffer’ between steel cargoes, vessel tank tops, bulk heads and/or other cargoes for the purposes of:

- (1) protecting against damage by moisture (ingressed water or sweat) or by residual chemicals or salts that may have accumulated within the vessel’s structure or upon other cargoes;
- (2) providing frictional resistance within the stow to prevent cargo movements or shifting during cargo stowage, transit and discharge that may lead to cargo damage, personnel injury and/or damage to the vessel’s structure;
- (3) achieving a tight fit for the cargo by filling up void spaces in the cargo hold; and
- (4) providing a means to distribute loads/forces across the tank tops and/or other vessel’s structure between individual units of steel cargoes (e.g. rolled steel coils). Also see **Section 5.3** regarding the basic principles for load distribution across tank tops for steel cargoes.

### 4.3 Dunnage use by cargo type

4.3.1 The primary dunnage material used in the transport of steel cargoes is wood which is used in various dimensions and geometries depending upon the cargo type and stowage configurations. However, dunnage wood should, if possible, be:

- of good quality, without damage or splinters ideally of hard wood type;
- dry to prevent moisture transfer to the cargo;
- of sufficient thickness and dimensions to be fit for the purpose of the particular steel cargoes being transported; and
- phytosanitary certified and approved to ensure the wood is free of pests.



The following sections provide some basic dunnaging principles for various steel cargoes taking into account the general stowage considerations as set forth in **Table 3.1**.

- 4.3.2 *Steel coil.* The bottom tier of steel coils is normally stowed (unless palletted, see **Section 5.5.2.1(n)**) with the “eye” of the coil facing in the fore and aft direction on top of at least two rows of dunnage wood boards laid athwartships. The numbers and dimensions of the wooden dunnage is dependent upon the weight and dimensions of the coil and tiers of coils stowed. Wooden chocks (wedges) should be inserted on top of the rows of wooden dunnage on the lower tier and nail secured into position to prevent movement of those coils. Dunnage timber should be inserted between coils along the same tiers if small void spaces occur as shown in **Figure 4.1**.

For heavier and larger steel coils (15 tons or more), vessel owners and charterers should consider suitable dimensions of the dunnage wood board for the weight of the coils in advance of loading the cargo. In any event, wooden dunnage with thickness of less than 2 inches (5 cm) should not be used as dunnage for heavy coils. The importance of the need to have dunnage of sufficient thickness and quantity when carrying heavy steel coils to help avoid spot over loading of the tank top and adjacent structure cannot be over emphasized. The vessel’s classification society can be consulted for guidance.

Dunnage wood boards should also be placed against the vessel’s sides and hopper tank structures to prevent contact between the coils and the vessel’s structures and to prevent movement of the coils.

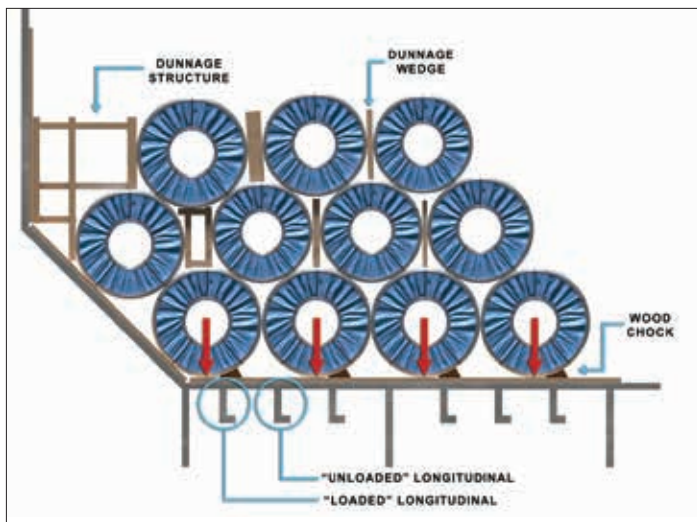
- 4.3.3 *Coiled steel wire rods.* The bottom tier of coiled wire rods is normally stowed with the “eye” of the coil in the fore and aft direction. Coiled rods do not normally require additional dunnage as they are not very heavy, as steel coil might be, such that they would pose a threat of damage to other cargoes or the vessel’s cargo hold structure (see **Figure 4.2**). If possible, a layer of soft dunnage material should be placed on top of the tank top to avoid steel on steel contact (see **Figure 3.5**), and avoid potential damage to the coiled wire rods and the tank top plating.

Dunnage wood boards should also be placed against the vessel’s sides and hopper tank structures to prevent contact between the coils and the vessel’s structures.

- 4.3.4 *Steel plate and bundled steel sheets, steel slabs, billets and blooms.* Flat steel plates can weigh up to 20 tons (20 tonnes) and bundled steel sheets may be of up to about 10 tons (10 tonnes) each. Steel slabs, billets and blooms can weigh up to 40 tons (40 tonnes). As seen in **Figures 4.3** and **4.4**, dunnage wood is used on the between the tiers to vertically separate stacked individual or bundled steel plates for ease of loading and discharging. It is recommended that a distance apart between the dunnage be not more than 10 feet (3 meters).

Dunnage wood boards should also be placed against vessel’s sides and hopper tank structures to prevent contact between the plates/bundles and the vessel’s structures, and also to prevent movement.

- 4.3.5 *Structural steel.* This category includes all types of girders, beams, profiles, etc. all of which should be stowed in a fore and aft direction. Dunnage is placed underneath the structural steel to keep the cargo off the tank top and increase the frictional coefficient to prevent movement. Numbers, dimensions and arrangement of the dunnage is largely dependent upon the weight, dimension and contact area of the cargo which should be discussed and mutually agreed by the Master and charterer/shipper prior to loading the cargo.
- Dunnage wood boards should also be placed against vessel's sides and hopper tank structures to prevent contact between the structural steel and the vessel's structures, and also to prevent movement.
- 4.3.6 *Large diameter steel/cast iron pipe.* Dunnage for large diameter steel and cast iron pipe are usually laid athwartships on the tank top, approximately 10 feet (3 meters) distance apart. Numbers, dimensions and arrangements of dunnage is largely dependent upon the weight and number of tiers of the cargo. Dunnage between the tiers is not always required. If the pipe is wrapped in special external protection materials, suitable dunnage materials should be considered for use.
- Dunnage wood boards should also be placed against vessel's sides and hopper tank structures to prevent contact between the pipes and the vessel's structures, and also to prevent movement.
- 4.3.7 *Small diameter steel pipe.* Normally small diameter pipes are bundled for efficiency of transport. Dunnage is not normally placed between adjacent individual pipes or bundles. Dunnage wooden boards for small diameter pipes and bundles are normally laid out in rows and laid athwartships on the tank top approximately 10 feet (3 meters) distance apart.
- Dunnage wood boards should also be placed against vessel's sides and hopper tank structures to prevent contact between the pipes and the vessel's structures, and also to prevent movement.
- 4.3.8 *Dunnage structures.* Wooden dunnage structures used to support stowage can be constructed against the vessel's structures as side shells, hopper tanks and bulk heads, for example as seen in **Figures 4.1** and **4.5**, to ensure steel cargoes remain in place during sea transit. Dunnage structures should be of sufficient strength to support the cargo being placed in the stowage.
- 4.3.9 *Dunnage for cargo holds with non-rectangular cargo spaces.* As the forward and after end cargo hold spaces are normally non-rectangular and tapering inward, forward and aft respectively, these spaces may require additional dunnage structures constructed to support steel cargoes, such as coils and large diameter steel pipes (see **Figures 4.5**). Similarly, dunnage used in way of non-rectangular cargo spaces should be of sufficient strength to support the cargo being placed into the stowage.
- 4.3.10 **Figures 4.6** through **4.12** provide further examples of the placement of dunnage, and damages to dunnage and cargoes as a result of improper dunnaging.



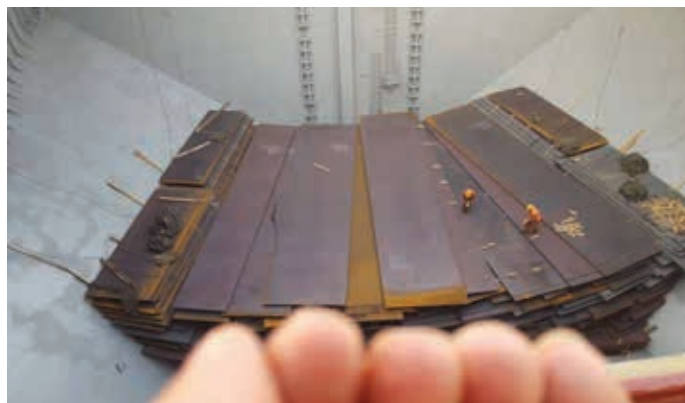
**Figure 4.1** | Cross section of steel coils stacked with dunnage materials in cargo hold.



**Figure 4.2** | Single and double tiers of coiled wire rod stacked on top packaged steel pipe.



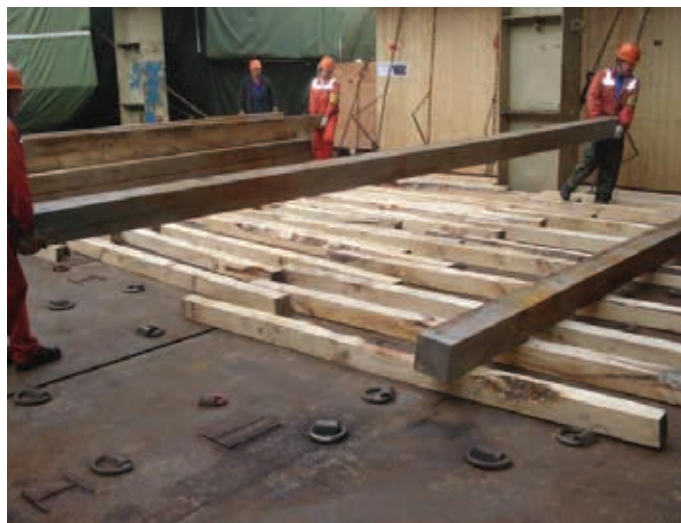
**Figure 4.3** | Steel plates ashore awaiting shipment. Note the dunnage properly vertically aligned and horizontally spaced to prevent deformation of the stacked steel plates. The same stowage philosophy applies aboard the vessel for vertically stacked steel plates and steel plate bundles.



**Figure 4.4** | Stevedores placing dunnage blocks for elongated steel plates in furthestmost aft cargo space with irregular geometry.



**Figure 4.5** | Dunnage structures constructed on sloping hopper tank to hold large steel diameter pipes in place.



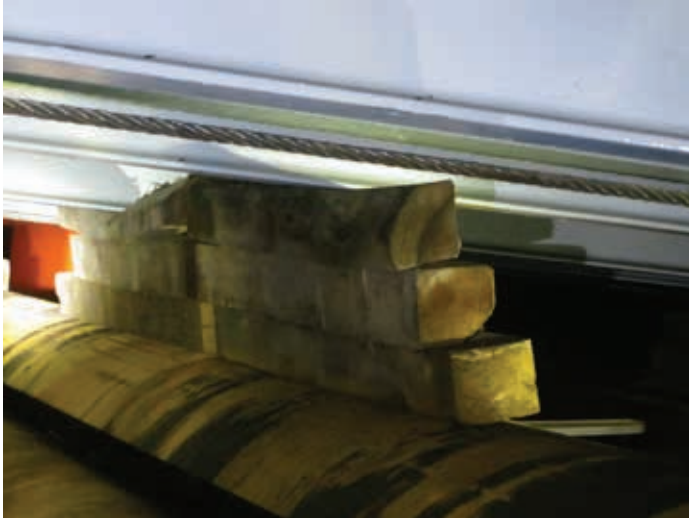
**Figure 4.6** | Dunnage being prepared for carrying heavy cargo.



**Figure 4.7** | Crushed dunnage caused the cargo stow failure.



**Figure 4.8** | Crushed dunnage due to improper arrangement.



**Figure 4.9** | Improper arrangement of dunnage that has been placed on top round shaped cargo.



**Figure 4.10** | Improper arrangement of dunnage that collapsed under the weight of the cargo.



**Figure 4.11** | Placement of cargo on the top of round shape cargo without proper dunnage.



**Figure 4.12** | Wooden dunnage that has been bent and crushed under the weight of steel coils.

## 5. Stowage and securing of steel cargoes

**5.1 Objective:** *To ensure the proper stowage and securing of steel cargoes to prevent movement and/or damage to the cargo and/or the vessel during transport by sea.*

### 5.2 Principles of proper stowage and securing

- 5.2.1 The basic objectives of proper stowage and securing are to prevent the movement or shifting of the cargo within the hold once the cargo is loaded onboard, during transit at sea, through to the final time of discharge. The risks associated with the forces due to movement or shifting of the cargo include possible damage of the cargo, injury to human life, damage to the structure of the cargo holds, negative impact on the vessel's stability and seaworthiness, delay the voyage and/or incur additional costs associated with re-stowing the cargo onboard.
- 5.2.2 The general principles for cargo stowage and securing are set forth in the International Maritime Organization's (IMO's) Assembly Resolution A.714(17), 1991 Code of Safe Practice for Cargo Stowage and Securing (CSS Code), as amended. The Code is mandatory and applies to cargoes other than solid and liquid bulk cargoes. As it relates to steel cargoes, the Code sets forth specific safe practices for the carriage of steel coils (Annex 6), and other cargo types not covered in this guide. The CSS Code together with the Cargo Securing Manual represents the vessel's standard set of practices for lashing and securing.

### 5.3 The stowage plan

- 5.3.1 The stowage plan is usually prepared by a representative of either the vessel owner or charterer, e.g., the party which under the governing contract(s) of carriage is responsible for cargo stowage, lashing and securing. The Master should consider the various factors regarding the stowage plan from a safety perspective, including but not limited to ensuring:
- (1) the cargo to be loaded onboard does not exceed any maximum allowable strength of the tank top taking into account the individual weights of cargo units and cumulative weights of tiered cargo, such as steel coils;
  - (2) the amount of cargo loaded onboard does not make the vessel exceed her allowances under the International Convention on Load Lines, 1966;
  - (3) the stowage planning should take into account the permissible tween deck load and the vessel's longitudinal strength (bending moment and stress);
  - (4) the vessel's stability is not compromised when loading, during transit at sea or discharging;

- (5) the cargo consignments are properly distributed amongst cargo holds to ensure that no individual cargo hold is heavily loaded in comparison to other cargo holds;
  - (6) consideration for vessels that call to multiple ports that load and discharge cargoes in intermediate ports. Any such operations should not result in poor cargo distribution that may adversely affect the vessel's stresses, strength, stability or seaworthiness during the remainder of the voyage; and
  - (7) whether there is any incompatibility between the cargoes and/or difficulty on lashing and securing of the cargoes on the completion of loading, for example, containers or roll base cargo (trucks) on the top of other cargo inside cargo hold, equipment or box shaped cargo on the top of round shaped cargo (such as rolled steel coils), etc. If such a situation presents itself, the stowage plan should be rejected and adjustments should be made.
- 5.3.2 Cargo should be loaded only when details of the cargo to be loaded is fully understood, the stowage, dunnaging, lashing and securing plan have been reviewed and agreed between the vessel's Master and the party responsible for these tasks such as the charterer of the vessel and/or shippers of the cargo.
- 5.3.3 *Tank top strength for cargo stowage.* The overall weight (load) of a stowage of cargo is limited by the maximum permissible tank top load. The maximum permissible load per square meter of surface area is supplied by the shipbuilder and approved by the vessel's classification society. The details for each individual cargo hold are usually provided in the vessel's Trim and Stability Booklet, Loading Manual and/or Cargo Securing Manual.

