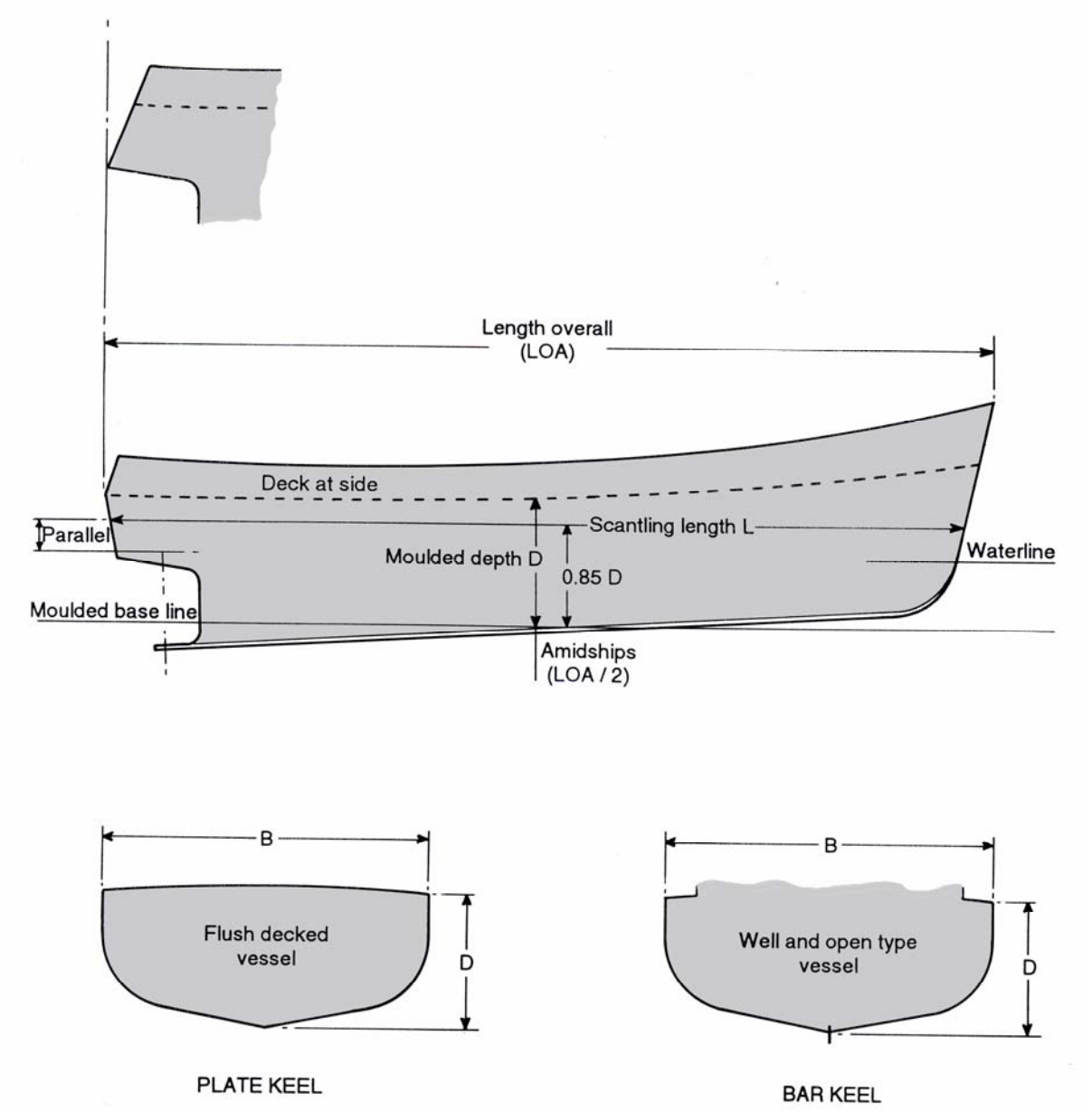
PART 6

SCANTLING AND EQUIPMENT TABLES (STEEL AND ALUMINIUM ALLOY)

SCANTLING AND EQUIPMENT TABLES (STEEL AND ALUMINIUM ALLOY)

Section 6.1 – Scantling numeral dimensions for steel mono-hull vessels



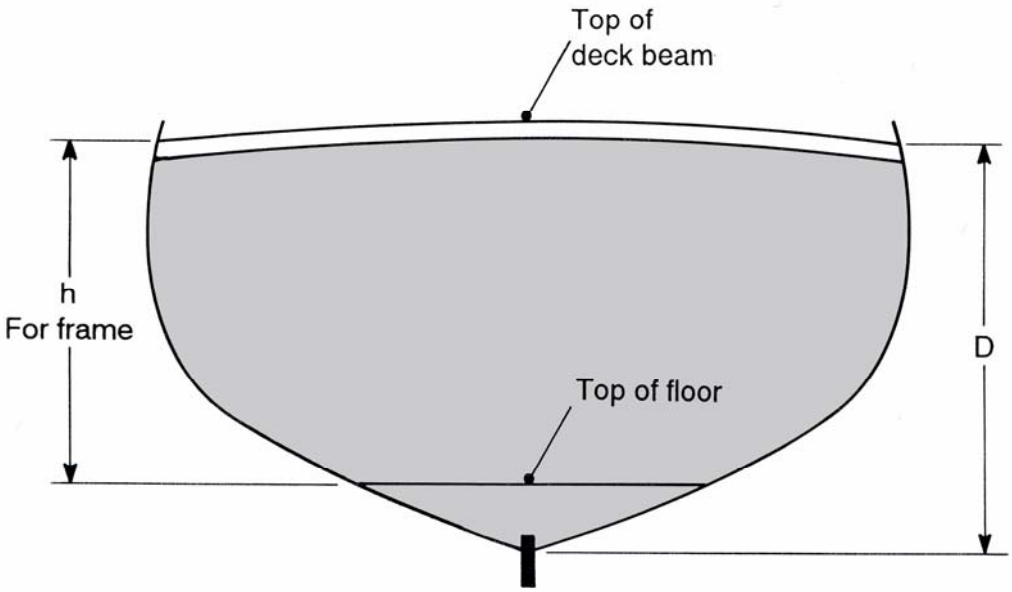
Length overall measured in a straight line from fore side of stem at top to after side of stern / transom.

Scantling length L measured in a straight line parallel to an assumed waterline at 0.85 x moulded depth, above top of keel amidships.

Breadth B measured to outside of plating at the greatest breadth of the vessel, but excluding fenders or rub rails.

Depth D measured amidships from top of plate keel or the line of intersection of the inside of the shell plating at keel to top of deck beam at side. (see fig.1a).

Section 6.1 – Scantling numeral dimensions for steel mono-hull vessels *(continued)*



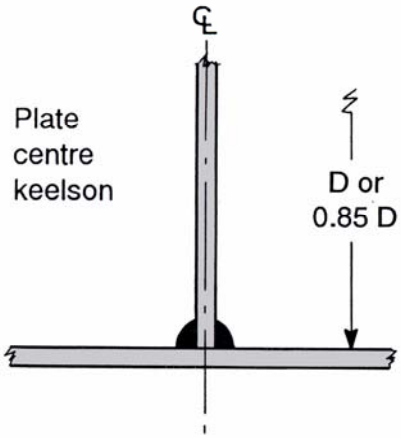
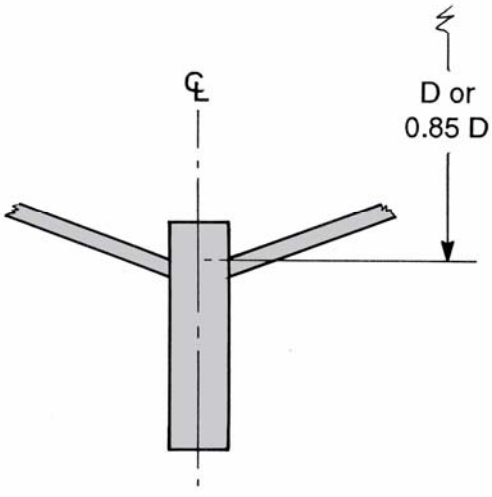


