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Ships and marine technology — Single point mooring arrangements for conventional tankers

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Foreword

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The committee responsible for this document ISO/TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*.

Ships and marine technology — Single point mooring arrangements for conventional tankers

1 Scope

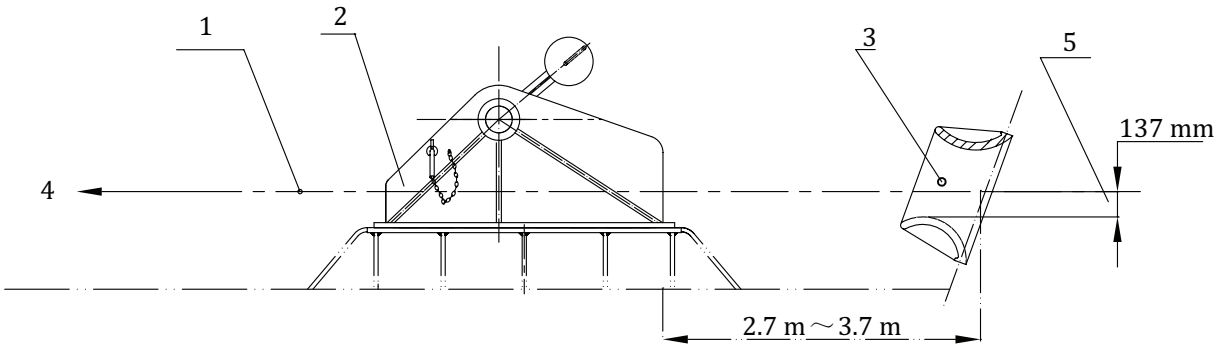
This International Standard specifies the technical requirements and test methods for the equipment necessary for the ships intended to use single point mooring (hereinafter referred to as "SPM") arrangements, such as bow chain stoppers, bow fairleads, and pedestal rollers.

This International Standard is applicable to the SPM arrangements provided for tankers, gas carriers, and chemical vessels.

2 Technical requirements

2.1 Design arrangement of SPM arrangements for tankers

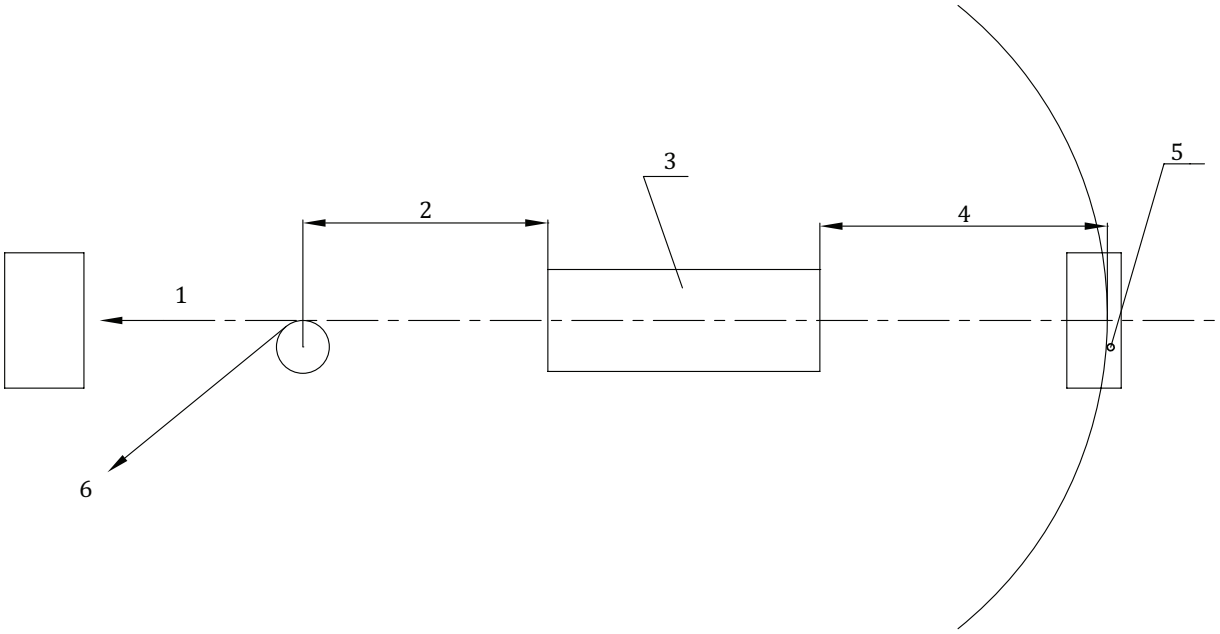
The general design arrangement is given in Figure 1 and Figure 2.