However, unless stated otherwise, the permissible load referred to assumes a uniform weight distribution which is encountered for homogenous bulk cargoes such as grain, coal or iron ore. It does not apply to the carriage of steel coils, which exert a spot load force concentrated at the point where the coil meets the dunnage/tank top. It should be remembered that the weight of the piece or pieces of cargo should be sufficiently and appropriately spread by the use of dunnage materials over the tank top area used in the calculation. If there is any doubt, the classification society should be immediately consulted. The theoretical maximum permissible tonnage of homogeneous bulk cargo allowed to be stowed in an individual cargo hold is calculated as follows:

**Area of the tank top (ft<sup>2</sup> or m<sup>2</sup>) \* Tons per ft<sup>2</sup> or m<sup>2</sup> tank top load limitation.**

The thickness of the steel scantlings within a cargo hold tank top structure can reduce over time. The theoretical limits for tank top permissible loads are set when the vessel is built. Therefore, for older vessels it is prudent to allow a safety margin when considering maximum permissible tank top loads.

- 5.3.4 *Consideration of tank top strength of hopper tanks.* When carrying steel products in conventional bulk carriers, the strength and load bearing capacity of the lower hopper tanks has to be considered. An additional concern is the sloping hopper tank plates. As seen in **Figure 5.1**, the force load on the hopper tank top, “R”, is calculated as a function of the vertical force load “M” calculated as follows:

$$R = M * \cos \alpha$$

where “ $\alpha$ ” represents the angle between the vertical load and the perpendicular load on the hopper tank. It is important to also note that as the vessel rolls while at sea, the dynamic load “R” can increase by as much as 50%. Therefore, careful consideration of the loads upon the hopper tank top should be taken into account prior to the vessel loading heavy cargoes such as steel coils. When loading the steel coils, the vessel’s Loading Manual and Cargo Securing Manual should be consulted to determine whether it is allowed to load coils on the hopper tanks. If it is not, the classification society should be consulted.

#### 5.4 Preparation of holds for stowage

See **Section 2.3**, *Hatch covers, cranes, ventilation and other systems* and **Section 2.5**, *Cleaning of the vessel cargo holds*.

#### 5.5 Stowage principles by cargo type

- 5.5.1 See **Table 3.1**, *Common steel products transported by ship, descriptions and general stowage considerations*.
- 5.5.2 *Additional stowage measures for particular types of steel cargoes.*
- 5.5.2.1 *Steel coil<sup>2</sup>.* Coils are normally loaded and stowed from “outboard to inboard”, i.e. starting from the vessel’s side shell moving inward towards the center of the hold with each coil being placed against the next outboard coil already in place, with the “eye” of the coil pointing in a fore and aft direction. When stowing steel coils, the following considerations should be taken into account:
- (a) the heaviest, longest and largest coils should be loaded on the lower tier to prevent damage to any smaller coils that may be stowed on tiers below. Usually the coils with the same length should be stowed in the same row, if possible;
  - (b) the number of tiers of steel coil to be loaded is dependent upon a number of factors including the vessel’s longitudinal strength, double bottom strength, local inner bottom

<sup>2</sup> The stowage, lashing and securing of steel cargoes in containers is not addressed in this guidance. For further information regarding the stowage of steel coils in containers, please refer to *Transport of Steel Materials in Containers*. TT Club, StopLoss 13 -2016.



strength and the weights and dimensions of individual coils. The number of tiers for various coil weights may be set out in the vessel's Loading Manual;

- (c) athwartships rows of coils should be spaced in the longitudinal, fore and aft direction anywhere between 4 inches (10 cm) to 6 inches (15 cm) apart;
- (d) with regard to the distances between the cargo hold's longitudinal stiffeners, ensure that the distribution of the coils, as seen in **Figure 4.1**, ensures that as many of the contact points of the bottom tier coils are stowed over longitudinals as possible (so the longitudinals become "loaded") and limit, as much as possible, the number of coils stowed between longitudinals ("unloaded");
- (e) if it is intended to stack heavy coils, in excess of 15 tons (15 tonnes), in more than a single tier, the vessel's Loading Manual or the classification society should be consulted to ensure the vessel has sufficient tank top strength to carry such heavy coils in more than one tier;
- (f) if only a single tier of coil is loaded, a "key" or "locking" coil should be placed in the space between non-adjacent coils as shown in **Figure 5.2** that locks the tier in position. The key/locking coil is most effectively placed at the center of the row unless otherwise unable to do so, but should not be placed on the sloping surface of the hopper/sloping wing tanks;
- (g) as a rule of thumb, if the gap between the two coils to be locked is greater than 60% of the diameter of the locking coil, it is recommended that two locking coils are used as shown in **Figure 5.3**. If the width of the gap is too great and the locking coil will sink lower, then wooden dunnage can be placed between the coils to reduce the gap and raise the position of the locking coil. The locking coil's diameter should not be more than one-third ( $1/3$ ) of its diameter into the gap of the two adjacent coils below as shown in **Figure 5.4**;
- (h) any small gaps found between stacked coils should be filled with wooden chocks (wedges) as shown in **Figure 4.1**;
- (i) if additional cargo is to be stowed on top of steel coils, consideration should be given to the weights of that cargo so as to not deform the coils beneath or exceed the allowable weight limit at that point. Also, any additional cargo stowed on top should be stable and necessary lashing and securing to the cargo properly arranged. **Figures 5.5** and **5.6** show examples of improperly stowed cargo on top of steel coils;

- (j) if the consignment of steel coils is not large enough to fill the entire cargo hold, coils should be loaded at the after part of the cargo hold adjacent to the aft bulkhead to minimize the risks of movement or shifting forward and aft during transit. Incomplete rows that do not cover the entire hold width from side to side should be avoided. Upon coming to completion of the loading operation, consideration should be made of the numbers and sizes of coils still yet to be loaded. This will enable the crew and stevedores to plan and stow the cargo so incomplete rows can be avoided;
- (k) cargo hold geometry can have a significant impact upon coil stowage arrangements and the volume of cargo that can be carried in these holds. This is particularly true for the forward and aft cargo holds which tend to have irregular geometries. In such cases, it is also important to consider the loads on sloping hopper tanks, as seen in **Figure 5.1**, if cargo is likely to be loaded upon them;
- (l) similarly, coil weight and dimensions can have an impact upon stowage and securing arrangements in the cargo space. **Figures 5.7 to 5.20** show examples of various practical configurations depending upon various coil sizes and other contributing factors;
- (m) the classification society may be able to offer assistance to calculate the permissible steel coil load for the vessel. One classification society suggests that as a rule of thumb, when loading steel coils the total cargo weight in the hold should not exceed half of the maximum permissible loads for evenly distributed weight in that cargo hold.; and
- (n) *palleted steel coils*. Steel coils that are palleted are normally stowed with the “eye to the sky” as seen in **Figure 5.21**. These coils are usually high value cargo when compared to usual cold rolled steel coils. The palleted coils are stowed directly onto the tank top, one against the other. Chocking by timber dunnage may be necessary between some coils and between outboard coils and the vessel’s side structures.

When palleted coils are stowed in more than one tier, dunnage is placed on top of the steel coils, in order not to damage coils stowed underneath and nailed together, not just placed as individual pieces of dunnage. This is because individual pieces are prone to movement, and if the dunnage moves, the coils underneath are likely to sustain damage to their edges. In addition, any cargo stowed on top should not be so heavy that the coils stowed underneath could be damaged.

5.5.2.2 *Coiled steel wire rods*. Coiled rods are normally stowed in athwartships rows with the “eye” of the coil in a fore and aft direction. The maximum number of tiers that coiled wire rods can be stacked is subject to many factors, such as the weight of the coils,

rigidity of the packing, and stowage of the coils. The shipper and/or manufacturer should be consulted if there is any doubt.

Care should be taken to ensure that outer coils, particularly on lower tiers are properly protected from the vessel's side shell frames as coils pressed against the side shell frames can cause deformation damage as seen in **Figure 1.2**.

Coiled wire rods can also be stacked on top of other steel products as seen in **Figure 4.2**, but other cargo items should not be stowed on top of a stowage of coil wire rod because the coils are likely to be deformed by the superimposed weight.

5.5.2.3 *Steel plates and bundled steel sheets, steel slabs, billets and blooms.* Steel plates, sheets, slabs, etc. have a tendency to shift if not properly dunnaged (see **Section 4.2.1(2)**). Therefore, the following should be considered for dunnaging these cargoes.

- (1) Wood dunnage of sufficient length to reach across the width of the steel pieces, or a number of pieces, should be placed athwartships on the tank top and then between each tier so that the dunnaging is in a vertical line as seen in **Figure 5.22**. This dunnaging should be properly spaced horizontally between the steel pieces to prevent deformation as seen in **Figure 5.23**.
- (2) If dunnage is not vertically aligned and properly horizontally spaced the possibility of permanent plate deformation during transit as can occur as seen in **Figures 1.9** and **5.23**. Steel slab, due to its thickness, is not normally at risk of deformation as steel plate, but the same practice for dunnage placement is recommended as best practice.
- (3) Particular care should be taken when stowing steel plate or slab in a non-vertically aligned stack, such as on sloping hopper tanks. This is particularly the case when stowing elongated plates or slabs along sloping hopper tanks as seen in **Figures 5.24** and **5.25**. Dunnage should be arranged along the hopper tanks for their protection taking into account the following considerations:
  - (i) wooden dunnage placed fore and aft for plates or slabs will not necessarily be vertically aligned, although wooden dunnage placed athwartships is a recommended practice as noted above in **Section 5.5.2.3(1)** along the length of the elongated plate;
  - (ii) for steel plates stowed in a fore and aft direction when stowing steel plate adjacent to hopper tanks, dunnage running fore and aft will be required. However, that dunnage may not necessarily be aligned vertically as seen in **Figure 5.26**;

- (iii) chocks (wedges) should be laid between slabs as an additional measure to prevent sliding of steel slab cargo in such instances as seen in **Figure 5.27** and **5.28**; and
  - (iv) any wooden dunnage laid athwartships at intervals along the length of the steel plate should be aligned vertically as shown in **Figure 5.22**.
- (4) dunnage should be of sufficient height dimensions to allow for ease of load and discharge; and
- (5) Shorter plates should be placed on top of longer plates so there is no significant overhang of plates stacked on top that would need additional dunnage. As a rule of thumb for heavy steel plate, the horizontal spacing of the dunnage should be no more than 10 feet (3 meters) apart.

5.5.2.4 *Structural steel*. This type of steel cargo may be loose or in bundles. The pieces or bundles should be stowed fore and aft with timber dunnage between each tier. The dunnage should be placed in a number of lines athwartships on the tank top and then between each tier so that the dunnage is aligned vertically. This dunnaging should also be properly spaced horizontally to prevent deformation during transit. Timber chocks (wedges) may also be required in gaps between adjacent items to prevent shifting or movement of the cargo.

5.5.2.5 *Small and large diameter pipes*. Pipes, almost invariably, should be stowed in a fore and aft direction without timber between each tier but at the cantelins of the pipes being stowed below. Some types of pipe or bundles of pipes might need particular stowage arrangements. For example, pipes with one bell end or those with a surface coating which might not be abraded. In such circumstances, appropriate dunnaging arrangements should be provided by the charterer/shipper prior to loading.

5.5.2.6 *California Block Stowage (CBS)*. The CBS method of stowing steel slab cargoes was developed some years ago for the California steel industries' trade between South and North America. It was intended to lower costs through the reduction of cargo handling by stevedores. However, this system of stowage should be carried out under the supervision of those with specialist knowledge of the techniques involved. The method involves loading semi-finished steel slabs to form a free-standing stow. The slabs are loaded fore and aft with minimal dunnage under and between the slabs. The American Club, like many other International Group of P&I Clubs, does not recommend the CBS method of stowage.

However, should vessel owners find themselves under pressure to agree to the CBS

method, the American Club has issued guidance as set forth in **Club Circular No. 15/11, *The California Block Stowage (CBS) Method***, dated April 4, 2011. In summary, it states that vessel owners should ensure that:

- (a) they contact the Managers before agreeing to carry steel cargoes using the CBS method;
- (b) the CBS method is only used for loading cargo into “box” shaped holds;
- (c) the stow is loaded out to the sides of the hold to prevent shifting of cargo athwartships;
- (d) the stow is used only for the trade route for which it was originally intended, and for steel slab cargoes only;
- (e) the stow is approved by an experienced third party inspector who has been approved in writing by the Managers; and
- (f) the Managers are consulted in advance as to wordings or amendments to any draft bill of lading, charter party, letter of indemnity, or other relevant document, in order to best protect the vessel owner’s interests.

## 5.6 Preparation of holds for stowage

See **Sections 7.2.2.4, 8.3.2(g)** and **Appendix 2, *List of important documents to be kept and maintained.***

## 5.7 Securing and lashing of steel cargoes

- 5.7.1 *Basic principles.* In accordance with chapters VI and VII of the SOLAS Convention and the 1991 Code of Safe Practice for Cargo Stowage and Securing (CSS Code), as amended, cargo units (other than solid and liquid bulk cargoes) shall be stowed and secured throughout the voyage in accordance with a Cargo Securing Manual (CSM) that is approved by the vessel’s flag State administration or the classification society of the vessel.
- 5.7.2 *Cargo securing devices.* Charterers – in their responsibilities to load, discharge, dunnage, provide the materials for securing and lashing cargo – usually wish to minimize the costs of dunnage materials and lashing and securing materials. Therefore, charterers look to use cost effective securing and lashing materials that are easily obtainable. The Master and the surveyors are encouraged to obtain certificates of the lashing and securing materials from the charterer or their lashing service provider. Some of the standard materials used for securing and lashing include, but are not limited to:

- flat steel band to lash together such steel products as steel coils (see **Figure 5.29**);
- steel wire rope cable in combination with “Bulldog” or “Crosby” clips, turnbuckles and shackles. For ease of use, normally 0.6 inch (16 mm) (6 x 12) wire rope is what is commonly used for lashing (see **Figure 5.30**);
- removable “weld-on” pad eyes used for securing lashings;
- steel chains (see **Figure 5.31**) and quick acting clamps;
- steel stoppers (see **Figure 5.3.1**); and
- nylon stripping band and ratchet tightener (see **Figure 5.3.2**).

### 5.7.3 *Securing and lashing: general principles.*

- 5.7.3.1 The securing and lashing of a wide variety of steel cargoes is normally left to the well-qualified cargo superintendent, or port captain, and/or stevedore foremen with many years of knowledge and experience. Vessel owners and their Masters should verify whether the methods to be used to secure any steel cargoes are in accordance with the relevant regulations, the CSS Code and their Cargo Securing Manual.
- 5.7.3.2 Although different securing methods are in use in different ports, these methods may be recognized and approved as “being in compliance” with the CSS Code. Masters are encouraged to obtain written evidence of such approval from the stevedores and lashing gang representatives.
- 5.7.3.3 In any instance, and depending upon the contractual responsibilities for loading, stowing, dunnaging, securing, lashing and/or discharging cargo, attaching any lashing to the vessel’s side frame directly as seen in **Figures 5.33** and **5.34**, should be avoided as it could damage the vessel’s structure.

### 5.7.4 *Securing and lashing by cargo type: some basic principles.* For certain steel cargoes there are some basic practices that should be considered as follows:

- 5.7.4.1 *Steel coil.* Normal lashing material for steel coil is 1 inch (2.5 cm) flat steel band. In dependent of the number of tiers, the general principle applied is that the lashings should secure each of the top tier coils to the two coils in the tier just beneath the top tier. Lashings should be run through the center of the coils. At a minimum, and in common practice, coils are lashed together in groups of threes as seen in **Figure 5.29**, an example of a basic 5 coil, two-tier configuration.

If coils are stowed in a single tier, coils are still to be lashed together in groups of threes but only to horizontally adjacent coils except if a key/or locking coil. Please see combinations of stowage, securing and lashing configurations meeting these criteria in **Figures 5.7** through **5.20**.

It is recommended that the outer coils of the lower tier are to be secured against the adjacent inner coils to keep the stow stable during rolling. For example, see **Figures 5.14** and **5.19**.