PLATE KEEL

Fig.1a



BAR KEEL

Section 6.2 – Keel and stem

Steel

Length L m	Bar		Plate		
	Keel mm	Stem mm	Keel		Stem mm
			Width mm	Thickness mm	
14	110 x 25	90 x 25	450	7	6
15	130 x 25	110 x 25	500	8	7
16	130 x 25	110 x 25	550	8	7
17	140 x 25	130 x 25	600	8	7
18	140 x 25	130 x 25	600	8	7
19	150 x 25	130 x 25	650	10	8
20	150 x 25	130 x 25	700	10	8
21	150 x 25	130 x 25	750	10	8
22	180 x 25	150 x 25	750	10	9
23	180 x 25	150 x 25	800	10	9
24	180 x 30	150 x 30	800	10	9
25	180 x 30	150 x 30	850	12	9
26	180 x 30	150 x 30	850	12	9

Aluminium alloy

Length L m	Bar		Plate		
	Keel mm	Stem mm	Keel		Stem mm
			Width mm	Thickness mm	
14	130 x 38.1	100 x 38.1	510	9.5	8
15	140 x 38.1	130 x 38.1	590	10	9
16	140 x 38.1	130 x 38.1	650	10	9
17	150 x 38.1	140 x 38.1	700	10	9
18	150 x 38.1	140 x 38.1	700	10	9
19	160 x 38.1	140 x 38.1	760	12.7	10
20	160 x 38.1	140 x 38.1	820	12.7	10
21	160 x 38.1	140 x 38.1	870	12.7	10
22	200 x 38.1	160 x 38.1	870	12.7	12
23	200 x 38.1	160 x 38.1	930	12.7	12
24	210 x 38.1	160 x 38.1	930	12.7	12
25	210 x 38.1	160 x 38.1	1000	15	12
26	210 x 38.1	160 x 38.1	1000	15	12

Refer to Notes on following page.

Section 6.2 – Keel and stem *(continued)*

Notes:-

1) Bar keels shall be continued to include the fore foot, and the reduction in scantling from the keel to the stem is to be tapered over a length of not less than 500mm.

2) Where stems are constructed of a combination of bar and plate, the bar stem may be continued at a reduced cross-section to the stem-head. The reduction in section is to be tapered as in Note (1) above.

3) The minimum widths of plate keels shown in the Table are at midships and may be tapered at ends to suit the stem plate or bar and stern skeg. Where it is intended to attach a box or ballast type keel to a plate keel, details are to be submitted for consideration.

4) Details of fabricated ballast and box type keels are to be submitted for consideration and approval prior to construction.

Section 6.3 – Stern frame

Steel

Length L m	Stern post		Stern bar		Sole piece
	Minimum sectional area cm^2	Minimum thickness mm	Minimum sectional area cm^2	Minimum thickness mm	Minimum sectional area cm^2
15	64	50	38	25	65
16	75	50	42	25	75
17	80	50	42	30	80
18	85	60	48	30	100
19	85	60	48	30	100
20	90	60	56	30	120
21	90	65	56	32	120
22	100	65	60	32	140
23	110	70	60	32	140
24	110	70	60	38	160
25	150	75	65	38	160
26	150	75	65	38	170

Aluminium alloy

Length L m	Stern post		Stern bar		Sole piece
	Minimum sectional area cm^2	Minimum thickness mm	Minimum sectional area cm^2	Minimum thickness mm	Minimum sectional area cm^2
15	109	63.5	65	38.1	111
16	128	63.5	72	38.1	128
17	136	63.5	72	38.1	136
18	145	76.2	82	38.1	170
19	145	76.2	82	38.1	170
20	153	76.2	96	38.1	204
21	153	80	96	40	204
22	170	80	102	40	238
23	187	90	102	40	238
24	187	90	102	50.8	272
25	255	101.6	111	50.8	272
26	255	101.6	111	50.8	289

Refer to Notes on following page.

Section 6.3 – Stern frame *(continued)*

Notes:-

1) The above scantlings relate to a stern frame supported by plating on both sides. Where a single plate skeg is fitted, the minimum sectional area and thickness of the stern post shall be increased by 50%.

2) The sole piece may be of solid square, rectangular or T section.

3) The stern frame shall be suitably radiused or bracketed where the stern post meets the sole piece.

4) The propeller boss is to have a finished thickness of metal around the bore of at least 30% of the propeller shaft diameter.

5) Solid round sections, where used, are to be of equivalent cross-sectional area to those shown in the Table.

Section 6.4 – Shell plating

Steel

Length L m	Shell thickness		
	General	Garboard bottom and bilge mm	Sheerstrake mm
15	7	7	7
16	7	7	7
17	7	7	7
18	7	8	7
19	7	8	7
20	7	8	7
21	8	8	8
22	8	8	8
23	8	9	8
24	8	9	9
25	8	9	9
26	8	9	9

Aluminium alloy

Length L m	Shell thickness		
	General	Garboard bottom and bilge mm	Sheerstrake mm
15	9.5	9.5	9.5
16	9.5	9.5	9.5
17	9.5	9.5	9.5
18	9.5	10	9.5
19	9.5	10	9.5
20	9.5	10	9.5
21	10	10	10
22	10	10	10
23	10	12	10
24	10	12	12
25	10	12	12
26	10	12	12

Refer to Notes on following page.

Section 6.4 – Shell plating *(continued)*

Notes:-

1) The plate thickness in the above Table is based on a transverse frame spacing of 500mm. Where the actual frame spacing differs, the thickness of the shell plating is to be increased at the rate of 0.25mm per 25mm of difference in the spacing, unless otherwise approved by the Surveyor.

2) The transom plating of stern fishing vessels is to be increased by a least 1mm above that required for the sheerstrake.

3) Side plating in way of gantries and gallows is to be increased by at least 1mm above Table value and locally reinforced to the Surveyor's satisfaction.

4) Plate thickness of box coolers and sea inlet boxes to be increased by 50% over the surrounding shell plate thickness.

5) Where plate thicknesses shown in the above Table are not available, the next higher available thickness should be utilised, or modulus calculations should be provided for approval of reduced thicknesses.

Section 6.5 – Transverse floors

Depth D m	Floors	Face bars mm
	Minimum depth at centreline and thickness mm	
1.5	200 x 5	45 x 5
1.75	230 x 5	50 x 5
2	250 x 6	50 x 6
2.25	280 x 6	50 x 6
2.5	310 x 7	50 x 8
2.75	340 x 7	65 x 8
3	380 x 7	75 x 8
3.25	400 x 8	75 x 8
3.5	440 x 8	75 x 8
3.75	470 x 8	80 x 8
4	500 x 8	80 x 8
4.25	525 x 8	100 x 8
4.5	550 x 8	100 x 8
4.75	575 x 8	100 x 8
5	600 x 10	100 x 10
5.25	625 x 10	100 x 10

Refer to Notes after aluminium table on following page.

Section 6.5 – Transverse floors (*continued*)

Aluminium alloy

Depth D m	Floors: Minimum depth at centreline and thickness mm	Face bars mm
1.5	230 x 6.4	63.5 x 6.4
1.75	265 x 6.4	63.5 x 6.4
2	275 x 8	63.5 x 9.5
2.25	310 x 8	63.5 x 9.5
2.5	355 x 9.5	63.5 x 9.5
2.75	375 x 9.5	101.6 x 9.5
3	425 x 9.5	101.6 x 9.5
3.25	450 x 10	101.6 x 12.7
3.5	495 x 10	101.6 x 12.7
3.75	535 x 10	101.6 x 12.7
4	570 x 10	101.6 x 12.7
4.25	550 x 12.7	101.6 x 12.7
4.5	570 x 12.7	101.6 x 12.7
4.75	600 x 12.7	101.6 x 12.7
5	625 x 15.9	101.6 x 15.9
5.25	650 x 15.9	101.6 x 15.9

Notes:-

1) For depths ‘D’ below 2m, flanged plate floors may be substituted for welded webs and face bars.

