



SLOVENSKI STANDARD

oSIST prEN 81-43:2021

01-november-2021

Varnostna pravila za konstruiranje in vgradnjo dvigal (liftov) - Posebna dvigala za prevoz oseb in blaga - 43. del: Dvigala za žerjave

Safety rules for the construction and installation of lifts - Special lifts for the transport of persons and goods - Part 43: Lifts for cranes

Sicherheitsregeln für die Konstruktion und Installation von Aufzügen - Besondere Aufzüge für den Transport von Personen und Gütern - Teil 43: Kranführeraufzüge

Règles de sécurité pour la construction et l'installation des élévateurs - Élévateurs particuliers destinés au transport des personnes et des matériaux - Partie 43: Élévateurs pour appareils de levage à charge suspendue

<https://standards.iteh.ai/catalog/standards/sist/fbc111d6-678b-4f64-ba10-67498021183f/osist-pren-81-43-2021>

Ta slovenski standard je istoveten z: prEN 81-43

ICS:

53.020.20	Dvigala	Cranes
91.140.90	Dvigala. Tekoče stopnice	Lifts. Escalators

oSIST prEN 81-43:2021

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 81-43:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/fbc111d6-678b-4f64-ba10-67498021183f/osist-pren-81-43-2021>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 81-43

September 2021

ICS 53.020.20; 91.140.90

Will supersede EN 81-43:2009

English Version

Safety rules for the construction and installation of lifts - Special lifts for the transport of persons and goods - Part 43: Lifts for cranes

Règles de sécurité pour la construction et l'installation
des élévateurs - Élévateurs particuliers destinés au
transport des personnes et des matériaux - Partie 43:
Élévateurs pour appareils de levage à charge
suspendue

Sicherheitsregeln für die Konstruktion und Installation
von Aufzügen - Besondere Aufzüge für den Transport
von Personen und Gütern - Teil 43: Kranführeraufzüge

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 10.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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, 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 United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

	Page
European foreword	5
Introduction	6
1 Scope.....	7
2 Normative references.....	8
3 Terms and definitions.....	10
4 List of significant hazards	13
5 Safety requirements and/or protective measures	16
5.1 General.....	16
5.2 Load combinations and calculations	16
5.2.3 Proof of static strength	23
5.2.4 Fatigue stress analysis of drive and braking system components.....	23
5.3 Base frame.....	23
5.4 Mast, ties and buffers.....	24
5.4.1 Guide rails and masts	24
5.4.2 Ties for mast and guide rails	24
5.4.3 Buffers.....	24
5.5 Liftway protection and landing access.....	25
5.5.1 General.....	25
5.5.2 Liftway protection	25
5.5.3 Landing access	27
5.5.4 Materials for enclosure and guarding	32
5.5.5 Landing gate locking devices.....	32
5.5.6 Clearances	34
5.5.7 Lighting.....	34
5.6 Car	35
5.6.1 General requirements.....	35
5.6.2 Overspeed safety device against falling of the car	37
5.6.3 Overload detection device	38
5.7 Drive unit.....	39
5.7.1 General provisions	39
5.7.2 Protection and accessibility.....	39
5.7.3 Suspension system	40
5.7.4 Braking system	46
5.8 Electric installations and appliances.....	46
5.8.1 General.....	46
5.8.2 Protection against electric faults	47
5.8.3 Protection against the effects of external influences.....	47
5.8.4 Electric wiring.....	47
5.8.5 Contactors, relay-contactors.....	48
5.8.6 Electric safety devices	48

