

16      *Section 5 Sub-section M*

**M.36 Watertight Bulkheads**

M.36.1 The construction of bulkheads shall be determined in accordance with M.18. and the scantlings for timber bulkheads are to be as shown in Table M.25.

**M.37 Pillars**

M.37.1 The scantlings of pillars shall be determined in accordance with M.19 and Table M.14.

**M.38 Engine Seatings**

M.38.1 The installation of engine seatings shall be in accordance with M.20.

**M.39 Deckhouses**

M.39.1 Plywood deckhouses are to have scantlings determined from Table M.15 and associated notes.

M.39.2 Deckhouse framing shall be substantially fastened to the deck framing by through-bolting to carlings, coamings or deck beams.

**PART 4—SCANTLINGS FOR HARD CHINE PLYWOOD HULLS CONSTRUCTED ON A SYSTEM OF LONGITUDINAL FRAMES SUPPORTED BY WEB FRAMES**

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**PART 4—SCANTLINGS FOR HARD CHINE PLYWOOD HULLS CONSTRUCTED ON A SYSTEM OF LONGITUDINAL FRAMES SUPPORTED BY WEB FRAMES**

**M.40 Symbols and Units**

M.40.1 In developing scantlings the following symbols and units are used:

B = Maximum beam (metres)

D = Depth moulded (metres)

h = height to deck edge from

(i) mid span of the stiffener or frame, for calculation of stiffener or frame scantlings

(ii) the middle of the panel between effective stiffeners, for panel thickness

(iii) the centre of the longitudinal, for calculation of longitudinal scantlings (millimetres)

L = water line length (metres)

e = length of span of frames stiffeners or beams (millimetres)

P = bottom pressure; determined from Part II Displacement Hulls, or Part III Planing Hulls, of Design Loadings Sub-section, as appropriate (kilopascals)

S = spacing of stiffeners, frames, beams or floors, measured from centre to centre (millimetres)

t = thickness of panels (millimetres)

V = maximum speed (knots)

Z = modulus of section (millimetres<sup>3</sup>)

**M.41 Basis for Scantlings**

M.41.1

	<i>Plywood (MPa)</i>	<i>Timber (MPa)</i>
Working stress (bending) . . . . .	14.0	14.0
Working stress (tensile) . . . . .	11.0	11.0
Modulus of elasticity . . . . .	12500	12500

M.41.2

Where the plywood or timber has a greater bending strength than that given in sub-clause M.41.1, the thickness of plywood may be obtained from the formula:

$$t_2 = t_1 \sqrt{\frac{14}{\text{permissible working stress}}}$$

where:

$t_1$  = thickness calculated in accordance with this Part

$t_2$  = required thickness.

and the modulus of section of frames and stringers from the formula:

$$Z_2 = Z_1 \frac{14}{\text{permissible working strength}}$$

where:

$Z_1$  = modulus calculated in accordance with this Part

$Z_2$  = required modulus.

The permissible working stress is to be taken from Australian Standard 1720-1975. Rules for Use of Timber in Structures (SAA Timber Engineering Code).

**M.42 Hull Thickness**

M.42.1 Bottom Pressure

M.42.1.1 Bottom pressure is to be determined from Part II Displacement Hulls, or Part III Planing Hulls of the Design Loadings Sub-section, as appropriate.

M.42.1.2 Bottom pressure in any case should not be less than 3(L + 6) kPa.

M.42.1.3 Where the rise of floor is less than 12°, the bottom pressure will be specially considered.

M.42.2 Bottom Ply

M.42.2.1 The thickness of plywood from hog to chine is not to be less than the greater of

$$t = 0.018f (125 + P) \frac{S}{100}$$

$$t = 0.021 (160 + 50L + 6V)$$

Where  $f = f_1, f_2$  and  $f_1$  and  $f_2$  are defined in paragraphs M.42.2.2 and M.42.2.3 respectively

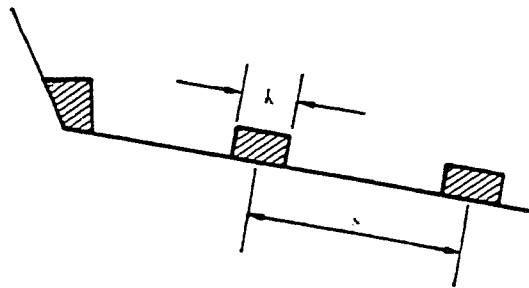
M.42.2.2 To correct for aspect ratio, where the aspect ratio of an unstiffened panel  $a/b$  (where  $a$  = length of longer side and  $b$  = length of shorter side) is less than 2, the calculated thickness may be multiplied by the factor  $f_1$ , where:

$$f_1 = 0.6 + 0.2 \frac{a}{b}$$

M.42.2.3 To correct for Breadth of frame, where the frame has a breadth K as shown below greater than  $K = 0.05S$ , the calculated thickness may be multiplied by the factor  $f_2$ , where:

$$f_2 = 1.1 - 2 \left( \frac{K}{S} \right)$$

In no case should  $f_2$  be taken as less than 0.7.



