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Ships and marine technology — Major components of emergency towing arrangements

Navires et technologie maritime — Principaux éléments des dispositifs de remorquage d'urgence

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html. (standards.iteh.ai)

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Ships and marine technology — Major components of emergency towing arrangements

1 Scope

This document specifies the technical requirements, test methods, inspection rules and markings for major components of emergency towing arrangements (ETA) provided for tankers, gas carriers (LPG, LNG, etc.) and chemical vessels no less than 20 000 deadweight tonnes (DWT).

It is only applicable to emergency towing arrangements as defined in 3.1.

NOTE For any other applications, such as for mooring at a single point mooring (SPM) facility, the appropriate standards need to be referred to.

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 3808, Road vehicles Unscreened high-voltage ignition cables General specifications, test methods and requirements (standards.iteh.ai)

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ISO 4306-1, Cranes — Vocabulary — Part 1: General

ISO 21130:2019

https://standards.iteh.ai/catalog/standards/sist/e4c8e1d0-e8ef-41b9-a0f7-

3 Terms and definitions 87674bde0fa4/iso-21130-2019

For the purposes of this document, the terms and definitions given in ISO 4306-1, ISO 3808 and the following apply.

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

- ISO Online browsing platform: available at <u>https://www.iso.org/obp</u>
- IEC Electropedia: available at <u>http://www.electropedia.org/</u>

3.1

emergency towing arrangement

ETA

system equipped on tankers, gas carriers and chemical vessels, used to tow the vessel in an emergency such as mechanical failure or lack of power

Note 1 to entry: The International Maritime Organization (IMO) requires that tankers, gas carriers and chemical vessels of not less than 20 000 DWT and constructed since Jan 1, 1996, be provided with emergency towing arrangements installed on both the bow and the stern.

3.2 safe working load SWL

maximum permissible load determined after the equipment has been tested according to the relevant regulations

3.3

ultimate strength

certified minimum breaking load of a wire rope, chafing chain, shackle, etc.

Note 1 to entry: In the case of equipment such as chain stoppers, fairleads, etc., it can be defined as the load that will cause a general failure of the structure or its attachment to the deck.

3.4

classification society

institution that establishes and maintains technical standards for the construction and operation of ships and offshore facilities

4 **Technical requirements**

Major components of ETA 4.1

The major components of ETA are listed in <u>Table 1</u> with their installation requirements.

Component	Bow ETA (not preconfigured)	Stern ETA (preconfigured)	Strength requirements (see <u>4.3.1</u>)
Pick-up gear	Optional	Required	_
Towing rope	Optional N	R Required	Required
Chafing chain	Requiredtand	Determined according to	Required
Fairlead	Required	Required	Required
Strong point	Required ISC	<u>21130:2</u> Required	Required
Pedestal rollers	Required 87674bde	Determined according to Determined according to the design	

Table 1 — ETA major components and installation requirements

4.2 Design arrangement of ETA

A typical arrangement of bow ETA is shown in Figure 1. 4.2.1



NOTE The centreline of the chain is parallel to the deck.



1

2



4.2.2 A typical arrangement of stern ETA is shown in Figure 2.

towing rope

1

2

Figure 2 — Typical arrangement of stern ETA

4.3 Design and manufacturing requirements for major components

Minimum strength requirement for ETA components 4.3.1

The minimum strength requirement for ETA components under stress during the towing operation is given in <u>Table 2</u>. iTeh STANDARD PREVIEW

Table 2- Minimum strength requirement

Shin cizo	Working strength	Ultimate strength
https://standards.iteh.	ai/catalog/standards/stsV/e4c8e1d0-e8ef-41t	9-a0f7- kN
20 000 tones ≤ DWT < 50 000 tonnes 8	7674bde0fa4/iso- 1 1 000 -2019	2 000
50 000 tonnes ≤ DWT	2 000	4 000

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

Strength requirement for other parts 4.3.2

Other parts shall have sufficient strength to withstand the load to which they may be subjected in towing operations.

