



# SLOVENSKI STANDARD SIST EN 16851:2017

01-marec-2017

---

**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**

[SIST EN 16851:2017](https://standards.iteh.ai/catalog/standards/sist/fe01c5b3-ae16-418b-837e-e0932add2b9f/sist-en-16851-2017)

<https://standards.iteh.ai/catalog/standards/sist/fe01c5b3-ae16-418b-837e-e0932add2b9f/sist-en-16851-2017>

**ICS:**

53.020.20      Dvigala                                      Cranes

**SIST EN 16851:2017**                                      **en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 16851:2017](#)

<https://standards.iteh.ai/catalog/standards/sist/fe01c5b3-ae16-418b-837e-e0932add2b9f/sist-en-16851-2017>

EUROPEAN STANDARD

EN 16851

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2017

ICS 53.020.20

English Version

## Cranes - Light crane systems

Appareils de levage à charge suspendue - Systèmes de  
grue légère

Krane - Leichtkransysteme

This European Standard was approved by CEN on 14 November 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

[SIST EN 16851:2017](https://standards.iteh.ai/catalog/standards/sist/fe01c5b3-ae16-418b-837e-e0932add2b9f/sist-en-16851-2017)

<https://standards.iteh.ai/catalog/standards/sist/fe01c5b3-ae16-418b-837e-e0932add2b9f/sist-en-16851-2017>



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

<b>Contents</b>	<b>Page</b>
European foreword.....	5
Introduction .....	6
<b>1 Scope</b> .....	<b>7</b>
<b>2 Normative references</b> .....	<b>7</b>
<b>3 Terms and definitions</b> .....	<b>9</b>
<b>4 List of significant hazards</b> .....	<b>11</b>
<b>5 Safety requirements and/or protective measures</b> .....	<b>16</b>
5.1 General.....	16
5.2 Aluminium structures .....	17
5.2.1 General.....	17
5.2.2 Products and materials.....	17
5.2.3 Proof of static strength.....	18
5.2.4 Proof of fatigue strength.....	18
5.2.5 Proof of elastic stability.....	19
5.3 Actions on supporting structures.....	19
5.4 General components.....	19
5.4.1 Joints in crane tracks, crane bridges and monorails.....	19
5.4.2 Suspensions.....	20
5.4.3 Bridge skewing.....	20
5.4.4 Backup devices for trolleys and suspensions.....	20
5.4.5 Turntables and switches .....	20
5.4.6 Interlock .....	21
5.4.7 Loading/unloading station .....	22
5.4.8 Telescopic and cantilevered crane systems.....	22
5.4.9 Trolleys.....	23
5.4.10 End stops and motion limiters .....	23
5.4.11 Power supply .....	24
5.5 Tandem operation of cranes/trolleys from a single control station.....	24
5.6 Use of multiple lifting devices.....	24
5.7 Man-machine interface .....	24
5.7.1 Control devices and control stations.....	24
5.7.2 Horizontal speeds .....	24
5.7.3 Guarding and access.....	25
5.7.4 Lighting.....	26
5.7.5 Reduction of noise by design .....	26
5.8 Equipment for warning.....	27
5.8.1 General.....	27
5.8.2 Warning markings .....	27
5.8.3 Cableless control warning light .....	27
5.8.4 Location of the visual display unit .....	27
5.9 Safety related functions of control systems.....	27
<b>6 Fitness for purpose testing</b> .....	<b>28</b>
6.1 Functional test.....	28
6.2 Static test.....	28

6.3	Dynamic test.....	29
7	Information for use.....	29
7.1	General.....	29
7.2	Operator's manual.....	29
7.3	User's manual.....	30
7.3.1	General.....	30
7.3.2	Instructions for installation.....	30
7.3.3	Instructions for maintenance.....	32
7.4	Marking of rated capacities.....	33
	Annex A (informative) Guidance for specifying the operating duty.....	34
	Annex B (normative) Actions on supporting structures and installation dimensions.....	35
B.1	Loads and load combinations.....	35
B.2	Jib cranes.....	36
B.2.1	Pillar jib crane.....	36
B.2.2	Wall-mounted jib crane.....	37
B.3	Suspended light crane systems.....	38
B.4	Free-standing systems.....	39
	Annex C (normative) Noise test code.....	40
C.1	General.....	40
C.2	Description of machinery family.....	41
C.3	Determination of a conventional emission sound pressure level by calculation.....	41
C.3.1	Principle of the method.....	41
C.3.2	Calculation.....	41
C.4	Determination of emission sound pressure level at control stations and other specified positions and determination of sound power level by measurement.....	43
C.4.1	Measurement method and points.....	43
C.4.1.1	Measurement of sound pressure level at working positions.....	43
C.4.1.2	Determination of sound power level or sound pressure level at determined positions.....	44
C.4.2	Installation and mounting conditions.....	44
C.4.3	Operating conditions.....	45
C.4.3.1	General.....	45
C.4.3.2	Hoisting and traversing.....	45
C.4.3.3	Travelling.....	45
C.5	Uncertainties.....	46
C.6	Information to be recorded.....	46
C.7	Information to be reported.....	46
C.8	Declaration and verification of noise emission values.....	46
	Annex D (informative) Selection of a suitable set of European Standards for cranes in a given application.....	48

EN 16851:2017 (E)

<b>Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered .....</b>	<b>50</b>
<b>Bibliography.....</b>	<b>51</b>

**iTeh STANDARD PREVIEW  
(standards.iteh.ai)**

SIST EN 16851:2017

<https://standards.iteh.ai/catalog/standards/sist/fe01c5b3-ae16-418b-837e-e0932add2b9f/sist-en-16851-2017>

## European foreword

This document (EN 16851:2017) 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 July 2017, and conflicting national standards shall be withdrawn at the latest by July 2017.

