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Lyftkranar – Offshorekranar – Del 1: Offshorekranar för allmänt ändamål

Cranes – Offshore cranes – Part 1: General-purpose offshore cranes

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Denna standard ersätter SS-EN 13852-1:2004, utgåva 1 och SS-EN 13852-1:2004/AC:2007, utgåva 1.

The European Standard EN 13852-1:2013 has the status of a Swedish Standard. This document contains the official version of EN 13852-1:2013.

This standard supersedes the Swedish Standard SS-EN 13852-1:2004, edition 1 and SS-EN 13852-1:2004/AC:2007, edition 1.

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EUROPEAN STANDARD

EN 13852-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2013

ICS 47.020.40; 53.020.20

Supersedes EN 13852-1:2004

English Version

Cranes - Offshore cranes - Part 1: General-purpose offshore cranes

Appareils de levage à charge suspendue - Grues off-shore
- Partie 1: Grues off-shore pour usage général

Krane - Offshore-Krane - Teil 1: Offshore-Krane für
allgemeine Verwendung

This European Standard was approved by CEN on 19 July 2013.

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COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 13852-1:2013) has been prepared by Technical Committee CEN/TC 147 “Cranes - Safety”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2014, and conflicting national standards shall be withdrawn at the latest by March 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13852-1:2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA and Annex ZB which are integral parts of this document.

Since the previous version, major changes have been made including the scope. New requirements are introduced on load chart, electrotechnical and non electrical equipment, mode and rigging selector, back-up brake on luffing winches, wire ropes, lighting, dropped object protection, controls, data recorder, motion limiters, rated capacity limiter, boom backstop, emergency operation system, fire protection and protective earthing, etc. Major changes have also been made to Annexes B, F, G, K, M and O.

There are several updates in standard references, and a number of clauses have been redrafted for reasons of clarity and technical and editorial accuracy.

EN 13852, *Cranes — Offshore cranes*, is composed of the following parts:

- *Part 1: General-purpose offshore cranes* (the present document);
- *Part 2: Floating cranes*.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard has been prepared to be a harmonised standard to provide one means for general purpose offshore cranes to conform to the essential health and safety requirements of the Machinery Directive, as mentioned in Annex ZA.

Absolute safety of cranes cannot be ensured by design alone, as their operation depends on the skill of operators, maintenance personnel and inspectors as well as on the numerous technical parameters relating to the crane and its operating environment, which can have large scatter.

As many of the hazards related to general-purpose offshore cranes relate to their operating environment and use, it is assumed in the preparation of this European Standard that all the relevant information relating to the use and operating environment of the crane has been exchanged between the manufacturer and user (as recommended in ISO 9374-1:1989 and ISO 9374-4:1989) covering such issues as, for example:

- clearances;
- requirements concerning protection against hazardous environments;
- processed materials, such as potentially flammable or explosive material (e.g. hydrocarbons, combustible dust, etc).

This European Standard is a type C standard as stated in EN ISO 12100:2010.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered and indicated in the scope of this European Standard.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

NOTE 1 A floating crane is a crane mounted on a vessel or barge designed for its support and transport, primarily intended for construction/deconstruction operations in a marine environment.

NOTE 2 EN 13852-2 is not a harmonised standard.

1 Scope

This European Standard specifies the requirements for general-purpose offshore cranes including their supporting pedestals or structures.

The standard is applicable to general-purpose offshore cranes covered by the scope of this European Standard which are manufactured after the date of its publication as EN.

This European Standard is not applicable to general-purpose offshore cranes which are manufactured before the date of its publication as an EN.

This European Standard does not cover use of - or hazards relating to the following:

- a) fabrication, transportation, assembly, dismantling, disabling, scrapping or changing the configuration of the crane;
- b) lifting accessories, i.e. any item between the hook and the load;
- c) minimum design temperature below -20 °C ;
- d) operations at an ambient temperature above 45 °C ;

NOTE: For equipment designed for operation in explosive atmospheres, the normal ambient temperature range is -20 °C to $+40\text{ °C}$, unless otherwise specified and marked. See Annex O and relevant standards indicated for complete information.

