

# RISK ALERT



## Damage Prevention Measures – Steel Cargoes



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### Introduction:

In accordance with SOLAS Chapter VI Regulation 5:-

*“cargoes shall be loaded, stowed and secured as to prevent as far as is practicable, throughout the voyage, damage or hazard to the ship and the persons on board, and loss of cargo overboard. Appropriate precautions shall be taken during loading and transport of heavy cargoes or cargoes with abnormal physical dimensions to ensure that no structural damage to the ship occurs and to maintain adequate stability throughout the voyage”.*

The International Maritime Organisation (IMO) adopted IMO Assembly Resolution [A.714\(17\)](#) to provide an international standard to promote the safe stowage and securing of cargoes. As a result the [Code of Safe Practice for Cargo Stowage and Securing \(CSS Code\)](#) was introduced. The main principles of CSS Code are as follows –

- *All cargoes should be stowed and secured in such a way that the ship and persons on board are not put at risk;*
- *The safe stowage and securing of cargoes depend on proper planning, execution and supervision;*
- *Personnel commissioned to tasks of cargo stowage and securing should be properly qualified and experienced;*
- *Personnel planning and supervising the stowage and securing of cargo should have a sound practical knowledge of the application and content of the Cargo Securing Manual (CSM);*

- *In all cases, improper stowage and securing of cargo will be potentially hazardous to the securing of other cargoes and to the ships itself;*
- *Decisions taken for measures of stowage and securing cargo should be based on the most severe weather conditions which may be expected by experience for the intended voyage; and*
- *Ship-handling decisions taken by the master, especially in bad weather conditions, should take into account the type and stowage position of the cargo and the securing arrangements.*

Annex 6 and Annex 7 of the CSS Code are dedicated to coiled steel sheet and heavy metal products, however, it should be noted that these Annexes of the CSS Code, given their focus on cargo stowage and securing, do not fully consider all P&I related issues and the potential liabilities arising from the carriage of steel cargoes. For example, the CSS Code considers the structural aspect of the ship when carrying steel and heavy metal cargoes and the cargo securing arrangements, however it does not take into consideration P&I issues such as claims arising from ship sweat, cargo sweat, ingress of seawater or rain water, which can result in development of rust to the steel cargoes with consequential very large liability exposure. To examine the problems arising from the loading, carriage and discharging of steel cargoes a significant amount of research has been completed by industry experts and based on this research the Club would like to highlight some of the associated risks identified and provide guidance to its Members on damage prevention when loading, carrying and discharging steel cargoes.

### Precautions:

Members should be aware that steel cargoes are very sensitive and expensive commodities, particularly finished steel products, and as such must be treated and carried with the utmost care and attention, if the risks of incurring large claims are to be minimised. Consequently, the Club generally recommends or may require steel

shipments to be supervised by an experienced surveyor during cargo loading and discharging operations. In accordance with the principles of the CSS Code, all cargoes should be stowed and secured in such a way that the ship and persons on board are not put at risk. Therefore, the safe stowage and securing of steel cargoes depends on proper planning, execution and supervision by properly qualified and experienced personnel having a sound practical knowledge of the content of the vessel's [Cargo Securing Manual](#) (CSM), the cargo holds, cargo stowage and cargo securing operations.

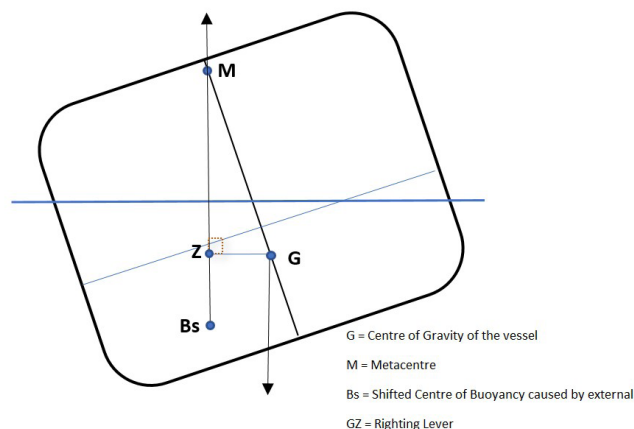
### Stability, Maximum loads and Tank Top loading:

Ships are usually built under Class rules founded on the [International Convention](#) (SOLAS) and these produce the stability criteria and information that governs the carriage of different cargo types (e.g. grain, timber, steel, etc.). When a Shipowner orders a new ship, the builder will offer several designs to meet the requirements of trade, cost and delivery time. In accordance with SOLAS and the requirements of Flag Administration, Class is obliged to provide a book of calculations or a curve or table that illustrates the ship's stability in various conditions of loading with various cargo types. The first pre-requisite in loading the ship, with any type of cargo, is that the designed loads must never be exceeded.