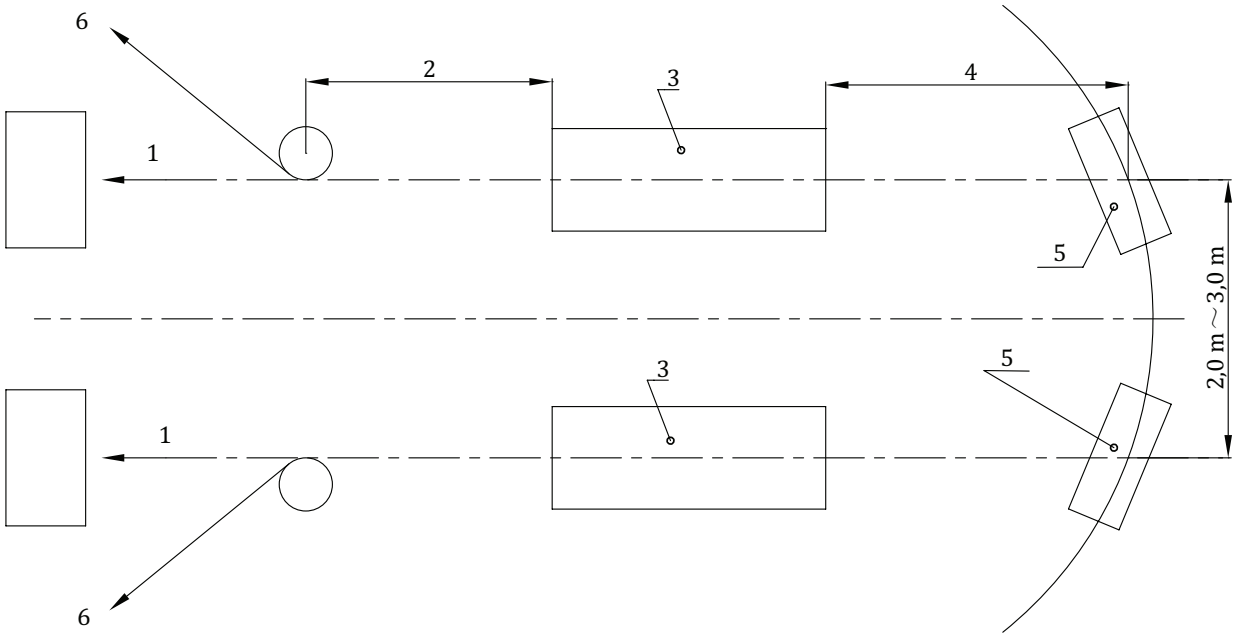
Key

1 centreline of chain parallel to deck
2 bow chain stopper
3 bow fairlead
4 to pedestal roller or direct to winch storage drum
5 half breadth of chain

Figure 1 — General arrangement of SPM arrangements for tankers



a) Installed with one bow chain stopper



b) Installed with two bow chain stoppers

Key

1 direct to winch storage drum without pedestal rollers
2 not less than 3 m from aft side of bow chain stopper
3 bow chain stopper
4 distance between fairlead and front side of the bow chain stopper is 2,7 m~3,7 m
5 bow fairlead
6 to winch storage drum via pedestal rollers

Figure 2 — General arrangement of SPM arrangements for tankers installed with different stoppers

2.2 Configuration and design manufacturing requirements for SPM arrangements for tankers

2.2.1 Bow chain stoppers

a) The configuration and load requirements are given in Table 1.