5.8.7	Safety contacts	48
5.8.8	Safety circuits.....	49
5.8.9	Lighting.....	50
5.8.10	Safety functions.....	50
5.9	Control and limiting devices.....	52
5.9.1	General	52
5.9.2	Travel limit switches.....	52
5.9.3	Slack rope device	53
5.9.4	Mast detection switch	53
5.9.5	Erection accessories	53
5.9.6	Stopping devices	53
5.9.7	Stopping the machine.....	53
5.9.8	Drive unit fault detection device for rack and pinion system with two redundant drive units.....	54
5.9.9	Control modes.....	54
5.10	Breakdown conditions.....	55
5.10.1	Alarm device.....	55
5.10.2	Emergency escape	55
5.10.3	Manual lowering device for permanent installed lifts.....	55
5.10.4	Manual lowering device for temporary installed lifts.....	55
6	Verification	56
6.1	Verification of design	56
6.2	Special verification tests	58
6.2.1	Introduction	58
6.2.2	Locking devices for car and landing gates	59
6.2.3	Overspeed safety device and overspeed governors.....	60
6.2.4	Energy accumulation type buffers with buffered return movement and energy dissipation type buffers.....	62
6.2.5	Pressure-sensitive protective device.....	62
6.3	Verification tests on each lift before first use	62
7	User information.....	62
7.1	Instruction handbook	62
7.1.1	Comprehensive information.....	62
7.1.2	Contents of the instruction handbook	63
7.2	Markings	68
7.2.1	General	68
7.2.2	Identification plate within the car.....	68
7.2.3	Mast or guide section identification	68
7.2.4	Basic user information sign	68
7.2.5	Warning sign at ground level	69
7.2.6	Type plate at overspeed safety device	69
7.2.7	Drive motor label.....	69
7.2.8	Marking of control elements	69
Annex A (informative)	Identification of suclauses dealing with specific requirements for temporary installed lifts/permanent installed lifts.....	70
A.1	General	70
Annex B (normative)	Requirements for the installation of lifts (for cranes) on tower cranes.....	72
B.1	General	72
B.2	Safety requirements and/or protective measures.....	73

prEN 81-43:2021 (E)

B.2.1	Requirements for the access.....	73
B.2.2	Requirements for the mast ties and base frame to connect the lift to the tower crane.....	73
B.2.3	Requirements for the combination of the crane and the lift.....	73
B.3	Information exchanged between manufacturers.....	73
B.3.1	General.....	73
B.3.2	Information provided by the crane manufacturer to the lift manufacturer	73
B.3.3	Information provided by the crane manufacturer to the lift landing platform manufacturer.....	74
B.3.4	Information provided by the lift manufacturer for the lift landing platform manufacturer.....	74
B.3.5	Information provided by the lift landing platform manufacturer to the tower crane manufacturer.....	74
B.3.6	Information provided by the lift manufacturer to the tower crane manufacturer	74
Annex ZA (informative)	Relationship between this European Standard and essential Requirements of EU Directive 2006/42/EC aimed to be covered.....	75
Bibliography	80

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[osIST prEN 81-43:2021](https://standards.iteh.ai/catalog/standards/sist/fbc111d6-678b-4f64-ba10-67498021183f/osist-pren-81-43-2021)

<https://standards.iteh.ai/catalog/standards/sist/fbc111d6-678b-4f64-ba10-67498021183f/osist-pren-81-43-2021>

European foreword

This document (prEN 81-43:2021) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 81-43:2009.

The main modification are:

- Revision of requirements for design/calculation (5.2) and integration of requirements for earthquakes;
- design requirement to introduce the reference to EN 13001-1 and EN 13001-2 for the calculation have been revised and requirements for earthquakes have been added;
- Performance level in accordance with EN ISO 13849-1 have been added;
- A new Annex A (informative) identifying the specific requirements for temporary installed lifts/permanent installed lifts has been added;
- A new Annex B (normative) for lifts installed on tower cranes have been added.

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

[oSIST prEN 81-43:2021](https://standards.iteh.ai/catalog/standards/sist/bc11fd6-678b-4664-ba10-67498021183f/osist-pr-en-81-43-2021)

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

Introduction

This document is one of a series of standards produced by CEN/TC 10/SC 1 as part of the CEN programme of work to produce machinery safety standards.

This document is a Type C standard as stated in EN ISO 12100:2010.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

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

This document gives details for the complete installation.