Whilst appearing obvious, it should be noted that steel cargoes are fundamentally heavy cargoes that produce cargo stows with a low centre of gravity. These commodities consequently exert high levels of stress on ship structures which may result in some limitations as to where these types of heavy cargoes can be loaded on a vessel. A general cargo vessel with tween decks may not be able to load heavy steel coils on her tween decks due to the weight of cargo in relation to the permissible designed load ( $t/m^2$ ) limitation, but steel tubes/pipes and similarly less dense steel cargoes may be capable of being loaded in such spaces.

However, on a bulk carrier there are no tween decks therefore any type of steel cargo on a bulk carrier and heavy steel coils on a general cargo vessel can only be loaded on tank tops. In contrast to a true bulk cargo such as grain where cargo holds will be substantially full when the ship is loaded to its full deadweight capacity, a full deadweight load of a steel cargo will be reached with much of the cargo holds empty. Consequently, the vertical centre of gravity of the cargo stow will be very low in the ship. This in turn results in a high figure for the "Metacentric Height" (GM). The

GM is an important measure in relation to a vessel's stability. When a vessel has a high GM it is referred to as being "stiff" in the context of its stability. If a ship is "stiff", the "Righting Moment" (GZ) that is experienced when the vessel is heeled or inclined by external forces such as waves, swell or wind will return the ship back to her original upright position very quickly. However, momentum resulting from the effect of the Righting Moment will result in the vessel then heeling or rolling past the vertical, thus initiating a rolling motion. It is to be noted that due to a large GZ, a ship with a high GM tends to roll with a shorter roll period even in moderate weather conditions. This motion will cause a vessel with steel cargo to be uncomfortable at sea, particularly during adverse weather conditions, and there is a risk that the vessel may stress herself and there may be consequential cargo shift and damage to the cargo, or to the vessel, as the result of the dynamic loads placed upon the cargo and its securing arrangements. The Master is advised to follow [IMO Guidelines for avoiding dangerous situations in adverse weather and sea conditions](#) and hence it is very important that where required additional lashings be applied to the cargo on a vessel with a very high GM.



Large GZ and GM condition on a ship which is "stiff"

When loading steel cargoes, pre-load and post load draught surveys are to be undertaken in order to determine the cargo quantity loaded on board. When a vessel reaches its maximum draught marks without exceeding the stress limitations then there are no issues. However, when a vessel is loading very dense and heavy steel coils or any other type of heavy steel cargoes, there is the potential for problems to arise when a vessel cannot reach its maximum draught marks due to the maximum permissible tank top loading having been achieved or where the longitudinal bending movements and shear forces exceed the safety limits of the vessel and this could lead to a dispute between the owners and charterers.

It should be noted that the objectives of the charterers or shippers, and the owners may not be



aligned; the charterers or cargo interests wishing to load a complete deadweight cargo (down to maximum permitted draught) whilst the Master will need to ensure that the maximum tank top loads and other safety limitations are not exceeded and that the vessel remains safe at all times, there is the potential therefore for disputes.

In determining that the ship is not overloaded, it is therefore important to ensure that the designed maximum tank top load is not to be exceeded. This designed load is expressed in tonnes per square metre. Note that on bulk carriers the tank top area is often reduced by sloping hopper sides. There is no extra allowance made for hopper sides and this is not an area for compromise. When the maximum load has been determined this weight should be spread as evenly as possible across the tank top. It is also to be noted that most ships will have approved ship's stability software on board which should enable optimisation of the maximum load without exceeding stresses on the ship beyond their permissible seagoing limits.

