INTERNATIONAL STANDARD

ISO 16855

First edition
2013-12-15

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

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

Reference number
ISO 16855:2013(E)

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Published in Switzerland

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Foreword

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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 — General requirements

1 Scope

This International Standard specifies the general requirements for loose gear of lifting appliances on ships.

This International Standard is applicable to lifting appliances on ships.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
loose gear
gear which is not permanently attached to the lifting appliances, such as chains, triangle eyeplates, hooks, blocks, shackles, swivels, sockets, preventer guys with patent clips, and rigging screws

Note 1 to entry: Lifting beams, spreaders, frames, and similar items of equipment are also regarded as loose gear.

2.2
safe working load
certified load for which the component has been designed and tested

Note 1 to entry: This certified load should be not less than the maximum load to which the component will be subjected when the appliance of which it forms part is operating at its SWL.

3 Technical requirements

3.1 Materials

3.1.1 Loose gear, such as hooks, lifting eyes, swivels, and shackles shall not be made of cast iron or cast steel.

3.1.2 Forgings shall be normalized or normalized and tempered or otherwise heat-treated according to a method appropriate to the properties of materials. Shackle materials shall use solid steel manufactured by Martin furnaces, electric furnaces, or oxygen top blown converters; it is recommended to use the electroslag remelting process.

3.2 Blocks

3.2.1 Blocks shall be so constructed to minimize the clearance between sheaves and enclosure partition plates to prevent ropes from jamming.

3.2.2 Effective lubricating shall be maintained to the blocks during operation. Provision shall be made for lubricating all bearings and swivel head fittings without dismantling the block.

3.2.3 Snatch blocks shall not be used in the lifting appliance systems.

3.2.4 The ratio of sheave diameter measured at the bottom of rope groove to the diameter of rope shall not be less than that as given in Table 1.

Table 1 — Ratio of sheave diameter to rope diameter

Use of sheaves		Sheave diameter/rope diameter	
		Running ropes	Static ropes
Wire ropes	Derrick rigs (including derrick cranes)	13	8
	Cranes and submersible handling systems	19	8
Fibre ropes		6	

3.3 Other technical requirements

3.3.1 "C" type hooks shall be so designed as to prevent the risk of the hook from catching on the ship's structure or other obstruction when hoisting by means of a hook shelter. Hooks for special purposes, such as for lifting freight containers, shall comply with the appropriate recognized International Standards.

3.3.2 Swivel shall be provided between the hook and short link chain or other item for lifting cargo, and capable of rotating freely and preventing from getting loose.

3.3.3 It is recommended that heavy load such as bob weight or short link chain be attached to the hook, such that disorder of reeling rope will not occur when the winch is working in no load condition.

3.3.4 The shackle pin end shall be screwed and provided with devices to prevent from getting loose. Shackles used for attaching the lifting gear (such as hooks, bob weight, or short link chains for lifting cargo, etc.) shall be provided with countersunk pins.

3.3.5 The thickness of triangle plates connecting short link chains and cargo runners shall be appropriate to the associated shackle so as to minimize the clearance between them.

3.3.6 The construction of rigging screws shall be capable of preventing their end fittings from turning. The end fittings of the rigging screw shall be forged in one piece. The rigging screws of hook type end fittings shall not be used in the lifting appliance system.

3.3.7 Chains used as span chain or as part of preventer guy shall be of studless long link chains. Preventer guy with patent clip shall be fitted with stop device; the distance between the device and the end clip shall be as short as practical and, in general, not greater than one pitch of the clips.

3.3.8 The items of loose gear, such as eyes, links, shanks, straps and hooks, etc., that have a wastage over 10 % of their original dimensions and a wastage of pins over 6 % of their original dimensions, or cracks or permanent deformation, and any breakage or cracks on the sheaves, shall be replaced or repaired immediately.

3.3.9 Welding shall not be used to lengthen, alter, or repair chains, hooks, links, shackles, or swivels.

4 Test requirements

4.1 Where testing machines are used to apply test loads, they shall be calibrated biennially by a recognized unit and the accuracy shall be within ±2 %. Where test weights are used to apply test loads, the weights shall be certified as accurate to within ±2 %.

