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Ships and marine technology — Loose gear of lifting appliances on ships — Hooks

Navires et technologie maritime — Accessoires mobiles des appareils de levage sur les navires — Crocs

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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

Ships and marine technology — Loose gear of lifting appliances on ships — Hooks

1 Scope

This International Standard specifies the types and basic parameters, technical requirements, marking, storage, and transportation, use and maintenance of hooks as loose gear of lifting appliances on ships.

This International Standard is applicable to lifting appliances on ships.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1837, *Lifting hooks — Nomenclature*

ISO 16855, *Ships and marine technology — Loose gear of lifting appliances on ships — General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16855 and ISO 1837 apply.

4 Types

4.1 Common hook types

4.1.1 Shank hook with point (S-shaped)

For the shapes and dimensions of a shank hook with point, see A.1.

4.1.2 Shank ramshorn hook (D-shaped)

For the shapes and dimensions of a shank ramshorn hook, see A.2.

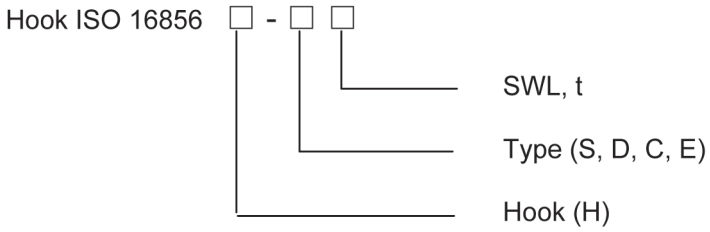
4.1.3 C-hook (C-shaped)

For the shapes and dimensions of a C-hook, see A.3.

4.2 Other types (E-shaped)

Types of hooks in ISO 1837 other than common hook types that can also be used as ship hooks fall under E-shaped.

4.3 Model designation



Figure

EXAMPLE Designation of a shank hook with point with 20 t SWL:

Hook ISO 16856 H-S20

4.4 Locking device requirement

Various types of hooks shall be provided with automatic locking devices.

5 Technical requirements

5.1 Materials

5.1.1 Hook materials must use solid steel manufactured by Martin furnaces, electric furnaces, or oxygen top-blown converters; it is recommended to use the electroslag remelting process.

5.1.2 For the chemical composition of hook materials, see Table 1. Other materials can be used (see 5.6).

Table 1 — Chemical composition of hook materials

Materials	Chemical composition (heat analysis) %						
	C	Si	Mn	P	S	Cr	Al
Carbon steel	0,17–0,24	0,17–0,35	0,45–0,80	≤0,035	≤0,035	≤0,030	≥0,025
Carbon-manganese steel	0,17–0,24	0,20–0,35	1,20–1,50	≤0,035	≤0,035	≤0,030	≥0,025

5.1.3 For the mechanical properties of hook materials, see Table 2. Other mechanical properties can be used (see 5.6).

Table 2 — Mechanical properties of hook materials

Materials	Mechanical properties						
	Tensile strength R_m MPa	Yield point R_{eH} MPa			Elongation A %		Impact energy A_K J
	Diameters or thicknesses of steel mm						
	≤100	≤16	>16–40	>40–60	≤50	≤100	≤60
Carbon steel	402–490	255	245	235	—	22	48
Carbon-manganese steel	510–608	353	343	333	22	—	41

NOTE 1 The values listed in this table refer to mechanical properties at normal temperature.

NOTE 2 For diameters or thicknesses > 60 mm, the impact energy and yield point under strain aging conditions are determined by the supplier and the purchaser based on demand.

If materials have no obvious yield points, the yield point R_{eH} shall be the yield strength $R_{P0,2}$.

5.1.4 When the design temperature of lifting appliances on ships is below −10 °C, the impact energy test temperature of hook materials shall satisfy the requirements of related organizations, such as classification societies.

5.2 Forging and heat treatment

5.2.1 The forging ratio of forged pieces shall be no less than 3 during the use of steel ingot and no less than 1,5 during the use of steel billet.

5.2.2 Heat treatment must be made after hook forging to achieve the properties specified in 5.1, with no more than three times of heat treatment.

5.3 Surface and internal quality of hooks

5.3.1 The surface of hooks shall be smooth and clean, without any defect such as burrs, cracks, folding, and burning.

5.3.2 Inside hooks, there shall be no cracks, fish eyes, or other defects such as impurities that affect their safe use. For other defects, such as impurities, allowed to exist, the following provisions shall be met: for single defects, the equivalent diameter shall be no more than 5 mm; for scattered defects, it is expected that the equivalent diameter shall be no more than 3 mm and the distributed length shall be no more than 30 mm.

