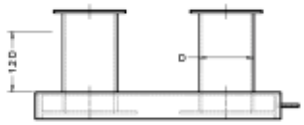
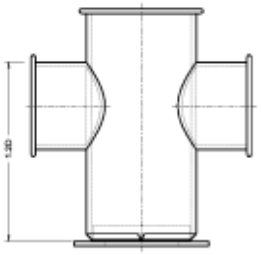
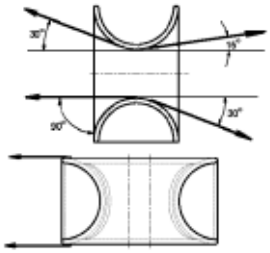
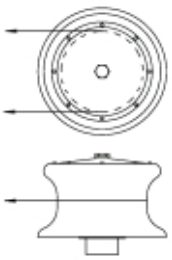
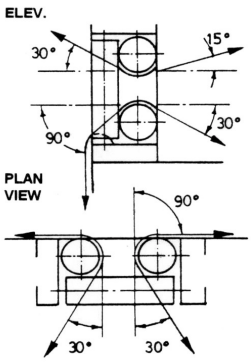
MOORING EQUIPMENT

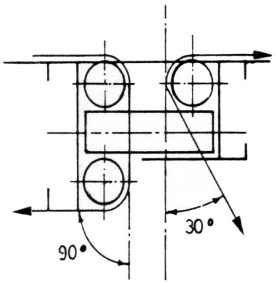
Recommended SWL, Load Position, Safety Factor and Test Load

Fitting	SWL	Load Position (Line Position)	Safety Factor on Yield	Test Load	Notes
Double Bollards 	Per ISO 3913 "Single Rope Maximum Loading"	1.2 X Barrel Dia. (D) Above Base, max.	2.36	2 X SWL	Scantling must be as per ISO 3913. Barrel loading when figure-of-eight belayed assumed to be twice eye load. SWL applies to figure-of-eight belaying.
Cruciform Bollards 	Single Type: 2 X Above Load Double Type: Same as above	1.2 X Barrel Dia. (D) Above Base, max.	2.36	2 X SWL	Scantling must be as per ISO 3913. Barrel Loading when figure-of-eight belayed assumed to be twice eye load.
Closed Chocks 	MBL of one line d/R = 1/4 IWRC Wire Rope with min. strand strength if 1770 N/mm^2	Outboard – Horizontal: ±90^O Vertical: Up 30^O Down 90^O Inboard – Horizontal: ±90^O Vertical: ±30^O	2.36	2 X SWL	d = Rope Diameter R = Chock Surface Radius If used for primary mooring line, MBL may be that of actual associated mooring line. Max. Horizontal Load = 2 X Rope Load.
Pedestal Fairleads and Rollers of Button-Roller Chocks 	0.55 MBL of one line: d/R = 1/4 IWRC Wire Rope with min. strand strength of 1770 N/mm^2	180^O wrap at upper end of cylindrical or conical part of throat (at center of roller if radius throat)	2.02	1.82 X SWL (=MBL)	If used for primary mooring line, MBL may be that of actual associated mooring line. Total Load on fitting is equal to twice the line load.
Universal Fairlead 4-Roller Type 	0.55 MBL of one line: d/R = 1/4 IWRC Wire Rope with min. strand strength of 1770 N/mm^2	Outboard – Horizontal: ±90^O Vertical: Up 30^O Down 90^O Inboard – Horizontal: ±30^O Vertical: ±15^O	2.02	1.82 X SWL	MBL = MBL of actual mooring Line. Inboard line leads may correspond to actual leads to winch drum. Position of line in aperture to be assumed such as to produce max. stress in part investigated. Assume highest position to calculate stress in frame and roller bearings; at mid-length of roller to calculate bending in roller.

BILLBOARD

MOORING EQUIPMENT

Recommended SWL, Load Position, Safety Factor and Test Load

Fitting	SWL	Load Position (Line Position)	Safety Factor on Yield	Test Load	Notes
Universal Fairlead 5-Roller Type 	0.55 MBL of one line: d/R = 1/4 IWRC Wire Rope with min. strand strength of 1770 N/mm^2	Outboard – Horizontal: ±90^O Vertical: Up 30^O Down 90^O Inboard – Horizontal: ±30^O Vertical: ±15^O	2.02	1.82 X SWL	MBL = MBL of actual mooring Line. Inboard line leads may correspond to actual leads to winch drum. Position of line in aperture to be assumed such as to produce max. stress in part investigated. Assume highest position to calculate stress in frame and roller bearings; at mid-length of roller to calculate bending in roller.
Chain Stoppers or Smit Brackets for use at SPMs or for Emergency Towing (Ship over 20,000 DWT)	Up to 350,000 DWT = 200 T Over 350,000 DWT = 250 T	In-line with fitting	1.50	SWL	SWL to be marked on fitting. Two fittings required for all ships over 150,000 DWT Chain B.S. = 4315 KN Towing B.S. = 3970 KN
Mooring Winch Drum, Shafts, Bearings	MBL of mooring line	Split Drums: On first layer. Single Drums: First or top layer, whichever produces highest stress.	1.11	SWL	Please refer standard winch sizes and rope B.S.
Mooring Winch Brakes, Frames and Foundations	MBL of mooing line	Split Drums: On first layer. Single Drums: First or top layer, whichever produces highest stress.	1.50	SWL	Per BS MA 93, Part 4.3.2.
Mooring Winch Drive Components	Stall load	Not applicable	See Remark	See ISO 3730 and section 7	Safety factor + 1.11 based on stall load; or 2.5 based on rated load; whichever is higher (per ISO 3730).
Mooring Lines	Highest load calculated for adopted standard environmental conditions	Not applicable	Steel:1.82 Nylon:2.2 Synth:2.0	Test sample to destruction confirm MBL	The safety factors for ropes quoted should only be applied to primary mooring lines in combination with the SWL defined.
Tails for Mooring Lines	As above	Not applicable	Polyester : 2.3 Nylon:2.5	As above	The safety factors for ropes quoted should only be applied to primary mooring lines in combination with the SWL defined.

Remark:

1. SWL to be marked on or near the fittings in units of metric tons (Letter “t”).
2. The SWL of Foundations and Supporting Deck Structure must be specially considered when siting and rating the capabilities of the fitting. In principle the strength of the supporting structure and connection of the fitting to it should be greater than the fitting itself so that any failure does not result in damage to the ship’s structure. Since foundations and connections to the deck are often made in non-ideal conditions onboard the ship rather than factory condition, and to allow for possible resulting weld imperfections, it is recommended that they be at least 10% stronger than the fitting.