4.2 Every item of loose gear shall be proof-tested. The proof load applied to each item of loose gear shall be as the requirements given in Table 2 and associated notes. Proof load shall be applied to each item with a testing machine or test weight for a duration of not less than 5 min.

Table 2 — Test load for loose gear

No.	Item	Test load kN
1	Single sheave blocks	4 × SWL
2	Multi-sheave blocks SWL ≤ 245 kN 245 kN < SWL ≤ 1 568 kN SWL > 1 568 kN	2 × SWL 0,933 × SWL + 265 1,1 × SWL
3	Chains, hooks, rings, shackles, swivels, etc SWL ≤ 245 kN 245 kN < SWL	2 × SWL 1,22 × SWL + 196
4	Lifting beams, spreaders, frames, and the like SWL ≤ 98 kN 98 kN < SWL ≤ 1 568 kN SWL > 1 568 kN	2 × SWL 1,04 × SWL + 94 1,1 × SWL

NOTE 1 The safe working load for single sheave blocks, including single sheave blocks with beckets, shall be taken as one-half of the load on the head fitting.

NOTE 2 The safe working load for a multi-sheave block shall be taken as the load on the head fitting.

NOTE 3 As an alternative to the testing per Table 2, the loose gear can be proof-tested in accordance with the requirements of the Flag Administration or a Classification Society acceptable to the Flag Administration provided the proof test is equal to or greater than the proof test specified in Table 2.

4.3 For blocks, test loads shall be taken as the total load on the head fittings of blocks during tests. If blocks are provided with beckets, during their proof tests, loads applied to beckets shall be taken as their proof test loads for acceptance.

4.4 In any case when single sheave blocks are used, shackles or end fittings connected to blocks should be stamped with twice the safe working load marked on the blocks.

4.5 After proof testing, each item of loose gear shall be thoroughly examined for deformation, cracks, or other defects and to ensure that its rotating parts can rotate freely.

4.6 Short and long link chains shall be subjected to a breaking test in addition to the proof test as required in Table 2. In general, a sample of 5 links length shall be taken from each length of chain measuring 55 m and shall withstand a breaking load not less than 4 × SWL for the chain.

4.7 Where the design of a lifting beam or similar item is such that the load can be lifted and supported in more than one manner, each arrangement shall be separately tested.

4.8 Under the following circumstances, loose gear shall be re-tested:

a) in case of no corresponding certificates of examination to prove that components have been tested in advance;

b) after any repair or change that might affect component strength.

5 Marking

5.1 Every item of loose gear which has been proof-tested and examined and found satisfactory in accordance with the above Clause 5 shall be marked visibly and permanently.

5.2 In view of the importance of ensuring correct safe working loads at specific positions of lifting appliances for each component of loose gear and for easy replacement, it is recommended to keep a specification or a detailed rigging plan on board.

5.3 It is recommended that the specification should be based on ISO 233, which has already provided a set of standard tables.

5.4 It is recommended that rigging plan use the symbol table specified in ISO 233.

5.5 Each item of loose gear, including lifting beams and similar components, shall be marked with the following contents:

a) safe working load, in t;

b) mark of steel grade shown in Table 3;

c) manufacturer's stamp or the stamp of test unit;

d) design maximum wire rope diameter for blocks;

e) self weight, in kN, for lifting beams and similar components.

Table 3 — Quality level marks of materials

Quality level marks	Steel types	Ultimate tensile strength N/mm^2
L	Mild steel	300
M	High strength steel	400
P	Alloy steel	500
S	Alloy steel	630
T	Alloy steel	800

5.6 Fraction strokes and slashes shall be avoided; it is preferred to use points or dashed lines rather than boundaries. In general, when safe working load is marked in t, the value following the decimal shall be marked.