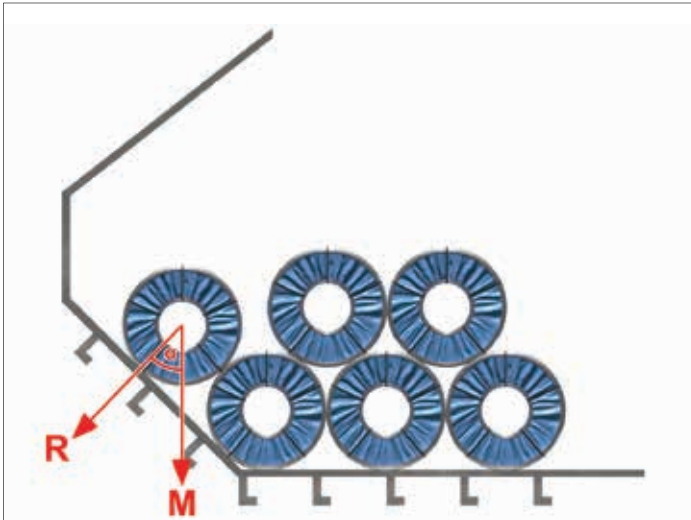
- 5.7.4.2 *Steel plates and bundled steel sheets, steel slabs, billets and blooms.* When stowed, any gaps between individual pieces should be chocked/wedged with strong timber as seen in **Figure 5.27**. Consignments of steel plate, slab, etc. are normally lashed with steel wire rope or bands as seen in **Figures 5.25** and **5.28**.
- 5.7.4.3 *Large diameter steel pipes.* See comments to **Figures 3.35**.
- 5.7.4.4 *Structural steel.* See comments to **Figure 5.24**.
- 5.7.4.5 *California Block Stowage.* The securing is only applied to the top tier(s) and the rest of the slabs are loose, with the assumption that they will stay in position and will not drift/shift during the voyage. The top tiers of the stow are then bound using steel strapping and metal clips, rather than traditional wire ropes and turnbuckles. The slabs inside the stacks essentially remain free-standing (see also **Section 5.5.2.6**).

## **5.8 Crew role ensuring proper stowage and securing**

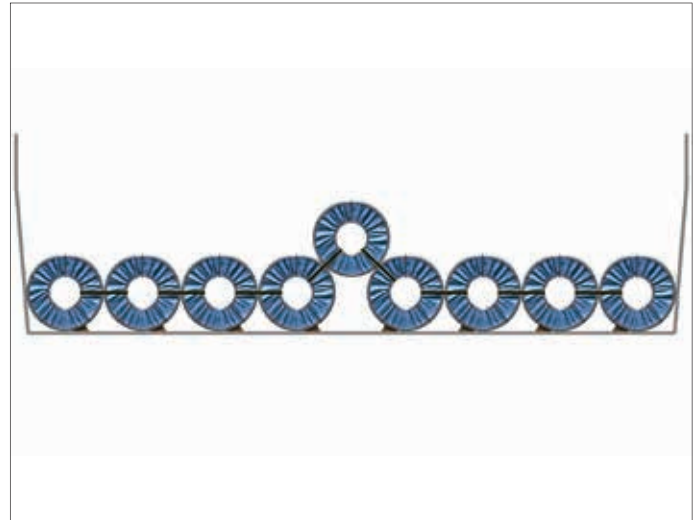
See **Section 7**, *Precautions during loading, transit and discharge*.

## **5.9 Surveyor's role in ensuring proper stowage and securing**

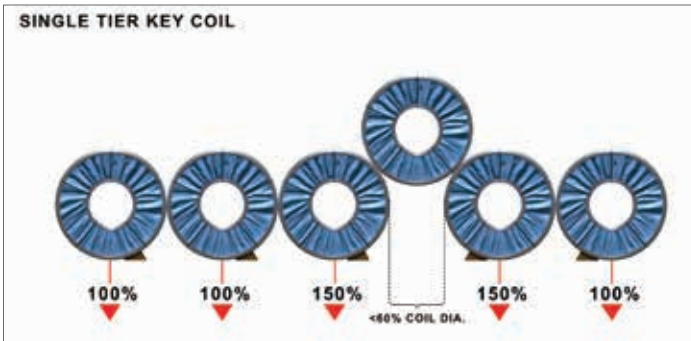
Should the surveyor have concerns regarding the safety of the vessel or the stowage, securing and/or lashing of the cargo, the surveyor should bring those concerns to the attention of the vessel's Master; the charterer and/or shipper and/or the supercargo assigned by them for consideration and/or suitable action.



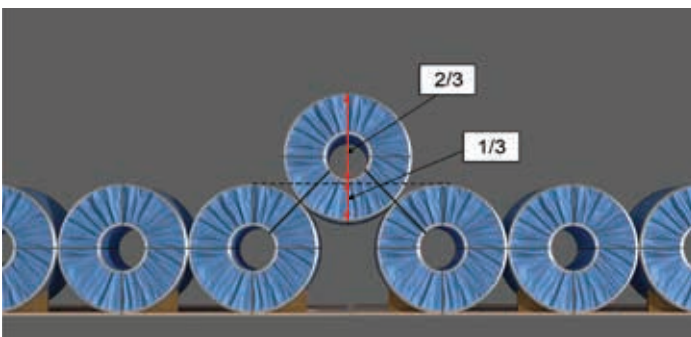
**Figure 5.1** | Steel coil force loads on sloping hopper tank plate.



**Figure 5.2** | A single layered stowage with the center elevated coil as the “key” or “locking” coil.



**Figure 5.3** | In order to be effective, as a rule of thumb, the gap where the “key” or “locking” coil is placed, should not exceed 60% of the coil’s diameter.



**Figure 5.4** | Diameter of locking coil.

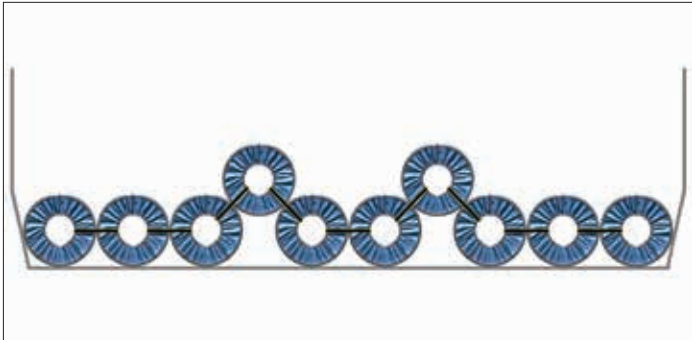




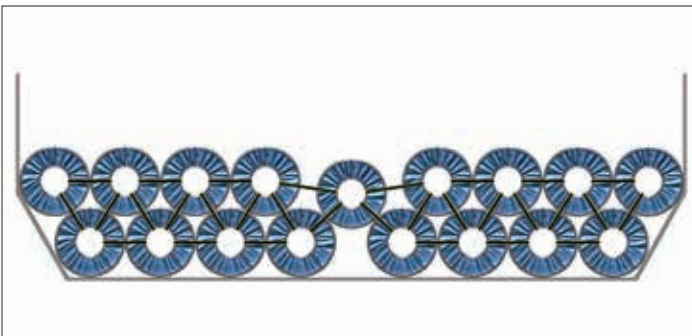
**Figure 5.5** | Note that the wooden case is loaded on the top of steel coils.



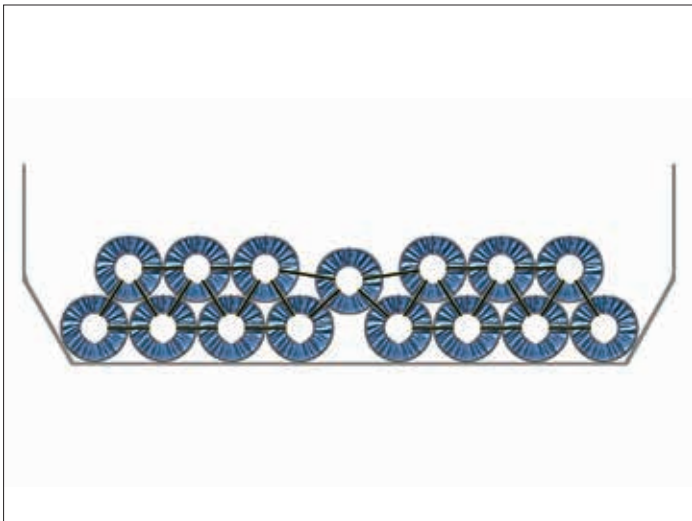
**Figure 5.6** | Note that the wooden case is resting on the steel lashing bands for the steel coils.



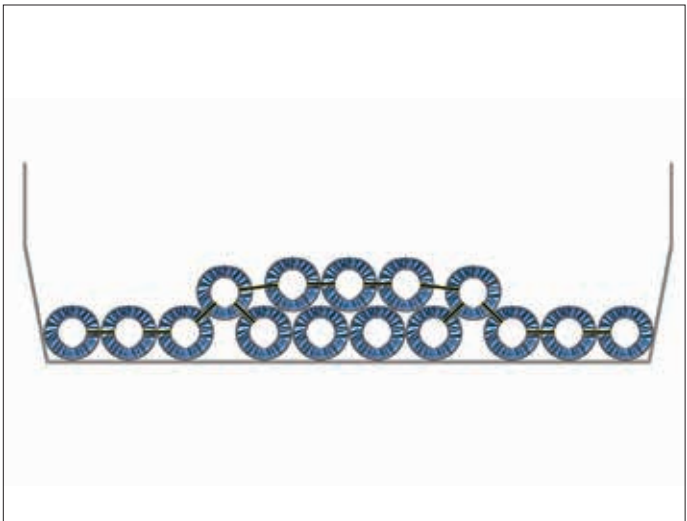
**Figure 5.7** | A single layered stowage with two symmetrically placed locking coils.



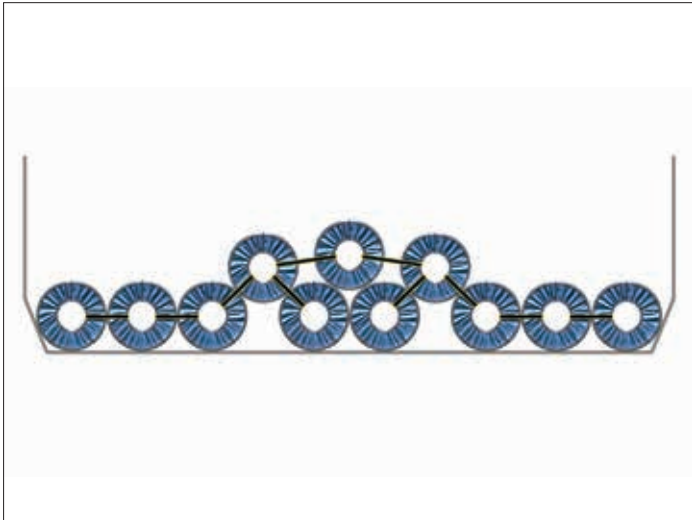
**Figure 5.8** | A two-layered stowage with second tier loaded with coils to the vessel's side shell.



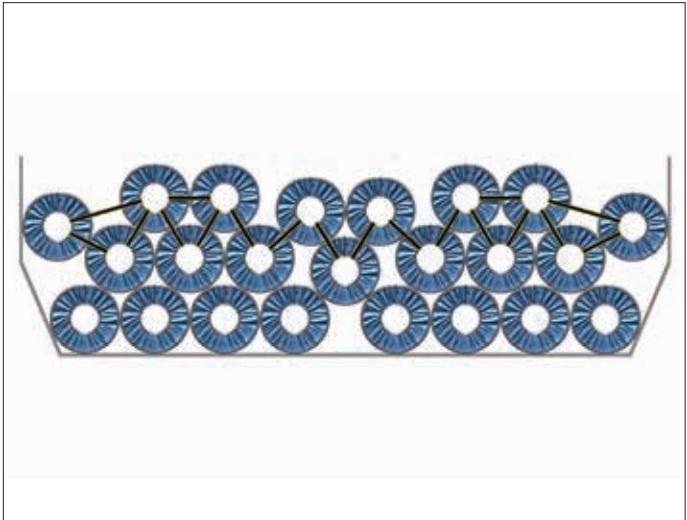
**Figure 5.9** | A two-layered stowage with second tier loaded with coils in two semi-pyramid fashion. Note that the outer coils of the second tier have additional lashing/securing in comparison with those in **Figure 5.8** to prevent movement of these coils towards the side shell while in transit.



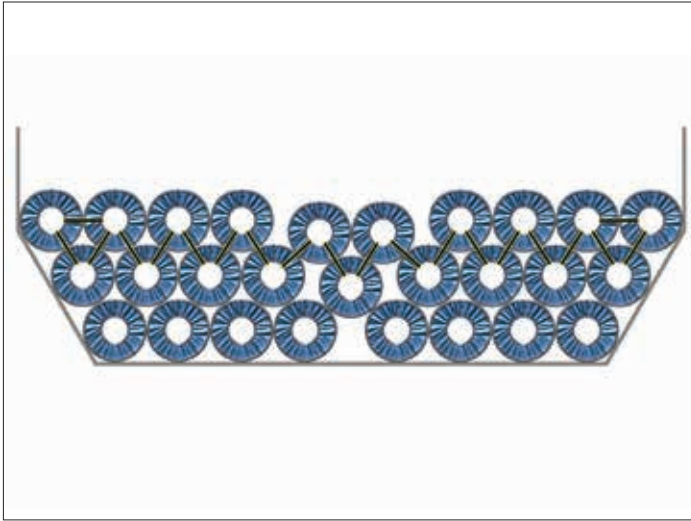
**Figure 5.10** | A partial two-layered stowage with two locking coils symmetrically placed with the partial second tier lashed in a "capped" arrangement over the two central first tier coils.



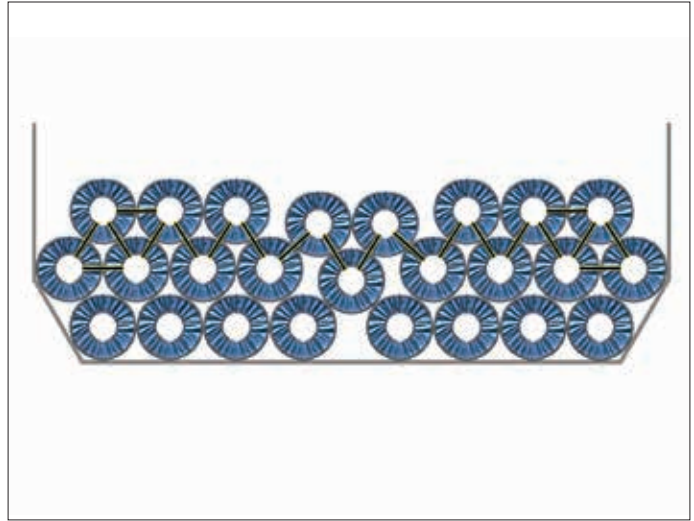
**Figure 5.11** | A partial two-layered stowage with two locking coils symmetrically placed. Note that the top center coil is well secured/lashed to the four adjacent coils given the significant gap between the second tier coils.



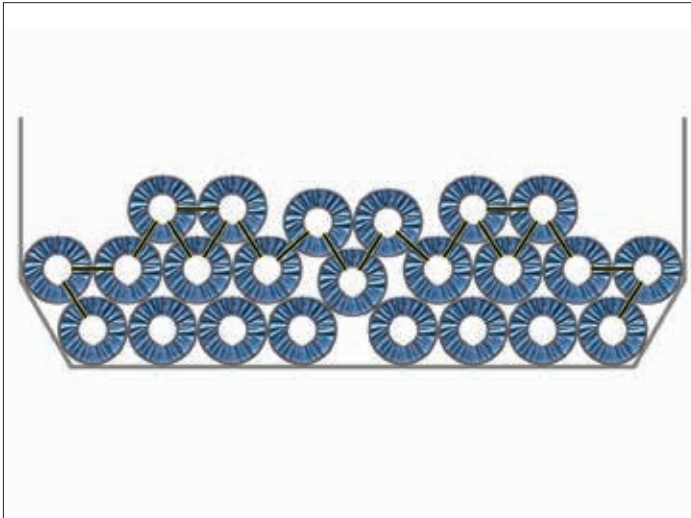
**Figure 5.12** | A complete three-layered stowage. Note there is no securing/lashing to the lower tier where only the top tier is secured to the tier immediately below.



