



International
Standard

ISO 10855-2

**Offshore containers and associated
lifting sets —**

Part 2:
**Design, manufacture and marking
of lifting sets**

*Conteneurs pour une utilisation en mer et dispositifs de levage
associés —*

*Partie 2: Conception, fabrication et marquage des dispositifs de
levage associés*

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy*, Subcommittee SC 7, *Offshore structures*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 12, *Oil and gas industries including lower carbon energy*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 10855-2:2018), which has been technically revised.

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The main changes are as follows:

- hardness requirements have been defined for chain and link components.

A list of all parts in the ISO 10855 series can be found on the ISO website.

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.

Introduction

The ISO 10855 series meets the requirements of IMO MSC/Circ.860 (1998) for the design, construction, inspection, testing and in-service examination of offshore containers and the associated lifting sets which are handled in open seas.

The ISO 10855 series does not cover operational use or maintenance.

Under conditions in which offshore containers are often transported and handled, the 'normal' rate of wear and tear is high, and damage necessitating repair can occur. However, containers designed and manufactured according to the ISO 10855 series have sufficient strength to withstand the normal forces encountered in offshore operations and to not suffer from complete failure even if subject to extreme loads.

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Offshore containers and associated lifting sets —

Part 2: Design, manufacture and marking of lifting sets

1 Scope

This document specifies requirements for lifting sets for use with containers in offshore service, including technical requirements, marking and statements of conformity for single and multi-leg slings, including chain slings and wire rope slings.

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 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

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

ISO 10474, *Steel and steel products — Inspection documents*

ISO 15613, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test*

EN 818-4:1996, *Short link chain for lifting purposes. Safety Chain slings - Grade 8*

EN 13414-1, *Steel wire rope slings — Safety — Part 1: Slings for general lifting service*

3 Terms and definitions

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

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

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

3.1

lifting set

items of integrated lifting equipment used to connect the offshore container to the lifting appliance

Note 1 to entry: This can comprise one or multi-leg wire rope or chain slings (with or without a top leg) and shackles, whether assembly secured or not.

3.2

sling

one leg of a lifting set

3.3

assembly secured

fitted to a sling leg and secured by a seal or similar device so as to signal unambiguously whether or not the shackle has been exchanged

Note 1 to entry: Shackles that are assembly secured, i.e. cannot be separated from the lifting set, are considered to be part of the lifting set.

4 Symbols and abbreviated terms

$m_{WLL,s}$	minimum working load limit of each shackle, in t
$m_{WLL,min}$	minimum calculated working load limit from Annex A , in t
$m_{WLL,off}$	maximum lifting capacity of a lifting set to be used on an offshore container, in t
NOTE 1	$m_{WLL,off}$ is the value that is to be marked on the lifting sets and may be higher than m_R .
ϑ	is the angle between a sling leg and the vertical, in degrees
m_R	rating [i.e. the maximum gross mass (MGM), of the container including permanent equipment and its cargo], in kg, but excluding the lifting set
m_T	tare mass (i.e. the mass of an empty container including any permanent equipment but excluding cargo and lifting set), in kg
m_p	payload (i.e. the maximum permissible mass of cargo which can be safely transported by the container), in kg
T_D	design air temperature (i.e. a minimum reference temperature used for the selection of steel grades used in offshore containers and equipment) expressed, in °C
m_S	mass of the lifting set in kg

NOTE 2 $m_p = m_R - m_T$.

NOTE 3 m_R , m_T and m_p are expressed in kg. Where design requirements are based on the gravitational forces derived from these values, those forces are indicated thus as m_Rg , m_Tg and m_pg , expressed in N.

5 Technical requirements

5.1 General requirements

5.1.1 Slings shall be rated for their intended angle of use. In all cases 4-leg slings shall be rated as for 3-leg slings. Maximum sling leg angle to the vertical shall be 45°.

NOTE Top legs are calculated as single legs.

The minimum working load limit for each sling leg shall be calculated as per [Table 1](#).

For chain slings the alternative method of rating in EN 818-4:1996, Annex A shall be applied.

5.1.2 Where two 2-leg slings are selected to function as a 4-leg sling, they shall be calculated as for a 4-leg sling.

5.1.3 Hinge type coupling components shall not be used.

NOTE This restriction is to avoid the possibility of the coupling seizing in the folded position due to corrosion and subsequently failing when forced straight under load.