4.3.3 **Bow ETA**

4.3.3.1 Fairlead

- The fairlead shall be of a closed type, with the opening dimensions of at least 600 mm in width and a) 450 mm in height.
- b) The fairlead should be capable of supporting the stress at the angles described in 4.3.1.
- See <u>Annex A</u> for the general configuration of a bow fairlead. c)
- d) Materials shall be weldable cast steel, e.g. 200-400 W in accordance with ISO 14737.
- The fairlead shall be free from defects that affect its intended use, such as cracks, sand holes e) and pores.
- The SWL of the installed fairlead shall be marked at a conspicuous location on the fairlead. f)

4.3.3.2 Chafing chain

a) The chafing chain shall be of a welded stud type and made of materials of Grade III or better chain steel. (See <u>Annex B</u> for the typical chemical composition and mechanical properties of steel bars for a ship anchor chain). The minimum diameters of chafing chains are given in <u>Table 3</u>.

Table 3 —	Minimum	diameters	of chafing	chains
-----------	---------	-----------	------------	--------

SWL	Minimum diameter ϕ of chafing chains
kN	mm
1 000	52
2 000	76

- b) The length of chafing chain shall not be less than 8 m and the length outboard of the fairlead shall be at least 3 m.
- c) One end of the chafing chain shall be connected to the chain stopper, and the other end shall be fitted with a standard pear-shaped studless link of a size suitable for the attachment to a standard bow shackle.
- d) See <u>Annex C</u> for the general configuration of a chafing chain.
- e) The manufacturing quality shall meet the relevant technical standards, e.g. ISO 1704.

4.3.3.3 Chain stopper **iTeh STANDARD PREVIEW**

a) Based upon the defined SWL, the specification of minimum chain stoppers is given in <u>Table 4</u>.

https://standards.iteb.a	i/-atal	
SWL SWL 8	7674bde0fa4 S hecification of minimum chain stoppers	
kN	specification of minimum chain scoppers	
1 000	Chafing chain diameter 52 mm	
2 000	Chafing chain diameter 76 mm	

Table 4 — Specification of minimum chain stoppers

- b) See <u>Annex D</u> for the general configuration of a chain stopper.
- c) In the closed position, the chain stopper design shall be such that it prevents chafing chains from being thrown-out due to their sudden release.
- d) Materials may be weldable cast steel, forged steel or rolled steel that conforms to the manufacturer's standards. The weldments must conform to the requirements of qualified welding procedures (WPS), etc.
- e) The chain stopper product shall be free from defects that affect its intended use, such as cracks, sand holes and pores.
- f) If the chain stopper is welded to its foundation, the weld strength shall be capable to resist design loads of at least 1,3× specified ultimate strength of the chain stopper or the weakest component of the emergency towing arrangement if that be lower.
- g) If the chain stopper is bolted to its foundation, effective thrust blocks shall be provided to reduce the shear.
- h) The chain stopper's SWL shall be marked at a conspicuous location on the chain stopper.
- i) When the ship is provided with a chain stopper for a single point mooring arrangement (SPM), that chain stopper may also be used for the ETA.

j) In lieu of a conventional chain stopper, a Smit-Type bracket together with an appropriate arrangement is considered acceptable.

4.3.3.4 Pedestal roller

a) The minimum roller diameter specification for pedestal rollers is given in <u>Table 5</u>.

Table 5 —	Specification	of pedestal	rollers
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Applicable tanker DWT	Minimum roller diameter, ϕ	
rippituble tunner b tt i	mm	
20 000 ≤ DWT < 50 000 tonnes	300	
50 000 tonnes ≤ DWT	350	

b) Materials may be weldable cast steel, forged steel or rolled steel that conforms to the manufacturer's standards. The weldments must conform to the requirements of WPS, etc.

4.3.4 Stern ETA

4.3.4.1 Pick-up gear

The general configuration of a pick-up gear is given in Figure 3.