Table 1 — Configuration and load requirements of chain stoppers

Ship size	Number of bow chain stoppers	Minimum safe working load (SWL) (t)
100 000 tonnes DWT or less (Two chain stoppers can also be installed on the ship of such size)	1	200
Over 100 000 but not greater than 150 000 tonnes DWT (Two chain stoppers can also be installed on the ship of such size)	1	250
Over 150 000 tonnes DWT	2	350
NOTE The safety factor on yield of bow chain stoppers should be minimum of 2,0 SWL.		

b) The general types of bow chain stoppers are given in Annex A.

c) In the closed position, the design shall be such that it can prevent chafe chains from throw-out due to the sudden release.

d) The operating force of bow chain stoppers shall be not more than 245 N.

e) Materials can be weldable cast steel, forged steel, or rolled steel, which conform to the corresponding manufacturing standard.

f) The product shall be free from defects that affect its use, such as cracks, sand holes, and pores.

g) When the chain stopper is welded to the foundation, the weld strength shall be capable of withstanding 2,0 times the SWL; when it is bolted to the foundation, effective thrust blocks shall be provided to reduce shear.

h) When the ship is provided with the bow chain stopper of an emergency towing arrangement, the SPM bow chain stopper may also be used as the bow chain stopper of the emergency towing arrangement.

2.2.2 Bow fairleads

a) The configuration and load requirements shall be consistent with those of the matching SPM bow chain stoppers.

b) The general type of bow fairleads is given in Annex B.

c) The bow fairlead shall be of closed type, with the opening dimensions of at least 600 mm in width and 450 mm in height.

d) The strength should be sufficient for all relevant angles of towline, i.e. up to 90° from the ship's centreline to port and starboard and 30° vertical upwards and downwards.

e) Materials can be weldable cast steel, forged steel, or rolled steel, which conform to the corresponding manufacturing standard.

f) The product shall be free from defects that affect its use, such as cracks, sand holes, and pores.

g) When the ship is provided with the bow fairlead of an emergency towing arrangement, the SPM bow fairlead may also be used as the bow fairlead of the emergency towing arrangement.

2.2.3 Pedestal rollers

a) The general type of pedestal rollers is given in Annex C.

b) The pedestal rollers are capable to withstand a horizontal force equal to the greater of the two values:

— 225 kN;

— the resultant force due to an assumed pull of 225 kN in the pick-up rope.

c) The common specifications of pedestal rollers are ⌀350, ⌀400, and ⌀450.

d) Materials can be weldable cast steel, forged steel, or rolled steel, which conform to the corresponding manufacturing standard.

e) The product shall be free from defects that affect its use, such as cracks, sand holes, and pores.

3 Test method

3.1 Bow chain stoppers

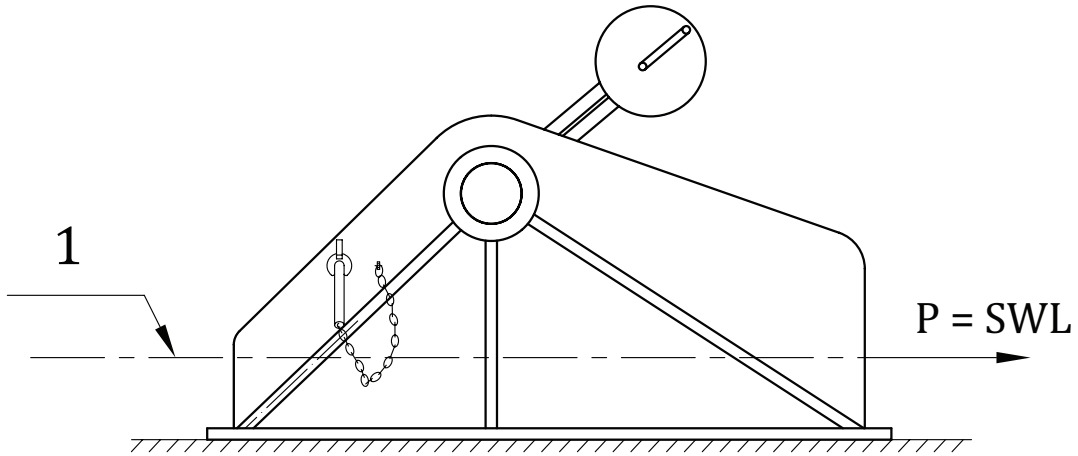
3.1.1 Material test

If the material is cast steel, physical and chemical inspection shall be carried out for the material test rods and inspection results shall conform to the corresponding material standards. Magnetic particle inspection shall be carried out after surface polishing, and the product shall be free from defects that affect its use, such as cracks, sand holes, and pores.