2) Where the floor spacing exceeds 500mm, the thickness of floors is to be increased by not less than 0.25mm per 25mm difference in spacing.

3) The depth of floor should be maintained over as great a distance fore and aft as is practicable.

4) For depth ‘D’ up to 3m, the thickness of plate floors in the engine room is to be increased by 1mm above the Table value, and for depth ‘D’ over 3m the floor thickness is to be increased by 20%. Face bars on such floors are to be increased in thickness to the same value.

5) Where the rise of the floor makes it necessary, the depth of the floors at the centreline is to be increased in order that the depth of floor 0.25 times the distance from the centreline to the outboard end of the floor is not less than 0.75 times the depth at the centreline.

6) The minimum height of floors in double bottom tanks is to be 650mm.

Section 6.6 – Centre and side girders

Length L m	Centre girder			Side girders	
	Thickness of girder mm	Face bar mm		Thickness mm	Face bar mm
	With plate keel	Flat bar	Channel		
15	8	130 x 8	75 x 51	6	60 x 6
17	8	130 x 8	102 x 51	7	75 x 8
19	8	130 x 8	127 x 64	7	75 x 8
20	8	130 x 8	127 x 64	7	75 x 8
24	10	130 x 10	152 x 76	8	100 x 8
26	10	130 x 10	152 x 76	8	100 x 8

Aluminium alloy

Length L m	Centre girder		Side girders	
	Thickness of girder mm	Face bar mm	Thickness mm	Face bar mm
	With plate keel	Flat bar		
15	10	152.4 x 12.7	8	63.5 x 9.5
17	10	152.4 x 12.7	9.5	101.6 x 9.5
19	10	152.4 x 12.7	9.5	101.6 x 9.5
20	10	152.4 x 12.7	9.5	101.6 x 9.5
24	12.7	152.4 x 12.7	10	127 x 12.7
26	12.7	152.4 x 12.7	10	127 x 12.7

Notes:-

1) The depth of the centre girder is to be a minimum of that of the floors at the centreline (see Table 6.5) for single bottoms. Minimum depth for double bottoms (intended as a tank) is to be not less than 650mm.

2) In the engine room, the vertical plates of the engine seats will be accepted as an alternative to the centre girder provided that the continuity of longitudinal strength is maintained by an overlap at the ends of the centre girder and the engine seats.

3) The thickness of the centre girder and the cross-section areas of the face bars are to be not less than that of the floors. If necessary the Table values for the centre girders shall be increased to meet this requirement.

4) The face bar may be formed of channel where required for draining purposes. The dimensions of the channel web are to be a minimum of that required for the equivalent face bar.

5) Where it is proposed to utilise the side plate of an internal box/ballast keel in lieu of the centre girder, the keel sides are to be to the minimum height required for the floor plate at centreline, with face bars as required by the Table, and of a thickness equal to the garboard strake or that required by the above Table whichever is the greater.

Section 6.7 – Transverse frames

Steel

Depth D in metres	Height h in metres: 1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75	4
2	50 x 50 x 6 80 x 8 FB (6) I/Y 16.7	60 x 50 x 6 90 x 8 FB (7) I/Y 20.2	Angle Flat Bar (Shell thickness) I/Y							
2.5	50 x 50 x 8 90 x 8 FB (7) I/Y 18.7	65 x 50 x 6 100 x 8 FB (7) I/Y 22.8	75 x 50 x 6 100 x 10 FB (7) I/Y 27.6	60 x 60 x 8 100 x 10 FB (8) I/Y 33.2						
3	60 x 50 x 6 90 x 8 FB (7) I/Y 20.6	60 x 50 x 6 100 x 8 FB (7) I/Y 25.2	75 x 50 x 6 100 x 10 FB (7) I/Y 30.6	75 x 50 x 8 110 x 10 FB (8) I/Y 36.8	70 x 70 x 8 120 x 10 FB (8) I/Y 43.8	75 x 75 x 8 120 x 12 FB (8) I/Y 51.6				
3.5	65 x 50 x 6 100 x 8 FB (7) I/Y 22.4	75 x 50 x 6 100 x 10 FB (7) I/Y 27.6	60 x 60 x 8 100 x 10 FB (8) I/Y 33.4	75 x 75 x 6 110 x 10 FB (8) I/Y 40.2	80 x 60 x 8 110 x 12 FB (8) I/Y 48.0	100 x 50 x 8 120 x 12 FB (8) I/Y 56.4	100 x 65 x 8 130 x 12 FB (8) I/Y 65.0	100 x 75 x 8 140 x 12 FB (8) I/Y 74.0		
4	65 x 50 x 6 100 x 8 FB (8) I/Y 24.2	75 x 50 x 6 100 x 10 FB (8) I/Y 29.8	80 x 60 x 6 110 x 10 FB (8) I/Y 36.0	80 x 60 x 8 120 x 10 FB (8) I/Y 43.4	75 x 75 x 8 130 x 12 FB (8) I/y 51.1	100 x 65 x 7 130 x 12 FB (8) I/Y 60.7	100 x 65 x 8 140 x 12 FB (8) I/Y 69.0	100 x 65 x 10 150 x 12 FB (8) I/Y 79.6	100 x 75 x 10 150 x 15 FB (8) I/Y 89.6	125 x 75 x 8 150 x 15 FB (8) I/Y 100.1
4.5	65 x 50 x 6 100 x 8 FB (8) I/Y 25.9	60 x 60 x 8 100 x 10 FB (8) I/Y 32.0	75 x 50 x 8 110 x 10 FB (8) I/Y 38.4	80 x 60 x 8 120 x 10 FB (8) I/Y 46.5	100 x 50 x 8 120 x 12 FB (8) I/Y 55.6	100 x 65 x 8 130 x 12 FB (8) I/Y 64.8	100 x 75 x 8 140 x 12 FB (8) I/Y 74.6	100 x 100 x 8 150 x 12 FB (8) I/Y 84.6	100 x 100 x 8 150 x 15 FB (8) I/Y 95.2	125 x 75 x 8 150 x 15 FB (8) I/Y 103.2