### **Types of steel cargoes:**

There are many types of steel cargoes but from the Club's experience, hot rolled sheeting (Coils), hot rolled sheeting (Bundles), cold rolled sheeting (Coils), cold rolled sheeting (Packs), wire rods, structural steel, galvanised steel and tin plate are the main types of steel cargoes that may result in large claims. Other steel cargoes include steel billets, steel blooms, steel scrap and pig iron.

### **Packaged steel cargoes:**

Steel cargoes which are finished products generally come wrapped in metal envelopes and are ready for direct use without further processing i.e. cold rolled steel sheeting, and therefore must be handled and transported with extreme care to avoid expensive claims. Hot rolled steel cargoes which would require further processing like unwrapped steel sheeting (in coils or bundles), constructional steel, reinforcing bars and wire rods, whilst being somewhat less sensitive, are still cargoes that can be harmed significantly by seawater, rain water and unsatisfactory stowage or careless handling.



Typical loading and securing method of steel coils

### **Importance of engaging an independent cargo surveyor:**

Steel cargoes are water sensitive, liable to damage and with the potential for large claims and, whilst the ship staff have a duty of care and responsibility for the cargo the Club recommends, and would like to stress the importance, of appointing an independent cargo surveyor to protect the Member's interests when loading hot rolled steel in coils or bundles, cold rolled steel in coils, packs or bundles, galvanised steel, stainless steel, tin plate, wire rods, steel pipes and structural steel (rebars, channels, angles, beams, bars, strips, sections, forgings). The independent surveyor should: –

- Check and verify the condition of the steel cargo lying at port premises before being loaded onboard the Member's vessel;
- Verify that the hatch covers, their associated fittings and other related openings are in sound condition and carry out an ultrasonic test (UST) of the cargo hold hatch covers and related items. As evidence, supporting photographs are to be taken documenting the condition of the hatch covers, rubber packing and associated items and these must be retained for future reference in the event of a claim;
- Check cargo holds are properly prepared (Swept and free from residue of previous cargo, loose rust and paint flakes, thoroughly washed down with fresh water, completely dry and that there are no signs of salt or sea or rain water) and as evidence take appropriate supporting photographs for every cargo hold prior to the loading operation;

- Check and verify that cargo hold bilges and bilge wells have been dried out, bilge cover plates and strum boxes must be cleared, cleaned and secured. A suction test of the bilges, including a pressure test of non-return valves is to be carried out prior to the loading operation. Ensure that there is no drop in suction from bilge discharge and that the non-return valve is not faulty avoiding the potential for back flow of water from bilge line/s to the cargo hold/s with consequential damage of steel cargo during the voyage. As evidence appropriate documentary records with accompanying supporting photographs should be taken.
- Ensure that the manhole covers of any tanks, fuel oil, ballast etc within the cargo holds/ spaces are properly secured, tightened and pressure tested to avoid any potential leakages/ hold flooding with resulting damage to the steel cargo.
- Ensure permissible weight on ship's cargo hold tank top is not exceeded at any time as this could result in damage to the ship's structure;
- Record any damage to the ship's structure caused by the cargo operation, this is to be noted and immediately advised to all concern stakeholders and as evidence adequate numbers of supporting photograph are to be taken;
- Ensure sufficient and appropriate dunnage, correctly applied, for the cargo being carried. Three lines of 15cm x 4cm dunnage would be acceptable, however the precise nature and quantity of dunnage that should be used will be a matter for discussion between the Master and Shipper/Charterer taking into account factors such as the weight, size, footprint and other applicable characteristics of the cargo being loaded, with due account and consideration to the age of the ship and the physical condition of ship's deck (tank top);
- Ensure suitable, sufficient number, appropriately sized and rigged strong lashings are applied to the cargo, correctly secured in line with the minimum requirements of the approved CSM. When determining final lashing arrangements, Metacentric height (GM) and the potential for adverse weather condition during the course of upcoming voyage need to be taken into consideration;
- Ensure, where possible, that there is no direct steel to steel contact;

- Assist with monitoring the loading / stowage / securing of the steel cargo;

Assist Masters and officers in recording the apparent condition of the cargo so that, where appropriate, mate's receipts and bills of lading can be **claused correctly**; and

- When the steel cargo is damaged by the mishandling of stevedores support the damaged cargo being removed from the ship if possible. If it is not possible to replace damaged cargo with sound, prepare correct damage report/s and support the master to issue a correct "Note of Protest" (NOP) and if appropriate in clausing mate's receipts and bills of lading correctly in order to protect the Member's interests.