For components made of forgings, physical and chemical inspection shall be carried out for the material test rods and inspection results shall conform to the corresponding material standards. Ultrasonic detection shall be made according to Grade II forging requirements, and the component shall be free from cracks, folding, or other defects that affect its use.

The welds on the weldments shall be smooth and flat; ultrasonic detection shall be made for main welds, which shall be free from defects that affect the use, such as cracks, sand holes, pores, and weld flashes.

3.1.2 Strength test



Key

1 chafe chain centreline

Figure 3 — Strength test on bow chain stopper

The test load shall be applied to the chafe chain centreline for 1 min and magnetic particle inspection shall be carried out for the bow chain stopper after unloading, to ensure its main welds or castings shall be free from defects that affect its use. See Figure 3.

3.1.3 Operation test

Take a balance weight of 25 kg mass, and verify that the operating force of chain stoppers vertical to the operating lever shall be not more than 245 N according to the lever balance theory.

3.2 Bow fairleads

3.2.1 Material test

If the material is cast steel, physical and chemical inspection shall be carried out for the material test rods and inspection results shall conform to the corresponding material standards. Magnetic particle inspection shall be carried out after surface polishing, and the product shall be free from defects that affect its use, such as cracks, sand holes, and pores.

For components made of forgings, physical and chemical inspection shall be carried out for the material test rods and inspection results shall conform to the corresponding material standards. Ultrasonic detection shall be made according to Grade II forging requirements, and the component shall be free from cracks, folding, or other defects that affect its use.

The welds on the weldments shall be smooth and flat; ultrasonic detection shall be made for main welds, which shall be free from defects that affect the use, such as cracks, sand holes, pores, and weld flashes.

3.2.2 Strength test

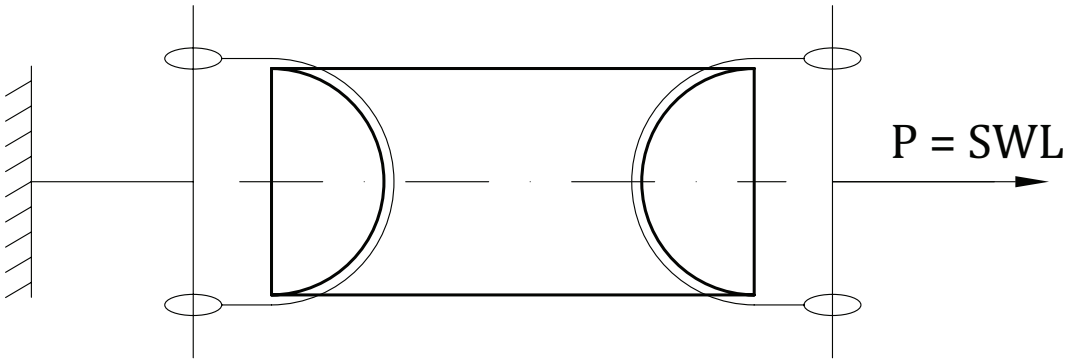


Figure 4 — Strength test on bow fairlead

The test load shall be applied for 1 min and magnetic particle inspection shall be carried out for the bow fairlead after unloading, to ensure its main welds or castings shall be free from defects that affect its use. The procedure is shown in Figure 4.

3.3 Pedestal rollers

3.3.1 Material test

If the material is cast steel, physical and chemical inspection shall be carried out for the material test rods and inspection results shall conform to the corresponding material standards. Magnetic particle inspection shall be carried out after surface polishing, and the product shall be free from defects that affect its use, such as cracks, sand holes, and pores.

For components made of forgings, physical and chemical inspection shall be carried out for the material test rods and inspection results shall conform to the corresponding material standards. Ultrasonic detection shall be made according to Grade II forging requirements, and the component shall be free from cracks, folding, or other defects that affect its use.

The welds on the weldments shall be smooth and flat; ultrasonic detection shall be made for main welds, which shall be free from defects that affect the use, such as cracks, sand holes, pores, and weld flashes.