Refer to Notes after aluminium table on following page

Section 6.7 – Transverse frames *(continued)*

Aluminium alloy

Depth D in metres	Height h in metres								
	1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75	4
2	76.2 x 50.8 x 6.4 101.6 x 9.5 FB (8) I/Y 28.4	76.2 x 50.8 x 6.4 88.9 x 12.7 FB (9.5) I/Y 34.4	Angle Flat Bar (Shell thickness) I/Y							
2.5	76.2 x 50.8 x 6.4 101.6 x 9.5 FB (9.5) I/Y 31.8	76.2 x 76.2 x 6.4 101.6 x 12.7 FB (9.5) I/Y 38.8	101.6 x 50.8 x 6.4 101.6 x 15.9 FB (9.5) I/Y 47.0	101.6 x 76.2 x 6.4 - (10) I/Y 56.5						
3	76.2 x 76.2 x 6.4 88.9 x 12.7 FB (9.5) I/Y 35.1	76.2 x 76.2 x 6.4 101.6 x 12.7 FB (9.5) I/Y 42.9	101.6 x 76.2 x 6.4 101.6 x 15.9 FB (9.5) I/Y 52.1	101.6 x 76.2 x 6.4 - (10) I/Y 62.6	101.6 x101.6 x 6.4 - (10) I/Y 74.5	88.9 x 88.9 x 9.5 - (10) I/Y 87.8				
3.5	76.2 x 76.2 x 6.4 101.6 x 12.7 FB (9.5) I/Y 38.1	101.6 x 50.8 x 6.4 101.6 x 15.9 FB (9.5) I/Y 47.0	101.6 x 76.2 x 6.4 - (10) I/Y 56.8	101.6 x101.6 x 6.4 - (10) I/Y 68.4	101.6 x101.6 x 6.4 - (10) I/Y 81.6	101.6 x101.6 x 9.5 - (10) I/Y 95.9	101.6 x101.6 x 9.5 - (10) I/Y 110.5	152.4 x 76.2 x 9.5 - (10) I/Y 125.8		
4	76.2 x 76.2 x 6.4 - (10) I/Y 41.2	101.6 x 50.8 x 6.4 - (10) I/Y 50.7	101.6 x 76.2 x 6.4 - (10) I/Y 61.2	101.6 x101.6 x 6.4 - (10) I/Y 73.8	88.9 x 88.9 x 9.5 - (10) I/Y 86.9	101.6 x101.6 x 9.5 - (10) I/Y 103.2	152.4 x 76.2 x 9.5 - (10) I/Y 117.3	152.4 x 76.2 x 9.5 - (10) I/Y 135.4	152.4 x 76.2 x 9.5 - (10) I/Y 152.4	152.4 x152.4 x12.7 - (10) I/Y 170.2
4.5	76.2 x 76.2 x 6.4 - (10) I/Y 44.1	101.6 x 76.2 x 6.4 - (10) I/Y 54.4	101.6 x 76.2 x 6.4 - (10) I/Y 65.3	101.6 x101.6 x 6.4 - (10) I/Y 79.1	101.6 x101.6 x 9.5 - (10) I/Y 94.6	101.6 x101.6 x 9.5 - (10) I/Y 110.2	152.4 x 76.2 x 9.5 - (10) I/Y 126.9	152.4 x 76.2 x 9.5 - (10) I/Y 143.9	152.4 x 76.2 x 9.5 - (10) I/Y 161.9	152.4 x152.4 x12.7 - (10) I/Y 175.5

Refer to Notes on following page.

Section 6.7 – Transverse frames *(continued)*

Notes:-

1) Sections stated are those stock sizes produced equivalent to or greater than the section moduli given, and the section sizes in the Table may be varied provided the relevant section modulus is not reduced.

2) Section dimensions are in mm and section moduli are in cm^3.

3) The section moduli are calculated with attached shell plating of thicknesses given in brackets immediately following the section dimension and a frame spacing of 500mm. Where the actual spacing is varied, the section modulus is to be increased or decreased in direct proportion, but in no circumstances should the frame spacing exceed 650mm.

4) Height 'h' in the Table is vertical depth of the frame measured from the top of the frame floor or inner bottom to the top of the deck beam at side as shown in Figure 6.1.

5) At the ends of the vessel where panel size may increase with shape, the strength is to be maintained by the introduction of additional stiffeners or by an increase in frame scantlings as per Note (3).

Section 6.8 – Deck beams

Steel

Breadth B	Section modulus (cm^3)	Suggested section (mm)	
		Angle	Flat bar
4.5	14.3	50 x 40 x 6	75 x 8
5	17	50 x 50 x 6	80 x 8
5.5	20.5	65 x 50 x 6	90 x 8
6	24.5	65 x 50 x 6	100 x 8
6.5	29	75 x 50 x 6	100 x 10
7	34	75 x 60 x 6	100 x 12
7.5	38	75 x 65 x 6	100 x 12
8	42.5	70 x 70 x 8	-
8.5	48	80 x 60 x 8	-
9	55	80 x 80 x 7	-
9.5	60	80 x 80 x 8	-
10	67	80 x 80 x 9	-

Aluminium alloy

Breadth B	Section modulus (cm^3)	Suggested section (mm)	
		Angle	Flat bar
4.5	24.4	63.5 x 50.8 x 6.4	101.6 x 9.5
5	28.9	76.2 x 50.8 x 6.4	101.6 x 9.5
5.5	34.9	76.2 x 76.2 x 6.4	101.6 x 12.7
6	41.7	76.2 x 76.2 x 6.4	101.6 x 12.7
6.5	49.3	101.6 x 76.2 x 6.4	-
7	57.8	101.6 x 76.2 x 6.4	-
7.5	64.6	101.6 x 101.6 x 6.4	-
8	72.3	101.6 x 101.6 x 6.4	-
8.5	81.6	88.9 x 88.9 x 9.5	-
9	93.5	101.6 x 101.6 x 9.5	-
9.5	102	101.6 x 101.6 x 9.5	-
10	113.9	152.4 x 76.2 x 9.5	-

Refer to Notes on following page.

Section 6.8 – Deck beams *(continued)*

Notes:-

1) Deck beams shall be fitted at every frame and should be connected to the frames by brackets in accordance with Part 7, Figure 7.1.

2) Deck beams are to be fitted in association with longitudinal deck girders and, where necessary, pillars (see Tables 6.9 and 6.19).

3) The dimensions of the sections given in the Table may be modified to suit stock sizes provided the section modulus is not reduced.

4) The Table section moduli are based on a spacing of 500mm. Where the spacing is varied, the moduli is to be increased in direct proportion.

Section 6.9 – Deck girders

Steel

Breadth B m	Girder span m					
	2	2.25	2.5	2.75	3	3.25	3.5
5	100 x 75 x 8 I/Y 71	100 x 65 x 10 I/Y 78	137 x 102 x 6 I/Y 87	137 x 102 x 6 I/Y 102	137 x 102 x 6 I/Y 107	150 x 75 x 8 I/Y 123	137 x 102 x 8 I/Y 138
6	100 x 75 x 8 I/Y 82	100 x 75 x 10 I/Y 87	130 x 65 x 8 I/Y 95	125 x 75 x 10 I/Y 115	150 x 75 x 8 I/Y 123	137 x 102 x 8 I/Y 138	150 x 75 x 10 I/Y 148
7	100x75x10 I/Y 82	130 x 65 x 8 I/Y 94	137 x 102 x 6 I/Y 107	150 x 75 x 8 I/Y 121	137 x 102 x 8 I/Y 138	150 x 75 x 10 I/Y 148	150 x 90 x 10 I/Y 173
8	100 x 75 x 10 I/Y 88	137 x 102 x 6 I/Y 102	125 x 75 x 10 I/Y 115	137 x 102 x 8 I/Y 134	150 x 75 x 10 I/Y 145	150 x 90 x 10 I/Y 172	150 x 100 x 10 I/Y 190
8.5	130 x 65 x 8 I/Y 93	137 x 102 x 6 I/Y 107	150 x 75 x 8 I/Y 121	137 x 102 x 8 I/Y 137	150 x 75 x 10 I/Y 157	150 x 90 x 10 I/Y 177	150 x 90 x 12 I/Y 200
9	137 x 102 x 7 I/Y 107	150 x 75 x 8	150 x 75 x 8	150 x 75 x 10	150 x 90 x 10	150 x 90 x 12	180 x 90 x 10
9.5	137 x 102 x 6	150 x 75 x 8	137 x 102 x 8	150 x 75 x 10	150 x 90 x 10	180 x 90 x 10	180 x 90 x 10
10	150 x 75 x 8	137 x 102 x 8	150 x 75 x 10	150 x 90 x 10	180 x 90 x 10	180 x 90 x 12	180 x 90 x 12

Refer to Notes after aluminium table on following page.