The steel cargoes of a less sensitive nature and some semi-finished materials may not require the attendance of a surveyor, for example steel billets, steel blooms, steel scrap and pig iron

### **Preparation of cargo holds:**

Most disputes and claims with steel cargoes arise at the discharging port with rust related issues. The receivers of steel cargoes will always expect carriers to be responsible and accountable for the weathertight integrity of the cargo holds and their hatch covers of the ship on which steel cargoes are carried. More is required than just compliance with the statutory requirements of the [International Convention on Load Lines, 1996 as amended](#) to establish the seaworthiness of ships and their cargo holds. In accordance with [Article III of the Hague-Visby rules](#), "*there is an obligation on the Carrier to exercise due diligence before and at the beginning of the voyage to make the ship seaworthy and make the cargo holds, and all other parts of the ship in which goods are carried, "fit and safe for their reception, carriage and preservation"*". This point is reiterated in Article IV of the Hague-Visby rules, "*Neither the Carrier nor the ship shall be liable for loss or damage arising or resulting from unseaworthiness unless caused by want of due diligence on the part of the Carrier to make the ship seaworthy*", therefore, to avoid [sea water ingress and unseaworthiness](#) claims a test of a good hatch cover sealing arrangement at the beginning of the voyage is very important to protect the cargo by preventing the ingress of rain and sea water into the cargo holds and maintaining weathertight integrity of the cargo holds in all sea states.

The obligation to exercise due diligence in relation to the seaworthiness of the vessel at the commencement of the voyage recognises that the owners are not in a position to guarantee their vessel's seaworthiness after leaving port (the vessel



being exposed to the peril of the sea). A structurally sound, well maintained and fit cargo ship will flex in a seaway and that in extreme circumstances this may result in water passing the hatch sealing arrangements and entering the cargo holds with resultant damage to the cargo. In a contractual context, cargoworthiness will be considered an essential element of seaworthiness, contractual seaworthiness including the expectation that the goods shall be maintained in a satisfactory condition in the face of ordinary perils of the sea. It is therefore the duty of the owner to exercise due diligence in ensuring that their ship can carry and deliver to the discharge port goods, in a satisfactory condition.



Adverse weather condition can result in water penetrating the cargo hold and may cause wetting damage and/or damage due to shifting of cargo)

A cargo vessel in adverse weather conditions may take sea or rain water inside cargo holds if cargo hold sealing arrangements are not efficient. A shipowner held responsible for cargo damage in such circumstances and may not be able to establish a defence themselves if it cannot be demonstrated that the cargo holds were weathertight, for example through the results of a UST of the hatches undertaken immediately prior to or on completion of the loading of the cargo.

As highlighted earlier, prior to the loading of steel cargoes, cargo holds, and bilge wells shall be thoroughly cleaned, dry and inspected. Cargo hold bilges including the non-return valves must always be tested satisfactorily prior to cargo loading operations. During passage, the cargo holds bilges should be sounded regularly and records maintained.

A significant number of all steel claims are the result of leaking hatch covers and it is because of this that the Club recommends that the crew and attending cargo surveyor(s) verify hatch covers to be fully weathertight by undertaking a UST (the Club's

preferred method of testing for sound hatch covers) prior to the loading of steel cargoes. This activity should be witnessed by all parties and recorded in the ship's log book.