In order to achieve a safe installation of a lift on a crane, negotiations shall take place between the crane user organization and the manufacturer of the lift and the manufacturer of the crane, about the interfaces (e.g. lift way protection, supporting structure, power supplies, suitability of alarm devices, ...) regarding the responsibility for these requirements. For installation of a lift on a tower crane, see Annex B (normative).

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.

1 Scope

1.1 This document specifies the safety requirements for the construction and installation of power operated lifts attached to cranes and intended for access to workplaces on cranes, by authorized persons. This includes intended use, erection, dismantling, inspection and maintenance. The lift serves defined landing levels and has a load carrying unit which is:

- a) designed for the transportation of persons and materials;
- b) guided;
- c) travelling vertically or along a path within 15 degrees maximum from the vertical;
- d) supported by rack and pinion or suspended by steel wire ropes;
- e) travelling with a speed not more than 1,0 m/s for permanent installed lifts and not more than 0,4 m/s for temporary installed lifts.

NOTE Annex A identifies the specific requirements applicable to the permanent installed lifts, respectively to the temporary installed lifts.

1.2 This document identifies hazards as listed in Clause 4 that arise during the various phases in the life of such equipment and describes methods for the elimination or reduction of these hazards when used as intended by the manufacturer.

1.3 This document does not specify the additional requirements for:

- a) operation in severe conditions (e.g. extreme climates, strong magnetic fields);
- b) noise;
- c) operation subject to special rules (e.g. potentially explosive atmospheres);

NOTE Directive 2014/34/EU concerning equipment and protective systems intended for use in potentially explosive atmospheres can be applicable to the type of machine or equipment covered by this document. The present standard is not intended to provide means of complying with the essential health and safety requirements of Directive 2014/34/EU.

- d) electromagnetic compatibility (emission, immunity);
- e) handling of loads the nature of which could lead to dangerous situations;
- f) the use of combustion engines;
- g) hydraulic drive units;
- h) hazards occurring during manufacturing process;

1.4 This document is not applicable to:

- a) builders hoists according to EN 12158-1:2000+A1:2010, EN 12158-2:2000+A1:2010 and EN 12159:2012 and transport platform according to EN 16719:2018;
- b) elevating control stations according to EN 14502-2:2005+A1:2008;

prEN 81-43:2021 (E)

- c) lifts according to EN 81-20:2014 and EN 81-50:2014;
- d) work platforms carried on the forks of fork trucks;
- e) work platforms;
- f) funiculars;
- g) lifts specially designed for military purposes;
- h) mine lifts;
- i) theatre elevators.

1.5 This document deals with the complete lift design but excludes the design of the crane. It includes the base frame and base enclosure of the lift but excludes the design of any concrete, hard core, timber or other foundation arrangement. It includes the design of mast ties and the design of anchorage parts between the mast tie and the crane structure. This document also includes the design of the landing gates and their fixings.

1.6 This document also deals with the information to be exchanged between the manufacturer of the lift and the crane user organization or the manufacturer of the crane.

2 Normative references**ITeh STANDARD PREVIEW****(standards.iteh.ai)**

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 81-20:2014, *Safety rules for the construction and installation of lifts — Lifts for the transport of persons and goods — Part 20: Passenger and goods passenger lifts*

EN 81-50:2014, *Safety rules for the construction and installation of lifts — Examinations and tests — Part 50: Design rules, calculations, examinations and tests of lift components*

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 ISO 14118:2018, *Safety of machinery - Prevention of unexpected start-up (ISO 14118:2017)*

EN 1808:2015, *Safety requirements on suspended access equipment — Design calculations, stability criteria, construction — Tests*

EN 1998-1:2004, *Eurocode 8: Design of structures for earthquake resistance - Part 1: General rules, seismic actions and rules for buildings*

EN 1999-1-1:2007, *Eurocode 9: Design of aluminium structures - Part 1-1: General structural rules*

EN 12159:2012, *Builders hoists for persons and materials with vertically guided cages*