- e) lifting operations involving more than one crane;
- f) accidental loads due to collisions;
- g) hand powered cranes and other cranes with a rated capacity less than 2 t or outreach less than 8 m;
- h) emergency rescue operations; (except training)
- i) subsea lifting operations.

The significant hazards covered by this European standard are identified in Clause 4.

This European Standard includes requirements for the lifting of personnel by a general-purpose offshore crane.

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.

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 842:1996+A1:2008, *Safety of machinery — Visual danger signals — General requirements, design and testing*

EN 953:1997+A1:2009, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 1127-1:2011, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology*

- EN 10025-1:2004, *Hot rolled products of structural steels — Part 1: General technical delivery conditions*
- EN 10025-2:2004, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*
- EN 10025-3:2004, *Hot rolled products of structural steels — Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*
- EN 10025-4:2004, *Hot rolled products of structural steels — Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*
- EN 10025-5:2004, *Hot rolled products of structural steels — Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*
- EN 10025-6:2004+A1:2009, *Hot rolled products of structural steels — Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition*
- EN 10083-1:2006, *Steels for quenching and tempering — Part 1: General technical delivery conditions*
- EN 10083-2:2006, *Steels for quenching and tempering — Part 2: Technical delivery conditions for non alloy steels*
- EN 10204:2004, *Metallic products — Types of inspection documents*
- EN 12077-2:1998+A1:2008, *Cranes safety — Requirements for health and safety — Part 2: Limiting and indicating devices*
- EN 12385-1:2002+A1:2008, *Steel wire ropes — Safety — Part 1: General requirements*
- EN 12385-2:2002+A1:2008, *Steel wire ropes — Safety — Part 2: Definitions, designation and classification*
- EN 12385-3:2004+A1:2008, *Steel wire ropes — Safety — Part 3: Information for use and maintenance*
- EN 12385-4:2002+A1:2008, *Steel wire ropes — Safety — Part 4: Stranded ropes for general lifting applications*
- EN 12644-1:2001+A1:2008, *Cranes — Information for use and testing — Part 1: Instructions*
- EN 12644-2:2000+A1:2008, *Cranes — Information for use and testing — Part 2: Marking*
- EN 13001-1:2004+A1:2009, *Cranes — General design — Part 1: General principles and requirements*
- EN 13001-2:2011¹⁾, *Crane safety — General design — Part 2: Load actions*
- CEN/TS 13001-3-1:2004, *Cranes — General design — Part 3-1: Limit states and proof of competence of steel structures*
- CEN/TS 13001-3-2:2008, *Cranes — General design — Part 3-2: Limit states and proof of competence of wire ropes in reeving systems*
- CEN/TS 13001-3-5:2010, *Cranes — General design — Part 3-5: Limit states and proof of competence of forged hooks*
- EN 13135:2013, *Cranes — Safety — Design — Requirements for equipment*

1) This standard is impacted by the corrigendum EN 13001-2:2011/AC:2012.