Water damaged steel (Steel cargo rust damage due to suspected leaking hatch covers)

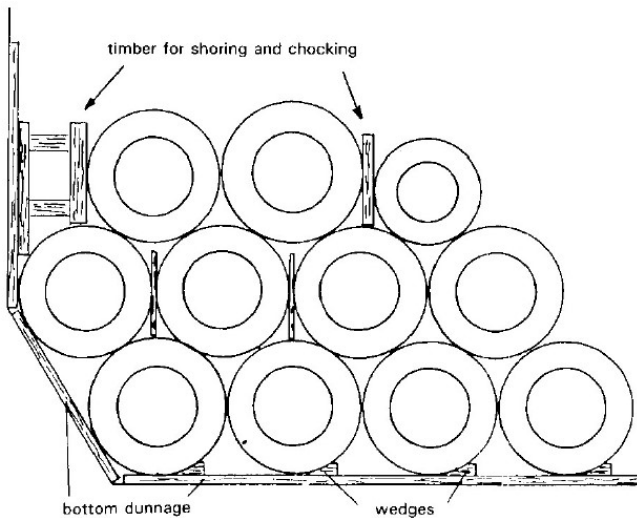
Cargo hold hatch covers must be in good condition with all sealing arrangements intact, coamings and drain channels clear of debris, drain channel non-return valves in good working order and their fire caps removed, compression bars smooth, free of rust and not wasted or distorted. Hatch cover rubber seals and their landing pads (bearing pads) are to be in good condition. Hatch securing devices including cleats and cross joint wedges should be fully operational, adjusted, and properly engaged before sailing. Furthermore, access hatches, mast house doors, ventilators and all other means of entry into the cargo holds should be in good operating condition and capable of being securely closed to prevent water ingress into the cargo hold.

#### **Stevedore handling of steel cargoes:**

Steel cargoes should never be loaded in rainy and adverse weather conditions except for those cargoes which have already been stowed to open weather conditions on the quay and remarks "wet before shipment" are to be added to the bill of lading and other cargo documents upon loading onboard the vessel.

Stevedores rough handling of the steel cargoes may cause cargo damage and ships staff need to be alert to this. As steel cargoes are heavy and dense, rough handling may cause damage to the vessel's tank-top or its structure or to the cargo itself (i.e. steel coils being ovalized). In such cases a "Letter of Protest" should be issued by the master. The tank top design load should NEVER be exceeded as this may result in damage of the tank top or damage to the ship's structure.

Shoring and chocking in voids between coils



Source – Annex 6 of CSS Code – Shoring and chokings in voids between coils

The steel cargo should be evenly spread out to prevent over stressing of the tank-top and this is achieved by laying heavy dunnage in 2 or 3 lines under the steel cargoes.

Care should also be given to the strappings of the steel coils to verify that they are not broken as this may damage the cargo itself or may lead to the disintegration of the wrapper and consequential exposure of the contents to damage.

If the cargo is to be loaded/handled with Fork-lift trucks, then the forklift should be appropriately equipped for handling such cargoes in order to minimise the risk of cargo damage. Wire slings if used need to be sheathed in rubber or plastic tubing, once again to protect the cargo from damage.



Fork-lift trucks equipped for handling of steel coils

### Stowage and securing of Steel coils:

It is generally accepted that tank top stowage, on top of suitable strength and properly laid dunnage, with cores facing fore and aft is the safest way to stow steel coils. However, some steel coils can be extremely large and weigh up to 20 tonnes or more. The loading and stowage of coils of this

size presents a number of difficulties. Steel coils, especially those weighing over 15 tonnes, are often loaded in a single tier. It is important that great care is exercised in order to ensure that tank top design load is never exceeded, and the vessel should comply with the requirements of its CSM for the safe stowage of ALL steel cargoes and ensure the stow is adequately secured for the voyage.

There is much literature in circulation stating that coils of up to 10 tonnes can be stowed 3 tiers high; coils up to 15 tonnes can be stowed 2 tiers high, and coils heavier than 15 tonnes can only be stowed in a single tier, however, there can be exceptions to this guidance. Ships differ, being built to differing designs, contain different sized components, use different qualities of steel and, probably more important, have suffered varying degrees of stresses throughout their working lives. Therefore, it is important to load the vessel with reference to the ship's stability particulars and the permissible loads and limitations which are never to be exceeded at any time as exceeding these permissible loads and limitations could lead to damage to the vessel's structure with severe consequences.

As a general rule and in accordance with the CSS Code, the bottom tier of coils should be started first in the wings, working inwards towards the centre. Wedges should be placed beneath each coil in succession as each one is positioned correctly. In many instances, a void space will be created in the centre of the row, and a locking coil should be placed so that it sits above the two innermost coils and will minimise the movement of the stow.