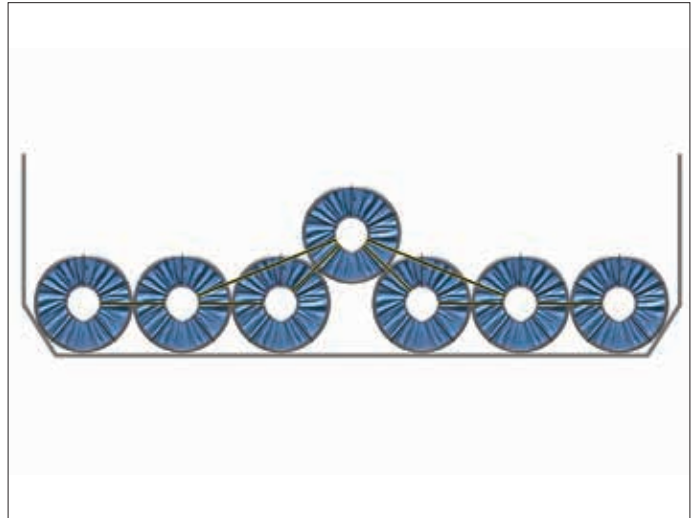
**Figure 5.13** | A complete three-layer stowage to the side shell. Note securing/lashing of top two tiers only.



**Figure 5.14** | A complete three-layer stowage to the side shell. Note additional securing/lashing of two outermost coils on the third tier.



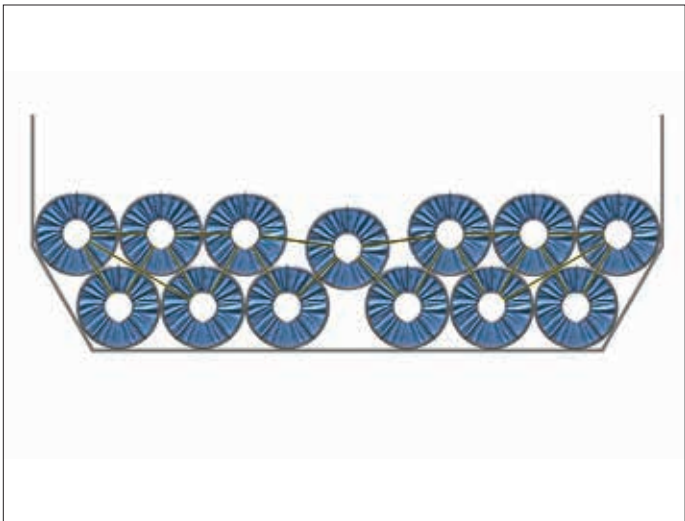
**Figure 5.15** | A partial three-layer stowage.



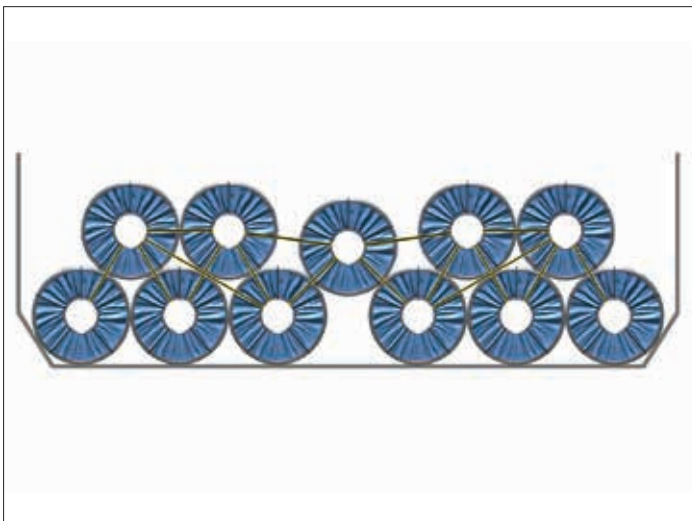
**Figure 5.16** | A single-layer stowage of heavy or ultra-heavy coil. Note additional securing/lashing of the “key” or “locking” coil in comparison for ultra-heavy coils compared to those seen in **Figure 5.7**.



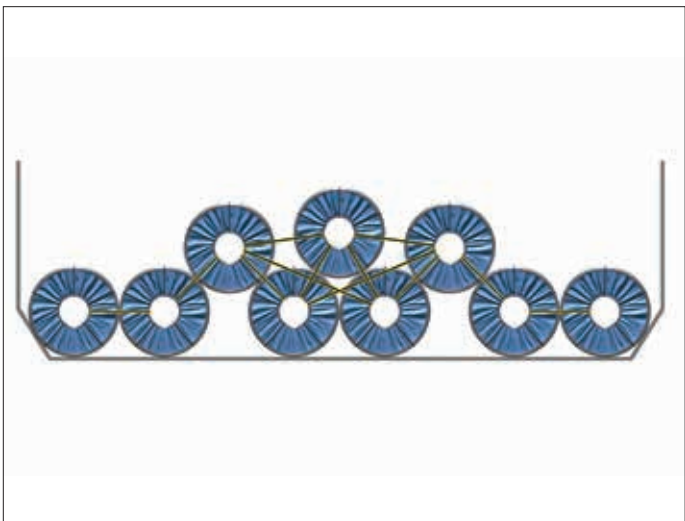
**Figure 5.17** | A single-layer stowage of heavy or ultra-heavy coil with two symmetrically placed locking coils. Note additional securing/lashing of the “key” or “locking” coils in comparison for ultra-heavy coils compared to those seen in **Figure 5.7**.



**Figure 5.18** | A two-layer stowage of heavy coil with the second tier loaded with coils to the vessel's side shell. Note the additional lashing of the two outer coils on the second tier in comparison to those shown in **Figure 5.8**.



**Figure 5.19** | A two-layer stowage of heavy coil with the second tier loaded with coils in semi-pyramid arrangement without outer coils stacked to the vessel's side shell. Note the additional securing/lashing of the two outer coils on the second tier in comparison to those shown in **Figure 5.9**.



**Figure 5.20** | A partial two-layer stowage of heavy or ultra-heavy coil. Note the additional securing/lashing of the “key” or “locking” coils with the two center lower tier coils.



Figure 5.21 | Palletized steel coil stowed with “eye to the sky”.

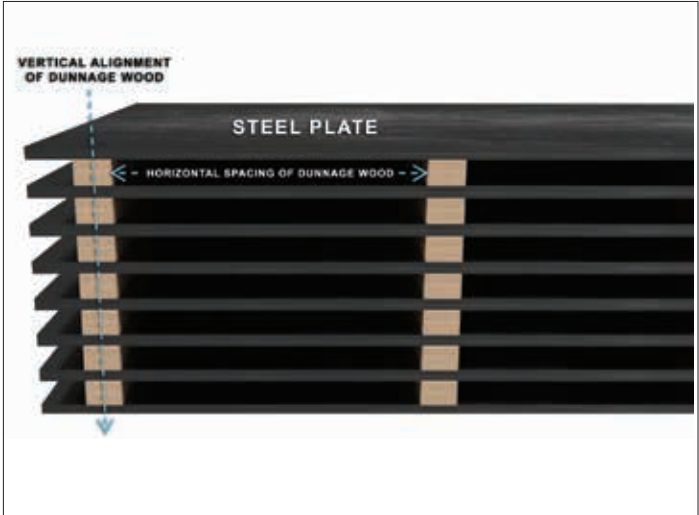


Figure 5.22 | Proper practice for dunnaging of vertically stowed steel plates and slabs.



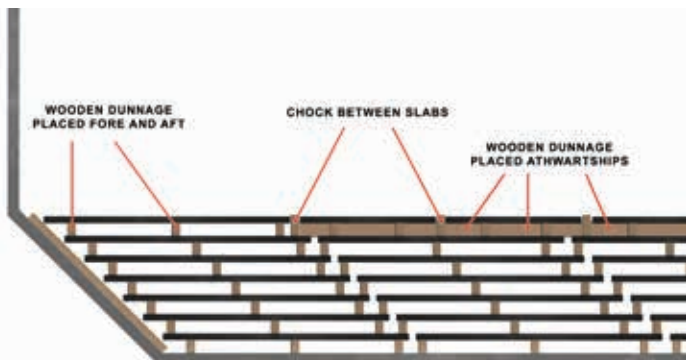
Figure 5.23 | Deformed steel plates. Note the dunnage not placed properly vertically and too far apart horizontally.



**Figure 5.24** | Elongated steel plates stowed and lashed with steel wire in the aft cargo hold. Note the cargo is loaded on the hopper tanks taking full advantage of volume of cargo to be carried by stowage on top of the hopper tanks.



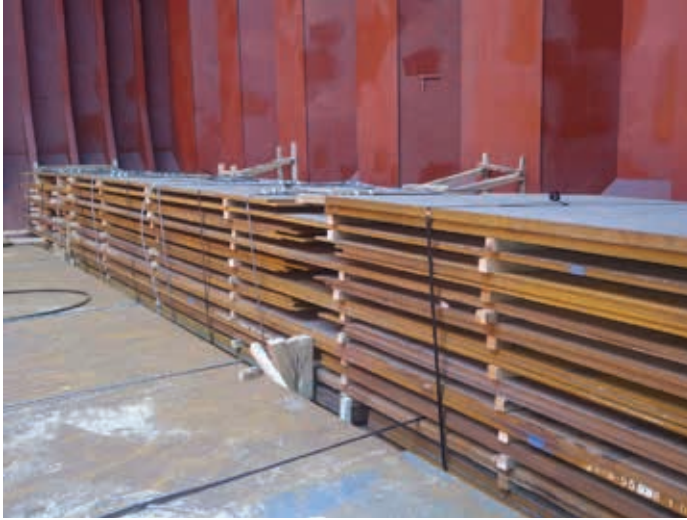
**Figure 5.25** | Stowed and lashed bundled steel plate in cargo hold on tank top and hopper tanks. Note dunnage wood for long plate in foreground of picture with dunnage properly distanced horizontally to prevent deformation of plate during transit.



**Figure 5.26** | Steel plate or slab stacked with longer length in a fore and aft oriented direction along hopper tank. Note the non-vertically aligned wooden dunnage and chocks between upper plates or slabs to prevent slippage during transit.



**Figure 5.27** | Gaps between steel plates should be properly chocked before the vessel sails.



**Figure 5.28** | Steel plates stacked athwartships against the bulkhead with proper dunnage and lashed/secured with steel band strapping.



**Figure 5.29** | Securing/lashing through centers of coils with 1 inch (2.5cm) wide flat steel band. Note that top-tier coils are banded in groups of threes to lower or adjacent coils depending upon the stowage configuration.



**Figure 5.30** | Stevedores preparing to lash steel bar in foreground and channels. Steel channels in the background have been lashed with steel wire rope, clips and turnbuckles.



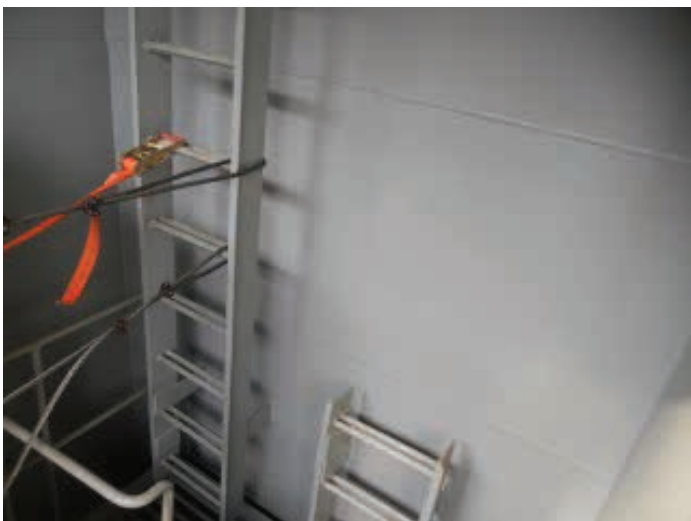
**Figure 5.31** | Steel chain and stopper for securing steel cargoes.



**Figure 5.32** | Nylon stripping bands and ratchet tighteners used on steel “I” beams.



**Figure 5.33** | Attaching lashings to the vessel’s side frames as seen here should be avoided.



**Figure 5.34** | Attaching lashings to the vessel’s structures, including ladders, as seen here should be avoided.



**Figure 5.35** | Secured/lashed large diameter pipe. Note the dunnage wood inserted into the pipes in the foreground used for the lashing and securing of the top tier of stowed pipe.



## 6. Ventilation of steel cargoes

**6.1 Objective:** *To properly ventilate the cargo holds to reduce the likelihood of condensation damage to steel cargoes.*

### 6.2 Purpose of ventilation

- 6.2.1 The purpose of ventilating steel cargoes is to remove any relatively warm moist air surrounding the cargo and replace it with cooler and drier air to minimize condensation onto the cold steelwork of the hold and drip down onto the steel cargo. Ventilation should not be used as a means to cool the cargo. The temperature of the bulk of the cargo will remain essentially constant throughout the voyage.
- 6.2.2 To prevent condensation, the cargo holds should be ventilated when the vessel transits from warmer to cooler climates where a simultaneous reduction in sea water temperature may cause the accumulation of moisture from the surrounding air onto the colder surfaces.

### 6.3 Condensation due to “sweat”

- 6.3.1 *Definition of sweat.* “Sweat” is the formation of condensation within a vessel’s hold. There are two types of sweat.
  - (a) *Ship sweat.* Moisture (condensation) that forms on the vessel’s structure is known as “ship sweat”.
  - (b) *Cargo sweat.* Moisture (condensation) that forms on the cargo itself is known as “cargo sweat”.
- 6.3.2 *Ship sweat.* Ship sweat traditionally occurs when a vessel loads cargo in a warm, moist atmosphere, and then sails into locations with much cooler climates. As the vessel’s steelwork cools, moisture from the humid atmosphere in the holds will condense on the colder steel surface of the hold.
  - 6.3.2.1 In general, ship sweat only forms in significant quantities when a vessel is carrying a *hygroscopic* cargo (i.e., a cargo which has its own inherent moisture content – such as rice). Steel is a non-hygroscopic material as it has no inherent moisture. However, steel products are normally transported using timber dunnage, which is a hygroscopic material or may be stowed in holds together with hygroscopic cargoes.

- 6.3.2.2 Ship sweat appears as tiny beads of moisture condensing onto the vessel's metal work. This phenomenon typically occurs on the sides of the hold when the sea temperature is lower than the ambient temperature in the cargo hold, on the undersides of the hatch covers and on the weather deck when the outside air temperature is lower than the ambient temperature in the cargo hold. The result is a reduction of the temperature of the ship's structures to a value below the "dew point" of the surrounding air.
- 6.3.2.3 When ship sweat forms on steel structures, the condensation water runs down to the tank top level causing wetting of cargo items in its path. When ship's sweat forms on hatch covers and the underside of weather deck plating and stiffeners, the water that is formed drips down causing the wetting of the top layer of the cargo stow.
- 6.3.3 *Cargo sweat.* Cargo sweat forms under precisely the opposite circumstances than that of ship sweat. Cargo sweat forms on the surface of the cargo when its temperature is below the dew point of the air adjacent to it.
  - 6.3.3.1 *An example of cargo sweat.* A vessel loads a cargo in cool weather and the cargo is itself cool in temperature. Thereafter, the vessel transits into warmer climates with higher humidity. If an attempt is made to ventilate at that time, then moisture from the warmer humid air introduced into the cargo space condenses onto the relatively colder cargo.
  - 6.3.3.2 *Cargo sweat on steel cargoes.* Cargo sweat can also affect non-hygroscopic cargoes such as steel. While ship sweat is a more frequent problem and controlled by proper ventilation. Cargo sweat, in contrast, is generally caused by ventilating when it is inappropriate to do so.