- EN 13411-3:2004+A1:2008, *Terminations for steel wire ropes — Safety — Part 3: Ferrules and ferrule-securing*
- EN 13411-4:2011, *Terminations for steel wire ropes — Safety — Part 4: Metal and resin socketing*
- EN 13411-6:2004+A1:2008, *Terminations for steel wire ropes — Safety — Part 6: Asymmetric wedge socket*
- EN 13411-7:2006+A1:2008, *Terminations for steel wire ropes — Safety — Part 7: Symmetric wedge socket*
- EN 13463-1:2009, *Non-electrical equipment for use in potentially explosive atmospheres — Part 1: Basic method and requirements*
- EN 13478:2001+A1:2008, *Safety of machinery — Fire prevention and protection*
- EN 13557:2003+A2:2008, *Cranes — Controls and control stations*
- EN 13586:2004+A1:2008, *Cranes — Access*
- EN 14502-1:2010, *Cranes — Equipment for the lifting of persons — Part 1: Suspended baskets*
- EN 60079-0:2009, *Explosive atmospheres — Part 0: Equipment — General requirements (IEC 60079-0:2007 + corrigendum Dec. 2010)*
- EN 60079-14:2008, *Explosive atmospheres — Part 14: Electrical installations design, selection and erection (IEC 60079-14:2007)*
- EN 60079-15:2010, *Explosive atmospheres — Part 15: Equipment protection by type of protection “n” (IEC 60079-15:2010)*
- EN 60204-32:2008, *Safety of machinery — Electrical equipment of machines — Part 32: Requirements for hoisting machines (IEC 60204-32:2008)*
- EN 61000-6-2:2005, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2:2005)*
- EN 61000-6-4:2007²⁾, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4:2006)*
- EN 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems (IEC 61508)*
- EN ISO 898-1:2013, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs specified property classes — Coarse thread and fine pitch thread (ISO 899-1:2013)*
- EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*
- EN ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO 4413:2010)*
- EN ISO 4414:2010, *Pneumatic fluid power — General rules and safety requirements for systems and their components (ISO 4414:2010)*

2) This text is impacted by the stand-alone amendment EN 61000-6-4:2007/A1:2011 (IEC 61000-6-4:2006/A1:2010).

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 7731:2008, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731:2003)*

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

IEC 60529 ed2.1 (2001)³⁾, *Degrees of protection provided by enclosures (IP Code)*

ISO 8566-1:2010, *Cranes — Cabins and control stations — Part 1: General*

ISO 9927-1:2013, *Cranes — Inspections — Part 1: General*

ISO 12478-1:1997, *Cranes — Maintenance manual — Part 1: General*

ISO 12480-1:1997, *Cranes — Safe use — Part 1: General*

ISO 12482-1:1995, *Cranes — Condition monitoring — Part 1: General*

ISO 20332:2008, *Cranes — Proof of competence of steel structures*

FEM 1.001 (10.1998), *Rules for the design of hoisting appliances*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply.

NOTE Additional terms and definitions specifically addressed in this document are added below.

3.1

actual hook load

total static weight of the load including any equipment placed between the load and the hook

3.2

automatic overload protection system

AOPS

system that automatically safeguards and protects the crane against the effects of a gross overload during operation by allowing the hook to be pulled away from the crane in downwards direction within specified offlead and sidelead angles, without causing significant damage to the crane

3) This standard is impacted by IEC Corrigenda 1 (2003) and 2 (2007).

3.3 component

single part or assembly of parts of a crane, which is subjected to load effects (wire ropes, stationary or running, traverse beams, pendant bars, rope sheaves, axles, gears, couplings, brakes, hoists, hydraulic cylinders, shafts, shackles, swivels and pins, etc.)

3.3.1 primary component

component which is essential for the mechanical and structural integrity of the crane, e.g. boom and a-frame lacing members

3.3.2 secondary component

component that is not a primary component

3.4 crane stiffness

vertical static force applied at the hook required to produce unit vertical deflection assuming the pedestal support structure to be rigid