3.3.2 Strength test

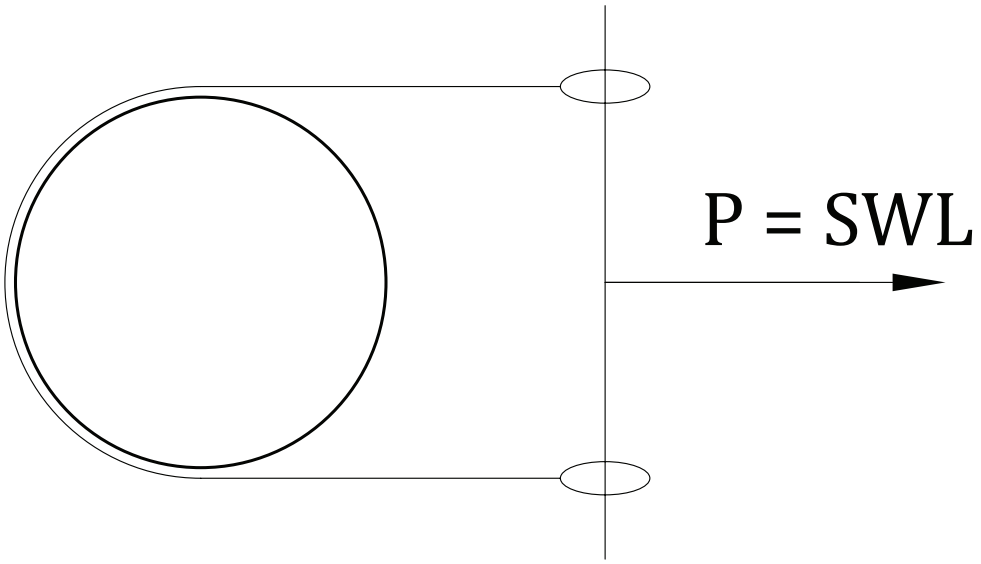


Figure 5 — Strength test on pedestal roller

The test load shall be applied for 1 min and the pedestal roller shall rotate normally after unloading, without affecting the use as shown in Figure 5.

4 Markings

a) The SWL shall be clearly marked at the conspicuous position.

b) Date or serial number of manufacture.

Annex A
(informative)

Types and dimensions of chain stoppers

See Figure A.1, Figure A.2, and Figure A.3.