EN 13001-2:2014, *Cranes — General design — Part 2: Load actions*

EN 13001-3-1:2012+A2:2018, *Cranes — General design — Part 3-1: Limit states and proof of competence of steel structures*

EN 13586:2004+A1:2008, *Cranes — Access*

EN 14439:2006+A2:2009, *Cranes - Safety - Tower cranes*

EN 60204-32:2008, *Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines*

EN 60529:1991, *Degrees of protection provided by enclosures (IP-Code) (IEC 60529:1991)*

EN IEC 60947-4-1:2019, *Low-voltage switchgear and controlgear — Part 4-1: Contactors and motor-starters — Electromechanical contactors and motor-starters (IEC 60947-4-1:2000)*

EN 60947-5-1:2017, *Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices*

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 13856-3:2013, *Safety of machinery - Pressure-sensitive protective devices - Part 3: General principles for design and testing of pressure-sensitive bumpers, plates, wires and similar devices (ISO 13856-3:2013)*

EN ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

EN ISO 14119:2013, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection (ISO 14119:2013)*

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

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs in workplaces and public areas*

ISO 4309:2017, *Cranes — Wire ropes — Care and maintenance, inspection and discard*

ISO 6336-1:2019, *Calculation of load capacity of spur and helical gears — Part 1: Basic principles, introduction and general influence factors*

ISO 6336-2:2019, *Calculation of load capacity of spur and helical gears — Part 2: Calculation of surface durability (pitting)*

ISO 6336-3:2019, *Calculation of load capacity of spur and helical gears — Part 3: Calculation of tooth bending strength*

ISO 6336-5:2019, *Calculation of load capacity of spur and helical gears — Part 5: Strength and quality of materials*

3 Terms and definitions

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

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

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

3.1

lift

machine with a car which is guided and intended for transport between different levels

3.2

rated load

maximum load which the lift has been designed to carry in service

3.3

rated speed

travelling speed of the car in m/s for which the equipment has been designed

3.4

wire rope lift

lift which uses wire rope as the load suspension system

3.5

supporting structure

crane and its foundations, giving vertical or horizontal support to the mast of the lift

3.6

rack and pinion lift

lift which uses a toothed rack and pinion as the load suspension system

3.7

base frame

lowest framework of the lift, upon which vertical loads are supported

3.8

top support

upper framework of the lift, from which vertical loads are suspended

3.9

guide rails

rigid elements which determine the travel way of the load carrying unit, that may form part of the mast

3.10

mast

lift mast is the structure that supports the load carrying unit

3.11

mast section

indivisible piece of mast, between two adjacent mast joints

3.12**mast tie**

connection system between the mast of the lift and the supporting structure, providing horizontal support for the mast

3.13**liftway**

total space which is travelled by the load carrying unit

3.14**car**

load carrying unit including floor, walls, gates and roof

3.15**stopping distances**

distance the load carrying unit moves from the moment, when the control or safety circuit is broken until the load carrying unit has come to a full stop

3.16**overspeed safety device**

combination of overspeed detecting device (3.17) and safety gear (3.18)

3.17**overspeed detecting device**

device which, when the lift attains a predetermined speed causes the safety gear to be triggered/applied

3.18**safety gear**

mechanical device for stopping and maintaining stationary the lift car on the guide rail, rack or rope

3.19**slack rope**

rope, normally under tension, from which all external loads have been removed

3.20**wire rope termination**

adaptation at the end of a wire rope permitting attachment

3.21**landing**

level in the crane structure intended for loading and unloading the load carrying unit

3.22**guard rail**

fixed equipment, other than gates, which is used to prevent people from falling or from reaching hazardous areas

3.23**normal operation**

usual operating conditions for the lift when in use for carrying loads but excluding routine maintenance, erection, dismantling etc. of the lift

STANDARD PREVIEW
(standards.iteh.ai)

oSIST prEN 81-43:2021

For stopping and maintaining stationary the lift car on the guide rail, rack or rope
67498021183f/osist-pren-81-43-2021

prEN 81-43:2021 (E)**3.24****in service**

condition during use of the lift when the load carrying unit is in any position, loaded or unloaded, moving or stationary

