



SLOVENSKI STANDARD SIST EN 16851:2017+A1:2021

01-april-2021

Žerjavi - Lahki žerjavni sistemi

Cranes - Light crane systems

Krane - Leichtkransysteme

Appareils de levage à charge suspendue - Systèmes de grue légère

Ta slovenski standard je istoveten z: **EN 16851:2017+A1:2020**

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Cranes - Light crane systems

Appareils de levage à charge suspendue - Systèmes de
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Krane - Leichtkransysteme

This European Standard was approved by CEN on 14 November 2016 and includes Amendment 1 approved by CEN on 9 November 2020.

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EN 16851:2017+A1:2020 (E)**European foreword**

This document (EN 16851:2017+A1:2020) 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of an identical text or by endorsement, at the latest by June 2021, and conflicting national standards shall be withdrawn at the latest by June 2021.

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

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, which is an integral part of this document.

This document includes Amendment 1 approved by CEN on 9 November 2020.

A1 This document supersedes EN 16851:2017. **A1**

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**.

For relationship with other European Standards for cranes, see Annex D.

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

Introduction

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

This European Standard has been prepared to provide one means for equipment of cranes to conform to the essential health and safety requirements of the Machinery Directive.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document (see Clause 1).

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.

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EN 16851:2017+A1:2020 (E)**1 Scope**

A1 This document applies to:

- light crane systems, either suspended or free-standing systems, where the rated capacity of any single lifting device is 4 t or less;
- pillar and wall-mounted jib cranes, without an operator's cabin, whose rated capacity is 10 t or less and whose overturning load moment is 500 kNm or less.

NOTE For illustration of crane types, see Annex B.

This document is not applicable to cranes covered by another product specific crane standard, e.g. EN 15011:2011+A1:2014 or EN 14985:2012.

This document is applicable to cranes and crane systems, whose structures are made of steel or aluminium, excluding aluminium structures containing welded joints.

This document gives requirements for all significant hazards, hazardous situations and events relevant to cranes, when used as intended and under conditions foreseen by the manufacturer (see Clause 4).

The specific hazards due to potentially explosive atmospheres, ionizing radiation, operation in electromagnetic fields beyond the range of EN 61000-6-2:2016 and operation in pharmacy or food industry are not covered by this document.

This document does not cover hazards related to the lifting of persons.

This document is applicable to cranes, which are manufactured after the date of its publication by CEN as a European Standard.

This document is not applicable to cranes manufactured before the date of its publication. **A1**

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2 Normative references

A1 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.

EN 515:2017, *Aluminium and aluminium alloys - Wrought products - Temper designations*

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

EN 755-9:2016, *Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 9: Profiles, tolerances on dimensions and form*

EN 795:2012, *Personal fall protection equipment - Anchor devices*

EN 894-1:1997+A1:2008, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 1: General principles for human interactions with displays and control actuators*

EN 894-2:1997+A1:2008, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 2: Displays*

EN 12077-2:1998+A1:2008, *Cranes safety - Requirements for health and safety - Part 2: Limiting and indicating devices*

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 13001-1:2015, *Cranes - General design - Part 1: General principles and requirements*
- EN 13001-2:2014, *Crane safety - General design - Part 2: Load actions*
- EN 13001-3-1:2012+A2:2018, *Cranes - General Design - Part 3-1: Limit States and proof competence of steel structure*
- EN 13001-3-2:2014, *Cranes - General design - Part 3-2: Limit states and proof of competence of wire ropes in reeving systems*
- EN 13001-3-3:2014, *Cranes - General design - Part 3-3: Limit states and proof of competence of wheel/rail contacts*
- EN 13001-3-4:2018, *Cranes - General design - Part 3-4: Limit states and proof of competence of machinery - Bearings*
- EN 13001-3-5:2016, *Cranes - General design - Part 3-5: Limit states and proof of competence of forged hooks*
- EN 13001-3-6:2018, *Cranes - General design - Part 3-6: Limit states and proof of competence of machinery - Hydraulic cylinders*
- EN 13135:2013+A1:2018, *Cranes - Safety - Design - Requirements for equipment*
- EN 13157:2004+A1:2009, *Cranes - Safety - Hand powered cranes*
- EN 13557:2003+A2:2008, *Cranes - Controls and control stations*
- EN 13586:2004+A1:2008, *Cranes - Access*
- EN 14238:2004+A1:2009, *Cranes - Manually controlled load manipulating devices*
- EN 14492-2:2019, *Cranes - Power driven winches and hoists - Part 2: Power driven hoists*
- EN 15011:2011+A1:2014, *Cranes - Bridge and gantry cranes*
- EN 60204-32:2008, *Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines (IEC 60204-32:2008)*
- 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 4871:2009, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*
- 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 11202:2010, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections (ISO 11202:2010)*

