

Grain securing methods

Following are recommended methods for securing grain as per International grain code

1 Shifting boards (Filled/partly filled)

2 Saucers (Filled)

3 Bundling of bulk grain (Filled)

4 Overstowing arrangements (Filled/partly filled)

5 Strapping or lashing (Filled/partly filled)

6 Feeders (Filled)

7 Securing with wire mesh (Filled/partly filled)

Shifting Board

- Longitudinal divisions (called shifting board), which must be grain tight may be fitted in both "filled" and "partly filled compartments".
- In "filled compartments, they must extend downwards from the underside of the deck or hatchcovers, to a distance below the deckline of at least one-eighth the breadth of the compartment, or at least 0.6m below the surface of the grain after it has been assumed to shift through an angle of 15 degree
- In a "partly filled compartment", the division, should extend both above and below the level of grain, to a distance of one-eighth the breadth of the compartment.

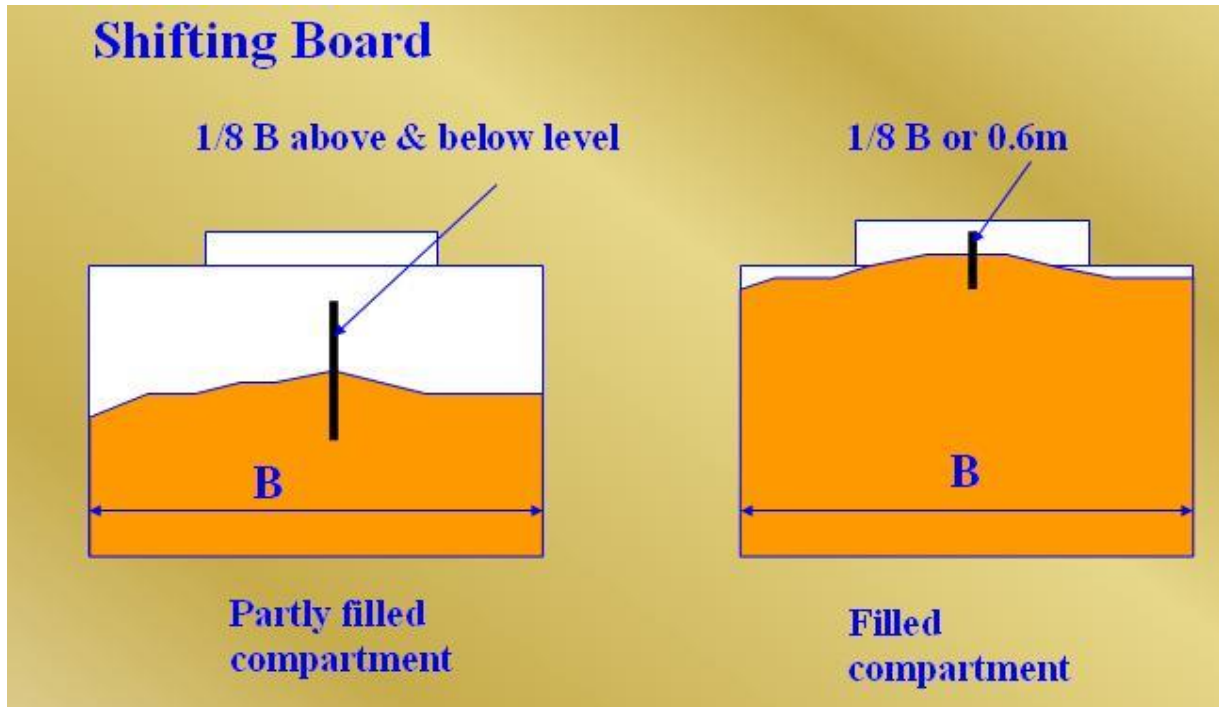


Figure: Shifting boards

14 Saucers

14.1. For the purpose of reducing the heeling moment a saucer may be used in place of a longitudinal division in way of a hatch opening only in a filled, trimmed, compartment as defined in A 2.2, except in the case of linseed and other seeds having similar properties, where a saucer may not be substituted for a longitudinal division. If a longitudinal division is provided, it shall meet the requirements of A 10.9.

14.2. The depth of the saucer, measured from the bottom of the saucer to the deck line, shall be as follows:

- .1. For ships with a moulded breadth of up to 9.1 m, not less than 1.2 m.
- .2. For ships with a moulded breadth of 18.3 m or more, not less than 1.8 m.
- .3. For ships with a moulded breadth between 9.1 m and 18.3 m, the minimum depth of the saucer shall be calculated by interpolation.