Stowage of steel coils

The second and subsequent tiers should be stowed in the same manner, nesting the coils between those in the tier below and applying lashings to secure any coil which does not sit tightly against adjacent coils. Loading a mixture of coils with different sizes in the same cargo hold should be avoided, however, if that is not possible, then smaller coils should be loaded in the top tiers to avoid their being crushed.



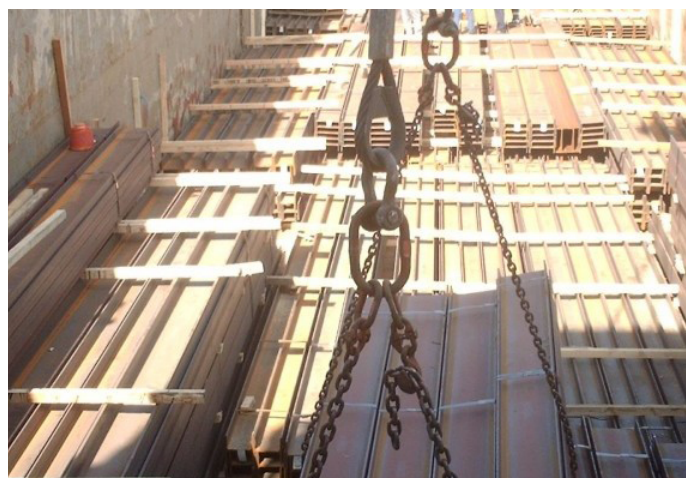
Void spaces at the ends should be braced with timber shoring. The top coils should then be securely lashed down and the lashings inspected and, Subject to risk assessment and always provided safe to do so, be adjusted regularly during the voyage. Wire rod coils should be loaded in a similar manner to sheeting coils, with cores facing fore and aft in an athwartships stow.



Damaged steel coil

### Steel cargoes other than steel coils:

Steel sections, bars, wire rods and flat strips are often shipped in long lengths, generally necessitating fore and aft bottom stowage. Athwartships stowage should be avoided. The Club once again emphasises that all cargoes are to be loaded and secured in accordance with the ship's approved CSM and ALL lashings are to be properly completed and inspected by an experienced ship's officer before the commencement of the sea passage.



Typical loading of steel beams on a cargo ship

At some geographical locations, for example the Club has been requested to provide guidance for

the carriage of steel slab cargoes with the California Block Stowage Method. The California Block Stowage (CBS) was developed by shippers and carriers involved in the regular transport of steel slabs between Brazil and California and allows for quicker loading and discharge of cargo. The essential elements of the CBS method are:

- Semi-finished steel slabs are loaded onto the hatch square tank top area as a free-standing stow;
- Slabs are loaded fore & aft with minimum dunnage under and between slabs;
- Minimal lashing - upper and outer tiers only - by metal bandings and clips;
- Stow is held in place by the inertia of its own mass and the friction between the semi-finished slabs; and
- Weight of stow is centred on half of the tank top area, thus cargo load is limited to half hold capacity.

The CBS method was designed for a particular cargo from a particular industry and for a particular route with stowage carried out under the supervision of those with specialist knowledge of the method. This method of stowage cannot be transferred to other situations without the potential for safety risks associated with the collapse of the stow.

It is the Club's experience that the CBS is not undertaken for a Shipowner's benefit but primarily for the charterer's convenience. The nature of the stowage method is such that less regard is paid to properly dunnaging and securing the cargo because that adds time to loading and discharging, with consequential increases in costs. The Club therefore does not recommend the use of the CBS method outside the trade for which it was devised and would recommend that members do not agree, by charterparty or otherwise, to use of the CBS method in inappropriate trades.

### Importance of the ship's ventilation system:

A typical ship would normally be able to perform natural and forced/mechanical ventilation of cargo holds. In case of natural ventilation, the cargo holds dampers (both inlet and outlets) are left open so the air inside the cargo holds is replaced naturally over the course of time. In the case of forced or mechanical ventilation, air inside the cargo hold is forcefully replaced by a mechanical ventilation system (supply/exhaust fans).

Improper ventilation may cause the [problem of sweat](#) which could result in "Ships sweat" or "Cargo sweat" both of which may result in damage to the steel cargoes during the sea passage. In order to

understand ship's sweat and cargo sweat, Mariners need to have an understanding of "Dew Point" temperature, which is the air temperature at which water vapour in the air condenses and forms water droplets (liquid).