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EN ISO 11203:2009, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203:1995)*

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 13849-1:2015, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2015)*

EN ISO 13854:2019, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body (ISO 13854:2017)*

EN ISO 13857:2019, *Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2019)*

EN ISO 14120:2015, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards (ISO 14120:2015)*

ISO 3864 (all parts), *Graphical symbols — Safety colours and safety signs*

ISO 4306-1:2007, *Cranes — Vocabulary — Part 1: General*

ISO 4309:2017, *Cranes — Wire ropes — Care and maintenance, inspection and discard* ^{A1}

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ^{A1} ISO 4306-1:2007, EN ISO 3744:2010 ^{A1} and the following apply.

**3.1
light crane system**

assembly of lifting devices, bridges, trolleys and tracks with their suspensions for lifting operations

**3.2
bridge**

beam carrying lifting device(s) and supported on trolleys running on tracks

Note 1 to entry: Wording of the definition differs from that given in ^{A1} ISO 4306-1:2007 ^{A1}.

**3.3
track**

stationary beam on which a bridge or lifting device(s) are running

Note 1 to entry: Characteristic for tracks in light crane systems is that a track can be removed from the supporting building structures without influence on strength of the supporting structures.

**3.4
suspension**

necessary clamps, hanger rods and other fittings from which a track is suspended from a building or other supporting structure

3.5**monorail**

☞ single track consisting of one or several sections, on which lifting devices or trolleys are running

Note 1 to entry: Monorail together with lifting devices is a particular type of a light crane system. ☞

☞ 3.6**pillar mounted jib crane**

crane with a vertical pillar fixed on a floor, equipped with a slewing jib and lifting device(s)

3.7**wall mounted jib crane**

crane fixed to a vertical structure (e.g. wall or column), equipped with a slewing jib and lifting device(s)

3.8**jib crane**

generic term for both pillar mounted and wall mounted jib cranes

Note 1 to entry: This definition is different from that in ISO 4306-1:2007. ☞

3.9**free-standing system**

floor-mounted light crane system

Note 1 to entry: A free-standing system can be supported by the surrounding structures using bracings.

Note 2 to entry: Characteristic for a free-standing system is that it can be removed from the supporting building structures without influence on strength of the supporting structures.

Note 3 to entry: For an example of free-standing system see Figure B.4.

3.10**trolley**

wheel assembly running on a track or on a bridge and supporting a bridge or lifting device

Note 1 to entry: Definition differs from that specified in ISO 4306-1.

3.11**loading/unloading station**

arrangement enabling a piece of track to be lowered down and lifted up together with the lifting device or trolley

3.12**turntable**

component able to rotate in a horizontal plane and containing a piece of track, enabling the lifting device or trolley to change from one track to another

3.13**switch**

component enabling the lifting device or trolley to change from one track to another

3.14**interlock**

mechanism aligning a moving bridge with a stationary track or aligning two bridges and keeping this aligned connection steady for lifting device or trolley to move through the connection

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.

Table 1 — List of significant hazards and associated requirements

No.	Type or group	Origin (sources)	Subclauses of this European Standard
1	Mechanical hazards		
1.1	Hazards generated by machine parts or work pieces, e.g. by:		
1.1.1		Relative location	5.4.3, 5.4.5, 5.4.6, 5.4.7, 5.4.8, 5.4.10, 5.7.3, Clause 6, 7.2
1.1.2		Mass and stability	5.1, 5.2, 5.3, 5.4.1, 5.4.2, 5.4.3, 5.4.4, 5.4.6, 5.4.7, 5.4.8, 5.4.9, 5.4.10, Clause 6, 7.2, 7.4
1.1.3		Mass and velocity	5.1, 5.2, 5.3, 5.4.1, 5.4.2, 5.4.3, 5.4.10, 5.5, 5.7.3, Clause 6, 7.2
1.1.4		Inadequacy of mechanical strength	5.1, 5.2, 5.3, 5.4.1, 5.4.2, 5.4.3, 5.4.4, 5.4.6, 5.4.7, 5.4.9, 5.4.10, Clause 6, 7.1, 7.4
1.2	Accumulation of energy inside the machinery, e.g. by:		
1.2.1		Fluids under pressure	5.4.11, Clause 6, 7.1, 7.2
1.3	Elementary forms of mechanical hazards:		
1.3.1		Crushing	5.7.3, 7.1
1.3.2		Shearing	5.1, 5.7.3, 7.1
1.3.3		Cutting or severing	5.7.3, 7.1
1.3.4		Drawing-in or trapping hazard - moving transmission parts	5.7.3, 7.1
1.3.5		Impact	5.7.3, 7.1, 7.2
1.3.6		High pressure fluid injection or ejection hazard	5.4.11, 5.7.3, 7.1