14.3. The top (mouth) of the saucer shall be formed by the underdeck structure in way of

the hatchway, i.e. hatch side girders or coamings and hatch end beams. The saucer and hatchway above shall be completely filled with bagged grain or other suitable cargo laid down on a separation cloth or its equivalent and stowed tightly against adjacent structure so as to have a bearing contact with such structure to a depth equal to or greater than one half of the depth specified in A 14.2. If hull structure to provide such bearing surface is not available, the saucer shall be fixed in position by steel wire rope, chain, or double steel strapping as specified in A 17.1.4 and spaced not more than 2.4 m apart.

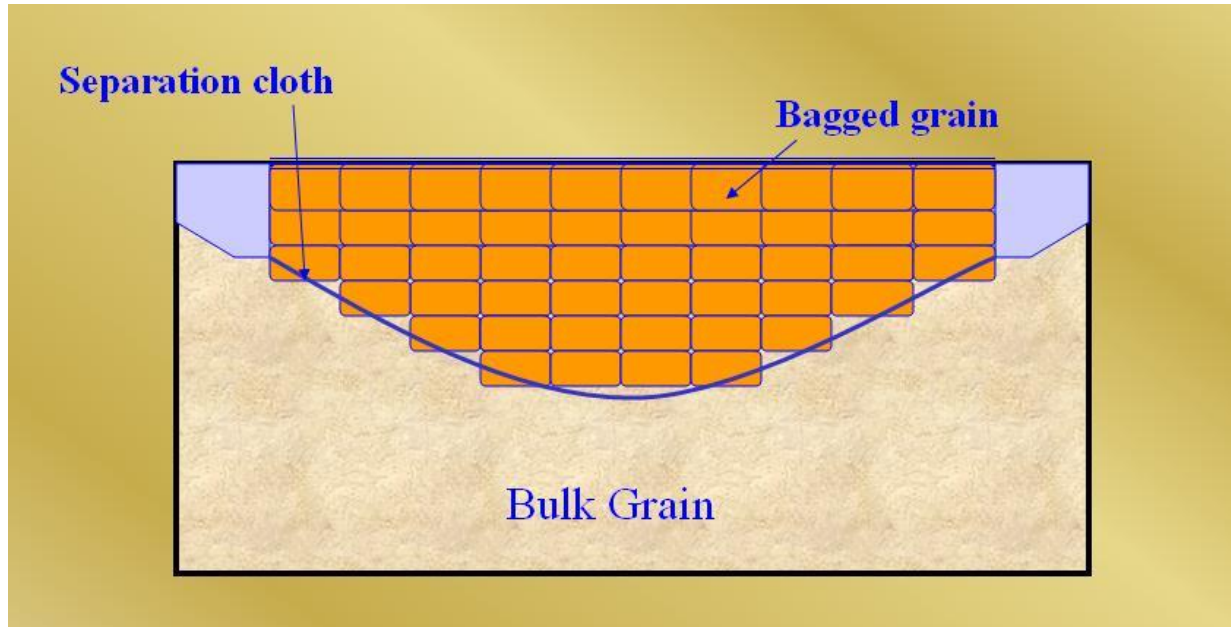


Fig: Saucers

15. Bundling of bulk grain

. As an alternative to filling the saucer in a filled, trimmed, compartment with bagged grain or other suitable cargo a bundle of bulk grain may be used provided that:

1. The dimensions and means for securing the bundle in place are the same as specified for a saucer in A 14.2 and A 14.3.
2. The saucer is lined with a material acceptable to the Administration having a tensile strength of not less than 2,687 N per 5 cm strip and which is provided with suitable

means for securing at the top.

.3. As an alternative to A 15.2, a material acceptable to the Administration having a tensile strength of not less than 1,344 N per 5 cm strip may be used if the saucer is constructed as follows:

.3.1. Athwartship lashings acceptable to the Administration shall be placed inside the saucer formed in the bulk grain at intervals of not more than 2.4 m. These lashings shall be of sufficient length to permit being drawn up tight and secured at the top of the saucer.

.3.2. Dunnage not less than 25 mm in thickness or other suitable material of equal strength and between 150 mm and 300 mm in width shall be placed fore and aft over these lashings to prevent the cutting or chafing of the material which shall be placed thereon to line the saucer.

