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Ships and marine technology — Shark jaws and towing pins

Navires et technologie maritime — Broches d'entraînement et stoppeurs "shark jaws"

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Foreword

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This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Ships and marine technology — Shark jaws and towing pins

1 Scope

This document specifies requirements for the design, operation, performance and acceptance tests of marine shark jaws and towing pins having electric, hydraulic, diesel or steam drive.

It is applicable to the design, manufacture and acceptance of marine shark jaws and towing pins.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3828, *Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols*

ISO 7365, *Shipbuilding and marine structures — Deck machinery — Towing winches for deep sea use*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3828 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
shark jaw
equipment for temporarily securing the inboard end of a towline

Note 1 to entry: A left-hand shark jaw is a shark jaw placed on the left-hand side of the central axis of the *towing pins* (3.2) when looking at the bow from the stern of a ship.

Note 2 to entry: A right-hand shark jaw is a shark jaw placed on the right-hand side of the central axis of the *towing pins* (3.2) when looking at the bow from the stern of a ship.

Note 3 to entry: A central shark jaw is a shark jaw placed on the central axis of the *towing pins* (3.2) when looking at the bow from the stern of a ship.

3.2
towing pin
equipment for leading and restraining a towline to the intended path

3.3
support box
device fixing and supporting the *shark jaw* (3.1) and *towing pins* (3.2)

3.4
working height
maximum height from a towline to the board, when *shark jaws* (3.1) or *towing pins* (3.2) operate normally

3.5
emergency release
release and withdrawal actions of a *shark jaw* (3.1) and *towing pins* (3.2) depending on standby power under loss of driving power or in emergency

3.6
fork shark jaw
shark jaw (3.1) with clamp forks on top, which have clamping devices inside that can seize the lock chains or steel wire rope clips, and with a cylindrical under part enabling a vertical slice movement within the *support box* (3.3)

Note 1 to entry: The clamping device on the clamp fork of a fork shark jaw can be replaced to adapt to different types of steel wire ropes or lock chains for fixture.

3.7
triplex shark jaw
shark jaw (3.1) with two independently reversible and retractable claws that fix the steel wire ropes or lock chains between them when operating and fall down to be levelled with the deck when not in use

Note 1 to entry: The lifting pin between the two claws can lift the drooping steel wire ropes or lock chains up to the top of the claws, to facilitate dismounting of the shackles.

3.8
Safe working load
SWL
total allowable working load considered safe of *shark jaw* (3.1) or *towing pins* (3.2), under design working conditions