## 6.4 Comparison of dew points

- 6.4.1 If the dew point of the outside air (the air used for ventilation) is lower than that in the hold, then it is appropriate to ventilate. If the ambient dew point is not lower than that of the cargo hold, it may be necessary to ventilate for other reasons, such as when the cargo has been fumigated, and timely ventilation of the fumigant is required. Steel is not a cargo that needs to be fumigated. However, the vessel may be carrying other cargoes in the same holds that may require fumigation when appropriate.
- 6.4.2 A comparison of the dew points between the cargo hold air and the external environment is commonly made by taking readings from wet and dry-bulb thermometers on deck and in the hold. Obtaining the ambient readings is simple. Most vessels have a box containing a pair of thermometers, suitable for measuring wet and dry-bulb temperatures. These thermometers should be hung in a shaded spot on the windward side of the bridge.

- 6.4.3 During the voyage, it may not be safe for the vessel's crew to enter the hold to obtain temperature readings (see **Section 2.6**). If a cargo hold has been fumigated after loading, it certainly will not be safe, even if the compartment has been ventilated. If the wet-bulb thermometer is simply lowered into the hold from outside, there will be difficulty obtaining a sufficient air-flow across the thermometer's wick. Some vessels are equipped with temperature measuring pipe for the cargo hold. If not, it may be feasible to measure the temperature through the cargo hold access, rather than enter the cargo hold.
- 6.4.4 In the event that the crew is able to safely enter cargo holds to obtain meaningful readings, it may be necessary to stop ventilating to allow the in-hold atmosphere to stabilize. If this is not done, the crew will be measuring the parameters of the ventilating air rather than those of the true in-hold atmosphere. Unfortunately, suspending ventilation in this way negates the purpose of ventilating, but may be the only means to obtain the readings at the time. If this is done, it should be properly noted in the "Remarks" section of the Humidity-Temperature-Cargo Ventilation Record Book (see **Section 6.9.1(3)**).
- 6.4.5 In practice, measuring the dew point temperature inside a cargo hold can be problematic. One of the simplest methods is to use a "whirling psychrometer", which involves swinging the instrument inside the hold until the wet-bulb temperature has stopped falling and remains steady.
- 6.4.6 All readings should be taken well away from any air inlets to ensure that only hold air is tested. As an important safety precaution, enclosed space entry procedures should always be observed (see **Section 2.6**).
- 6.4.7 If the vessel is taking spray across the ventilator openings or onto the hatch covers or coamings, ventilation should be postponed until weather conditions improve. Also, when sea sprays and seawater comes on deck, there is a significant risk that the water and spray will enter the cargo hold and wet the cargo.
- 6.4.8 If access to the holds is impossible or undesirable, the hold dew point can be determined from traditional wet and dry-bulb thermometers placed inside the trunking of an exhaust ventilator or similar pipe-work leading from the compartment. If done, it should be properly noted in the "Remarks" section of the Humidity-Temperature-Cargo Ventilation Record Book (see **Section 6.9.1(3)**).

## 6.5 Comparison of temperatures

- 6.5.1 In many instances, it is impracticable to measure hold dew point temperatures accurately, or at all. Therefore, it is recommended that the “3<sup>o</sup> Celsius Rule” should be applied as described in **Sections 6.5.3, 6.6.2 and 6.8.6.**
- 6.5.2 The temperature of the bulk of a stowed cargo will remain the same, or will change little throughout the voyage. Conversely, the temperature of the ambient air at the vessel’s position will change during each day, and progressively over the course of the voyage. Experience has shown that ventilation can be effective in removing moisture from a cargo hold if the outside air is at least 3<sup>o</sup> Celsius (C) below the temperature of the cargo stowage.
- 6.5.3 In order to use the 3<sup>o</sup> Celsius Rule, the temperature of the cargo should be obtained accurately during loading. This process might involve taking a number of temperature readings within cargo loaded into each hold in order to establish an accurate temperature for the cargo in each hold. During the voyage, a reading from the dry-bulb thermometer in the box on the bridge should be taken by the crew during each watch and then compared with the cargo temperatures for each hold established during loading. Therefore:
- (a) if the temperature of the outside air is 3<sup>o</sup> C below the cargo temperature for any hold, that hold should be ventilated; conversely; and
  - (b) if the outside air is not 3<sup>o</sup> C below the cargo temperature in the particular hold, that hold should not be ventilated.

## 6.6 When to ventilate—Rules

- 6.6.1 *Dew Point Rule.* Ventilate when the dew-point of the outside air is lower than the dew point of the air in the hold.
- 6.6.2 *3<sup>o</sup> Celsius Rule.* Ventilate when the dew-point of the outside air is at least 3<sup>o</sup> C below the temperature of the cargo taken during loading.

## 6.7 Systems of ventilation

- 6.7.1 In general, there are three means of ventilation for shipboard cargoes:
- (1) *Natural ventilation.* The natural air ventilation of cargo hold is the most basic means. This can be supplemented by modified mechanized air circulation systems.

- (2) *Temperature control system.* A temperature control system of circulating air within insulated cargo hold.
  - (3) *Mechanical ventilation.* The principle of most types of shipboard mechanical ventilation is to replace the warm air in the cargo hold with colder ambient air.
- 6.7.2 For voyages from warmer to colder climatic regions, natural ventilation may be insufficient for the carriage of steel. Vessels carrying steel cargoes should be equipped with a proper functioning mechanical ventilation system with sufficient capacity of between 15 – 25 air changes per hour (calculated under the assumption that the cargo hold is empty). Furthermore, all fans need to be checked to ensure that they run properly in the correct direction. Where the vessel is not fitted with fixed mechanical ventilation, the vessel owner may then consider supplying and using portable blowers, if necessary.

## 6.8 Ventilation of steel cargoes

- 6.8.1 It is important to note again that the goal of ventilation is not to cool or heat the cargo. Ventilating dissipates the natural buildup of water vapor to minimize the differences in temperature between the air in the hold and vessel's steel structure to prevent condensation build up on the vessel's steel parts in the cargo hold.
- 6.8.2 The periphery of the cargo stowed is directly influenced by the passing of the cooler ventilation air, will become cooler as well. This process also reduces the difference in temperature between the cargo and vessel's steel structure. Consequently, the periphery of the stowed cargo becomes dryer and cooler resulting in moisture migration from the center towards the boundary of the stowed cargo. It should be noted that the efficiency of mechanical ventilation does not always consistently ventilate throughout a loaded cargo hold. This should be taken into consideration, particularly if mechanical ventilation is applied.
- 6.8.3 When the weather conditions and the dew point are within acceptable parameters to ventilate, the hatches can be opened during the voyage to allow appropriate surface cooling but only when sea conditions are sufficiently benign. If possible, this type of ventilation should also be carried out in port until completion of cargo loading or discharging.
- 6.8.4 During periods of inclement weather, steps should be taken to prevent rain and spray from entering the cargo spaces. This may include, if necessary, suspending ventilation until conditions improve. However, during rain or fog, ventilation can be continued as long as the dew point temperature of the ambient air is lower than the dew point temperature of the air inside the hold. Any such conditions and actions taken should be recorded in the Deck Log Book and in the "Remarks" section of the Humidity-Temperature-Cargo Ventilation Record Book (see **Section 6.9.1(2)**).

- 6.8.5 Ventilation can be done at night if the readings indicate that ventilation is appropriate bearing in mind that ambient temperatures are usually lower at night. Therefore, the risk of developing ship sweat is more likely during the hours of darkness so ventilation may be continued if conditions permit. If ventilating at night, the crew should be particularly diligent at monitoring the weather conditions as set forth in **Section 7.2.1**.
- 6.8.6 In addition to ventilating the cargo holds, it is important that cargo holds inspections are regularly made, preferably as often as once a day. This need not necessarily involve direct entry into the cargo holds. For example, ship sweat may be seen forming on the underside of manhole covers. In such instances, and especially at night, the cargo should be ventilated irrespective of the "Dew Point Rule" or "3<sup>rd</sup> Celsius Rule" (see **Section 6.6**), weather permitting.
- 6.8.7 Vessels with natural ventilation systems should be equipped with either permanent or portable cargo hold dehumidification systems that are able to remove the moisture from the holds before any condensation should occur. Additional dehumidifiers should be considered if the vessel is carrying a high value steel cargo such as steel coils or other finished steel cargoes.

## 6.9 Cargo humidity and ventilation testing: Example of best practices

- 6.9.1 During the vessel's voyage, the crew should obtain regular ventilation reports using the following basic principles to determine if ventilation is required and favorable. Applying the good practice of taking records in a daily log during carriage is an effective measure to help establish that the vessel owner has applied prudent practices to protect the cargo from unnecessary damage. Some examples of best practices are:
- (1) *Temperature readings.* Wet-bulb and dry-bulb temperature readings of each hold and the outside air should be taken at least once a watch. When the wet and dry-bulb temperatures are known, the dew point is ascertained from the scale as shown in **Table 6.1**. It is important that:
    - (a) the outside air control position thermometer should read near the bridge. It should be exposed to the weather in open air, but out of contact with direct sunlight, reflected heat, exhaust ventilators or any other heat source;
    - (b) the thermometers in the hold should be waved in the air vigorously for a few moments until the temperature of the wet-bulb remains steady. False temperature readings may be observed if this approach is not followed;
    - (c) it is also good practice to take original temperature readings prior to commencement of the voyage as a benchmark to making further readings during the voyage; and

- (d) readings of the relative humidity/dew point should be recorded prior to loading when the hold is empty and then again when the cargo hold is full prior to departure. The relative humidity should be kept below 40%. If that is not possible, the relative humidity should be maintained between 40-60%. However, the relative humidity should be no more than 60%, the point where the risks of heavy oxidation and cargo corrosion are more likely to occur.
  - (2) *Entry of cargo hold temperature into the Cargo Record Book.* Once the temperatures have been measured and the dew point of all cargo holds and the control position has been ascertained, the information should be entered into the vessel's Humidity-Temperature-Cargo Ventilation Record Book as shown in **Table 6.2**.
  - (3) *Entries into the Humidity-Temperature-Cargo Ventilation Record Book.* Under the heading "VENTING", indicate "Yes" or "No" as the case may be. Under "GENERAL REMARKS", it is important to indicate events such as any reasons for not ventilating, times of opening and closing of hatches, times of operating mechanical ventilation systems if the vessel is fitted with such equipment, or using portable ventilation equipment. Under "WEATHER CONDITIONS", brief remarks should be provided on weather conditions over a 24-hour time period particularly if there are periods of rain, fog, heavy seas, water or spray on the deck and/or hatches, etc.
- 6.9.2 As steel is a non-hygroscopic cargo, the following should be considered when transiting between warmer and colder climates.
- (1) *When transiting from warmer to colder climates.* The likelihood of the development of ship sweat is high, therefore ventilation will likely be needed.
  - (2) *When transiting from colder to warmer climates.* Ventilation will not normally be required. However, cargo sweat could occur if warm air comes into contact with a colder steel cargo. Therefore, cargo holds containing steel cargoes should be sealed at the load port and remain sealed during the course of the voyage until discharge.

**Table 6.1: Dew Point Table**

Dry-Bulb Temperatures (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (°C)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
-20	-20	-33														
-18	-18	-28														
-16	-16	-24														
-14	-14	-21	-36													
-12	-12	-18	-28													
-10	-10	-14	-22													
-8	-8	-12	-18	-29												
-6	-6	-10	-14	-22												
-4	-4	-7	-12	-17	-29											
-2	-2	-5	-8	-13	-20											
0	0	-3	-6	-9	-15	-24										
2	2	-1	-3	-6	-11	-17										
4	4	1	-1	-4	-7	-11	-19									
6	6	4	1	-1	-4	-7	-13	-21								
8	8	6	3	1	-2	-5	-9	-14								
10	10	8	6	4	1	-2	-5	-9	-14	-28						
12	12	10	8	6	4	1	-2	-5	-9	-16						
14	12	12	11	9	6	4	1	-2	-5	-10	-17					
16	16	14	13	11	9	7	4	1	-1	-6	-10	-17				
18	18	16	15	13	11	9	7	4	2	-2	-5	-10	-19			
20	20	19	17	15	14	12	10	7	4	2	-2	-5	-10	-19		
22	22	21	19	17	16	14	12	10	8	5	3	-1	-5	-10	-19	
24	24	23	21	20	18	16	14	12	10	8	6	2	-1	-5	-10	-18
26	26	25	23	22	20	18	17	15	13	11	9	6	3	0	-4	-9
28	28	27	25	24	22	21	19	17	16	14	11	9	7	4	1	-3
30	30	28	27	26	24	23	21	19	18	16	14	12	10	8	5	1



**Table 6.2: Humidity-Temperature-Cargo Ventilation Record Book**

Vessel Name: M/V \_\_\_\_\_

Date	Time	Outside Air			Hold No.: _____			Hold No.: _____			Venting (Y or N)	Sea Temp	Remarks
		Wet Bulb	Dry Bulb	Dew Point	Wet Bulb	Dry Bulb	Dew Point	Wet Bulb	Dry Bulb	Dew Point			
	0000												
	0400												
	0800												
	1200												
	1600												
	2000												
	0000												
	0400												
	0800												
	1200												
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	0000												
	0400												
	0800												
	1200												
	1600												
	2000												
	0000												
	0400												
	0800												
	1200												
	1600												
	2000												

Average cargo temperature at loading: \_\_\_\_\_ C/F Master's Signature/Date: \_\_\_\_\_ Chief Officer's Signature/Date: \_\_\_\_\_

## 7. Precautions during loading, transit and discharge

**7.1 Objectives:** *To ensure that proper precautions and protective actions are taken during: (1) the loading of steel cargoes onto the vessel; (2) the carriage of steel cargoes by the vessel; and (3) the discharging of steel cargoes from the vessel.*

### 7.2 Cargo operations procedures

7.2.1 *Weather monitoring (load port, transit and discharge port).*

7.2.1.1 *Inclement weather during cargo operations.* Vessel owners should be mindful of the tasks to be performed if inclement weather is experienced during cargo operations. Such preparations should include allowing for sufficient time to fully close the cargo hatch covers before the onset of precipitation, to prevent damage to the steel cargoes.

7.2.1.2 *Weather watch keeping prior to and during cargo operations.* When the cargo hatch covers are open, the cargo may be exposed to potential inclement weather conditions. During loading and discharging operations, the Master and crew members on duty should monitor weather conditions that may require the closing of the cargo hatch covers. Means of monitoring include visual observation, shipboard radar and via the internet on local meteorological sites that show shower activity on actual radar/satellite pictures. “Rain letters” alone, issued at the discharge port, may not be sufficient and should be supplemented with additional sources.

7.2.1.3 *Hatch cover and crane are operation.* Prior to loading and discharging operations for steel cargoes, the Master and crew should determine whether the hatch covers and cranes are in good working order, if the latter are to be used in cargo operations (as specified in Section 2.3). The crew should be fully aware of the required closing time for every hatch cover prior to the commencement of cargo operations.

7.2.1.4 *Use of tarpaulins.* Tarpaulins (rain tents) can be considered as an additional measure of cargo protection. If used, tarpaulins should be properly shaped and sized for their specified use otherwise their effectiveness may be limited.

7.2.1.5 *Weather monitoring during the voyage.* If hatch covers are opened during the voyage to ventilate the cargo, changes in the atmospheric weather conditions as well as sea state conditions, may lead to the ingress of sea water spray into the cargo holds or through the

vessel's cargo ventilators. Sea state and weather conditions should be regularly monitored to ensure that hatch covers are closed and ventilation is suspended if necessary until weather and sea state conditions permit.