.4. The saucer shall be filled with bulk grain and secured at the top except that when using material approved under A 15.3 further dunnage shall be laid on top after lapping the material before the saucer is secured by setting up the lashings.

.5. If more than one sheet of material is used to line the saucer they shall be joined at the bottom either by sewing or by a double lap.

.6. The top of the saucer shall be coincidental with the bottom of the beams when these are in place and suitable general cargo or bulk grain may be placed between the beams on top of the saucer.

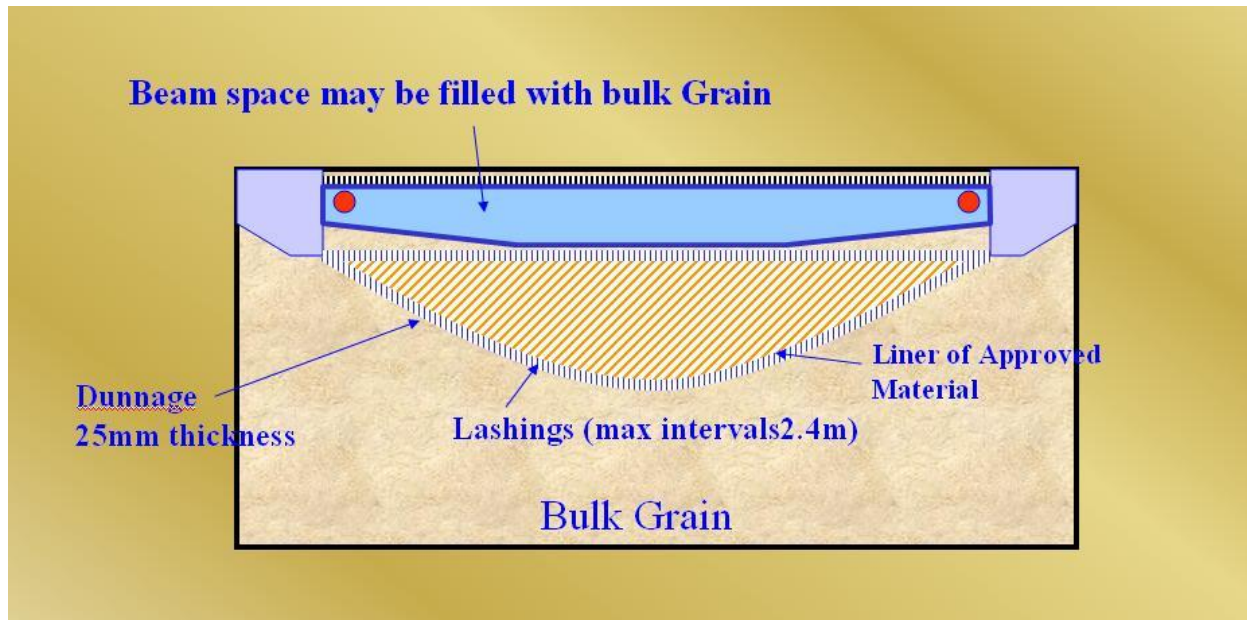


Figure: Bundling of bulk grain

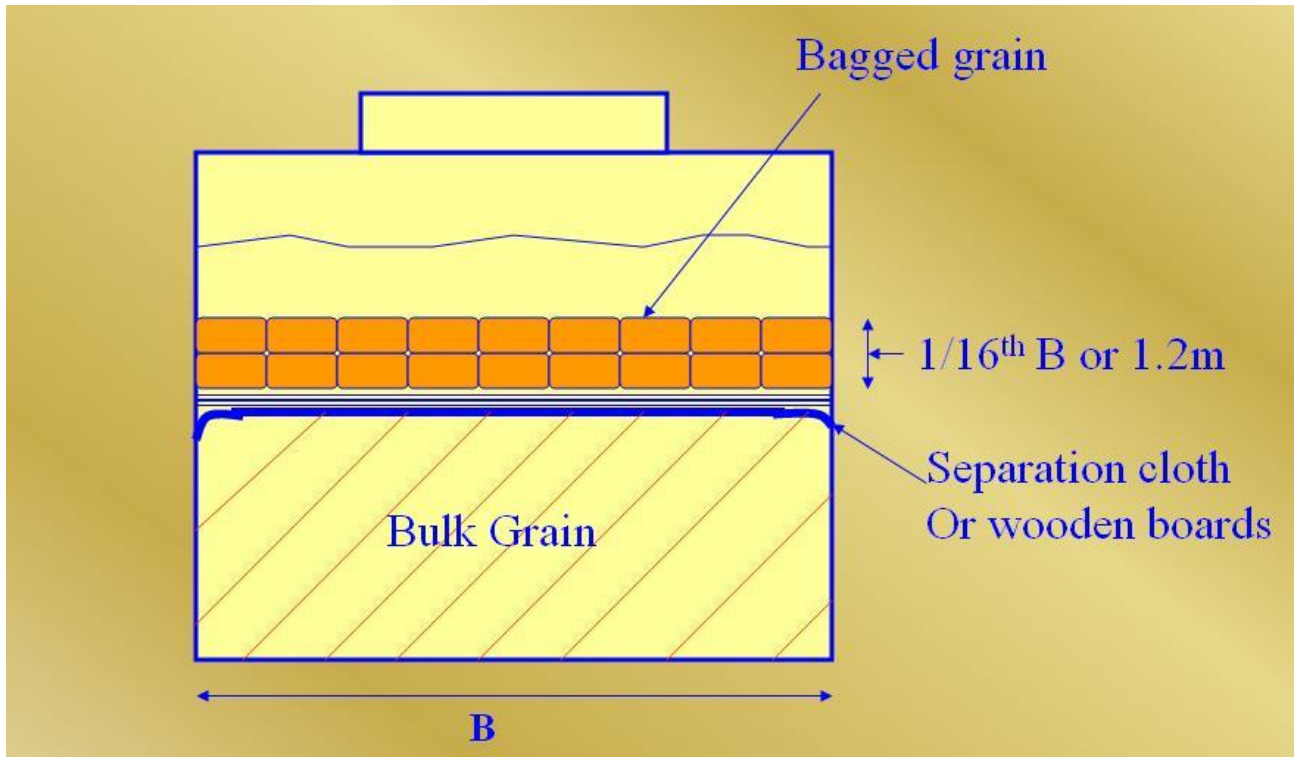
16. Over-stowing arrangements

16.1. Where bagged grain or other suitable cargo is utilized for the purpose of securing partly filled compartments, the free grain surface shall be level and shall be covered with a separation cloth or equivalent or by a suitable platform. Such platform shall consist of bearers spaced not more than 1.2 m apart and 25 mm boards laid thereon spaced not more than 100 mm apart. Platforms may be constructed of other materials provided they are deemed by the Administration to be equivalent.

16.2. The platform or separation cloth shall be topped off with bagged grain tightly stowed and extending to a height of not less than one sixteenth of the maximum breadth of the free grain surface or 1.2 m, whichever is the greater.

16.3. The bagged grain shall be carried in sound bags which shall be well filled and securely closed.

16.4. Instead of bagged grain, other suitable cargo tightly stowed and exerting at least the same pressure as bagged grain stowed in accordance with A 16.2 may be used.



17 Strapping or Lashing

. When, in order to eliminate heeling moments in partly filled compartments, strapping or lashing is utilized, the securing shall be accomplished as follows:

- .1. The grain shall be trimmed and levelled to the extent that it is very slightly crowned and covered with burlap separation cloths, tarpaulins or the equivalent.
- .2. The separation cloths and/or tarpaulins shall overlap by at least 1.8 m.
- .3. Two solid floors of rough 25 mm x 150 mm to 300 mm lumber shall be laid with the top floor running longitudinally and nailed to an athwartships bottom floor. Alternatively, one solid floor of 50 mm lumber, running longitudinally and nailed over the top of a 50 mm bottom bearer not less than 150 mm wide, may be used. The bottom bearers shall extend the full breadth of the compartment and shall be spaced not more than 2.4 m apart. Arrangements utilizing other materials and deemed by the

Administration to be equivalent to the foregoing may be accepted.