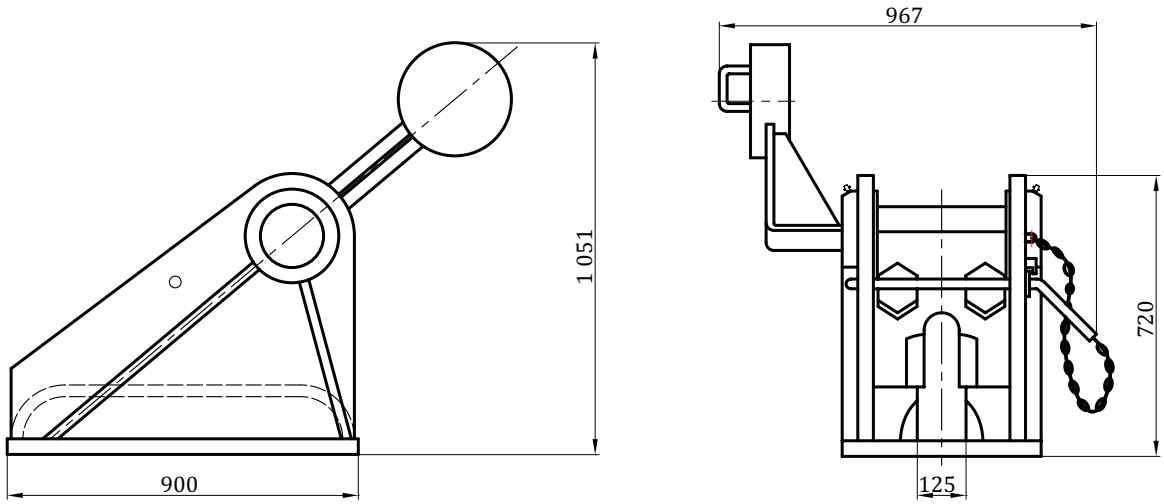


Figure A.1 — SWL200t tongue type chain stopper

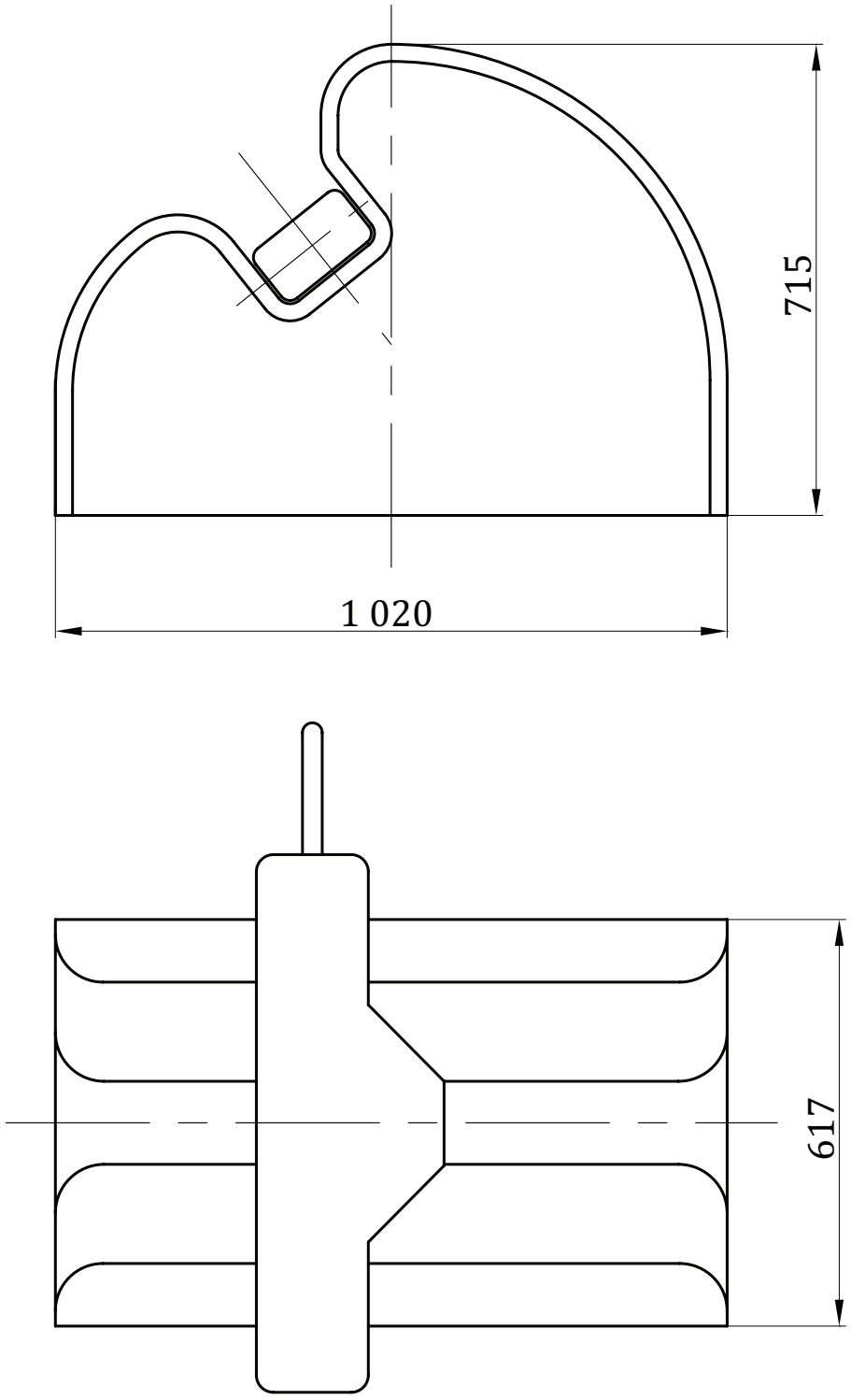


Figure A.2 — SWL200t bar type chain stopper

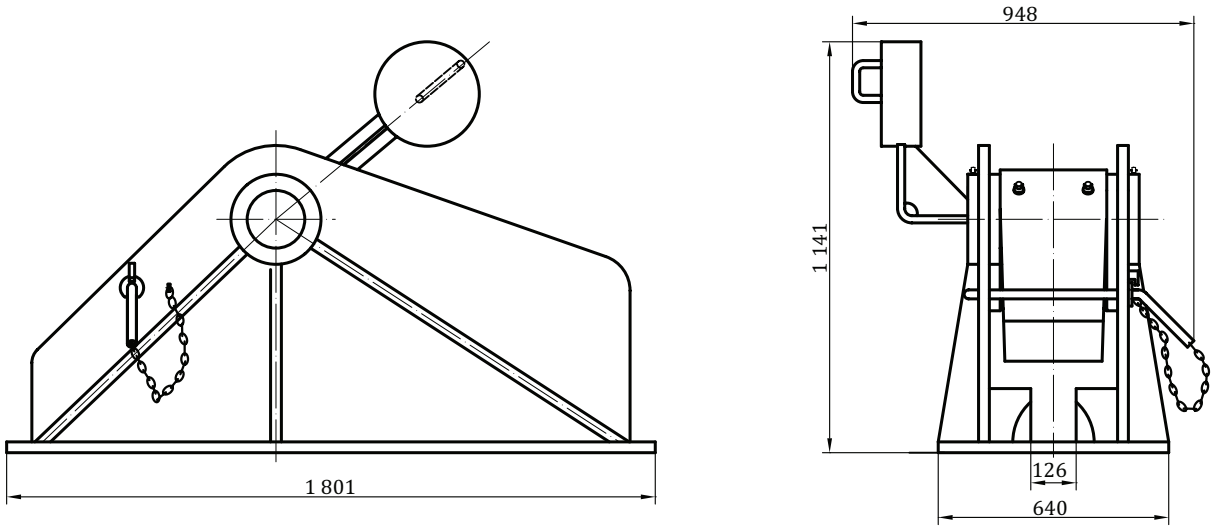


Figure A.3 — SWL350t tongue type chain stopper