M.42.3 Side Ply

M.42.3.1 The loading P, illustrated below, should be used to determine the thickness of the side plywood where P is the bottom pressure determined from paragraph M.42.1.1 or paragraph M.42.1.2 as appropriate.

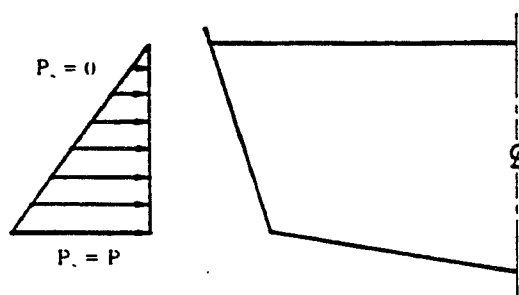
M.42.3.2 The pressure to be used is that applicable at the middle of the panel being considered.

M.42.3.3 The thickness of plywood from chine to deck at side is not to be less than the greater of:

$$t = 0.013 f (100 + P_1) \frac{S}{100} \text{ mm}$$

$$t = 0.021 (160 + 50L) \text{ mm}$$

Where  $f = f_1 f_2$  and  $f_1$  and  $f_2$  are as defined in paragraphs M.42.2.2 and M.42.2.3 respectively. In no case shall the thickness be less than 6 mm.



M.42.4 Transom

M.42.4.1 Transoms for carrying outboard engine or stern drive installations

M.42.4.1.1 The thickness of plywood is dependent on the engine power and is to be obtained as follows:

(a) outside the area of attachment of the outboard or stern drive installation, the thickness shall not be less than:

$$t = 0.041 (160 + 50L)$$

(b) in way of the area of attachment of the outboard or stern drive installation, the thickness should not be less than:

$$t = 0.041 (160 + 50L) + a$$

where a is obtained from the following table:

Total installed engine power kW	a. mm
less than 30 . . . . .	20
30 and over but less than 60 . . . . .	25
60 and over but less than 100 . . . . .	30
100 and over but less than 135 . . . . .	35
135 and over but less than 165 . . . . .	45
165 and over . . . . .	to be specially considered

M.42.4.1.2 A substantial knee shall be fitted—

- (a) in the case of an outboard installation, between the transom and the hog,
- (b) in the case of a stern drive installation, between the transom and the engine seatings.

M.42.4.2 Transom not carrying an outboard or stern drive installation

M.42.4.2.1 The thickness of plywood is to be determined from paragraph M.42.3.3.

M.42.5 Deck

M.42.5.1 The deck may be supported by transverse beams or by longitudinal stringers or battens in association with deep transverse beams. The deep transverse beams are to be aligned with the side web frames and shall be arranged at the end of deck openings, in the way of masts and posts and under heavy deck fittings. The thickness of the deck is to be increased by doubling pads at stressed corners of deck openings and under masts, posts, deck fittings and heavy loads.

M.42.5.2 The thickness of plywood in the deck of a vessel having length (L) less than or equal to 15 metres shall not be less than:

$$t = 0.036S$$

M.42.5.3 Subject to paragraph M.42.5.4 the thickness of plywood in the deck of a vessel having length (L) greater than 15 metres shall not be less than:

- (a) where the deck is supported by transverse beams

$$t = 0.001 (L + 33)S$$

- (b) where the deck is supported by longitudinals

$$t = 0.001 (L + 18)S$$

M.42.5.4 After applying corrections  $f_1$  and  $f_2$ , where appropriate the thickness of plywood in the deck of a vessel having length (L) greater than 15 metres shall in no case be less than

$$t = 2.1 (0.2L + 3)$$

M.42.6 Compensation for openings

M.42.6.1 Compensation is to be provided for openings in the side and bottom plywood having a diameter greater than 150mm.

M.42.7 Local Reinforcement

M.42.7.1 In the way of hawse pipes, windlasses, gallows, booms and winches, adequate means of protecting the side from the abrasion and impact of equipment lifted by such gallows, booms, winches, windlasses or derricks is to be provided.

M.42.7.2 Where the rise of floor of the bottom of the vessel in way of the propeller is less than 30° additional stiffening is required. Either the frame spacing should be decreased or the thickness of the bottom plywood increased by the following percentages.