3.25**out of service**

installed condition when the load carrying unit is positioned such that it is provided with the most shelter from the wind. This is normally, but not necessarily, ground level. The load carrying unit is unloaded

3.26**competent person**

designated person, suitably trained, qualified by knowledge and practical experience, and provided with the necessary instructions to enable the required procedures to be carried out

3.27**overrun**

travel of the car beyond the normal stopping positions at its uppermost and its lowermost landing

3.28**authorised person**

person having permission and competency to use the lift

3.29**temporary installed lifts for cranes**

lifts attached to or installed inside tower cranes for temporary construction works for a limited period of time

iTeh STANDARD PREVIEW
(standards.iteh.ai)

oSIST prEN 81-43:2021

Note 1 to entry: A temporary situation is given when either the lift or the tower crane, with the lift remaining on or in the cranes structure, is being dismantled after completion of the temporary works.

3.30**permanent installed lifts for cranes**

lifts attached to cranes and intended for access to workplaces by authorised persons, not covered by 3.29

3.31**safety rope**

steel wire rope, only carrying the load when the safety device is activated

3.32**lift landing platform**

platform and access means intended to provide access and rest at a landing level located between the tower crane own accesses and the landing gate of a lift

Note 1 to entry The lift landing platform can be integrated into the rest platform of the tower crane.

3.33**unlocking zone**

zone, extending above and below the landing level, in which the car floor has to be to enable the corresponding landing door to be unlocked

4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this document, 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 document. Before using this document, it is important to carry out a risk assessment of lifts to check that it has the hazards identified in this clause.

Table 1 — Hazards relating to the general design and construction of lifts for persons and materials

Group	Significant hazard in accordance with EN ISO 12100:2010, Table B.1	Clause/subclause of the EN
<i>General, for many machines relevant</i>		
1	Mechanical hazards	
1.1	Due to machine parts or workpieces, e.g. <ul style="list-style-type: none"> — by potential energy (falling objects, height from the ground, gravity) — by kinetic energy (acceleration, deceleration, moving/rotating elements) — by mechanical strength (break-up) 	5.5.3, 5.6.1.2 5.6.1.2 5.6.2, 7.1.2.5
1.2	by stored energy, e.g.: <ul style="list-style-type: none"> — elastic elements (springs) 	5.7.4.1
1.3	Crushing	5.5.2, 5.5.3, 5.5.4, 5.5.6, 5.7.2, 7.1.2.7.1, 7.1.2.8
1.4	Shearing	5.5, 5.6.1.2, 5.7.2, 7.1.2.7.1, 7.1.2.8
1.5	Cutting or severing	5.5, 5.6.1.2, 5.7.2, 7.1.2.7.1, 7.1.2.8
1.6	Entanglement	5.7.2
1.7	Drawing-in or trapping	5.5.2, 5.5.3, 5.5.6, 5.6.1.2, 5.6.1.5, 5.7.2.3, 7.1.2.7, 7.1.2.8
1.8	Impact	5.4.3, 5.6.2, 7.1.2.5, 7.1.2.7, 7.1.2.8
1.10	Friction or abrasion	5.5.2, 5.5.3, 7.1.2.7, 7.1.2.8
1.12	Slipping, tripping and falling	5.5, 5.6.1, 7.1.2.7, 7.1.2.8
1.13	Instability	5.2, 5.3, 5.4.1, 5.4.2, 5.6.3, 7.1.2.7, 7.1.2.8
2	Electrical hazards	
2.1	Touching live parts	5.8, 7.1.2.7, 7.1.2.10
2.2	Parts which have become live under fault conditions	5.8, 7.1.2.7, 7.1.2.10
2.5	Electromagnetic phenomena	NC
2.7	Short-circuit	5.8.2
2.8	Overload	5.8.2
8	Ergonomic hazards	
8.1	Unhealthy postures or excessive effort	5.1, 7.1.2.7, Annex B