Annex B
(informative)

Types and dimensions of fairleads

See Figure B.1.

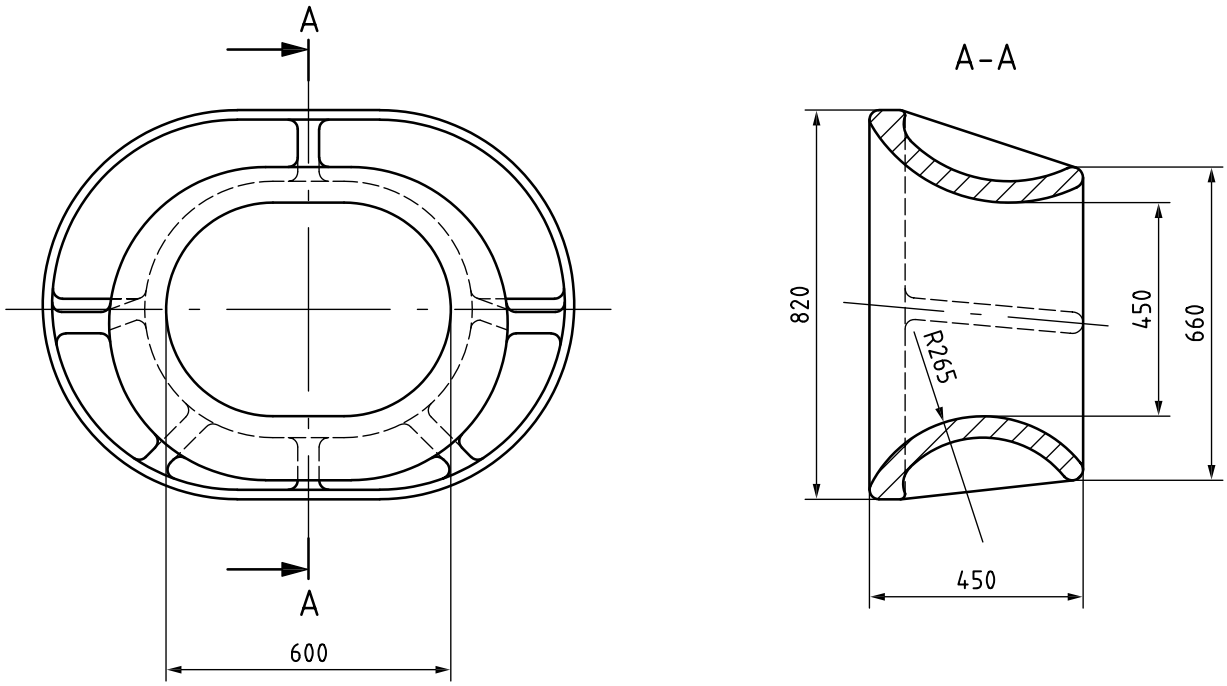


Figure B.1 — SWL350t fairlead

Annex C
(informative)

Types and dimensions of pedestal rollers

See Figure C.1 and Figure C.2.