3.5 design load

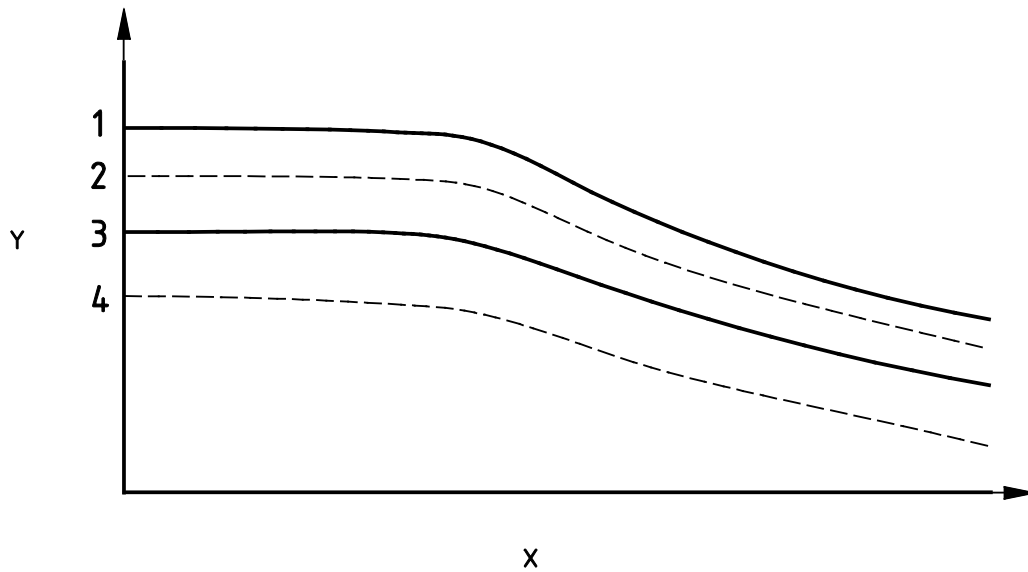
maximum theoretical load ($R_0 \times \Phi_0$) that can be safely lifted by the crane at any given radius in the design condition such that the acceptance criteria are not exceeded

Note 1 to entry: See Figure 1.

3.6 design moment

maximum moment caused by the design load multiplied by radius

Note 1 to entry: See Figure 1.



$$R_0 \times \Phi_0 \geq R_n \times \Phi_n + \text{“Loss”}$$

Key

- X radius
- Y load
- 1 design load $R_0 \times \Phi_0$
- 2 operational load $R_n \times \Phi_n$
- 3 on-board lift R_0
- 4 off-board lift R_n

Figure 1 — Design load and design moment

3.7 design temperature

T_d
 lowest mean daily temperature

Note 1 to entry: The design temperature is a reference temperature used as a criterion for the selection of materials.

3.8 dynamic coefficient

Φ_n
 ratio between the maximum dynamic load at the hook and the actual hook load for any given configuration or operating condition

3.9 emergency operation system

EOS
 back-up system for limited operation of the crane, if the normal system of operation is inoperative

3.10 folding

motion from a mechanical system, which enable the knuckle boom assembly to be folded or unfolded

3.11 general-purpose offshore crane

multipurpose slewing jib type offshore crane

3.12

hazardous area

area in which an explosive gas atmosphere is or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of the equipment

3.13

hoisting

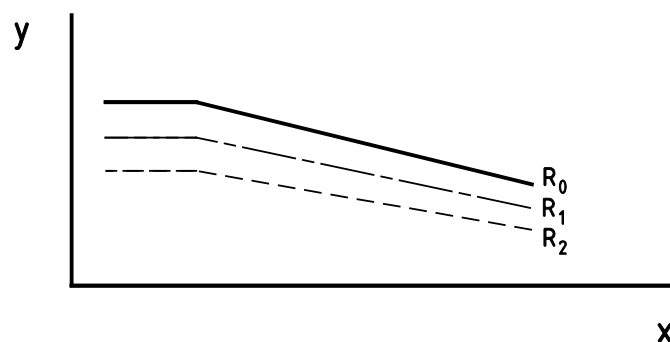
motion from a mechanical system, which enables the hook to be raised and lowered

3.14

load chart

diagram or table showing the rated capacity relative to the radius, environmental conditions, out of plane influences and type of operation

Note 1 to entry: An example is given in Figure 2 showing rated capacity for off-board lifts to and from the deck of supply vessels at 3 fall hoist reeving. Maximum 1° trim and 2° heel, maximum wind speed 25 m/s.