5.2 Dimensions and strength of lifting sets

5.2.1 To allow for the dynamic amplification that is experienced in offshore lifting in adverse weather and sea states, the working load limit of the lifting sets for offshore containers shall be determined using [Annex A](#). Except for containers with ratings below 2 000 kg, the container rating m_R shall be multiplied by an enhancement factor to give the minimum working load limit ($m_{WLL,min}$) of the lifting set. For intermediate container ratings the $m_{WLL,min}$ values shall be interpolated.

5.2.2 The $m_{WLL,min}$ from [Annex A](#) shall be used for determination of the nominal size of the lifting set.

The master link which is to be attached to the crane hook shall have minimum dimensions of 270 mm × 140 mm internally.

5.2.3 The minimum working load limit of each shackle ($m_{WLL,s}$) shall be calculated as given in [Table 1](#).

Table 1 — Required minimum shackle working load limit ($m_{WLL,s}$)

4-leg sling	2-leg sling	Single leg sling
$m_{WLL,min} / (3 \times \cos \vartheta)$	$m_{WLL,min} / (2 \times \cos \vartheta)$	$m_{WLL,min}$

5.2.4 The lifting set should be of sufficient length to allow easy handling by operators. The top link or master link shall be able to reach down to a height of no more than 1,3 m above the container bottom when the sling hangs over the long side of the container.

5.3 Chain slings

Chain slings shall meet all requirements of EN 818-4.

5.4 Wire rope slings

5.4.1 Wire rope slings shall meet all the requirements of EN 13414-1 with restrictions as specified in [5.4.2](#) and [5.4.3](#).

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5.4.2 The wire rope shall be 6-stranded and of type 6 × 19 or 6 × 36.

5.4.3 The termination of wire rope shall be a ferrule secured thimble.

As an aid to in-service inspection, ferrules which permit the tail end of the rope to be visible should be used.

5.4.4 Wire rope grade 1770 or 1960 shall be used. The working load limit shall be calculated on the basis of the actual rope grade used.

NOTE This also applies when slings are rated and marked in accordance with [5.1.1](#), NOTE.

5.5 Shackles

5.5.1 Shackles shall be of Grade 6 or Grade 8 and meet all the requirements of ISO 2415, with the additional requirement that the tolerance on the nominal diameter of the shackle pin shall be −0 +3 %.

NOTE EN 13889 and EN 1677-1 are considered alternative standards to ISO 2415.

5.5.2 Shackles shall be restricted to bolt type pin with a hexagon head, hexagon nut and split cotter pin.

5.6 Materials

5.6.1 Impact testing

Steels in chains, links, shackles and couplings shall be impact tested by the Charpy impact (V-notch) method in accordance with ISO 148-1. The impact test temperature shall be equal to the design air temperature T_D and the minimum average impact energy shall be 42 J. However, for welded components (e.g. chains, links,) it shall be sufficient only to take impact test samples in the weld with the notch centred in the fusion line. The position of the weld shall be accurately identified by etching with a suitable reagent before cutting the notches. The minimum average impact energy of the weld shall be 27 J.

Where the cross section of the material to be tested is too small to allow the standard test specimen to be taken (10 mm × 10 mm), the required energy values shall be reduced as follows:

- 10 mm × 7,5 mm: $\frac{5}{6}$ of the minimum average impact energy for standard size specimens;
- 10 mm × 5,0 mm: $\frac{2}{3}$ of the minimum average impact energy for standard size specimens.

For tests where the size of the test piece is too small (diameter less than 13 mm), tests may be carried out on sample material which shall be of the same specification and heat treatment.

5.6.2 Hardness testing

Chains and link components should not exceed hardness value of 38 HRC. See ISO 18265 for hardness conversion values.

5.6.3 Welding

In addition to the requirements of EN 818-4, qualification of the welding process shall be in accordance with ISO 15613.

5.6.4 Corrosion protection

Corrosion protection coatings shall only be applied under the control of the manufacturer of the component.

5.6.5 Material certificates

The materials used in all components shall be supplied with an inspection certificate in accordance with either ISO 10474, type 3.1, or, in the case of materials in ferrules and thimbles, ISO 10474, type 2.2, with content as detailed in [Clause 6](#).

6 Certificates

6.1 Preparation of certificates

Certificates provided in support of claims of conformity to the requirements of this document shall be prepared in accordance with ISO 10474 and contain the information specified in the relevant product standard, together with that specified in [6.2](#) or [6.3](#) as appropriate.

6.2 Single component certificates

Single components used in slings conforming to this document shall have certificates as specified in [5.6.5](#), containing the information specified in the relevant product standard together with the following, as a minimum:

- manufacturer's name, mark and contact location;