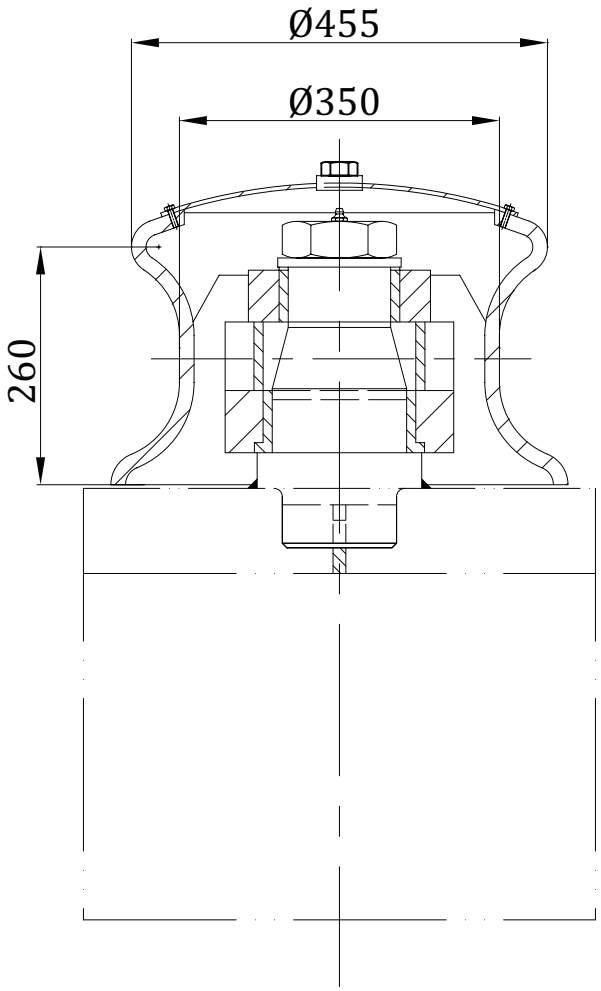


Figure C.1 — ⌀350 pedestal roller

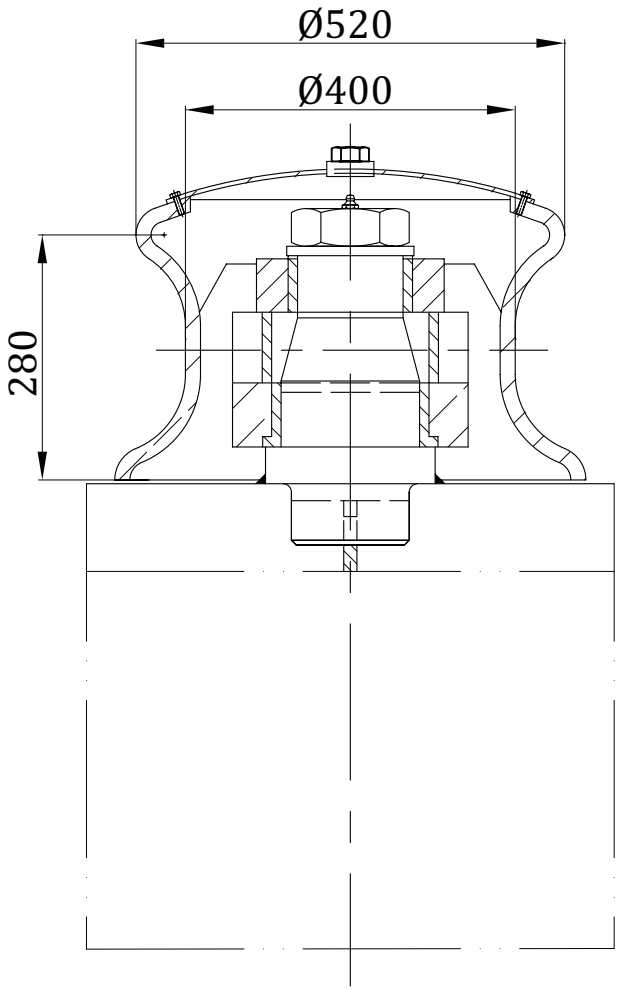


Figure C.2 — ⌀400 pedestal roller

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