



fig. 01/ typical Reel stowage

STOWAGE PLANS - WHAT YOU NEED TO KNOW

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A lot of considerations must be taken into account when creating a stowage plan.

- Does the cargo fit in the allocated space?
- What will be used to secure the cargo?
- How will personnel stow and secure the cargo?
- Is the deck strong enough to take the cargo?
- Does the cargo need segregated?

The safe stowage and securing of cargo is dependent on the proper planning, execution and supervision of the process. The cargo should be stowed and secured in such a way which does not put the ship or personnel in any risk. Improper stowage and securing can put the vessel, crew and other cargo into a potentially hazardous situation.

The International Maritime Organization (IMO) has developed guidelines which must be followed when carrying cargo. This is the Code of Safe Practice for Cargo Stowage and Securing (CSS Code). It is also a mandatory requirement for vessels to carry a Cargo Securing Manual (CSM) specific to their cargo carrying capability.

The CSS Code provides an international standard to promote the safe stowage and securing of cargoes. It manages this by:

- ensuring that ship owners and operators utilise the ship for its intended purpose
- providing advice to ensure vessels are equipped with proper cargo securing means
- providing advice on cargo stowage and securing to minimize risks to the ship

and personnel

- provide specific advice on cargoes which are known to create difficulties and hazards regarding their stowage and securing
- advising on actions that may be taken when in heavy sea conditions
- advising on actions that may be taken to remedy the effects of cargo shifting

The CSS Code provides the advice; however, the overall responsibility of the vessel, crew and cargo always lies with the Master. The Cargo Securing Manual is broken into five chapters:

- Chapter 1 – General (Definitions and General Information)
- Chapter 2 – Securing Devices and Arrangements
- Chapter 3 – Stowage and Securing of Non Standardized and Semi-Standardized Cargo
- Chapter 4 – Stowage and Securing of Containers and other Standardized Cargo
- Chapter 5 – Cargo Safe Access Plan

Using the guidelines laid out by the IMO, in combination with the predominant industry standards, we can look to answer the aforementioned queries.

Does the cargo fit in the allocated space?

Vessel owners and charterers can supply vessel particulars, which will allow you to find the right vessel for the specific cargo. Many vessels have multiple holds for carrying cargo, which are normally numbered starting at the bow and moving aft.

Within the particulars, hold dimensions should be supplied for each hold. Hold capacity can also be referred to in different ways depending on the type of vessel:

- it is often measured in cubic metres, stating the Grain/Bale capacity
- when carrying containers, TEU (Twenty Foot Equivalent Units) is referred to

There may be cases where the cargo dimensions are greater than the allowable height in the hold. With permission from the vessel owner, the hatch covers can

be left open to allow for this. When considering the allocated space, it is important to consider the cargo securing method and materials and whether the addition of these will also fit into the allocated space.

Cargo securing:

Cargo can be secured in several different ways:

- web lashings
- chain lashings
- welded blockers/cleats
- welded bridge plates
- welded braces
- twistlocks

The type of securing is dependent on differing factors, the majority of which are directed by a calculation of the seagoing forces that will act on the cargo. In order to calculate the seagoing forces, the following information allows for the most accurate answer:

- weight of the cargo
- accurate position of the Cargo's Centre of Gravity (CoG), in relation to a base point on the vessel
- dimensions between the transverse and longitudinal supports in relation to the CoG
- accurate dimensions of the vessel being used for the transportation
- nature of transportation, in terms of expected sea state and weather conditions

We would recommend the use of "Planning and Execution of Marine Operations – DNVGL-ST-N001" as the industry Standard to comply with. From the seagoing forces we can find the transverse and longitudinal forces that will act upon the cargo, and whether there will be any uplift present.

Once the seagoing forces are known, the type of securing can be chosen. This will depend on how the cargo has been constructed.

- Are there any lashing points on the cargo?

- How is the cargo supported where it makes contact with the deck/dunnage?
- Is it being carried on a specially designed transportation frame?

Web Lashings are relatively light, fairly easy to use and also due to their material, the majority being made from polyester, don't cause as much damage to the cargo. However, they are susceptible to wear and chafe, especially if being used across edges.

The rubber (or similar) protection should be used to help protect the lashings. Web lashings are also not recommended for use on exposed decks of a vessel, or on a barge where the lashings cannot be checked. The webbing material can deteriorate when exposed to salt water and UV rays from the sun. It is important to know the Minimum Breaking Load (MBL) of the lashing you are working with, and that they are certified.

Chain Lashings are heavy and can be quite cumbersome when moving around the deck/hold of a vessel. Care must be taken when moving the chains around a piece of cargo to prevent any damage from occurring, especially to painted surfaces. It is important, as with the web lashing, to know the MBL of the chain you are working with, and that the chains have been tested and certified.