7.2.1.6 When cargoes are loaded during wet or humid conditions, it should be anticipated that the cargoes can be moist or wet, thereby increasing the moisture level in the cargo hold and risk of condensation during the voyage.

7.2.2 *Stevedore monitoring (load port and discharge port).*

7.2.2.1 During loading and discharge operations, the Master and crew should be aware of the particular risks associated with stevedores' loading and discharging of steel cargoes, such as, but not limited to:

- (1) rough or improper handling of steel cargo products that can lead to physical damages;
- (2) the lowering and lifting of heavy slings of steel cargo should be monitored to ensure that cargo is properly handled; and
- (3) improper placement of consignments of steel cargo associated with the cargo hold and dunnage configurations by not taking into account proper dunnage, stowage and lashing principles as set forth in **Sections 4 and 5**.

7.2.2.2 The Master should consider holding a pre-load/pre-discharge meeting with the stevedore's foreman and/or the supercargo assigned by the charterer or shipper in the presence of any inspectors and surveyors to:

- (1) agree on a procedure to be adopted if there is a threat of rain. If the vessel's cranes are being used to load or discharge cargo, it is important to prevent stevedores from abandoning their stations and leaving bundled cargo hanging on a crane wire or within a hold thus preventing the crew from closing the hatch covers;
- (2) ensure that stevedores load/discharge cargo in a uniform manner throughout the hold and not leave high piles of cargo in the wings and hold corners which may then collapse, which not only damages the cargo, but would also present a risk of injury to people working in the holds;
- (3) communicate that in the case of rampant pilferage in certain ports by stevedores and/or other unauthorized persons in the vessel's holds, the Master will be obliged to suspend discharge and close the hatch covers;

- (4) obtain a copy of the cargo manifest to familiarize the crew with the details of the cargoes to be loaded. This should be discussed with supercargo and the stevedore foreman regarding their plans for cargo stowage, dunnage, lashing and/or securing, as well as the vessel's requirements, safety regulations and any additional concerns, if applicable; and
  - (5) to ensure there are sufficient means of communication between the relevant port authority, the supercargo, stevedores, the tallyman and surveyors as needed.
- 7.2.2.3 The Master should consider stationing crew members at key locations during cargo loading or discharge operations to visually monitor the stevedores' activities. Crew members on cargo operation duties should be stationed at the following areas:
- (1) embarkation and disembarkation points for stevedores and surveyors to prevent against theft and pilferage of cargo;
  - (2) above each and every cargo hold where cargo loading or discharge operations are underway whereby being able to visually scan and observe the activities of all stevedores and surveyors working in the cargo holds; and
  - (3) any other locations where cargo may be loaded onto or discharged from the vessel, where stevedores are engaged in cargo operations, or where any other visiting non-crew personnel are allowed access.
- 7.2.2.4 The Master and crew should have procedures, record and document any incidents, such as those specified in **Section 7.2.2.1**. In the event of such incidents:
- (1) the crew should notify the Master and/or officer on watch of any and all observed activities of concern by third parties aboard vessel;
  - (2) the Master or officer on watch should log the details of the incidents in the vessel's Cargo Log Book and/or in some other contemporaneous written record;
  - (3) the Master and/or officer on watch should collect all relevant evidence as practicable to be kept as a record of the incident such as film, pictures, statements from witnesses and physical evidence of the incident;
  - (4) the Master should ensure that the Mate's Receipt clearly states the details of the apparent condition of the cargo, including details of any defects or damages to the steel cargo upon loading (i.e. prior to arriving aboard the vessel), etc.; and

- (5) the Master should issue protest letters to the charterer and/or cargo receiver if stevedores do not load, stow or discharge the cargo as instructed.

7.2.3 *Surveyor monitoring and interaction (load port and discharge port).*

- 7.2.3.1 It is recommended that vessel owners arrange for independent surveyors to ensure proper care of the cargo prior to loading, during loading, stowage and discharge of the cargo and conduct proper precautionary surveys, as appropriate, to protect the vessel owner's interests (see **Sections 10.2** through **10.5**).

Vessel owners are strongly encouraged to conduct steel pre-load surveys as per **Club Circular No. 23/14, Steel cargo pre-load surveys: An update** dated August 11, 2014. The American Club will, in all cases, make a 50% contribution toward the cost of such steel pre-load surveys. Furthermore should a cargo claim arise in connection with the voyage in question, the cost of the steel pre-load survey will be applied towards the claims file cost for that matter, subject to any applicable deductible.

- 7.2.3.2 The credentials and identification of any cargo surveyor who arrives to perform the steel cargo surveys should be checked and verified before their work is allowed to commence. Identification cards and the gangway log, as per the requirements of regulation A.7.2.3 of the International Ship and Port Facility Security (ISPS) Code, can be used to identify those persons who have been aboard on behalf of cargo operations if a cargo incident or claim should arise, should this information be necessary.
- 7.2.3.3 The vessel's Master, chief officer and any other crew responsible for monitoring cargo operations should be aware of the specific tasks to be performed by the individual surveyor (e.g. tally, stowage, etc.). The scope of work to be performed by the surveyor should be communicated in writing and discussed prior to taking on his duties with the vessel's Master and/or officer on watch.
- 7.2.3.4 The crew should regularly monitor and ensure that for each surveyor, that they perform only those tasks that stay within the scope of their surveyor's attendance that may include, but not necessarily limited to:
  - (1) the pre-load survey of steel cargo as set forth in **Section 8.4**;
  - (2) the proper tallying of the number of steel cargo consignments coming aboard the vessel;
  - (3) a visual survey of all steel consignments coming aboard the vessel to ensure they are undamaged;

- (4) checking that cargo is properly stowed as to charterer's or shipper's instructions, as well as the condition and handling by stevedores of individual consignments of cargo while being stowed;
- (5) monitoring and attendance of any other surveyor instructed by cargo interests, charterers or third parties; and
- (6) conducting a draft survey before and after cargo operations. It is important to note that draft surveys are not allowed in certain ports. Vessel owners should check with the local agent in advance of arrival to the load or discharge cargo to ascertain whether draft surveys are allowed.

7.2.3.5 The crew should refrain from engaging in discussions or conversations with any attending surveyor on behalf of cargo interests or charterers if a cargo claim has been alleged. Any such communications should be restricted through one designated individual, preferably the attending surveyor for the vessel.

7.2.4 *Hatch covers and cranes operability (load port, transit and discharge port).*

See **Sections 2.3**, *Hatch covers, cranes, and ventilation and other systems* and **7.2.1.3**.

7.2.5 *Pre-arrival of cargo to the vessel (load port).*

See **Section 8.3**, *Condition of cargo upon arrival onboard the vessel*.

7.2.6 *Cargo monitoring (load port, transit and discharge port).*

7.2.6.1 During the voyage, regular, periodic inspection of the cargo holds and cargo should be carried out when possible taking into consideration the following:

- (1) perform checks that focus upon the condition of the stow, if lashings remain tight, the hold air condition (ship or cargo sweat) and possible signs of water ingress through hatches, bilge wells or pipework that passes through the hold.
- (2) check the stowed steel cargoes within and/or at 24 hours after departure from the load port to ensure the cargoes have not shifted or lashings have loosened. As a rule of thumb, most settling of the cargo will have occurred within this time period;
- (3) check to ensure that the cargo is properly secured and lashed prior to any encounters with inclement weather and, when deemed safe by the Master, after clearing from the inclement weather; and

- (4) remember that safety is always the first priority including the safety considerations as set forth in the company's SMS and further considerations as set forth in **Section 2.6**.
- 7.2.6.2 The crew should check, as safely and reasonably practicable, that the cargo remains secured and that lashings have not loosened during transit. If lashings have loosened, they should be secured as per charterer's requirements if it can be done so safely.
- 7.2.6.3 While the vessel is in transit, the crew should take daily soundings of the bilge tanks, pump the bilge tanks as necessary, and record the weather and sea conditions for the duration of time that the cargo remains onboard the vessel.

## 8. Cargo surveying

**8.1 Objectives:** *To utilize qualified third party surveyors to properly, efficiently and effectively represent the interests of the vessel owner in the performance of survey duties prior to loading, during loading, stowing and discharging of steel cargo consignments.*

### 8.2 General

- 8.2.1 Vessel owners should ensure that the surveyors hired on their behalf are properly qualified and are given specific detailed instructions regarding the duties they are to perform. See **Section 7.2.3** for additional guidance on interacting with and monitoring the activities of the cargo surveyor(s) while onboard the vessel.
- 8.2.2 Responsibility for properly loading, stowing, dunnaging and/or discharging the cargo is dependent upon the terms of the relevant contract(s) of carriage, such as the governing charter party and/or bill(s) of lading. Accordingly, the scope of appointment and attendance of the surveyor is dependent upon whether such responsibilities lie with the vessel owner, the charterer or the shipper. The following provisions should be read in this context.

### 8.3 Condition of cargo upon arrival onboard the vessel

- 8.3.1 The condition of the cargo, when presented for loading onboard the vessel, should be thoroughly inspected and documented contemporaneously. Steel cargoes frequently exhibit some rusting or physical damage and it is strongly recommended that a pre-load survey is performed on the cargo prior to its being loaded onboard in order to establish the actual loaded condition of the cargo and protect against any potential cargo claims brought by cargo interests against vessel interests.
- 8.3.2 It is recommended that the following steps should be taken by the vessel's officers and crew before the cargo is loaded onboard:
- (a) conduct a pre-shipment inspection of the cargo prior to and after loading to check for any pre-shipment damages;
  - (b) make a note of the location and type of storage area provided for the cargo, and the weather conditions to which the cargo has been subjected while in storage;
  - (c) make note of the cargo packaging and packaging defects, if any;
  - (d) if the cargo is loaded in very low temperatures and to be shipped to warmer climates, the Master should make a note of this point and of the ambient temperatures during loading (see **Section 6.9.1(1)**). It is, in any case, prudent to record ambient temperatures during loading;



- (e) note any atmospheric corrosion observed on the cargo;
- (f) continuously monitor the loading of cargo;
- (g) ensure that any remarks regarding physical condition, quantity, type and/or misdescription of the steel cargo is properly reflected on any Mate's Receipts and/or bills of lading;
- (h) in advance of their arrival, ascertain precisely which persons/third parties, such as surveyors, supercargo, etc., will be attending the vessel during loading operations and that appropriate protocols regarding their attendances be agreed to ensure safety and security of the vessel; and
- (i) continuously monitor the pre-load survey.

#### 8.4 Vessel and cargo surveying prior to and during loading

- 8.4.1 As per **Club Circular No. 23/14**, *Steel cargo pre-load surveys: An update* dated August 11, 2014, the American Club has set forth requirements for the types of steel cargoes subject to the mandatory pre-load survey. This circular was issued to minimize the risk of exposure to such claims by requesting Members to appoint an experienced surveyor at the port(s) of loading and to conduct a precautionary pre-load survey in order to:
- (1) assist the Master in recording the apparent condition of the cargo prior to loading so that, where appropriate, Mate's Receipts and bills of lading can be claused accurately and correctly as necessary; and
  - (2) verify the condition of the vessel's cargo hatch covers and other openings in way of the hold spaces.
- 8.4.2 When instructing a surveyor to conduct a pre-load survey, the vessel owner should consider the following, both prior to and after the loading of cargo:
- (1) before loading, surveyors should note the location and type of storage area provided for the cargo and the weather conditions to which the cargo has been subjected while in storage;
  - (2) surveyors should describe the cargo packaging and any packaging defects, if any;
  - (3) if cargo is to be loaded in very low temperatures and to be shipped to warmer climates, the surveyor should make a note of this point and record the ambient temperatures during loading (see **Section 6.9.1(1)**);
  - (4) the surveyor should note any atmospheric corrosion;

- (5) the surveyor should assist the Master and chief officer to review the cargo manifest, stowage plan, dunnage, lashing and securing as proposed by the charterer or shipper, and attend any meeting with the supercargo, chartering, shipping agent and stevedore foreman, if possible and as necessary;
- (6) the surveyor should assist the Master and chief officer to ensure effective communications with the port authority, supercargo, charterers, shippers and/or stevedores to address any problems as they may arise;
- (7) the surveyor should continuously monitor the loading of cargo;
- (8) the surveyor should confirm/witness that there are no defects in securing and lashing of cargo. Should defects be found, they should be brought to the attention of the vessel's Master, the charterer and/or shipper, and supercargo for consideration and/or suitable action; and
- (9) should cargo be found to be damaged, the surveyor should bring the details and evidence of the damages to the attention of: (1) the Master; (2) the charterer and/or shipper; and (3) the tallyman so as to agree to accept relevantly claused Mate's Receipt(s) and bill(s) of lading (see **Sections 7.2.2.4(4)** and **9.2.3**);
- (10) silver nitrate solution testing should be performed by surveyors on the cargo prior to and during loading as shown in **Figure 8.1**. Particular attention should be made to testing of cargoes that are transported into the storage facilities from different locations and if transported during times of inclement weather;
- (11) the surveyor should inspect the Phytosanitary Certificate/International Standards For Phytosanitary Measures (ISPM) markings on the dunnage materials to be used for the cargo to ensure all is in order;
- (12) the surveyor should check to ensure that the vessel has the correct equipment and fittings onboard and that procedures are in place for monitoring and recording the status of the atmosphere in the cargo holds;
- (13) all surveyors should take numerous photographs, both wide views, and close up views, of any item of interest of the vessel's cargo holds, hatch covers, vents and related fittings, etc. Photographs should be taken of each type of steel cargo to be loaded, including the labels and markings of each type of steel, in close up so that the wording can be read, and also in wide view so the method of securing the label to the cargo, can be seen;

- (14) photos should be date and time stamped. For close up photos, the hold number should be written in chalk or on a small piece of paper within the photo frame, so that the location of the cargo shown in the photo can be easily identified; and
- (15) when photos are provided with the report, each one should contain a narrative explaining what is shown in the photo.

## 8.5 Condition of the cargo hold, hatch covers and ventilation system

- 8.5.1 The steel pre-load survey is only one of several protective measures to be implemented to prevent steel cargo claims.
- 8.5.2 The watertight integrity of the vessel's hatch covers to protect against water ingress into the cargo holds, and a properly functioning ventilation system to control the cargo hold humidity during the voyage are also essential to avert or minimize the risk of cargo claims caused by sea water ingress wetness and/or condensation damage.
- 8.5.3 With this in mind, the vessel owner should refer to the attachment to **Club Circular No. 23/14**, *Hatch cover, ventilation, ballast and bilge system checklist for steel pre-load surveys prior to loading steel cargoes*.

## 8.6 Cargo stowage and lashing

- 8.6.1 The attending surveyor should monitor cargo loading operations to ensure that the cargo is properly stowed with due consideration to adequate/sufficient dunnaging. The stow should have unobstructed ventilation channels if and as instructed by the charterer or shipper.
- 8.6.2 The surveyor should also confirm that the cargo:
  - (1) is not in direct contact with vessel's steel structure;
  - (2) is stowed with sufficient overhead space to avoid any restriction of ventilation air;
  - (3) has been properly loaded and dunnaged;
  - (4) is stacked in stable condition to prevent shifting or collapsing during the voyage; and
  - (5) is lashed and secured in accordance with the vessel's Cargo Securing Manual as required by the CSS Code.
- 8.6.3 The surveyor should monitor and ensure that the cargo is properly handled by stevedores according to the approved stowage plan and securing and lashing arrangements.