4 Types

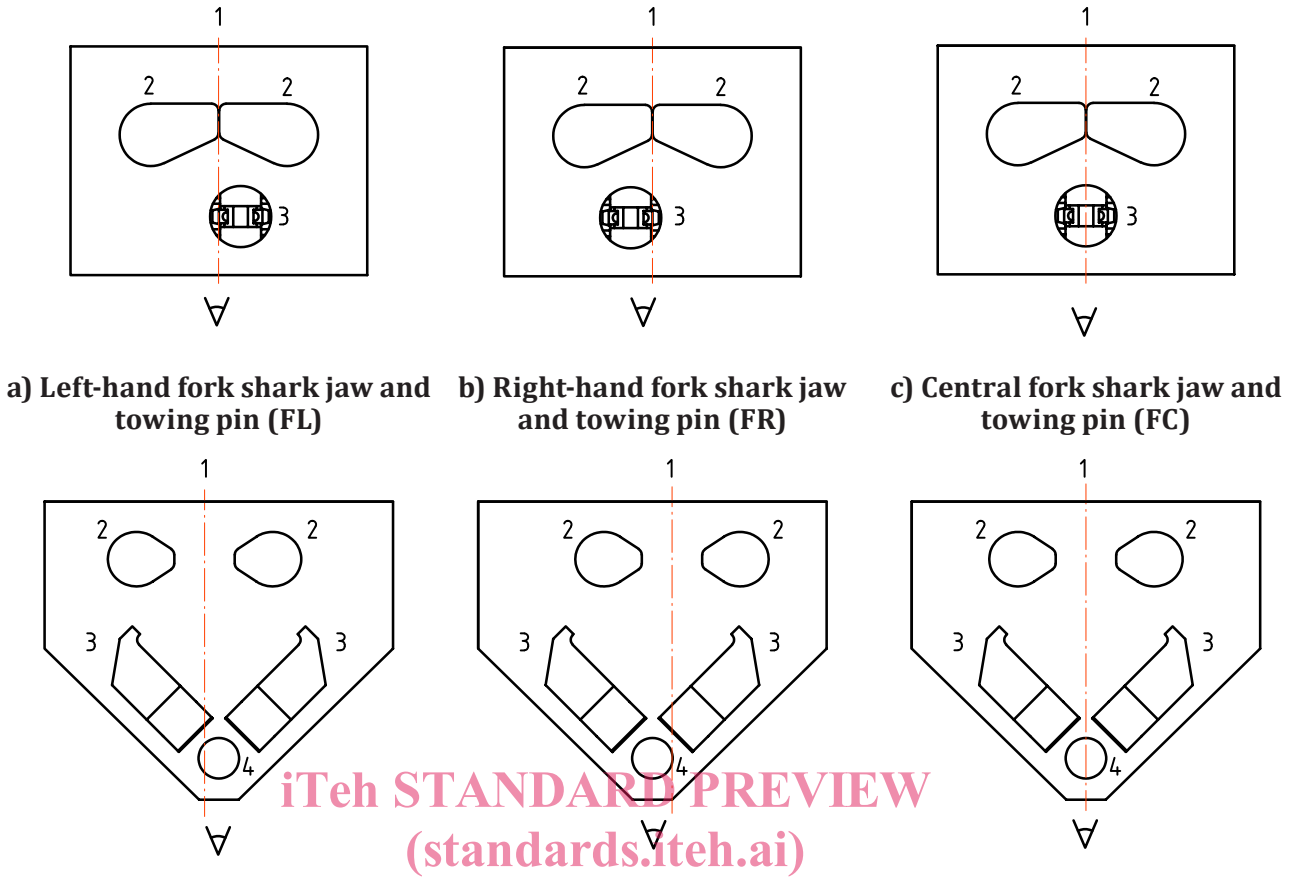
4.1 Types of shark jaws

Shark jaws can be classified as fork shark jaws and triplex shark jaws, by means of structural form.

4.2 Structural form of shark jaws and towing pins

Code representing shark jaws and towing pins is related to the relative position of the shark jaw type and the position between shark jaw and towing pins.

NOTE Structural form codes are given in brackets next to the subheadings in Figure 1.



a) Left-hand fork shark jaw and towing pin (FL)

b) Right-hand fork shark jaw and towing pin (FR)

c) Central fork shark jaw and towing pin (FC)

d) Left-hand triplex shark jaw and towing pin (TL)

e) Right-hand triplex shark jaw and towing pin (TR)

f) Central fork shark jaw and towing pin (TC)

Key

1 centreline between towing pins
2 towing pin
3 shark jaw
4 lifting pin

Figure 1 — Structural drawing of shark jaws and towing pins

5 Design

5.1 Material stresses

The component parts of the shark jaw and towing pins shall be made of materials with sufficient strength to withstand all loads of the respective nominal sizes, as specified in Table 1.

