

6 *Section 5 Sub-section M*

M.6 Stem

M.6.1 Stem scantlings shall be determined from Table M.2.

M.6.2 The moulding of the stem at the heel may be greater than that of the keel to permit the butting of the docking keel against the scarp end.

M.6.3 The scarp of the stem to the keel shall not be less than 2.5 times the keel moulding in length.

M.6.4 The face of the stem may be reduced in siding below the deckline to conform to a suitable stem band.

M.7 Apron and Forward Deadwood

M.7.1 The apron and forward deadwood shall be sided and moulded to permit a double row of fastenings in the planking hood ends.

M.7.2 The outer rabbet line is to be such as to permit a faying surface of twice the planking thickness.

M.7.3 The forward deadwood at the hog position shall be sided not less than the hog.

M.7.4 The forward deadwood knee shall have the same siding as the stem while the moulding in the throat should be not less than 1.5 times the siding.

M.8 Stern Post, Aft Deadwood, Shaft Log

M.8.1 The stern or propeller post shall have a minimum siding equal to that of the keel and be in one piece throughout its length. The sternpost is to be connected to the keel by a mortice and tenon joint and also by a dovetail plate or other equivalent connection on both sides in addition to the fastenings (Refer to M.8.3). Scantlings are shown in Table M.3.

M.8.2 The inner posts, deadwoods, and/or shaft logs shall be substantially moulded to permit a double row of fastenings in the hood ends, coupled with a minimum faying surface of 3 times the planking thickness.

M.8.3 The thickness of timber on each side of the shaft tube shall not be less than 0.25 times the keel siding. Where the diameter of the shaft tube is such that there is less than this siding the timber scantling shall be increased to the required dimension in this area.

M.8.4 Inner posts, deadwoods and/or shaft logs may run either horizontally or vertically.

M.9 Horn Timber Assembly

M.9.1 The horn timber assembly sectional areas are shown in Table M.4.

M.9.2 The horn timber may be cut from solid timber and locked in with the stern post by a large tenon and mortice. Where the horn timber is cut from solid timber the sectional areas shown in Table M.4 may be reduced by up to 15 per cent.

M.9.3 The horn timber fashion piece may be gradually reduced towards its after end where its sectional area is not then to be less than 0.8 of the sectional areas shown in Table M.4.

M.9.4 The side horn timbers shall be moulded such that their top edges are not lower than the top edge of the middle horn timber and notched at least 12 mm into the aft deadwood assembly. They shall extend from the transom to the forward end of the aft deadwood.

M.9.5 Siding of side horn pieces shall be 1.25 times the hull planking thickness and permit the planking being fastened with a double row of fastenings.

M.9.6 The cantilever length of the horn timber assembly shall not exceed 60 per cent of the overall length of the side horn timbers.

M.10 Transom

M.10.1 Transom planking thickness for single thickness construction shall be obtained from Table M.5.

M.10.2 All types of transoms shall have stiffeners spaced at not greater than 450 mm centres together with substantial margins. The stiffeners and margins shall have scantlings derived from Table M.5.

M.10.3 A substantial grown knee, chock or bracket shall be fitted between the transom and horn timber. Grown knees and chocks shall have a siding equal to 2.5 times the tabular

transom thickness and a moulding in the throat of a grown knee shall be not less than such siding.

M.10.4 Care should be taken in ensuring that any vertical stiffeners are in line with the stringers to facilitate the fitting of the stringer to transom knees, chocks or brackets required by M.15.4 (d) and M.15.4 (f).

M.11 Bent or Laminated Frames

M.11.1 The scantlings for bent or laminated frames are to be derived from Table M.6.

M.11.2 Frames are to maintain the same moulding and siding throughout their length and may be checked, if desired, into the hog, apron, forward and aft deadwoods or the horn timbers.

M.11.3 If the basic frame spacing shown in Table M.6 is not adopted, the scantling of the frame shall be adjusted by maintaining the section modulus of the frame per millimetre of frame spacing.