Welded blockers/cleats are specified dependant on the findings from the seagoing forces. Blockers tend to be used when the only considerations are transverse and longitudinal forces; and cleats should be specified whenever additional restraint is required from uplift. When using blockers or cleats it is important to know the vessel's underdeck framing in relation to the piece of cargo, therefore an accurate drawing of the vessel would be extremely useful. When welding the blockers or cleats to the deck it is important to do this in line with the underdeck framing, as this will be the

strongest part of the deck (see Figure 2).

Welded bridge plates are used when connecting a piece of cargo to a transportation frame, a good example of this would be when transporting offshore reels (see Figure 2).

An important aspect to consider when choosing welded seafastenings are the location of fuel tanks or other flammable liquids or gases that may be stowed onboard the vessel. Since heat produced during the welding process could pose a fire or explosion risk if exposed to flammable materials, the vessel's owner or operator should always be consulted to ensure it is safe to weld in the desired location.

Twistlocks are used to secure containerised cargo. The twistlocks attach to the vessel's deck in pre-set positions, where the four corners of a container would land, and the container is placed on top of them. Once the container is in position, a lever is used on the twistlock to lock the container in place.

Stowage and Securing Method

The majority of cargoes will be lifted using either a shore side crane or the vessel's crane, from the quayside, either into the hold or onto the deck of the vessel, straight into their final position. However, some smaller cargoes may then need manoeuvred once on the vessel. This may be done with the use of a forklift, and in this instance, it would be important to consider the forklifts manoeuvrability and dimensions when creating a stowage plan.

When uplift is calculated in the seagoing forces, additional vertical restraint is required on the cargo. This may involve working at height, when using web or chain lashings for the vertical restraint, which in turn may require the use of a cherry picker (or similar). Again, if this is the case then the manoeuvrability and dimensions of the machinery on the vessel should be considered when creating a

stowage plan. In some cases, it may be necessary to install the vertical restraint on the cargo prior to lifting onboard the vessel. Another instance where a cherry picker may be required is when disconnecting the lifting equipment from the cargo.

Deck Strength

Within the vessel particulars that you should receive from the owner or charterer, there should be information on the deck strength of the vessel. This is normally presented in the units' tonne per metre squared (T/m²). If loading cargo with a high point loading, deck strength checks should be carried out to tie into primary structure within the vessel. There are a

few standards that we would recommend that you generally adhere to, these being, BS5950 (British Standard – Structural use of steelwork in building), AISC 360-10 (American institute of Steel Construction – Specification for Structural Steel Buildings), Lloyd's Register (Rules and regulations for the classification of ships) and Eurocode 3 (Design of steel structures).

When loading cargoes with a high point loading, it is important to land them to suitable load spreading mats/dunnage, in order to prevent any damage to the vessel's deck. It is also important to consider the friction coefficient of the load spreading devices, as this will affect the results of seagoing forces being calculated.

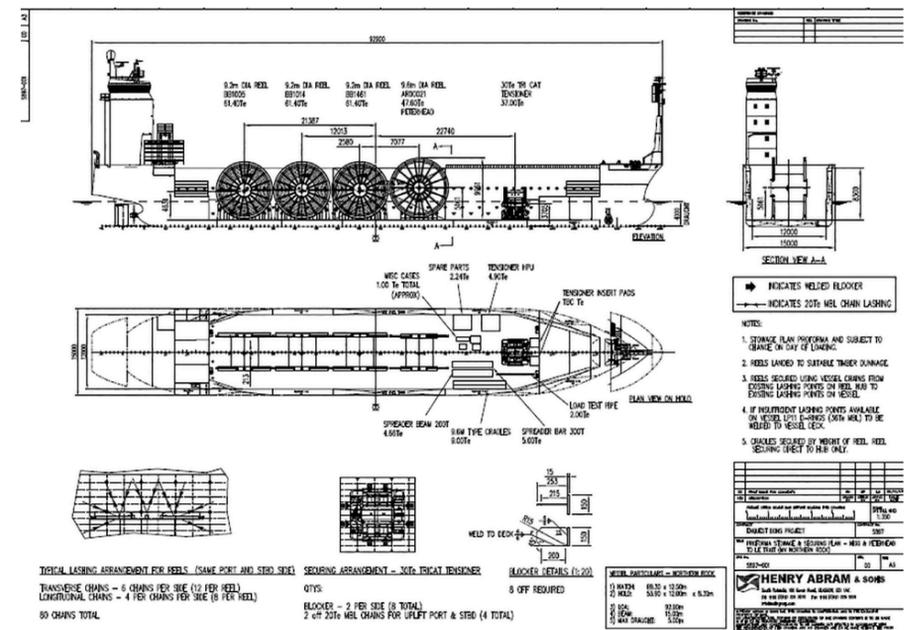


fig. 02/ typical stowage plan