Section 6.9 – Deck girders *(continued)*

Aluminium alloy

Breadth B m	Girder span m						
	2	2.25	2.5	2.75	3	3.25	3.5
5	152.4 x 76.2 x 9.5 I/Y 120.7	152.4 x 76.2 x 9.5 I/Y 132.6	152.4 x 76.2 x 9.5 I/Y 147.9	200 x 100 x 9.5 I/Y 173.4	200 x 100 x 9.5 I/Y 181.9	200 x 100 x 9.5 I/Y 209.1	200 x 100 x 9.5 I/Y 234.6
6	152.4 x 76.2 x 9.5 I/Y 139.4	152.4 x 76.2 x 9.5 I/Y 147.9	200 x 100 x 9.5 I/Y 161.5	200 x 100 x 9.5 I/Y 195.5	200 x 100 x 9.5 I/Y 209.1	200 x 100 x 9.5 I/Y 234.6	200 x 100 x 9.5 I/Y 251.6
7	152.4 x 76.2 x 9.5 I/Y 139.4	200 x 100 x 9.5 I/Y 159.8	200 x 100 x 9.5 I/Y 181.9	200 x 100 x 9.5 I/Y 205.7	200 x 100 x 9.5 I/Y 234.6	200 x 100 x 9.5 I/Y 251.6	250 x 100 x 9.5 I/Y 294.1
8	152.4 x 76.2 x 9.5 I/Y 149.6	200 x 100 x 9.5 I/Y 173.4	200 x 100 x 9.5 I/Y 195.5	200 x 100 x 9.5 I/Y 227.8	200 x 100 x 9.5 I/Y 246.5	250 x 100 x 9.5 I/Y 292.4	250 x 100 x 9.5 I/Y 323
8.5	152.4 x 76.2 x 9.5 I/Y 158.1	200 x 100 x 9.5 I/Y 181.9	200 x 100 x 9.5 I/Y 205.7	200 x 100 x 9.5 I/Y 232.9	200 x 100 x 9.5 I/Y 266.9	250 x 100 x 9.5 I/Y 300.9	250 x 100 x 9.5 I/Y 340
9	200 x 100 x 9.5 I/Y 181.9	200 x 100 x 9.5	200 x 100 x 9.5	200 x 100 x 9.5	200 x 100 x 9.5	250 x 100 x 9.5	250 x 100 x 12
9.5	200 x 100 x 9.5	200 x 100 x 9.5	200 x 100 x 9.5	200 x 100 x 9.5	250 x 100 x 9.5	250 x 100 x 12	250 x 100 x 12
10	200 x 100 x 9.5	200 x 100 x 9.5	200 x 100 x 9.5	250 x 100 x 9.5	250 x 100 x 12	250 x 100 x 12	250 x 100 x 12

Refer to Notes on following page.

Section 6.9 – Deck girders *(continued)*

Notes:-

1) Girders are to be generally fitted on the centreline, but consideration will be given to the fitting of a girder each side of the centreline, which may be of reduced section.

2) The unsupported span of girders should not exceed 3.5m.

3) The Table moduli are based on a beam spacing of 500mm. Where the beam spacing is varied, the section modulus of the girder is to be varied in direct proportion.

4) The sections in the Table may be varied or replaced by a fabricated girder provided that the section modulus is not reduced, and provided that the thickness of the girder is not less than that of the deck beams.

5) Where the girder web is notched over the deck beams, the depth of the girder web should be not less than twice that of the beams, excepting where the notch is filled by a fully welded closing plate. Girders fitted in association with flat bar beams should be welded to the beams.

6) For continuity, longitudinal strength girders are to be fitted with brackets at the transom and bulkheads. The depth and length of the brackets are to be as shown in Section 7.2.

7) For intermediate breadths not given in the Table, the nearest breadth is to apply. Above table is based on RSS (Rolled Steel Section). Fabricated sections are to be of equivalent modulus.

Section 6.10 – Watertight bulkheads

Steel

Depth of bulkhead at centreline m	Thickness of plating mm	Section modulus of stiffeners (I/Y cm^3)	Stiffener sections meeting modulus required	
			Angle mm	Flat bar mm
1	5	4.4	-	50 x 5
1.25	5	6.2	-	60 x 5
1.5	5	7.5	-	60 x 6
1.75	5	9.1	40 x 40 x 5	70 x 6
2	6	12	45 x 45 x 5	70 x 8
2.25	6	15	50 x 40 x 6	75 x 8
2.5	6	17.7	50 x 50 x 6	75 x 10
2.75	6	21.3	65 x 50 x 5	80 x 10
3	6.5	26	60 x 60 x 6	90 x 10
3.25	6.5	30.6	75 x 50 x 6	100 x 10
3.5	6.5	35	70 x 70 x 6	100 x 12
3.75	6.5	41	75 x 75 x 6	110 x 12
4	8	48	80 x 60 x 8	110 x 12
4.25	8	54.4	80 x 80 x 8	-
4.5	8	59.6	80 x 80 x 8	-
4.75	8	61.5	80 x 80 x 8	-
5	8	63.5	80 x 80 x 8	-
5.25	8	67.5	80 x 80 x 9	-

Refer to Notes after aluminium table on following page.

Section 6.10 – Watertight bulkheads *(continued)*

Aluminium alloy

Depth of bulkhead at centreline m	Thickness of plating mm	Section modulus of stiffeners (I/Y cm^3)	Stiffener sections meeting modulus required	
			Angle mm	Flat bar mm
1	6.4	7.5	-	63.5 x 6.4
1.25	6.4	10.6	-	76.2 x 6.4
1.5	6.4	12.8	44.5 x 44.5 x 6.4	76.2 x 6.4
1.75	6.4	15.5	50.8 x 50.8 x 6.4	76.2 x 9.5
2	8	20.4	63.5 x 38.1 x 6.4	76.2 x 12.7
2.25	8	25.5	76.2 x 50.8 x 6.4	76.2 x 12.7
2.5	8	30.1	76.2 x 50.8 x 6.4	101.6 x 9.5
2.75	8	36.3	76.2 x 76.2 x 6.4	101.6 x 12.7
3	8	44.2	76.2 x 76.2 x 6.4	127 x 12.7
3.25	8	52.1	101.6 x 76.2 x 6.4	127 x 12.7
3.5	8	59.5	101.6 x 76.2 x 6.4	127 x 12.7
3.75	8	69.7	101.6 x 101.6 x 6.4	152.4 x 12.7
4	10	81.6	101.6 x 101.6 x 6.4	152.4 x 12.7
4.25	10	92.5	101.6 x 101.6 x 9.5	152.4 x 12.7
4.5	10	101.4	101.6 x 101.6 x 9.5	-
4.75	10	104.6	101.6 x 101.6 x 9.5	-
5	10	108	101.6 x 101.6 x 9.5	-
5.25	10	114.8	101.6 x 101.6 x 9.5	-

Notes:-

1) Watertight bulkheads are to extend from the keel to the lowest continuous deck except for the collision bulkhead, which is to extend to the underside of the freeboard deck (see Section 3.9.)

2) The moduli of stiffeners in the Table are based on a stiffener spacing of 500mm. If the spacing is varied, the modulus is to be varied in direct proportion.

3) The stiffener sections given in the Table may be varied provided the section moduli are not reduced.

4) Where the depth of the bulkhead at any stiffener is less than 2.5m, brackets or other end connections may be omitted. Bracket or other approved end connections should be fitted at the top and bottom of stiffeners where the depth of the bulkhead locally is 2.5m or more. Regardless of the depth of the bulkhead, stiffeners should always be connected to deck girders by flanged brackets and the stiffeners of bulkheads so spaced as to make this possible.

5) For details of bracket connections see Part 7, Figure 7.2.

6) The thickness of bulkhead plating, in way of bilge wells and slush wells, is to be increased by 2mm above the Table value, but need not be increased beyond the thickness of the outer bottom plating locally.

7) The thickness of collision bulkhead plating is to be increased by 1mm above the Table value, and the modulus of the stiffeners should be increased by not less than 25% above the Table value.