5.3.3 Defects in hooks cannot be rewelded.

5.4 Tests

5.4.1 Every hook shall be proof tested, with test loads given in Table 3. Proof load shall be applied to each hook with a testing machine or test weight for a duration of not less than 5 min.

Table 3 — Proof load for hooks

Safe working load (SWL) kN	Proof load (PL) kN
≤245	2 × SWL
>245	1,22 × SWL + 196

5.4.2 After proof testing, each hook shall be thoroughly examined for deformation, cracks, or other defects and to ensure that its rotating parts can rotate freely.

5.4.3 The proof load can be applied to a shank ramshorn hook as indicated in Figure 1 a) or Figure 1 b), but in the latter case, an additional load of half the proof load is to be subsequently applied, as shown in Figure 1 c).

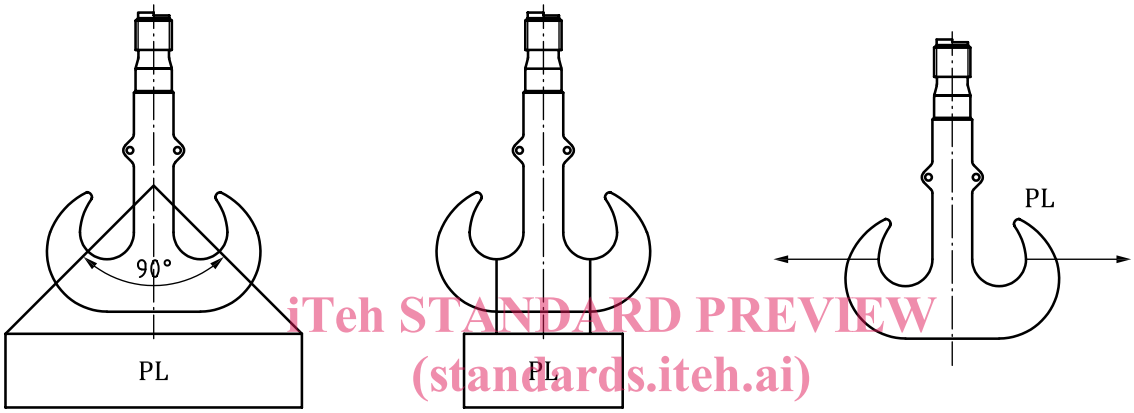


Figure 1 — Proof testing of shank ramshorn hook

5.5 Inspection

5.5.1 Inspection shall be made after the production of hooks to ensure that the surface and internal quality satisfies the requirements of 5.3, and the requirements of 5.4.2 after the test.

5.5.2 For hooks that pass the test, the manufacturer shall provide technical documents such as certifications.

5.6 Other requirements

For hooks (type or SWL, materials) beyond common types, strength shall be calculated during the design. The calculations of hook stress are checked based on the curved beam theory, in which the safety factor of the allowable stress to the yield limit of materials is no less than 1,55. Commercially available forged hooks that meet industry standards in terms of SWL, design factor, forging reduction, heat treatment, testing, and inspection are acceptable as agreed on by the supplier and the purchaser.

6 Marking

6.1 Marks of hooks shall be permanently distinct with the following items:

a) safe working load, in t;

b) test load, in kN;

c) test date;

d) hook number;

e) manufacturer's stamp or the stamp of test unit.

6.2 Hooks shall be marked at their broad space, but not at their bends, for check.

6.3 For hooks of a small size, should the place where marking is restricted, the marks of number and date can be eliminated.

7 Storage and transportation

7.1 During storage, the machined surfaces of hooks that pass the test shall be painted with anti-rust oil, and their non-machined surfaces shall be painted with anti-rust paint.

7.2 Secure packaging shall be made for hooks to prevent collision during transportation.

8 Use and maintenance

8.1 Upon installation on the lifting appliances, hooks shall be checked before each use, with major check items as follows:

a) wear;

b) normal operation of moving parts;

c) good lubrication;

d) no abnormal conditions such as loose fixed parts or defects;

e) no crack, scratch, and heat damage, including welding slag or arc striking mark, in hook bodies.

8.2 Hook defects found during the check shall be repaired and cannot be used until confirmation by an experienced personnel. Hooks shall be scrapped under the following circumstances:

a) there are defects in the hooks, such as crack, heat damage, including welding slag or arc striking mark, which prevent them from use;

b) the dimension of the worn moving part reaches 10 % of its total dimension.