M.12 Web Frames

M.12.1 The scantlings for web frames are to be derived from Table M.7. If the basic web frame spacing shown in Table M.7 is not adopted, the scantling of the web frame shall be adjusted by maintaining the section modulus of the frame per millimetre of frame spacing.

M.12.2 Where a web frame is notched in excess of 12.5 per cent of its depth to accommodate longitudinals, the moulding of the web frame shall be increased to maintain the required sectional area in way of the notch.

M.12.3 A floor timber of siding equal to that of the web frame, is to be used to connect the web frame members across the top of the keel and hog (See also M.14.2.).

M.12.4 Gusssets or chocks shall be used to connect the bilge and topside sections of web frames. These shall be of adequate scantling and through fastened by bolts. Where web frames are not in one piece suitable strengthening shall be provided in way of any joint.

M.12.5 Where web frames are used, intermediate frames of dimensions and spacings determined for bent frames are required to be fitted between the web frames.

M.13 Floors

M.13.1 Floors shall be in accordance with Table M.8 and associated notes.

M.13.2 The spacing of floors (centre to centre) shall be as follows:

- (i) Machinery spaces: not more than twice the bent frame spacing adopted or the spacing may be three times the frame spacing if the floor siding is increased by 30 per cent of that of normal floors derived from Table M.8.
- (ii) Outside machinery spaces: not more than three times the bent frame spacing adopted.

M.13.3 Special consideration is required to be given in way of machinery installations where the engine sump and/or gearbox is in close proximity to the hog. Details of proposals related to such installations where any interference to the floors is occasioned shall be submitted to the Authority.

M.13.4 Floors in way of machinery beds shall support such beds and all floors should have arm lengths from the centreline of the vessel not less than three times the normal frame spacing.

M.13.5 Where practicable the moulding of the floor should be sufficient for the arms to cover and be fastened to the lower bilge stringers.

M.14 Floors in Web Framed Vessels

M.14.1 Floors in web framed vessels shall be sided at twice the single planking thickness shown on Table M.11 and shall be fitted between web frames at not more than 450 mm centres.

M.14.2 Floors connecting web frames across the top of the hog and keel may be equal in siding to the frame being connected except in way of engine rooms where their siding shall be equal to that of the intermediate floors fitted between the web frames.

M.14.3 Where practicable, floors should be of sufficient depth to connect with and be through fastened to the lower bilge stringers.

M.15 Longitudinal Members

M.15.1 Stringers

- (a) The scantlings of bilge stringers and the number of stringers on each side of the hull shall be determined from Table M.9.
- (b) Stringers may be laminated. Each lamination should be not less than 12 mm in thickness and end joints in laminations shall be at least 9 frame spaces apart.
- (c) Stringers, if not in one length, may be scarphed or lapped. Where a scarph is fitted, its length shall be not less than 6 times the dimension of the face or edge scarphed and it shall be through bolted. (Refer to M.15.4(b)). Where a lapped stringer arrangement is used, the length of overlap, side by side, shall be not less than 9 frame spaces (10 frames).
- (d) In 'wet well' vessels stringer details shall be specially considered.

M.15.2 Sheer Clamps

- (a) The recommended scantlings for sheer clamps are given in Table M.10. However, the siding should be not less than 1.5 times hull plank thickness and moulding generally not less than 2 times tabular moulding of deck beam ends given on Table M.12.
- (b) Sheer clamps, if not in one length, may be scarphed and such scarphs shall be not less in length than 6 times the moulding of the sheer clamp fitted, and be edge bolted.

M.15.3 Beam Shelf

The beam shelf scantlings are given in Table M.10.