Section 6.11 – Bulwark plating and stays

Steel

Length L m	Thickness of bulwark plating mm		I/Y of bulwark rail cm^3		
	In way of gallows and transom	Elsewhere	Height of fixed plate bulwarks mm		
			600	750	1000
15	8	6	16.8	26.5	49
18	8	6.5	16.8	26.5	49
21	8	6.5	16.8	26.5	49
26	10	7	16.8	26.5	49

Aluminium alloy

Length L m	Thickness of bulwark plating mm		I/Y of bulwark rail cm^3		
	In way of gallows and transom	Elsewhere	Height of fixed plate bulwarks mm		
			600	750	1000
15	10	8	28.6	45.1	83.3
18	10	8	28.6	45.1	83.3
21	10	8	28.6	45.1	83.3
26	12.7	9.5	28.6	45.1	83.3

Notes:-

1) Where stays consist of a flanged flat plate, the flanged width should be not less than 50mm and the plate thickness not less than that of the bulwark plating locally.

2) Only the section of the bulwark stay that is welded to the deck is to be used when determining the modulus of the stay.

3) Where length 'L' is between those shown in the Table, the thickness is to be that shown for the nearest length.

4) Where the shell plating is extended to bulwark height, the bulwark thickness may be that required for the shell plating except in way of gallows, subject to the approval of the Surveyor.

5) Stays are to be fitted at each frame if shelter fitted.

6) Stays should be spaced at alternate frames in way of open bulwarks.

7) Stays are to be continuously welded with a sealing run to prevent corrosion.

8) Slots should be cut out of stay at deck for drainage scallops.

9) Stays should be fitted at every frame space at hauling position.

Section 6.12 – Chine bars

Steel

Length L m	Diameter mm
14	32
17	40
20	45
23	50
26	55

Aluminium alloy

Length L m	Diameter mm
14	41.3
17	50.8
20	54
23	60.3
26	66.7

Notes:-

1) When the length 'L' falls between those given in the Table, the diameter of the bars is to be to the next higher length.

2) Diameters shown are for solid round section. Proposals for the use of alternative sections are to be submitted for consideration and approval, provided they are of solid section.

Section 6.13 – Shelter deck beams (steel)

Breadth B	(Modulus cm^3) - recommended scantling			Frame spacing mm
	Full shelter		Partial shelter	
	Weathertight (WT)	Non-weathertight		
4	(7.4) 65 x 6 FB	(5.9) 65 x 5 FB	(4.4) 50 x 5 FB	500
4.5	(8.3) 65 x 6 FB	(6.6) 65 x 5 FB	(4.9) 50 x 6 FB	500
5	(9.2) 75 x 6 FB	(7.4) 65 x 6 FB	(5.5) 65 x 5 FB	500
5.5	(10.1) 75 x 6 FB	(8.2) 65 x 6 FB	(6) 65 x 5 FB	500
6	(13.2) 75 x 10 FB	(10.5) 75 x 6 FB	(7.9) 65 x 6 FB	500
6.5	(17.5) 75 x 10 FB	(14) 75 x 10 FB	(10.5) 75 x 6 FB	500
7	(21.8) 65 x 50 x 6 IA	(17.5) 75 x 10 FB	(13) 75 x 10 FB	500
7.5	(26.8) 65 x 50 x 6 IA	(21.5) 65 x 50 x 6 IA	(16) 75 x 10 FB	500
8	(34) 76 x 50 x 6 IA	(26) 65 x 50 x 6 IA	(20.3) 65 x 38 x 6 IA	500
8.5	(36) 70 x 70 x 6 IA	(26) 65 x 50 x 6 IA	(21.5) 65 x 50 x 6 IA	500
9	(36) 70 x 70 x 6 IA	(26) 65 x 50 x 6 IA	(26) 65 x 50 x 6 IA	500
9.5	(50) 80 x 80 x 6 IA	(36) 70 x 70 x 6 IA	(26) 65 x 50 x 6 IA	500
10	(50) 80 x 80 x 6 IA	(36) 70 x 70 x 6 IA	(26) 65 x 50 x 6 IA	500

Notes:-

1) The moduli shown are based on girders spaced *B/3* apart. If the unsupported span of beams is greater, the following correction is to be applied:-

$$New\ modulus = \frac{Table\ modulus\ x\ S^2}{(B/3)^2} cm^3$$

Where *B* = Breadth of vessel; *S* = unsupported span of beam.

2) Where frame spacing is other than 500mm, the modulus is to be modified by 10% for each 50mm difference in spacing.

3) Alternative sections giving equal moduli may be used.

4) *B/3* or *S*, unsupported span of beam, shall not be less than 1.83m.

Section 6.14 – Shelter deck beams (aluminium alloy)

Breadth B	(Modulus cm^3) - recommended scantling		
	Full shelter		Partial shelter
	Weathertight (WT)	Non-weathertight	
4	(12.5) 76.2 x 6.4 FB	(10) 76.2 x 6.4 FB	(7.5) 63.5 x 6.4 FB
4.5	(14) 76.2 x 9.5 FB	(11.2) 76.2 x 6.4 FB	(8.4) 63.5 x 6.4 FB
5	(15.6) 76.2 x 9.5 FB	(12.5) 76.2 x 6.4 FB	(9.4) 63.5 x 6.4 FB
5.5	(20.6) 63.5 x 38.1 x 6.4 IA	(13.8) 76.2 x 9.5 FB	(10.3) 76.2 x 6.4 FB
6	(22.4) 63.5 x 50.8 x 6.4 IA	(20.6) 63.5 x 38.1 x 6.4 IA	(13.4) 76.2 x 6.4 FB
6.5	(29.6) 76.2 x 50.8 x 6.4 IA	(23.7) 63.5 x 50.8 x 6.4 IA	(20.6) 63.5 x 38.1 x 6.4 IA
7	(37) 76.2 x 76.2 x 6.4 IA	(29.6) 63.5 x 50.8 x 6.4 IA	(22.2) 63.5 x 50.8 x 6.4 IA
7.5	(45.5) 101.6 x 76.2 x 6.4 IA	(36.4) 76.2 x 76.2 x 6.4 IA	(27.3) 76.2 x 50.8 x 6.4 IA
8	(57.7) 101.6 x 76.2 x 6.4 IA	(46) 101.6 x 76.2 x 6.4 IA	(34.5) 76.2 x 76.2 x 6.4 IA
8.5	(61.2) 101.6 x 76.2 x 6.4 IA	(46) 101.6 x 76.2 x 6.4 IA	(36.4) 76.2 x 76.2 x 6.4 IA
9	(61.2) 101.6 x 76.2 x 6.4 IA	(46) 101.6 x 76.2 x 6.4 IA	(46) 101.6 x 76.2 x 6.4 IA
9.5	(85) 101.6 x 76.2 x 9.5 IA	(61.2) 101.6 x 76.2 x 6.4 IA	(46) 101.6 x 76.2 x 6.4 IA
10	(85) 101.6 x 76.2 x 9.5 IA	(61.2) 101.6 x 76.2 x 6.4 IA	(46) 101.6 x 76.2 x 6.4 IA

Notes:-

1) The moduli shown are based on girders spaced *B/3* apart. If the unsupported span of beams is greater, the following correction is to be applied:-

$$New\ modulus = \frac{Table\ modulus\ x\ S^2}{(B/3)^2} cm^3$$

Where *B* = Breadth of vessel; *S* = unsupported span of beam.

2) Where frame spacing is other than 500mm, the modulus is to be modified by 10% for each 50mm difference in spacing.

3) Alternative sections giving equal moduli may be used.

3) *B/3* or *S*, unsupported span of beam, shall not be less than 1.83m.

