Shipment of oversized columns and vessels on ocean carriers

Liberty International Underwriters

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The lifting, stowage and securing of oversized cargo for shipment poses logistical challenges and involves careful advance preparation, the use of specialised ocean carriers with appropriate onboard lifting equipment, and the sound knowledge and execution of suitable stowage and securing methods. In the absence of adequate forward planning and preparation, or where best-practice loading and shipment of oversized cargo is not observed, there is an increased risk of damage to the cargo, incurring potential delays for the project.

Oversized project equipment, due to the nature of its structure, is generally loaded to heavy-lift cargo carriers that are specifically designed for the shipment of heavy project cargo. Despite this, high freight rates and the lack of availability of these specialist ships mean that it has become increasingly common for older ocean carriers (that is, more than 30 years of age) with single heavy-lift derricks to be used for the shipment of oversized project equipment.

While these ships may be suitable for the carriage of 'normal'-sized heavy cargo, they are not regarded as suitable for the carriage of oversized cargo, such as large columns or vessels. Furthermore, it should be noted that the Institute Classification Clause of the standard insurance policy wordings specifies an age limitation for ocean carriers; that is, they should be less than 15 years of age, or, if older, they should be less than 25 years of age and should have been used on an established and regular trading pattern.

Liberty International Underwriters (LIU) risk engineers have prepared this guide as a handy reference for marine project risk management teams. It provides practical guidance on the appropriate loading, stowage and securing of oversized cargo on ocean-going carriers.

For the purpose of this guide, 'oversized' cargo should be understood to refer to columns or vessels; however, the guidelines may be adapted to include other oversized cargo with an off-centre centre of gravity (CoG) or irregular footprint, or which, for some other reason, requires special handling or sea-fastening.

Lifting and loading oversized cargo

The loading of oversized cargo should not begin until the cargo has been weighed, and a detailed engineering review of the lifting arrangements has been conducted, reviewed and approved by all interested parties. Such lifting arrangements should be engineered to take into consideration the cargo's CoG.

In addition, it is recommended that the weather forecast for the duration of the operations be considered before starting the lift.

Oversized cargo should be tandem-lifted by a carrier fitted with two cranes of adequate capacity. A tandem lift is the preferred method for lifting oversized columns since this method helps compensate for an off-centre CoG, reduces deflections in the column, and allows for easier handling. Each crane hook loading should be calculated to include an offset allowance to compensate for an off-centre CoG.

Lifting large columns using a single hook (a 'single lift') should be avoided wherever possible; however, if this option is unavoidable, a suitable lifting beam not less than 25% the length of the oversized column should be used, in order to spread the slings as far as practicable on either side of the CoG.

Regardless of whether lifting the oversized cargo involves a single or tandem lift, the usual precautions for a controlled heavy lift should apply.

A single, heavy-lift derrick on a cargo vessel poses limitations on the lifting of long columns.

A tandem lift compensates for an off-centre CoG.

A heavy-lift vessel specifically designed for the carriage of heavy project cargo. Two cranes allow for tandem lifts.

A single crane lifts a column horizontally. The position of the slings here, offset from wooden battens, indicate an off-centre CoG.

When a lifting beam is not used, lifting slings should be matched as accurately as possible, unless the rigging arrangement is deliberately asymmetric to compensate for CoG offset, in which case, matched pairs of slings should be used. Where there is a minor mismatch in sling length, the slings should be arranged in such a way as to minimise skew on the load.

Where connection to designed lifting lugs or trunnions is not possible for the lift, soft belly slings or hard wire ropes (with adequate protection to prevent damage to the main body of the column) should be used.

In engineering any lifting arrangement, the external fittings on the main body of the column should be considered, and allowances should be made for positioning the slings to ensure a horizontal lift where an off-centre CoG is anticipated.

In all cases, the vendor should be involved in the lifting approval process, in order to ensure that any deflections, clashes or out-of-plane loadings on lifting lugs are all within design parameters.

Stowage and securing of oversized cargo

Personnel responsible for planning and supervising the stowage of oversized cargo should have a sound understanding and knowledge of the ocean carrier's Cargo Securing Manual.

Oversized cargo can be stowed either below deck, in the holds, or above deck. (Above-deck stowage may include on-hatch stowage.) In planning the stowage of oversized cargo, careful consideration should be given to the strength of the ship's tank top, main deck or cargo hold hatches and allowances should be made for load spreading to ensure the deck load-bearing capacity is not exceeded.

Cargo should always be stowed and secured in accordance with recognised safety standards.

In engineering the securing arrangements for units of cargo on an ocean carrier, consideration should be given to the longitudinal, transverse and vertical forces which will act upon the cargo in a seaway. These forces increase in proportion with the height of the cargo and its longitudinal distance from the ship's central axis. For this reason, the optimal stowage orientation and location of cargo on board is in a fore and aft direction, along or as close as practicable to the ship's centre line, and as close as practicable to amidships.

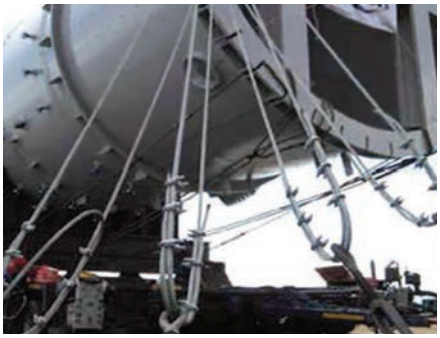
In addition to the forces already described, on-deck cargo is also subject to the force of the wind and green seas (or green water) during the voyage. These forces should be taken into consideration when planning the cargo securing methods.

The weight of the cargo item should be distributed so as to avoid undue stress on the ship's structure, particularly the hatch covers. Suitable steel plates, flat racks or timber beams of adequate strength should be used to transfer the weight of the cargo item onto the ship's structure.

Steel on steel contact should always be avoided. Timber packing, or dunnage, should always be used between the underside of the cargo unit saddle and the ship's steel deck to prevent steel-on-steel contact and, by increasing the co-efficient of friction, prevent undesirable shifting of the cargo.

The optimum lashing angle to counteract sliding is 25° from the horizontal, while the optimum lashing angle to counteract tipping is generally between 45° and 60° from the vertical. Any lashings that are set at greater angles will be less effective, and additional lashings or welded braces or stoppers should be used to compensate.

As a general rule, and for nearly any size of ship, the 'total of the MSL (maximum securing load) values of the securing devices on each side of a unit of cargo (port and starboard) should equal the weight of the unit (in kN)'. This rule of thumb implies a transverse acceleration of 1*g* (9.81m/s^2), and applies regardless of the location of the stowage, its stability and loading condition, the season, or area of operation of the cargo vessel.



Wire lashing arrangements offer extra insurance against cargo movement.

Want more information?

International Maritime Organization, *CSS Code: Code of Safe Practice for Cargo Stowage and Securing,* 2011 edn.

Lloyds Register UK P&I Club 2011, *Survey and examinations of ships' lifting appliances,* Lloyds Register, https://www.ukpandi.com/fileadmin/uploads/uk-pi/LP%20Documents/Survey%20and%20Examination%20of%20Ships'%20Lifting%20Appliances.pdf