M.15.4 Fitting of Longitudinal Members

- (a) Beyond 0.6 L amidships the scantlings of stringers, sheer clamps and beam shelves may be reduced by a uniform taper of both moulding and siding by up to 20 per cent of the cross sectional area shown in the Tables.
- (b) Scarphs in stringers, sheer clamps, beam shelves etc., may not be closer than three times the length of the scarph, measured between the closest extremities of the scarphs considered. Scarphs are not permitted in way of bulkheads, web frames or masts, or in line with keel scarphs. The scarph in a sheer clamp shall not be closer to the butt in a sheer strake than 6 times frame spacing used.
- (c) Sheer clamps and beam shelves in way of raised forecastle decks shall have similar scantlings to those given in Table M.10.
- (d) Bilge stringers and sheer clamps shall be connected to the stem and transom by a grown knee, suitable chock or bracket.
- (e) Breasthooks of grown timber, chocks of straight grain or brackets are to be fitted at the forward end of the hull between the stem and:
 - (i) Sheer clamp; and
 - (ii) Every stringer.
- (f) Grown knees, solid chocks or brackets are required to be fitted between the transom and:
 - (i) Sheer clamp;
 - (ii) Every stringer; and
 - (iii) Hog.
- (g) The siding of the breasthooks, chocks and knees required for M.15.4 (e) and M.15.4 (f) shall be not less than the least dimension of the section of the members being connected. The length of the arms should be not less than 6 x the siding of the knee or connection being used. Bracket scantlings should be specified on plans submitted for approval.

M.16 Hull Planking

M.16.1 Timber

- (a) The scantling of the hull planking shall be as shown in Table M.11 and associated notes. No plank in a bent frame system shall have a length in metres less than the actual frame spacing in millimetres divided by 80, except from the transom to the next butt forward when the plank length may be reduced subject to approval by the Authority.

- (b) In longitudinally planked web frame systems the minimum length of any plank shall be determined using the method given in M.16.1 (a) and by assuming the frame spacing required for a bent frame vessel of the same length.
- (c) No butts are to be nearer than 1500 mm to each other unless there is a passing strake between when a distance of 1200 mm will be allowed.
- (d) No butts shall be in the same transverse plane unless there are three passing strakes between.
- (e) Butts in garboard strakes shall be clear of keel and hog scarpns (See M.15.4 (b) re sheer clamp).
- (f) Longitudinally planked vessels shall have butt blocks fitted close between frames adjacent to the butt, having a thickness equal to that of the hull planking and a width of overlap on the adjacent strakes of planking by an amount equal to half the thickness of the butt block. The grain of the butt blocks shall run in the longitudinal direction.
- (g) The butts in hull planking shall not be positioned on frames except where the Authority is satisfied that by virtue of frame siding and spacing, and in consideration of the number of fastenings related to the frame scantlings, butts on frames may be permitted.
- (h) Any opening made in the hull planking having a diameter greater than one third of the plank width shall be fitted with an internal doubling or compensator strake in the same manner described in M.16.1 (f). Where more than one plank is cut special consideration will be required by the Authority.
- (i) The width of any strake of hull planking shall not be less than 2 times tabular plank thickness, nor greater than 4 times tabular plank thickness for the 3 strakes in way of the turn of the bilge at amidships, except in edge glued or cold moulded construction in which case the plank widths shall be subject to the approval of the Authority.

M.17 Decks

M.17.1 Deck Beams

- (a) Scantlings of ordinary deck beams are not to be less than those determined from Table M.12. and associated notes.
- (b) The scantling tables for deck beams indicate the size of the beam at the centreline of the hull. The moulding at beam ends may be 50 per cent of that at the centreline but in any case shall be not less than the siding of the beam.
- (c) Hatch end beams and carlings are to be sided 30 per cent in excess of the tabular siding for ordinary deck beams where two or more ordinary deck beams are cut.
- (d) Carlings shall have sidings equivalent to deck beams at the ends of deck openings, whilst the moulding shall be equal to that of the deck beam to which the carling is attached.
- (e) Tie bolts of diameters determined from Table M.26 shall be fitted at side decks between the carlings and sheer clamp where:
 - (i) the length of deck opening exceeds 1.80 metres;
 - (ii) the width of such opening exceeds Beam ;
 - (iii) 3 or more normal deck beams are cut; or
 - (iv) otherwise as required by the Authority.
- (f) Where beams are fitted in association with a suitable arrangement of pillars and fore and aft girders the length of beam to be used for Table M.12 shall be the distance between girders or the girder and the side of the vessel.
- (g) Strong beams, or equivalent strengthening, shall be fitted in way of winches, masts and other places where the deck is required to withstand concentrated or above normal loadings. Hanging knees or brackets shall be fitted at the ends of all such beams.
- (h) Lodging knees or brackets shall be fitted at the ends of all main deck beams or beams providing stiffening as described in M.17.1 (g) and also at the corners of deck openings between the carlings and main beams where such openings come within the scope of M.17.1 (e).
- (i) In no case should a notch or housing on the upper side of a deck beam exceed the scantling thickness of plywood decking when derived from Table M.13.
- (j) In no case should a notch on the under side at the end of deck beams exceed 1/5 of the beam moulding (or depth) at the ends.