In the case of "Ship's sweat", condensation will form on the hold frames and plating and might drip or run onto the cargo and thus damage it. Ship sweat normally occurs when a ship loads steel cargo in warm and humid climatic condition and makes passage to a colder climatic region. To avoid ship sweat the Master needs to monitor dew point temperature and ventilate the hold accordingly.

"Cargo sweat" is condensation forming on the surface of the cargo itself. Cargo sweat normally occurs when steel cargoes are loaded in a colder climatic region and during the course of the sea passage warm moist air is introduced into a hold, this moist air being, cooled below its dew point as it comes into contact with the cooler cargo, results in cargo sweat forming on the cargo.

In the case of cargo sweat there is the likelihood that all steel cargoes within the cargo hold will be affected and, therefore, the consequences of cargo sweat are potentially more damaging than the effects of ship's sweat.

To ascertain dew point at sea, wet and dry bulb ambient temperatures should be taken and as a matter of routine compared regularly with hold temperatures to gauge/establish whether ventilation is necessary, which is why a fully operational cargo hold ventilation system is very important when carrying steel or any other cargoes. All these activities need to be properly recorded and records maintained which could be quite important in mitigating potential damage claims that may be brought.

Other type of cargo/cargoes which might impact on the atmospheric environment of a cargo hold should not be carried in the same cargo hold where the steel cargoes are stowed.

### **Importance of Clauses of Bills of Lading:**

It is very important to clause the Bill of lading and notation of the mate's receipt for the apparent condition of the cargo on loading i.e. remarks for rust, damage to the cargo or its coverings, weather conditions and cargo exposure before loading, etc. Failing to identify pre-shipment damage and neglecting to make appropriate notations, will deprive the carrier of his rights, limitations and immunities under the contract of carriage and may prejudice Club cover. Any differences found

between the ship and shore tally or ship and bill of lading figures must be noted on the bill of lading.

In the event of a serious dispute with cargo interests regarding the clausing of mate's receipts or bills of lading, it is essential that the Club is informed immediately and without delay so that appropriate advice can be provided.

For their guidance, Members are also recommended to review Club articles on [Clausing Bills of Lading by Incorporation of Survey Reports](#) and [Minimising the Risk of Cargo Rejection](#) for the carriage of steel cargoes.

### **Club Rules, Claims and Disputes:**

**Steamship Rule 25 – Discretionary Claims – (viii)**  
*Unless and to the extent that the Directors shall in their absolute discretion otherwise determine (and in any event only if they are satisfied that the Member took such steps as appear to those Directors to be reasonable to avoid the event or circumstances giving rise to such liabilities, costs and expenses), there shall be no recovery from the Club under paragraphs a–d of this Rule 25 xiii in respect of the Member's liabilities, costs or expenses arising out of:*

*(e) "the issue of a bill of lading, waybill or other document containing or evidencing the contract of carriage known by the Member or the Master of the entered ship to contain an incorrect description of the cargo or its condition or quantity"*

In the event of any dispute or a claim, and dependent on the particular circumstances, the Club will initiate an investigation and as part of that process would require following documents –

- Master's Statement;
- UST of hatch covers;
- Photographs of actual damage and/or other relevant areas;
- Copy of preload survey report together with photographic evidence;
- Copy of pre discharge survey report with photographic evidence;
- Copies of logbooks;
- Weather reports;
- Copies of bills of lading;
- Pre-load draught survey report;
- Final draught survey report at loading port; and
- Ship's hydrostatic and stability information.



Finally, Members are strongly recommended to contact either the Managers' appropriate Representatives or the Club's local correspondents for advice in the event of any difficulties encountered in the loading of steel cargoes.

### **References:**

1. SOLAS Convention
2. [Code of Safe Practice for Cargo Stowage and Securing \(CSS Code\)](#)
3. Steel Carriage by Sea by Arthur Spark
4. Hatch Cover Inspections – A Practical Guide by Walter Vervloesem, FNI published by the Nautical Institute
5. [IMO Resolution MSC.1/Circ 1228](#)