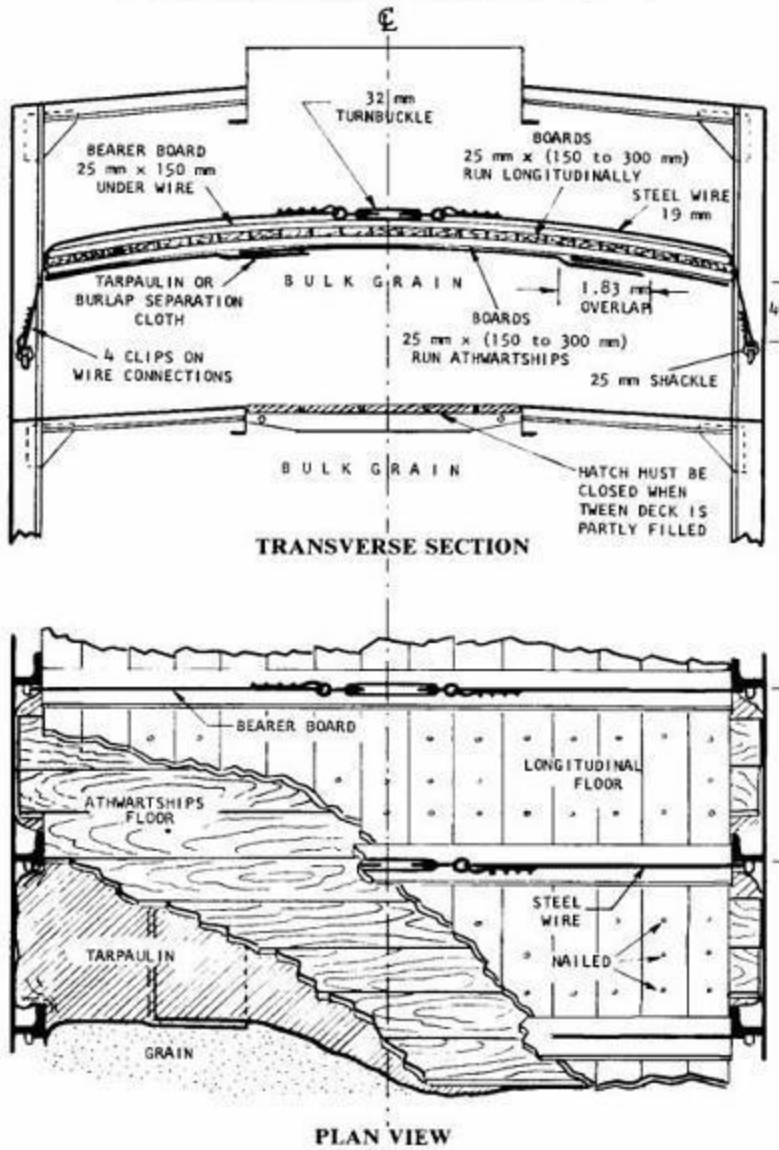
.4. Steel wire rope (19 mm diameter or equivalent), double steel strapping (50 mm x 1.3 mm and having a breaking load of at least 49 kN), or chain of equivalent strength, each of which shall be set tightly by means of a 32 mm turnbuckle, may be used for lashings. A winch tightener, used in conjunction with a locking arm, may be substituted for the 32 mm turnbuckle when steel strapping is used, provided suitable wrenches are available for setting up as necessary. When steel strapping is used, not less than three crimp seals shall be used for securing the ends. When wire is used, not less than four clips shall be used for forming eyes in the lashings.

.5. Prior to the completion of loading the lashing shall be positively attached to the framing at a point approximately 450 mm below the anticipated final grain surface by means of either a 25 mm shackle or beam clamp of equivalent strength.

.6. The lashings shall be spaced not more than 2.4 m apart and each shall be supported by a bearer nailed over the top of the fore and aft floor. This bearer shall consist of lumber of not less than 25 mm x 150 mm or its equivalent and shall extend the full breadth of the compartment.

.7. During the voyage the strapping shall be regularly inspected and set up where necessary.

SECURING OF PARTLY FILLED COMPARTMENT BY STRAPPING OR LASHING



Feeders

It may be assumed that under the influence of ship motion underdeck voids will be substantially filled by the flow of grain from a pair of longitudinal feeders provided that:
the feeders extends for the full length of the deck and that the perforations therein are adequately spaced.

the volume of each feeder is equal to the volume of the underdeck void outboard of the hatchside

girder and its continuation.