## 8.7 Cargo condition: pre-load and aboard the vessel

- 8.7.1 The attending surveyor and/or their designated representatives should continue to monitor and record the condition of the cargo as it comes onboard and during its handling by stevedores in order to reject, on behalf of the vessel owner, any consignments that are visibly damaged.
- 8.7.2 The surveyor should issue his observations and recommendations concerning the cargo's condition for inclusion into the Mate's Receipt to the owner's surveyor.
- 8.7.3 If any such observation of damaged cargo being loaded or any recommendations concerning cargo condition are ignored by cargo interests or their servants/representatives, the vessel owner, in coordination with the attending surveyor should prepare and issue a Letter of Protest to document these events and circumstances. The surveyor should also include such events and circumstances in any pre-load survey request to be issued.



**Figure 8.1** | Silver nitrate testing of steel rebar bundled with steel wire.

## 9. Charter party and bill of lading considerations

**9.1 Objectives:** *To ensure that the relevant transport documentation is prepared in a manner that either averts or minimizes the vessel owner's potential exposures and risks associated with the carriage of steel cargoes.*

### 9.2 Charter party considerations

9.2.1 *General.* The most prevalent steel cargo damage claims have been presented in **Table 1.2** that include rust/condensation damage, shortages, rough handling and shifting of cargo during the voyage. Improper lashing, securing, dunnaging and/or stowing steel cargoes are also common causes of cargo claims.

9.2.1.1 In order to best protect its interests, the vessel owner should, as a matter of generally accepted best practices, ensure that the governing fixture or charter party is appropriately worded to allocate the risks and responsibilities of properly loading, stowing, dunnaging and/or discharging the cargo upon the charterer, and that the fixture includes sufficient wordings to protect and preserve any rights of indemnity or contribution from charterer for the breach of any such responsibilities. In the case of a sub-charter, the disponent owner should also make best efforts to do so.

9.2.1.2 For example, Clause 8 of a standard New York Produce Exchange Form (NYPE) form charter party provides for and allocates the risk and responsibility of loading, stowing, dunnaging and discharging upon the charterer. However, if Clause 8 is amended with the words “and responsibility”, the risk and responsibility for these tasks may shift to the vessel owner. Such an amendment would have significant impact upon the vessel owner's risk exposure when carrying steel cargoes or any other cargo destined for jurisdictions where cargo claims are prevalent.

It should be noted that there may be some distinction as to just how much significance attaches to this amendment in England versus the United States, where courts/arbitrators in the latter are more inclined to require something more than just the additional language “and responsibility” in order to shift liability to the vessel owner.

Also see **Section 9.2.1.5** regarding the Inter-Club Agreement.

9.2.1.3 If the vessel is voyage chartered, the words “Free In Out Stowed and Trimmed”, abbreviated to “F.I.O.S.T”-- whereby the vessel owner is not responsible for the costs of loading, unloading, stowage and/or, trimming-- should be used, if possible.

9.2.1.4 Whenever possible, especially in the context of bulk carriers being used to carry steel cargoes along with general or other mixed cargoes (e.g. bagged cargoes, containers, etc.), it is recommended that the vessel owner do the following:

- (1) ask the charterer to identify the specific types of cargo to be carried before concluding the charter party;
- (2) state in the charter party that the vessel's Loading Manual, Cargo Securing Manual and classification society requirements are to be strictly adhered to by the charterer; and
- (3) request the charterer to provide a full list of cargoes, the stowage plan, and the lashing and securing plan for review prior to the vessel's arrival at the loading port.

9.2.1.5 *Inter-Club Agreement.* Another consideration during the charter party drafting and negotiation phase is the incorporation of the Inter-Club New York Produce Exchange Agreement (ICA) wording to the fixture. The ICA has provided a relatively simple mechanism for promptly and fairly apportioning liability for cargo claims arising under a NYPE Form time charter agreement. Any amendments that alter the vessel owner's risk and responsibility, such as adding "and responsibility" to Clause 8 of the NYPE Form charter party, can increase a vessel owner's cargo claims exposure even under the ICA. The following is a brief summary of the key components of the ICA as it relates to allocation of liability for cargo loss/damage as between the vessel owner and charterer.

- (a) *Claims arising out of unseaworthiness, and errors in navigation or management of the vessel.* These claims will generally be allocated 100% for the account of the vessel owner unless the vessel owner proves that the unseaworthiness was caused by loading, stowage, lashing, discharge or other handling of the cargo, in which case liability will be allocated as per (b) below.
- (b) *Claims arising out of loading, stowage, lashing, discharge, storage or other handling of cargo.* These claims will generally be 100% for the account of charterer unless the words "and responsibility" or similar language has been added to Clause 8, in which case liability will be allocated 50%-50% as between vessel owners and charterer, except where the charterer proves that the failure to properly load, stow, lash, discharge or handle the cargo was caused by unseaworthiness of the vessel, in which case allocation will again be allocated 100% to the vessel owner.

The ICA, by its terms, does not apply where the cargo responsibility clauses in the charter party have been “materially amended.” For purposes of this provision, the addition of “and responsibility” to Clause 8 of the NYPE is not deemed to be a “material amendment.” However, the addition of the words “cargo claims” at Clause 26 of the NYPE Form (1946 or 1993) or Clause 25 of the Asbatime Form (1981) will render the ICA allocation of liability inapplicable.

- (c) *Claims for shortage/over-carriage.* Such claims are to be allocated 50%-50% as between the vessel owner and charterer unless there is “clear and irrefutable evidence” that the claim arose from pilferage or act or neglect of one of the parties (including their servants and subcontractors), in which case liability will be allocated 100% to that party.
- (d) *All other claims.* Liability for all other claims will likewise be allocated 50%-50% as between the vessel owner and charterer unless there is “clear and irrefutable evidence” that the claim arose from pilferage or act or neglect of one of the parties (including their servants and subcontractors), in which case liability will be allocated 100% to that party.
- (e) *Additional points for consideration regarding application of the ICA.*
  - The claim under the ICA may include legal and experts’ fees incurred in defending the cargo claim in the first instance, but not costs incurred in making the claim under the ICA or seeking indemnity under the charter party.
  - The underlying cargo claim has been “properly settled or compromised and paid.”
  - Notice of Claim shall be made within 24 months (36 months where the Hamburg Rules are compulsory applicable.)
  - The latest version of the ICA provides for the posting of reciprocal security between the parties to the charter party.

9.2.2 *Jurisdiction and choice of law provisions.* Most charter parties provide for a specific and exclusive dispute resolution venue, such as arbitration in London or New York. Such provisions also specify the applicable law that will govern such disputes. The decision to arbitrate should not be taken lightly and it should be done in a clear and unambiguous manner, not just in the charter party itself, but also in any bills of lading to be issued in connection with the performance of the charter party.

9.2.2.1 *Vessel owners should always remember to:*

- (1) ensure that the bills of lading make explicit reference to and incorporate the relevant charter party;
- (2) obtain a copy of the charter party incorporated in the bills of lading and place it on file as soon as possible after loading;
- (3) make it a requirement that time charterers provide a copy of any sub-fixture within 7 days of being concluded as otherwise a copy may not be obtained later if needed; and
- (4) physically attach a copy of the incorporated charter party to each original and each copy of the bill of lading.

9.2.3 *Delegation of the Master's duty to issue bills of lading.* Such provisions may be a pitfall for vessel owners because when such duties are assigned to the charterer or its agent, a clean bill of lading may be issued by the charterer despite the existence of remarks in the Mate's Receipts which are inconsistent with respect to the conditions, quality and/or quantity of cargo.

9.2.3.1 Whenever possible, the vessel owner should not delegate this duty to best protect its interests and avoid unnecessary exposure to a paper cargo claim that, in essence, may accrue before the vessel even departs the load port limits. If a vessel owner or disponent owner chooses to make the commercial decision to include such a term in its charter party agreement, it runs the risk of prejudicing its P&I cover for cargo claims that may arise in connection with that voyage (see **Section 9.3.4**).

### 9.3 Bill of lading considerations

9.3.1 *Incorporation of charter party jurisdiction: Choice of law provision.* Incorporate into the bill of lading the dispute resolution and/or jurisdiction and/or applicable law provisions of the governing charter party to preserve the parties' conscious and deliberate decision to arbitrate and/or have all disputes under the charter party and/or under the bill of lading subject to the same law and jurisdiction. By doing so, the vessel owner or disponent owner can preserve jurisdictional arguments which may have a considerable bearing and influence as to:

- (1) how a particular cargo claim is presented or prosecuted;
- (2) the forum in which such claims are defended, including any vessel arrest proceedings; and
- (3) the substantive law to govern all such disputes.



- 9.3.2 *Bills of lading form.* Whenever possible, bills of lading should be issued on the Congenbill 1994 or 2007 form or similar. It is strongly recommended that the Congenbill 1978 form or similar should NOT be used. Otherwise the arbitration clause may not be validly incorporated into the bills of lading.
- 9.3.2.1 Whenever possible and depending on the arbitration/laws set forth in the governing charter party, bills of lading should have the words “LONDON/NEW YORK\* ARBITRATION ENGLISH/U.S. LAW\* APPLICABLE as per the charter party dated [date inserted here], copy attached. F.I.O.S.T” typed on the front, as relevant.
- 9.3.2.2 An example of an ideal bill of lading is provided in **Appendix 4**.
- 9.3.2.3 In some civil law countries, only physically attaching a copy of the incorporated charter party to all original and to all copies of bills of lading before their release will ensure valid incorporation of the charter party clauses including the law and jurisdiction clauses.
- 9.3.3 *U.S. Trade Clause – Incorporation of U.S. COGSA.* For shipments to/from the U.S., vessel owners should consider the incorporation of a U.S. trade clause providing for application of the U.S. Carriage of Goods by Sea Act (“COGSA”). COGSA contains a package limitation defense that is particularly well suited for steel cargo claims. Many of the common packaging methodologies used for steel shipments may be deemed COGSA “packages,” e.g., such as steel coils, bundles of pipe or wire, etc. By contrast for those same shipments, other cargo reliability regimes, such as Hague-Visby, may result in limitation values that are significantly higher, often far in excess of the amount of the claim, due to the weight of the cargo. For shipments to/from the U.S. where a U.S. Trade Clause has been incorporated, vessel owners may further consider incorporation of a U.S. jurisdiction clause as U.S. courts and arbitrators will be more familiar with the COGSA package limitation defense and arguably more inclined to enforce same.
- 9.3.4 *Potential prejudice to P&I coverage for cargo claims.* Whenever possible, the vessel owner should ensure that any decisions made in connection with the carriage of steel cargoes do not unnecessarily prejudice a vessel owner’s protection under the P&I insurance policy. All International Group of P&I Clubs contain provisions in their P&I contract terms which provide that coverage for cargo claims may be prejudiced under the following circumstances:
- 9.3.4.1 delivery of cargo to a port or place other than the port or place listed in the governing bills of lading or contract of carriage;
- 9.3.4.2 delivery of cargo without production of original bills of lading;
- 9.3.4.3 the issue of antedated or postdated bills of lading;
- 9.3.4.4 the issuance of a bill of lading with the knowledge of the vessel owner or the Master of the insured vessel with an incorrect description of the cargo or its quantity or its condition; or

- 9.3.4.5 the failure to arrive or the late arrival of the insured vessel at a port of loading, or the failure to load any particular cargo in an insured vessel other than liabilities, loss and expenses arising under a bill of lading already issued.
- 9.3.5 Some consideration for deck cargoes.
- 9.3.5.1 *Shipper's Risks Clauses—Generally.* The responsibility for cargo damage in the context of on-deck carriage can be somewhat complex and will likely vary depending on the applicable carriage contract terms, jurisdiction and governing law. For example, "shipper's risk" clauses printed on the face of a bill of lading can exculpate a carrier from liability for damage that is normally incident to deck carriage (i.e., damage due to exposure to the elements). A "shipper's risk" clause places on the shipper "the customary and predictable risks of deck carriage."). However, "shipper's risk" clauses generally will not exonerate a carrier from damage caused by negligent or improper stowage. It is recommended that a vessel owner should consult with its P&I club or a qualified maritime lawyer for specific advice concerning the subject voyage or scenario in question.
- 9.3.5.2 *Exclusions under COGSA.* COGSA does not apply of its own force - i.e. as a matter of law - to carriage of cargo on deck. Thus, where cargo is being carried to or from the United States, in order avail itself of COGSA's defenses, including the \$500 package limitation defense, the carrier should consider contractually extending COGSA to deck cargo by including an express provision in the bill of lading. When extending COGSA contractually, the carrier should be very careful do so as explicitly as possible.

The bill of lading should employ "sufficiently express language" that the on-deck cargo is subject to COGSA. In the absence of such an express incorporation clause - specifically covering deck cargo - the carrier runs the risk that a court will find that COGSA has not been contractually extended by the parties, thereby depriving the carrier of its \$500 package limitation defense. To the extent a vessel owner has a question as to whether their bill of lading affords adequate protection to deck cargo, it should confer with its P&I club and/or counsel.

#### **9.4 Burden of proof and the Retla clause**

- 9.4.1 *Burden of proof: An overview.* As in any cargo claim, claimants bear the initial burden of proof to establish good order and condition of the steel cargo at the time it was turned over to the vessel owner/carrier and that the steel cargo was discharged and in a damaged condition upon delivery. Thus, vessel owners should be mindful of the critical importance of fully inspecting and documenting any pre-carriage defects in the cargo, including physical and rust damage, as well as damage to any

packaging, such as wrappers, securing bands and/or other packaging. Again, this illustrates the importance of conducting a proper and detailed pre-load survey of the cargo as noted in **Section 8.3.1.**

#### 9.4.2 *The Retla clause.*

9.4.2.1 The Retla clause draws its name from the case of *Tokio Marine & Fire Insurance Co. v. Retla S.S. Co.*, 426 F.2d 1372 (9th Cir. 1970). In that case, the court upheld a clause which provided that the carrier’s “apparent good order and condition” notation on the bill of lading “does not mean that the goods, when received, were free of visible rust or moisture.” The clause further provided that if requested by the shipper, the carrier will issue a substitute bill of lading omitting the subject clause and setting forth any notations as to rust or moisture consistent with the mates’ or tally clerks’ receipts.

9.4.2.2 In effect, the Retla clause seeks to modify the presumption of good order/condition evidenced by a “clean” bill of lading to exclude rust/moisture damage. The Retla clause has not been without criticism by both courts and legal commentators in the United States. Those courts which have enforced the clause have generally done so on a rather narrow basis, often following strictly the facts presented in the *Retla S.S. Co.* holding and thus requiring that the clause:

- (1) be printed on the face of the bill of lading, and
- (2) provide for issuance of a substitute bill of lading if requested by the shipper.

Notwithstanding the criticism of the case, the clause certainly provides a benefit to vessel owners and should be included in bills of lading for carriage of steel cargoes.

9.4.2.3 The use and validity of the Retla clause has also come under criticism by the courts in England. In *The SAGA EXPLORER*, [2012] EWHC 3124 (Comm), that decision the Court refused to give full effect to the Retla clause, rather construing it such that any qualification as to the good order/condition of the cargo by the carrier is limited as to what “may be expected to appear on any cargo of steel: superficial oxidation caused by atmospheric conditions.” Again, a vessel owner should contact its P&I club or counsel with any questions regarding the potential use of a Retla clause.

### **9.5 Further considerations regarding California Block Stowage**

9.5.1 If owners already have a charter party that does not explicitly state an exclusion for California Block Stowage (CBS), the vessel owner may not have sufficient protection of its interests under their charter party. The choices available for the vessel owner then would be:

- (1) to ensure that it notify the charterer for liability associated with this risky carriage and CBS stowage as this is not a common way to carry slabs on vessels;
- (2) that the Mate's Receipt and bills of lading can be marked as "F.I.O.S.T." terms, i.e. free in and out, stowed, lashed, secured all being the charterer's liability;
- (3) that the Master and/or vessel owner should not accept responsibility for stowage and securing, because CBS of stowage has a high risk of shifting during transit; and/or
- (4) that the vessel owner should contact its P&I club and/or legal counsel to seek advice on how to best protect its interests in the context of preparing any wording or amendments to any draft bills of lading, charter party, letter of indemnity or any other relevant document (see **Section 5.5.2.6(f)**).