Table 1 — Performance specifications

Nominal size	Design basis rope diameter	Minimum breaking strength of rope	Shark jaw		Towing pins	
			Minimum SWL	Maximum working time for moving to working height	Minimum SWL	Maximum working time for moving to working height
	mm	kN	kN	s	kN	s
20	20	252[a]	252	8	100	10
26	26	426[a]	426	8	160	10
28	28	547[b]	547	8	200	10
32	32	645[a]	645	8	250	10
36	36	817[a]	817	8	320	10
40	40	1 010[a]	1 010	8	400	10
44	44	1 350[b]	1 350	8	560	10
45	45	1 410[b]	1 410	8	630	10
52	52	1 700[a]	1 700	8	800	10
56	56	2 190[b]	2 190	8	1 000	10
60	60	2 510[b]	2 510	8	1 250	10
70	70	3 320[c]	3 320	10	1 600	15
78	78	4 130[c]	4 130	10	2 000	15
86	86	5 020[c]	5 020	10	2 500	20
96	96	6 250[c]	6 250	10	3 000	20
102	102	7 060[c]	7 060	10	3 500	20
110	110	8 210[c]	8 210	15	4 000	25
116	116	9 130[c]	9 130	15	4 500	25
122	122	10 100[c]	10 100	15	5 000	25
134	134	12 200[c]	12 200	15	6 000	25

[a] ISO 2408 rope grade 1 770 N/mm^2.

[b] ISO 2408 rope grade 1 960 N/mm^2.

[c] Not covered by ISO 2408 diameter series: rope grade 1 960 N/mm^2.

Vessel specific selection of the shark jaw and towing pins, together with the wire rope, shall be based on the rated Bollard Pull of the vessel.

5.2 Basic calculation

5.2.1 Safety factor under SWL

5.2.1.1 The permissible stresses of all components of shark jaws and towing pins shall not be more than 0,67 times the yield strength of the materials under SWL.

5.2.1.2 The permissible stresses of the support structure of shark jaws and towing pins shall not be more than 0,5 times the yield strength of the materials under SWL.

5.2.2 Load alarm device

Provisions shall be made to incorporate an alarm device giving an alarm signal at 50 % of the breaking load of steel wire ropes or chain locks, or at 50 % of the shark jaw SWL.

5.2.3 Emergency release load

5.2.3.1 When the SWL of a shark jaw is greater than 5 000 kN, the emergency release load shall be 40 % of the SWL of the shark jaw.

5.2.3.2 When the SWL of a shark jaw is comprised between 1 200 kN and 5 000 kN, the emergency release load shall be 20 % +1 000 kN of the SWL of the shark jaw.

5.2.3.3 When a shark jaw's SWL is smaller than 1 200 kN, the emergency release load shall be equal to the shark jaw's safe working load.

5.3 Shark jaw design

The part of shark jaws used to seize the joint of steel wire ropes or lock chains shall be sufficiently strong and stiff, with good friction resistance, corrosion resistant and modifiable to fix with different towline types. The material safety factor of the inserts shall meet the requirements of 5.2.1.

5.4 Towing pin design

Towing pins shall be designed with a rotating sleeve structure, that shall be sufficiently strong and stiff and shall be able to rotate flexibly. The material strength safety factor shall conform to the requirements of 5.2.1.

5.5 Support box design

5.5.1 The support box shall be able to bear the SWL of the shark jaw and towing pins at the position of working height. Its material safety factor shall meet the requirements of 5.2.1.

5.5.2 The support box of fork shark jaws and towing pins shall be watertight enough to prevent water from seeping into the support box and flowing to the cabin when the fork shark jaws and towing pins are working or taking back.

5.5.3 The support box of triplex shark jaws and towing pins shall be designed with outlet coupling to drain off the water into the support box when in operation. Meanwhile, triplex shark jaws and towing pins shall be designed with dealing devices to prevent water from seeping into the support box when shark jaws and towing pins are not working. The bottom of the support box of triplex shark jaws and towing pins shall be designed with accumulated water-free structure.

5.6 Lubrication design

The lubrication position shall be designed for kinetic pairs of shark jaws and towing pins manually or automatically. Enough space shall be designed for lubricating.

5.7 Auxiliary equipment

5.7.1 Control panel and arrangement

5.7.1.1 The main control panel shall be placed in the wheelhouse with a clear view of the working state of the shark jaw and towing pins. A portable control box shall be designed to operate the shark jaw and towing pins locally.

5.7.1.2 An emergency release button shall be placed in the control panels and the portable control box.