Section 6.15 – Shelter deck girders (steel)

Modulus cm^3 – recommended scantling								
Spacing of girders m	**Distance between girder supports (metres)**							
	2		**2.5**		**3**		**3.5**	
Weathertight								
1	43	100 x 50 x 6 (IA)	67	100 x 100 x 6 (IA)	96		132	100 x 75 x 10 (IA)
2	57	100 x 75 x 6 (IA)	89		129	150 x 75 x 10 (IA)	175	
2.5	71	100 x 100 x 6 (IA)	112	150 x 75 x 10 (IA)	161		219	200 x 100 x 10 (IA)
3	86.2	150 x 75 x 10 (IA)	134		193	200 x 100 x 10 (IA)	262	
Non-weathertight								
1	25.8	65 x 50 x 6 (IA)	40.2	100 x 50 x 6 (IA)	57.6	100 x 75 x 6 (IA)	79.2	100 x 100 x 6 (IA)
2	34.2	100 x 50 x 6 (IA)	53.4	100 x 75 x 6 (IA)	77.4	100 x 100 x 6 (IA)	105	
2.5	42.6		67.2	100 x 100 x 6 (IA)	96.6	150 x 75 x 10 (IA)	131.4	150 x 75 x 10 (IA)
3	51.6	100 x 75 x 6 (IA)	80.4		115.8		157.2	
Partial shelters								
1	19.3	65 x 50 x 6 (IA)	30.1	75 x 50 x 6 (IA)	43.3	100 x 50 x 6 (IA)	59	100 x 75 x 6 (IA)
2	25.7		40.1	100 x 50 x 6 (IA)	57.8	100 x 75 x 6 (IA)	78.6	100 x 100 x 6 (IA)
2.5	32.1	100 x 75 x 6 (IA)	50.1		72.2	100 x 100 x 6 (IA)	98.2	100 x 75 x 10
3	38.5	75 x 75 x 6 (IA)	60.2	100 x 75 x 6 (IA)	86.6	150 x 75 x 10 (IA)	117.9	

Notes:-

1) Maximum spacing of girders should not exceed B/3.

2) The unsupported span of girder shall not exceed 3.5m.

3) Tripping brackets are to be fitted at least every thirds beam.

4) Pillars supporting girders are to be adequately supported at the top and at the deck.

5) Where the girder web is cut over the deck beams, the depth of the girder web should not be less than 50mm greater than that of the beams.

6) Ends of the girders are to be bracketed to the satisfaction of the Surveyor.

7) Moduli for intermediate spans are to be obtained by interpolation.

Section 6.16 – Shelter deck girders (aluminium alloy)

Modulus cm^3 – recommended scantling								
Spacing of girders m	Distance between girder supports (metres)							
	2		2.5		3		3.5	
Weathertight								
1	73	101.6 x 101.6 x 6.4 (IA)	114	152.4 x 76.2 x 9.5 (IA)	163	200 x 100 x 9.5 (IA)	224	200 x 100 x 9.5 (IA)
2	97	152.4 x 76.2 x 9.5 (IA)	151		219		298	250 x 100 x 9.5 (IA)
2.5	121		190.5	200 x 100 x 9.5 (IA)	274		372	
3	146.2		228		328	250 x 100 x 9.5 (IA)	445	250 x 100 x 12 (IA)
Non-weathertight								
1	43.9	101.6 x 50.8 x 6.4 (IA)	68.4	101.6 x 101.6 x 6.4 (IA)	98	152.4 x 76.2 x 9.5 (IA)	134.7	152.4 x 76.2 x 9.5 (IA)
2	58.2	101.6 x 76.2 x 6.4 (IA)	90.8	152.4 x 76.2 x 9.5 (IA)	131.6		178.5	200 x 100 x 9.5 (IA)
2.5	72.5	101.6 x 101.6 x 6.4 (IA)	114.3		164.3	200 x 100 x 9.5 (IA)	223.4	
3	87.8	152.4 x 76.2 x 9.5 (IA)	136.7		196.9		267.2	
Partial shelters								
1	25.7	63.5 x 50.8 x 6.4 (IA)	40.1	101.6 x 50.8 x 6.4 (IA)	57.7	101.6 x 76.2 x 6.4 (IA)	78.6	101.6 x 101.6 x 6.4(IA)
2	34.2	76.2 x 50.8 x 6.4 (IA)	53.5	101.6 x 76.2 x 6.4 (IA)	77	101.6 x 101.6 x 6.4 (IA)	104.7	152.4 x 76.2 x 6.4 (IA)
2.5	42.8	101.6 x 50.8 x 6.4 (IA)	66.8	101.6 x 101.6 x 6.4 (IA)	96.2	152.4 x 76.2 x 6.4 (IA)	130.9	
3	51.3	101.6 x 76.2 x 6.4 (IA)	80.2		115.4		157.1	

Notes:-

1) Maximum spacing of girders should not exceed B/3.

2) The unsupported span of girder should not exceed 3.5m.

3) Tripping brackets are to be fitted at least every thirds beam.

4) Pillars supporting girders are to be adequately supported at the top and at the deck.

5) Where the girder web is cut over the deck beams, the depth of the girder web should be not be less than 50mm greater than that of the beams.

6) Ends of the girders shall be bracketed to the satisfaction of the Surveyor.

7) Moduli for intermediate spans are to be obtained by interpolation.

Section 6.17 – Shelter deck side and deck plating (steel and aluminium alloy)

Shelter [side] plating (steel)						
Length of vessel LOA m	Weathertight		Non–weathertight		Partial	
	Thickness mm	Maximum stiffener spacing mm	Thickness mm	Maximum stiffener spacing mm	Thickness mm	Maximum stiffener spacing mm
15 - <20	5	500	5	500	5	500
20 < 27	6	500	5	500	5	500

Shelter [side] plating (aluminium alloy)						
Length of vessel LOA m	Weathertight		Non–weathertight		Partial	
	Thickness mm	Maximum stiffener spacing mm	Thickness mm	Maximum stiffener spacing mm	Thickness mm	Maximum stiffener spacing mm
15 < 27	8	500	6.5	500	6.5	500

Shelter [deck] plating (steel)						
Length of vessel LOA m	Weathertight		Non-weathertight		Partial	
	Thickness mm	Beam spacing mm	Thickness mm	Beam spacing mm	Thickness mm	Beam spacing mm
15 - <20	6	500	6	500	5	500
20 < 27	6.5	500	6	500	5	500

Shelter [deck] plating (aluminium alloy)						
Length of vessel LOA m	Weathertight		Non-weathertight		Partial	
	Thickness mm	Beam spacing mm	Thickness mm	Beam spacing mm	Thickness mm	Beam spacing mm
15 - <27	8	500	6.35	500	6.35	500

Refer to Notes on following page.

Section 6.18 – Weathertight/non-weathertight and partial shelter side stiffeners (steel and aluminium alloy)

Steel		
Depth D m	**Modulus cm^3**	**Recommended scantlings**
1.5	6.3	65 x 5 (FB)
2	8.4	65 x 6 (FB)
2.5	10.5	75 x 6 (FB)
3	12.6	75 x 10 (FB)
3.5	14.7	65 x 38 x 6 (IA)
4	16.8	
4.5	18.8	
Aluminium alloy		
Depth D m	**Modulus cm^3**	**Recommended scantlings**
1.5	10.7	76.2 x 6.4 (FB)
2	14.2	63.5 x 38.1 x 6.4 (IA)
2.5	17.8	
3	21.4	63.5 x 63.5 x 6.4 (IA)
3.5	25	
4	28.5	
4.5	32	76.2 x 50.8 x 6.4

Notes:-

Tables 6.17 and 6.18

1) Where the stiffener/beam spacing differs from the values given in the Tables, the plating thickness is to be increased at the rate of 0.25mm per 20mm spacing difference.