M.17.2 Deck Planking

- (a) Deck planking thickness shall be as obtained from Table M.13 and generally having a siding of not more than twice this thickness. Cover boards and king planks shall be sided at least 1.5 times plank siding, while deck ends are to be jogged into cover boards.
- (b) A shift of butts similar to that required for hull planking in M.16.1 (c) and M.16.1 (d) should be obtained.
- (c) In the case of deck openings referred to in M.17.1 (e) (i) and (ii) the Authority may require additional stiffening and/or increased deck frame scantlings to be incorporated.

M.17.3 Hanging and Lodging Knees

- (a) Hanging knees are to be fitted in the following positions:
 - (i) at the ends of all deck beams in way of the deck openings described in M.17.1 (e);
 - (ii) at the ends of strong beams as described in M.17.1 (g); and
 - (iii) at the ends of other beams as may be required by the Authority.
- (b) Hanging knees may be of grown or laminated timber, or fabricated brackets, and the arms shall be not less in length than 3 times the centreline depth of the beam shown in Table M.12. The throat moulding of grown timber knees shall be 40 per cent of the arm length.
- (c) The arms of hanging knees are to be fastened to the deck beams and hull frames with at least 3 bolts of the diameter shown on Table M.26 in each arm. Such fastenings need not pass through decking or planking.
- (d) Lodging knees are required to be fitted in the following positions:
 - (i) at the ends of all deck beams in way of the deck openings described in M.17.1 (c) and (e); and
 - (ii) at the ends of carlings in way of deck openings described in M.17.1 (h).
- (e) The proportions and fastening of lodging knees shall be as for hanging knees and described in M.17.3 (b) and (c) and Table M.26, respectively.

M.18 Watertight Bulkheads

M.18.1 General

M.18.1.1 Every vessel shall be provided with watertight bulkheads as required by Sub-sections C and D of the Construction Section.

M.18.1.2 Watertight bulkheads may be constructed of timber or steel. Other materials shall be subject to special consideration by the Authority.

M.18.1.3 Watertight bulkheads shall be pierced to the least possible extent, and where they are pierced proper steps shall be taken to maintain their watertight integrity.

M.18.1.4 Any access openings in watertight bulkheads that may be permitted by the Authority shall comply with the requirements of clauses C.66, D.7 and D.8 of the Construction Section. Where stiffeners are cut in way of water-tight doors, the openings are to be framed and bracketed to maintain the full strength of the bulkhead.

M.18.2 Timber Bulkheads

M.18.2.1 Timber bulkheads shall be constructed to the scantlings shown in Table M.25. Such bulkheads shall have vertical stiffeners fastened into the grounds and to the deck beams.

M.18.2.2 Bulkheads shall be fitted on substantial timber grounds, or as may be permitted under M.18.2.3. The timber grounds shall be bedded into a non-setting mastic or other material approved for this purpose and be through fastened to the hull planking.

M.18.2.3 The planking on timber bulkheads may be fitted either into rabbets or on to the face of the bulkhead grounds. It may also be fastened to the face of deep or web frames where such frames are fitted and fastened to the hull planking and are not less in size than the scantlings shown in Table M.7 for web frames.

M.18.2.4 Planked bulkheads shall be laid diagonally with two equal thicknesses having a material acceptable to the Authority between these layers.