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 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.

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

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/fe01c5b3-ae16-418b-837e-e0932add2b9f/sist-en-16851-2017>

## 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.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 16851:2017](https://standards.iteh.ai/catalog/standards/sist/fe01c5b3-ae16-418b-837e-e0932add2b9f/sist-en-16851-2017)

<https://standards.iteh.ai/catalog/standards/sist/fe01c5b3-ae16-418b-837e-e0932add2b9f/sist-en-16851-2017>



## 1 Scope

This European Standard applies to:

- light crane systems, either suspended or free-standing systems;
- pillar jib cranes;
- wall-mounted jib crane.

NOTE 1 For illustration of crane types, see Annex B.

NOTE 2 The rated capacity of the light crane systems is generally below 10 t, but the standard is still applicable, if the rated capacity is higher.

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

This European Standard is not applicable to cranes covered by another product specific crane standard, e.g. EN 15011 or EN 14985.

This European Standard 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 and operation in pharmacy or food industry are not covered by this European Standard.

This European Standard does not include requirements for the lifting of persons.

This European Standard is applicable to cranes, which are manufactured after the date of approval by CEN of this European Standard.

## 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 349, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

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

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

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

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

EN 894-1, *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, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

**EN 16851:2017 (E)**

EN 12077-2, *Cranes safety — Requirements for health and safety — Part 2: Limiting and indicating devices*

EN 12644-1, *Cranes — Information for use and testing — Part 1: Instructions*

EN 13001-1, *Cranes - General design - Part 1: General principles and requirements*

EN 13001-2, *Crane safety - General design - Part 2: Load actions*

EN 13001-3-1, *Cranes — General Design — Part 3-1: Limit States and proof competence of steel structure*

EN 13001-3-2, *Cranes - General design - Part 3-2: Limit states and proof of competence of wire ropes in reeving systems*

EN 13001-3-3, *Cranes - General design - Part 3-3: Limit states and proof of competence of wheel/rail contacts*

EN 13001-3-5, *Cranes - General design - Part 3-5: Limit states and proof of competence of forged hooks*

EN 13135, *Cranes - Safety - Design - Requirements for equipment*

EN 13157, *Cranes — Safety — Hand powered cranes*

EN 13557:2003+A2:2008, *Cranes - Controls and control stations*

EN 13586, *Cranes — Access*

EN 14238, *Cranes — Manually controlled load manipulating devices*

EN 14492-2, *Cranes — Power driven winches and hoists — Part 2: Power driven hoists*

EN 15011, *Cranes — Bridge and gantry cranes*

EN 60204-32, *Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines (IEC 60204-32)*

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, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871)*

EN ISO 11201, *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)*

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)*

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

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

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

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

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

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

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

ISO 4309, *Cranes — Wire ropes — Care and maintenance, inspection and discard*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4306-1, EN ISO 3744 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 ISO 4306-1.

#### 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**

track on which lifting devices or trolleys are running

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

**EN 16851:2017 (E)****3.6****jib crane**

crane operating in a fixed position, equipped with a slewing jib and lifting device(s)

**3.7****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.

**3.8****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.

**3.9****loading/unloading station**

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

**3.10****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

**3.11****switch**

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

**3.12****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
<b>1</b>	<b>Mechanical hazards</b>		
<b>1.1</b>	<b>Hazards generated by machine parts or work pieces, e.g. by:</b>		
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
<b>1.2</b>	<b>Accumulation of energy inside the machinery, e.g. by:</b>		
1.2.1		Fluids under pressure	5.4.11, Clause 6, 7.1, 7.2
<b>1.3</b>	<b>Elementary forms of mechanical hazards:</b>		
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
<b>2</b>	<b>Electrical hazards due to:</b>		
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
<b>3</b>	<b>Thermal hazards, resulting in:</b>		
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
<b>4</b>	<b>Hazards generated by noise, resulting in:</b>		
4.1		Hearing losses	5.7.5
4.2		Interference with speech communication, signals	7.3.1
<b>5</b>	<b>Hazards generated by vibration</b>		
5.1		Whole body vibration, particularly when combined with poor postures	
<b>6</b>	<b>Radiation</b>		
6.1		External radiation	5.1
<b>7</b>	<b>Processed materials and substances, used materials, fuels</b>		
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
<b>8</b>	<b>Neglected ergonomic principles in machine design, e.g. hazards from:</b>		
8.1		Unhealthy postures or excessive efforts	5.1, 5.7.3

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
<b>9</b>	<b>Unexpected start-up, unexpected overrun/over speed (or any similar malfunction) from:</b>		
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
<b>10</b>		<b>Impossibility of stopping the machine in the best possible conditions</b>	5.7.1, 5.7.2, 7.2
<b>11</b>		<b>Failure of the power supply</b>	5.4.11
12		Failure of the control circuit	5.1, 5.7.1, 5.9
<b>13</b>	<b>Break-up during operation</b>		
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
<b>17</b>	<b>Hazards relating to the travelling function</b>		
17.1		Movement without an operator at the driving position	5.1, 5.7.2, 5.9