No.	Type or group	Origin (sources)	Subclauses of this European Standard
2	Electrical hazards due to:		
2.1		Contact of persons with live parts (direct contact)	5.4.11, 5.7.3, 7.2
2.2		Contact of persons with parts which have become live under faulty conditions (indirect contact)	5.1
2.3		Approach to live parts under high voltage	5.4.11, 5.7.3, 7.2
2.5		Thermal radiation or other phenomena such as the projection of molten particles and chemical effects from short-circuits, overloads, etc.	5.1
3	Thermal hazards, resulting in:		
3.1		burns and scalds, by possible contact of persons with objects or materials with an extreme temperature, by flames, by radiation, etc.	5.7.3, 7.3
4	Hazards generated by noise, resulting in:		
4.1		Hearing losses	5.7.5
4.2		Interference with speech communication, signals	7.3.1
5	Hazards generated by vibration		
5.1		Whole body vibration, particularly when combined with poor postures	
6	Radiation		
6.1		External radiation	5.1
7	Processed materials and substances, used materials, fuels		
7.1		Hazards from contact with harmful fluids, gases, mists, fumes and dusts	7.1
7.2		Fire or explosion hazard	Clause 1, 7.1
8	Neglected ergonomic principles in machine design, e.g. hazards from:		
8.1		Unhealthy postures or excessive efforts	5.1, 5.7.3

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No.	Type or group	Origin (sources)	Subclauses of this European Standard
8.2		Inadequate consideration of hand-arm or foot-leg anatomy	5.7.3
8.3		Neglected use of personal protection equipment	5.7.3, 5.7.5, 7.2, 7.3
8.4		Inadequate local lighting	5.7.4
8.6		Human errors, human behaviour	5.7.1, 7.2, 7.3
8.7		Inadequate design, location or identification of manual controls	5.1, 5.7.1
8.8		Inadequate design or location of visual display units	5.7.1, 5.8.4
9	Unexpected start-up, unexpected overrun/over speed (or any similar malfunction) from:		
9.1		Failure/disorder of control systems	5.1, Clause 6, 5.9
9.2		Other external influences (gravity, wind, etc.)	7.2
9.3		Errors in the software	Clause 6, 5.9
9.4		Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see hazard N° 8.6)	5.7.1, 5.7.2, 7.2, 7.3
10		Impossibility of stopping the machine in the best possible conditions	5.7.1, 5.7.2, 7.2
11		Failure of the power supply	5.4.11
12		Failure of the control circuit	5.1, 5.7.1, 5.9
13	Break-up during operation		
13.1		Thermal effect on the crane	Clause 7
14		Falling or ejected object or fluid	5.1, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.4.8, 5.4.9, 5.4.10, 5.7.3.4, Clause 6
15		Loss of stability / overturning of machinery	5.4.9, Clause 6, 7.4
16		Slip, trip and falling of persons (related to machinery)	5.7.2
17	Hazards relating to the travelling function		
17.1		Movement without an operator at the driving position	5.1, 5.7.2, 5.9

No.	Type or group	Origin (sources)	Subclauses of this European Standard
17.2		Excessive speed of pedestrian controlled machinery	5.7.2, 5.9
17.3		Excessive oscillations when moving	5.7.2, 7.2
17.4		Insufficient ability of machinery to be slowed down, stopped and immobilized	5.4.10, 5.7.2, Clause 6
17.5		From derailment due to travelling	5.4.1, 5.4.5, 5.4.6, 5.4.7, 5.4.9
18	Linked to the work position (including driving station) on the machine		
18.1		Fall of persons during access to (or at/from) the work position	5.7.3, 5.7.4
18.2		Mechanical hazards at the work position	5.7.3, 7.1, 7.2
18.3		Insufficient visibility from the working position	5.7.4
18.4		Inadequate lighting	5.7.4
18.5		Inadequate seating	5.7.1
18.6		Noise at the driving position	5.7.5
18.7		Vibration at the driving position	5.7.1
19	Due to the control system		
19.1		Inadequate location of controls /control devices	5.1, 5.7.1, 5.7.2
19.2		Inadequate design of the actuation mode and/or action mode of controls	5.1, 5.7.1
20		From handling the machine (lack of stability)	5.5
21	From/to third persons		
21.1		Unauthorized start-up/use	7.3
21.2		Drift of a part away from its stopping position	5.4.11
21.3		Lack or inadequacy of visual or acoustic warning means	5.8
22	Insufficient instructions for the driver / operator		
22.1		Movement into prohibited area	5.8, 7.2, 7.3
22.2		Tipping - Swinging	7.2, 7.3