4.3.4.2 Towing rope

- a) The length shall be at least twice the ship's freeboard when in its lightest ballasted condition, plus 50 m.
- b) The towing rope shall be provided with a rigid eye ring suitable for the connection to a standard shackle. The rigid eye ring shall not be attached by a manual tuck. A poured socket or other types of mechanical attachment shall be used.
- c) See <u>Annex E</u> for the general configuration of a towing rope.
- d) The towing rope and pick-up gear may be connected by a shackle or studless chain.

4.3.4.3 Fairlead

a) The fairlead shall be of a closed type, with an opening large enough to allow the passage of the towing rope.

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- b) The fairlead should be capable of supporting the stress at the angles described in <u>4.3.1</u>.
- c) The ratio of the curvature of the fairlead surface in contact to the towing rope diameter under stress during towing operations shall be not less than 7:1.
- d) Materials shall be weldable cast steel, e.g. 200-400 W in accordance with ISO 14737.
- e) The product shall be free from defects that affect its intended use, such as cracks, sand holes and pores.
- f) The SWL shall be marked at a conspicuous location on the fairlead.

4.3.4.4 Strong point

a) The strong point may be integrated into a design of the fairlead, the general configuration of a strong point is given in <u>Annex F</u> and its working state is given in <u>Figure 4</u>.



Figure 4 — Working state of a fairlead/strong point

- b) The strong point shall have the equivalent strength as that of the device, such as brake, bracket, etc.
- c) If the material is weldable cast steel, e.g. 200-400 W in accordance with ISO 14737, the product shall be free from defects that affect its intended use, such as cracks, sand holes and pores.
- d) If the material is rolled steel, the welds shall be smooth and flat, and shall be free from defects, such as cracks, pores, undercut and lack of fusion/penetration. The weldments must conform to the requirements of WPS, etc.
- e) The SWL shall be marked at a conspicuous location on the strong point.

4.3.4.5 Storage container of the pick-up gear

a) The design shall be such that the pick-up gear can be easily cast into the sea.

- b) Materials shall be ordinary rolled steel, stainless steel or other materials (such as glass reinforced plastic) that conform to the manufacturer's standards.
- c) If the storage container is provided with the hinges, their material shall be suitable for the exposed marine environment or stainless steel.

4.3.4.6 Storage winch

- a) The storage winch shall be used for the storage of the towing rope.
- b) The winch design shall be such that it can control the release speed of the towing rope.
- c) Materials shall be ordinary rolled steel or other materials that conform to the manufacturer's standards.
- d) The welds shall be smooth and flat, and shall be free from defects, such as cracks, pores, undercut and lack of fusion/penetration.

5 Test method

5.1 Bow ETA

5.1.1 Prototype strength test for the bow ETA

- a) Magnetic particle inspection shall be carried out on the fairlead, chain stopper and chafing chain prior to the test so as to ensure they are free from defects.
- b) Using the SWL requirements of <u>4.2.1</u> and <u>4.3.1</u>, the fairlead, chain stopper and chafing chain shall be tensioned to twice the SWL. ISO 21130:2019
- c) Tension force shall be gradually applied to the components and the maximum tension held for 1 min.
- d) After the test, the prototype shall be examined for any failures, including unacceptable deformations.
- e) The prototype of an ETA arrangement that was strength-tested shall not be installed on board.

5.1.2 Fairlead

- a) A physical and chemical inspection shall be carried out for the material test rods, and the inspection results shall conform to the corresponding material standards.
- b) A magnetic particle inspection shall be carried out during the manufacturing process but after surface polishing; the product shall be free from defects that affect its intended use, such as cracks, sand holes and pores.

5.1.3 Chain stopper

- a) If the material is cast steel, a physical and chemical inspection shall be carried out for the material test rods, and the inspection results shall conform to the corresponding material standards.
- b) A magnetic particle inspection shall be carried out after surface polishing; the product shall be free from defects that affect its use, such as cracks, sand holes and pores.
- c) For components made of forgings, a physical and chemical inspection shall be carried out for the material test rods, and the inspection results shall conform to the corresponding material standards. An 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.