Key

X radius

Y rated capacity

R₀ rated capacity for on-board lifts

R₁ rated capacity for off-board lifts with wave height $H_{1/3} = 1$ m

R₂ rated capacity for off-board lifts with wave height $H_{1/3} = 2$ m

Figure 2 — Load chart

3.15

lowest mean daily temperature

lowest value on the annual mean daily temperature curve for a specific area

3.16

luffing

motion from a mechanical system which enables the boom to be raised or lowered

3.17

manual overload protection system

MOPS

system activated by the crane operator, that protects the crane against possible overload by limiting the hoist rope pull to a low value and allowing the hook to be pulled away from the crane in any direction

3.18

mean daily temperature

statistical 24 hour mean temperature for a specific calendar day, averaged over a number of years of operation

3.19

minimum operating temperature

T_0

lowest temperature the crane can be operated at without compromising the safety of the crane, and which, for the selection of steel materials, is normally 20 °C below the design temperature

3.20

off-board lift

lifting operation between the offshore installation and a floating unit or the sea

3.21

offlead load

horizontal load at the boom tip caused by the radial displacement of the hook and/or the radial acceleration of the boom tip, including the effects of crane base inclination

3.22

offshore crane

crane mounted on an offshore installation and used for on-board and off-board lifts

3.23

offshore installation

structure supported by the seabed or floating unit, exposed to an offshore marine environment

3.24

on-board lift

lifting operation within the offshore installation

3.25

overload

condition where the actual hook load exceeds the design load

3.26

over-moment

condition where the actual hook load multiplied by the radius (at existing inclination and offlead) exceeds the design moment

3.27

personnel lift

lifting operation where personnel are lifted by the crane

3.28

radius

horizontal distance between the crane axis of slewing and a vertical line through the hook when the axis of slewing is vertical and there is no offlead

3.29

rated capacity

R_0 or R_n

actual hook load that the crane is designed to lift for a given operating condition "n" (e.g. boom configuration, reeving arrangement, offlead/sidelead, heel/trim, radius, wave height, etc)

Note 1 to entry: Rated capacity R_0 equates to Safe Working Load (SWL) as used by ILO conventions.

3.30

rated capacity limiter

RCL

device or system that automatically prevents the rated capacity from being exceeded during on-board lifts or personnel lifts

3.31**running rigging**

all wire ropes passing over rope sheaves or guide rollers, or wound on winches, irrespective of whether or not the ropes are moved under load

3.32**sidelead load**

horizontal load at the boom tip caused by the lateral displacement of the hook and/or the lateral acceleration of the boom tip, including the effects of crane base inclination

3.33**significant damage**

state of loading that represents 80 % of the calculated failure load of the weakest load carrying structural or mechanical component

3.34**significant wave height**

$H_{1/3}$

average height of the highest one third of the individual wave heights in a short term constant state of sea, typically 3 h

3.35**standing rigging**

ropes that are not turned round or wound on to winches (e.g. guided wires, pendants, stays)

3.36**telescoping**

motion from a mechanical system, which enable the boom to be extended or retracted

4 List of significant hazards

Table 1 contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this European Standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

The significant hazards are based upon EN ISO 12100:2010. Also shown are the subclause references to the safety requirements and/or protective measures in this standard.

A risk assessment of the general-purpose offshore crane shall be carried out to check that the hazards identified Table 1 and any other relevant hazards not identified in Table 1 are dealt with.

Table 1 — List of significant hazards and associated requirements

No	Significant hazards and hazardous events	Machinery Directive 2006/42/EC, Annex I	Requirement clause(s) in this standard
1	Mechanical hazards due to		
	— machine parts or workpieces	1.3	5.7.4
	— accumulation of energy inside the machinery	1.5.3, 1.6.3	5.4.2, 5.4.3
1.1	Crushing hazard	1.3	5.7.2, 5.9.3
1.2	Shearing hazard	1.3	5.7.2, 5.9.3
1.4	Entanglement hazard	1.3	5.3.11, 5.5.2
1.5	Drawing-in or trapping hazard	1.3	5.7.2, 5.9.3