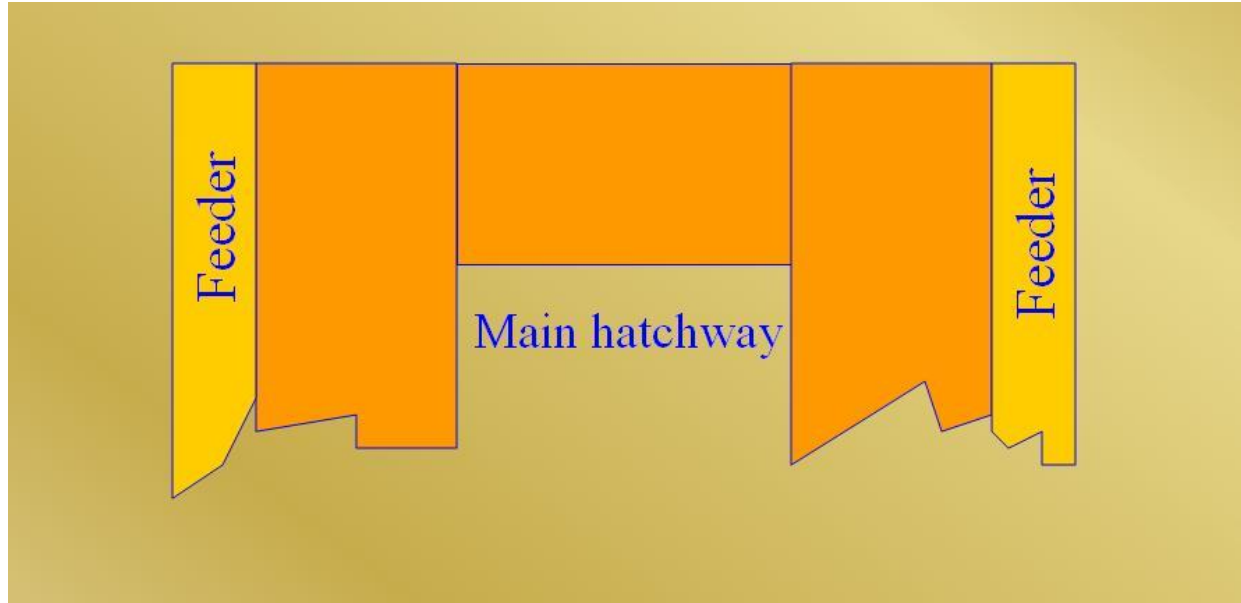


Fig: Feeders

18. Securing with wire mesh

. When, in order to eliminate grain heeling moments in partly filled compartments, strapping or lashing is utilized, the securing may, as an alternative to the method described in A 17, be accomplished as follows:

- .1. The grain shall be trimmed and levelled to the extent that it is very slightly crowned along the fore and aft centreline of the compartment.
- .2. The entire surface of the grain shall be covered with burlap separation cloths, tarpaulins, or the equivalent. The covering material shall have a tensile strength of not less than 1,344 N per 5 cm strip.
- .3. Two layers of wire reinforcement mesh shall be laid on top of the burlap or other covering. The bottom layer is to be laid athwartships and the top layer is to be laid longitudinally. The lengths of wire mesh are to be overlapped at least 75 mm. The top layer of mesh is to be positioned over the bottom layer in such a manner that the squares formed by the alternate layers measure approximately 75 mm x 75 mm. The wire reinforcement mesh is the type used in reinforced concrete construction. It is fabricated

of 3 mm diameter steel wire having a breaking strength of not less than 52 kN/cm² welded in 150 mm x 150 mm squares. Wire mesh having mill scale may be used but mesh having loose, flaking rust may not be used.

.4. The boundaries of the wire mesh, at the port and starboard side of the compartment, shall be retained by wood planks 150 mm x 50 mm.

.5. Hold-down lashings, running from side to side across the compartment, shall be spaced not more than 2.4 m apart except that the first and the last lashing shall not be more than 300 mm from the forward or after bulkhead, respectively. Prior to the completion of the loading, each lashing shall be positively attached to the framing at a point approximately 450 mm below the anticipated final grain surface by means of either a 25 mm shackle or beam clamp of equivalent strength. The lashing shall be led from this point over the top of the boundary plank described in A 18.1.4, which has the function of distributing the downward pressure exerted by the lashing. Two layers of 150 mm x 25 mm planks shall be laid athwartships centred beneath each lashing and extending the full breadth of the compartment.

.6. The hold-down lashings shall consist of steel wire rope (19 mm diameter or equivalent), double steel strapping (50 mm x 1.3 mm and having a breaking load of at least 49 kN), or chain of equivalent strength, each of which shall be set tight by means of a 32 mm turnbuckle. A winch tightener, used in conjunction with a locking arm, may be substituted for the 32 mm turnbuckle when steel strapping is used, provided suitable wrenches are available for setting up as necessary. When steel strapping is used, not less than three crimp seals shall be used for securing the ends. When wire rope is used, not less than four clips shall be used for forming eyes in the lashings.

.7. During the voyage the hold-down lashings shall be regularly inspected and set up where necessary.