5.7 Marks shall be stamped at the conspicuous place of the item so as to facilitate inspection but they shall not be stamped at the places where high stress or stress concentration takes place. The positions where marks are stamped shall be as follows and the typical arrangement of the marks is shown in Figure 1.

a) hooks: to be marked at their broad space but not at their bends;

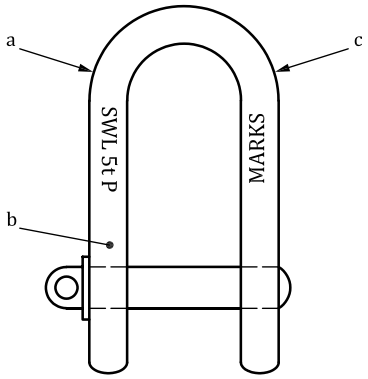
b) blocks: to be marked at their straps or face plates;

c) shackles: to be marked at their jaws adjacent to the pin holes;

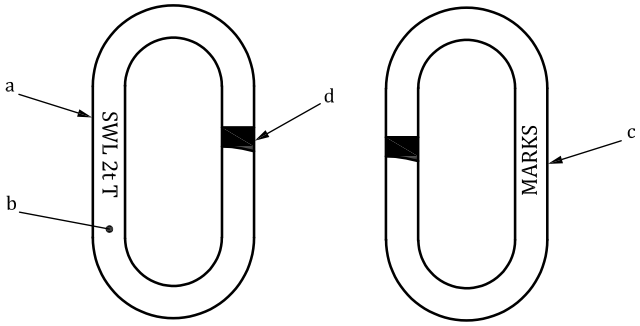
d) swivels: to be marked at the sides of their bow piece;

e) chains: to be marked at the straight side of their end links;

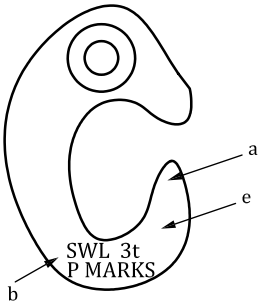
f) preventer guys with patent clips: to be marked at each clip.



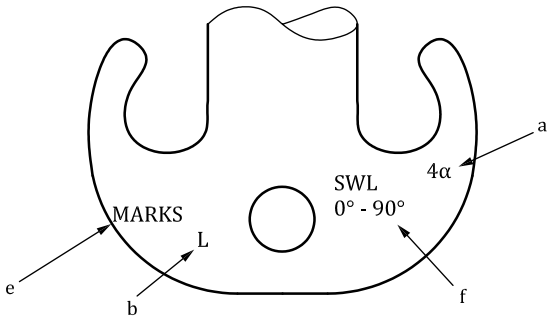
a) Shackles



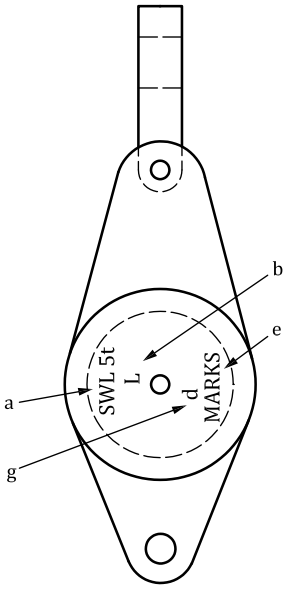
b) Chains and links



c) C hooks



d) Ramshorn hooks



e) Blocks

Key

a safe working load

b quality mark

c identification number and surveyor's or manufacturer's stamp

d weld (if any)

e identification number and surveyor's or manufacturer's stamp (Marks can be on the back of the hook/block, i.e. on the opposite side to SWL.)

f range of sling angles

g rope diameter

Figure 1 — Typical marks of loose gear

Bibliography

[1] ISO 233, *Documentation — Transliteration of Arabic characters into Latin characters*

[2] ISO 1837, *Lifting hooks — Nomenclature*

[3] ISO 2415, *Forged shackles for general lifting purposes — Dee shackles and bow shackles*

ICS 47.020.50;47.020.40

Price based on 7 pages