Section 6.19 – Pillars

Steel – Solid Round

Factor N	Diameter of pillar mm	Length of pillar m				
		2	2.5	3	3.5	4
3		50	60	60	60	65
4		60	60	60	65	70
6		60	60	65	70	75
8		60	65	70	75	80
10		65	70	80	80	85
13		65	70	80	85	90
16		70	75	80	90	90
20		70	80	85	90	95
24		75	80	90	95	100
29		80	85	90	100	105

Steel – Square Hollow Section

Factor N	Section size in mm	Length of pillar m				
		2	2.5	3	3.5	4
3		63.5 x 6.4	63.5 x 6.4	63.5 x 6.4	63.5 x 6.4	76.2 x 6.4
4		63.5 x 6.4	63.5 x 6.4	63.5 x 6.4	76.2 x 6.4	76.2 x 6.4
6		63.5 x 6.4	63.5 x 6.4	76.2 x 6.4	76.2 x 6.4	80 x 6.4
8		63.5 x 6.4	76.2 x 6.4	76.2 x 6.4	80 x 6.4	90 x 6.4
10		76.2 x 6.4	76.2 x 6.4	90 x 6.4	90 x 6.4	100 x 6.4
13		76.2 x 6.4	76.2 x 6.4	90 x 6.4	100 x 6.4	100 x 8
16		76.2 x 6.4	80 x 6.4	90 x 6.4	100 x 8	100 x 8
20		76.2 x 6.4	90 x 6.4	100 x 6.4	100 x 8	100 x 10
24		80 x 6.4	90 x 6.4	100 x 8	100 x 10	120 x 6.4
29		90 x 6.4	100 x 6.4	100 x 8	120 x 6.4	120 x 8

Refer to Notes after aluminium tables on following page.

Section 6.19 – Pillars *(continued)*

Aluminium alloy – solid round

Factor N	Diameter of pillar mm	Length of pillar m				
		2	2.5	3	3.5	4
3		66.7	82.6	82.6	82.6	88.9
4		82.6	82.6	82.6	88.9	95.3
6		82.6	82.6	88.9	95.3	101.6
8		82.6	88.9	95.3	101.6	108
10		88.9	95.3	108	108	114.3
13		88.9	95.3	108	114.4	120.7
16		95.3	101.6	108	120.7	120.7
20		95.3	108	114.3	120.7	127
24		101.6	108	120.7	127	133.4
29		108	114.3	120.7	133.4	139.7

Aluminium alloy – round tube

Factor N	o/d and wall thickness In mm	Length of pillar m				
		2	2.5	3	3.5	4
3		88.9 x 6.4	114.3 x 6.4	114.3 x 6.4	114.3 x 6.4	127 x 6.4
4		114.3 x 6.4	114.3 x 6.4	114.3 x 6.4	127 x 6.4	152.4 x 6.4
6		114.3 x 6.4	114.3 x 6.4	127 x 6.4	152.4 x 6.4	165.1 x 6.4
8		114.3 x 6.4	127 x 6.4	152.4 x 6.4	165.1 x 6.4	-
10		127 x 6.4	152.4 x 6.4	-	-	-
13		127 x 6.4	152.4 x 6.4	-	-	-
16		152.4 x 6.4	165.1 x 6.4	-	-	-
20		152.4 x 6.4	-	-	-	-
24		165.1 x 6.4	-	-	-	-
29		-	-	-	-	-

Notes:-

1) Factor N = (1.4L x b) + Na for pillars supporting main deck and (1.07L x b + Na) for pillars supporting superstructure deck where:-

   L and b are the length and span respectively of deck supported by pillar.

   Na = N value for pillar directly or approximately above pillar concerned.

2) Where N and/or pillar lengths fall between table values, the next higher value for each is to apply.

3) Where pillars of a different size or section are intended, they are to be of equivalent strength to those shown in the Tables.

Table 6.20 – Rudders and steering

Steel

Scantling numeral	Stock diameter mm	Blade thickness mm
100	48	10
150	50	10
200	65	12
250	70	12
300	75	12
400	85	12
500	90	12
600	95	15
700	100	20
800	110	20

Aluminium alloy

Scantling numeral	Stock diameter mm	Blade thickness mm
100	60.4	12.7
150	60.4	12.7
200	82.6	15
250	88.9	15
300	95.3	15
400	108	15
500	114.3	15
600	114.3	19.1
700	120.7	25.4
800	133.4	25.4

Refer to Notes on following page.

Table 6.20 – Rudders and steering *(continued)*

Notes:-

1) The diameter of the coupling bolts is to be not less than $d = 0.65 \; x \frac{ds}{\sqrt{n}}$

Where *d* = bolt diameter; *ds* = diameter of stock; *n* = number of bolts (minimum of 4).

2) The pitch circle diameter of the rudder coupling bolts is to be a minimum of twice the diameter of the rudderstock.

3) The coupling flange thickness is to be not less than 0.25 times upper stock diameter.

4) Where higher tensile steels are proposed for rudderstocks of reduced diameters from those listed above, details are to be submitted for approval.

5) Double plate rudders are to be constructed watertight and fitted with a drain plug. Such rudders may be filled with an approved internal coating or filling. The side plating of double plate rudders are each to be a minimum of 75% of the thickness required for single plate rudders.

Section 6.21 – Anchors and cables (minimum requirements)

Anchor weights and lengths of cables should comply with the table below subject to notes 1), 2), 3) and 4).

Equipment Numeral = $D^{2/3} + 1.6BH + A/10$

Where:-

A = area (in metres²) in profile view of the hull, superstructures and houses above the deepest operating waterline, having a breadth greater than B/4.

B = breadth of vessel (in metres).

H = freeboard midships (in metres) from the deepest operating waterline to the freeboard deck, plus the sum of the heights, in metres, of each tier of superstructures and houses at the centreline, each tier having a breadth greater than B/4.

D = displacement, in tonnes, to the deepest operating waterline.

Equipment numeral	Total anchors weight kg	Minimum number of anchors	Minimum length of cables m	Size of chain cable mm U2**
Up to 60	95	1	82.5	12
61 - 80	130	1	82.5	12
81 - 90	165	1	82.5	12
91 - 100	190	1	110	14
101 -110	210	1	110	14
111 - 120	245	1	110	15
121 - 130	270	1	110	15
131 - 140	305	1	137.5	16
141 - 150	350	1	137.5	16
151 - 175	435	1	137.5	19
176 - 205	520	1	137.5	20.5
206 - 240	590	1	137.5	22
241 - 280	660	1	165	24

For intermediate values of equipment numeral, linear interpolation may be carried out for anchor weights, cable lengths and sizes.

Refer to Notes on following page.

Section 6.21 – Anchors and cables (minimum requirements) *(continued)*

Notes:-

1) Where stud link cable is used, the diameter may be 1.5mm less than the tabular diameter.

2) Where it is proposed to use high holding power anchors, a reduction in anchor weight of up to 20% will be considered.

3) U2** grade refers to special quality steel (wrought/cast with a tensile strength in the range 490 - 690N/mm^2).

4) Where two anchors are specified, the weight of the main anchor is to be at least 66% of the total weight for the anchors given in the Table.

Chain cables constructed of mild steel (U1) (tensile strength in the range 300-490N/mm^2) should be increased by 14% in diameter.

Section 6.22 – Colour codes for piping

Pipe contents	Ground colour		Colour band	
	Colour	BS colour no.	Colour	BS colour no.
Water				
Cooling(primary)	Sea green	217	-/-	-/-
Drinking	Aircraft blue	108	-/-	-/-
Treated	Aircraft grey/blue	283	-/-	-/-
Central heating below 60°C	French blue	166	-/-	-/-
Central heating 60°C-100°C	French blue	166	Post Office red	538
Central heating above100°C	Crimson	540	French blue	166
Cold water domestic service	Brilliant green	221	-/-	-/-
Domestic hot water supply	Eau-de-nil	216	-/-	-/-
Hydraulic power	Mid brunswick green	226	-/-	-/-
Sea, river, untreated	Grass green	218	-/-	-/-
Air				
Compressed up to 14g/cm^2	White	-/-	-/-	-/-
Compressed over 14g/cm^2	White	-/-	Post Office red	538
Vacuum	White	-/-	Black	-/-
Drainage	Black	-/-	-/-	-/-
Electrical service	Light orange	557	-/-	-/-
Oils				
Diesel fuel	Light brown	410	-/-	-/-
Lubricating	Salmon pink	447	-/-	-/-
Hydraulic power	Salmon pink	447	Sea green	217
Transformer	Salmon pink	447	Light orange	557
Fire installations	Signal red	537	-/-	-/-