## 10. Communicate with your P&I club

**10.1 Objectives:** *To ensure prompt and timely communication between the vessel owner and its P&I club to prevent or minimize the risk of potential claims associated with steel cargoes, and if such a claim is asserted against the owner and/or its vessel, to best coordinate their respective efforts to defend against any such claims.*

### 10.2 Precautionary pre-load survey arrangements

- 10.2.1 In order for the P&I club to contact its correspondent in a particular port and to make the necessary arrangements for the precautionary load port survey, the following basic information should be provided by the vessel owner to its P&I club at least seven (7) days prior to the vessel's estimated arrival at the load port:
- (1) full details of the vessel;
  - (2) the load port and/or terminal in question;
  - (3) the type and quantity of cargo to be loaded;
  - (4) the contact details of the vessel's local agent, charterer, shipper or cargo forwarder;
  - (5) the estimated time of arrival of the vessel at the load port;
  - (6) the type(s) of survey(s) being requested; and
  - (7) any other relevant information.
- 10.2.3 Copies of all load port surveys (pre-load survey, tally survey, draft survey and/or other relevant survey) should be forwarded immediately to the P&I club, and should be maintained by the vessel owner until the limitations period for cargo claims lapses.
- 10.2.4 If the Master considers that the method of stowage and securing gives cause for concern regarding the safety of the vessel and/or integrity of the cargo, he/she must bring it to the attention of the charterer and/or its surveyor and/or supercargo. If the Master's concerns are not dealt with satisfactorily, he/she should advise the vessel owner's protective surveyor and, if not already appointed, recommend appointment of the same.
- 10.2.5 Vessel owners are reminded that in cases where surveyors representing other interested parties wish to board the vessel, they should only be permitted access to the cargo and/or the vessel's documents while in the presence of the P&I club's attending surveyor.

### 10.3 Discharge port survey arrangements

- 10.3.1 The vessel owner or the charterer should also contact its P&I club in advance of any estimated time of arrival at the discharge port where the steel cargo consignments will be discharged. The vessel owner should provide the P&I club with the same information as set forth in **Section 10.2.2** above.
- 10.3.2 The P&I club should be advised of proposed discharge ports as early as possible to address or mitigate any specific local concerns or problems related to the discharge of steel cargoes.

### 10.4 Cargo claims

- 10.4.1 If heavy weather has been encountered during the vessel's passage, or if damage was observed at the time of loading, the P&I club should be given timely notification of the vessel's estimated time of arrival at its intended port(s) of discharge since the appointment of an experienced surveyor at that point is highly advisable.
- 10.4.2 If a cargo claim is presented by cargo interests, the Master or the vessel owner should immediately contact its P&I club and advise it of the allegations of cargo loss, damage or shortage. The P&I club may then instruct its local correspondent and/or lawyers to attend the matter and protect the vessel owner's interests as best as possible.
- 10.4.3 Prompt and timely communication, combined with close cooperation between the vessel owner or disponent owner and its P&I club, will contribute greatly to an effective defense of any such asserted cargo claims, and preserve all avenues for potential indemnity claims against the charterer and/or any other responsible third parties.

### 10.5 Demands for security

If a demand for security is made to the vessel owner or if the vessel is threatened with arrest or actually arrested, the vessel owner should immediately contact its P&I club for assistance. The vessel owner should also refrain from communicating with cargo interests to ensure that it does not inadvertently waive any jurisdictional arguments or otherwise potentially prejudice its rights or defenses.

### 10.6 Sanctions considerations

Vessel owners must also consider any potential sanctions issues as they relate to steel cargoes. Significantly, and particularly with respect to steel cargo shipments to Iran, the carriage of finished or other steel products may potentially violate existing U.S., European Union or other applicable sanctions laws if such products intend to be used for prohibited purposes. Vessel owners are urged to conduct the required due diligence investigation into its contract partners and the end use of the subject steel cargo to avoid any unnecessary exposure to sanctions related liabilities or penalties. For additional guidance regarding sanctions related considerations, please refer to the American Club's website at [www.american-club.com](http://www.american-club.com).

## APPENDIX 1: LIST OF DEFINITIONS

- **Dew point:** The temperature at which air becomes saturated and cannot hold all of the moisture in it and condensation begins to form.
- **Dry-bulb thermometer:** A thermometer used to measure the ambient temperature. The dry-bulb thermometer is exposed to the air but shield from radiation and moisture. The dry-bulb thermometer is one of the two thermometers that make up a psychrometer.
- **Dunnage:** Loose materials used to support and protect cargo in a vessel's hold. Examples of such materials include plywood, plastic/polythene sheets, cardboard, Styrofoam, air bags, rubber padding, kraft paper, bamboo, bamboo mats, timber, etc.
- **Mate's Receipt:** A receipt document signed by the vessel's Master or chief officer, acknowledging the condition and receipt of cargo by the vessel. The individual in possession of the Mate's Receipt is entitled to the bill of lading, which in due course is issued in exchange for that receipt.
- **Steel:** A generally hard, strong, durable, malleable alloy of iron and carbon, usually containing between 0.2 and 1.5 percent carbon, often with other constituents such as manganese, chromium, nickel, molybdenum, copper, tungsten, cobalt, or silicon, depending on the desired alloy properties, and widely used as a structural material. Examples of the types of steel that are commonly transported by sea can be found in Section 3.
- **Sweat:** The formation of condensation within a vessel's hold. Sweat can be categorized into two types: ship sweat and cargo sweat.
- **Ship sweat.** Condensation that accumulates on a vessel's steel structure in the cargo hold's side or deckhead when a vessel sails from a warmer to cooler place and warm air in the cargo holds come into contact with the cooler vessel's structure.
- **Cargo sweat.** Condensation that accumulates on the surface of a cargo when its temperature is below the dew point of the air adjacent to it.
- **"3<sup>rd</sup> Celsius Rule":** Rule of thumb for ventilating. If the temperature of the outside air is at least 3<sup>rd</sup> Celsius cooler than the air in the hold, then the cargo should be ventilated.
- **Wet-bulb thermometer:** A thermometer with a bulb that is covered with moist muslin and is used in a psychrometer to measure humidity.
- **Whirling psychrometer:** A psychrometer with a handle, which allows rapid rotation of mounted wet- and dry-bulb thermometers to ensure air flow around the bulbs.

## APPENDIX 2: LIST OF IMPORTANT DOCUMENTS TO BE KEPT AND MAINTAINED

1. Bill of lading (see **Sections 8.3, 9.2.3, 9.3, 9.4, 10.3** and **Appendix 4**)
2. Mate's Receipt (see **Section 7.2.2.4(4)**, **Sections 8.3.2(g), 8.4.1(1), 8.4.2(i), 8.7.2** and **9.2.3** and **9.5.1(2)**)
3. Cargo Humidity-Temperature-Ventilation Record Book (see **Section 6.9.1, Table 6.1** and **Table 6.2**)
4. Bilge sounding records
5. Stowage plan with exact stowage position of each consignment (see **Sections 5.3, 8.6.3, 8.4.1(1)**, and **9.2.1(3)**)
6. Hatch cover test report (see **Section 2.3**)
7. Certification of cleanliness of the cargo hold (see **Section 2.5.2.8**)
8. Certificate of phytosanitary (see **Sections 4.3.1** and **8.3.2(k)**)
9. Draft survey records (see **Sections 7.2.3.4(6)** and **10.2.3**)
10. Pre-load survey report and the surveyor's recommendations (see **Sections 7.2.2.4, 7.2.3.1, 8.3.1, 8.4.1, 8.5.2, 8.5.3,** and **10.2**)
11. Documentation of condition of cargo upon arrival onboard vessel (see **Sections 9.3.4.4, 9.4.1**, and **9.4.2**)
12. Letter of Protest (e.g. insufficient dunnage provided, damage to cargo, pilferage or theft of cargo) (see **Sections 7.2.2.4(5)** and **8.7.3**)
13. Letter of indemnity (see **Sections 5.5.2.6(f)** and **9.5.1(4)**)
14. Port log records
15. Cargo manifest/cargo list (see **Sections 7.2.2.2(4)** and **8.4.2(e)**)
16. All correspondences, including emails, should a dispute arise



## APPENDIX 3: STEEL CARGO REFERENCE MATERIAL

International Maritime Organization. *Code of Safe Practice for Cargo Stowage and Securing, Resolution A714(17)*. London: IMO Publication, 1991.

Isbester, Captain J. *Bulk Carrier Practice*. 2nd Edition. London: The Nautical Institute, 2010.

Knott, Captain J.R. *Lashing and Securing of Deck Cargoes*. 3rd Edition. London: The Nautical Institute, 2002.

Sparks, A. and Coopers, F. *Steel: Carriage by Sea*. London: Informa, 2009.

Thomas, Captain R.E. *Thomas' Stowage: The Properties of Stowage of Cargoes*. Rev. ed. Captain G. M. Pepper, Master Mariner. (Ed.) Glasgow: Brown, Son & Ferguson Ltd; 2016.

### **BILL OF LADING**

TO BE USED WITH CHARTER-PARTIES

CODE NAME: "CONGENBILL"

EDITION 1994

ADOPTED BY

THE BALTIC AND INTERNATIONAL MARITIME COUNCIL (BIMCO)

### **Conditions of Carriage**

- (1) All terms and conditions, liberties and exceptions of the Charter Party, dated as overleaf, including the Law and Arbitration Clause/Dispute Resolution Clause, are herewith incorporated.
- (2) General Paramount Clause
  - (a) The Hague Rules contained in the International Convention for the Unification of certain rules relating to Bills of Lading, dated Brussels the 25th August 1924 as enacted in the country of shipment, shall apply to this Bill of Lading. Where no such enactment is in force in the country of shipment, the corresponding legislation of the country of destination shall apply, but in respect of shipments to which no such enactments are compulsorily applicable, the terms of the said Convention shall apply.
  - (b) Trades where Hague-Visby Rules apply.

In trades where the International Brussels Convention 1924 as amended by the Protocol signed at Brussels on February 23rd 1968 – the Hague-Visby Rules – apply compulsorily, the provisions of the respective legislation shall apply to this Bill of Lading.
  - (c) Trades where Hague-Visby Rules apply.

The Carrier shall in no case be responsible for loss of or damage to the cargo, howsoever arising prior to loading into and after discharge from the Vessel or while the cargo is in the charge of another Carrier, nor in respect of deck cargo or live animals.
- (3) General Average

General Average shall be adjusted, stated and settled according to York-Antwerp Rules 1994, or any subsequent modification thereof, in London unless another place is agreed in the Charter Party.

Cargo's contribution to General Average shall be paid to the Carrier even when such average is the result of a fault, neglect or error of the Master, Pilot or Crew. The Charterers, Shippers and Consignees expressly renounce the Belgian Commercial Code, Part II, Art. 148.

(4) New Jason Clause

In the event of accident, danger, damage or disaster before or after the commencement of the voyage, resulting from any cause whatsoever, whether due to negligence or not, for which, or for the consequence of which, the Carrier is not responsible, by statute, contract or otherwise, the cargo, shippers, consignees or the owners of the cargo shall contribute with the Carrier in General Average to the payment of any sacrifices, losses or expenses of a General Average nature that may be made or incurred and shall pay salvage and special charges incurred in respect of the cargo. If a salving vessel is owned or operated by the Carrier, salvage shall be paid for as fully as if the said sailing vessel or vessels belonged to strangers. Such deposit as the Carrier, or his agent, may deem sufficient to cover the estimated contribution of the goods and any salvage and special charges thereon shall, if required, be made by the cargo, shippers, consignees or owners of the goods to the Carrier before delivery.

(5) Both-to-Blame Collision Clause

If the Vessel comes into collision with another vessel as a result of the negligence of the other vessel and any act, neglect or default of the Master, Mariner, Pilot or the servants of the Carrier in the navigation or in the management of the Vessel, the owners of the cargo carried hereunder will indemnify the Carrier against all loss or liability to the other or non-carrying vessel or her owners in so far as such loss or liability represents loss or, or damage to, or any claim whatsoever of the owners of said cargo, paid or payable by the other or non-carrying vessel or her owners to the owners of said cargo and set-off, recouped or recovered by the other or non-carrying vessel or her owners as part of their claim against the carrying Vessel or the Carrier.

The foregoing provisions shall also apply where the owners, operators or those in charge of any vessel or vessels or objects other than, or in addition to, the colliding vessels or objects are at fault in respect of a collision or contact.

For particulars of cargo, freight, destination, etc., see overleaf.

CODE NAME: "CONGENBILL" EDITION 1994

BILL OF LADING

\_\_\_\_\_  
Shipper

TO BE USED WITH CHARTER-PARTIES

\_\_\_\_\_  
Consignee

B/L No.

\_\_\_\_\_  
Notify address

Reference No.

\_\_\_\_\_  
Vessel

Port of loading

\_\_\_\_\_  
Port of discharge

\_\_\_\_\_  
Shipper's description of goods

Gross weight

(of which            on deck at Shipper's risk:  
the Carrier not being responsible for loss or  
damage howsoever arising)

Freight payable as per CHARTER-PARTY dated  
(copy attached)

ARBITRATION LONDON, ENGLISH LAW TO APPLY, FIOST

FREIGHT ADVANCE

Received on account of freight

Time used for loading        days            hours

SHIPPED at the Port of Loading in apparent good order and condition on board the Vessel for carriage to the Port of Discharge or so near thereto as she may safely get the goods specified above.

Weight, measure, quality, quantity, condition, contents and value unknown.

IT WITNESS whereof the Master or Agent of the said Vessel has signed the number of Bills of Lading indicated below all of this tenor and date, any one or which being accomplished the others shall be void.

FOR CONDITIONS OF CARRIAGE SEE OVERLEAF

Freight payable at	Place and date of issue
Number of original Bs/L	Signature





AMERICAN STEAMSHIP OWNERS MUTUAL PROTECTION & INDEMNITY ASSOCIATION, INC.  
AMERICAN STEAMSHIP OWNERS MARINE INSURANCE COMPANY (EUROPE), LTD

**SHIPOWNERS CLAIMS BUREAU, INC., MANAGER**

One Battery Park Plaza, 31st Floor  
New York, New York 10004 U.S.A

TEL +1 212 847 4500  
FAX +1 212 847 4599  
WEB [www.american-club.com](http://www.american-club.com)

**SHIPOWNERS CLAIMS BUREAU (UK) LTD.**

New London House – 1st Floor  
6 London Street  
London EC3R 7LP U.K.

TEL +44 20 7709 1390  
EMAIL [claims@scb-hellas.com](mailto:claims@scb-hellas.com)

**SHIPOWNERS CLAIMS BUREAU (HELLAS), INC.**

Filellinon 1-3, 3rd Floor  
185 36 Piraeus, Greece

TEL +30 210 429 4990  
FAX +30 210 429 4187 8  
EMAIL [claims@scb-hellas.com](mailto:claims@scb-hellas.com)

**SCB MANAGEMENT CONSULTING SERVICES, LTD.**

28/F, The Workstation  
43 Lyndhurst Terrace  
Central, Hong Kong SAR, People's Republic of China

TEL +852 3602 3083  
EMAIL [hkinfo@scbmcs.com](mailto:hkinfo@scbmcs.com)

**SCB MANAGEMENT CONSULTING (CHINA) CO., LTD.**

Room 905, Cross Tower  
No. 318 Fuzhou Road  
Shanghai 200001, People's Republic of China

TEL +86 21 3366 5000  
FAX +86 21 3366 6100  
EMAIL [claims@scbmcs.com](mailto:claims@scbmcs.com)

**SHIPOWNERS CLAIMS BUREAU (CYPRUS), LTD**

4, Kallitheas Street  
Imperial House, 2nd floor, Office 202  
3086 Limassol, Cyprus

TEL +357 25 584545  
FAX +357 25 584641  
EMAIL [info@asomic.eu](mailto:info@asomic.eu)



