



**SLOVENSKI STANDARD**  
**oSIST prEN 13155:2014**  
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**Dvigala (žerjavi) - Varnost - Snemljiva dvigalna sredstva**

Crane - Safety - Non-fixed load lifting attachments

Krane - Sicherheit - Lose Lastaufnahmemittel

Appareils de levage à charge suspendue - Sécurité - Accessoires de levage amovibles

**Ta slovenski standard je istoveten z: prEN 13155 rev**

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equipment

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EUROPEAN STANDARD  
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EUROPÄISCHE NORM

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## Crane - Safety - Non-fixed load lifting attachments

Appareils de levage à charge suspendue - Sécurité -  
Accessoires de levage amovibles

Krane - Sicherheit - Lose Lastaufnahmemittel

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 147.

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.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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

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## prEN 13155:2014 (E)

### Foreword

This document (prEN 13155:2014) has been prepared by Technical Committee CEN/TC 147 “Crane - Safety”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13155:2003+A2:2009.

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, B, C or D, which is an integral part of this document.

The main modifications concern:

- General requirement to introduce the reference to EN 13001-1 for the calculation;
- Vacuum lifters;
- Lifting magnet;
- Lifting beams for which the static load vary according to the working load.

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## Introduction

This European Standard has been prepared to be a harmonized standard to provide one means for non-fixed load lifting attachments used on cranes to conform with the essential health and safety requirements of the Machinery Directive, as amended.

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

The machinery concerned and the extent to which hazards are covered are indicated in the scope of this 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 non-fixed load lifting attachments which have been designed and built according to the provisions of this type C standard.

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**prEN 13155:2014 (E)****1 Scope**

This European Standard specifies safety requirements for the following non-fixed load lifting attachments for cranes, hoists and manually controlled load manipulating devices:

- plate clamps;
- vacuum lifters;
  - self priming;
  - non-self priming (pump, venturi, turbine);
- electric lifting magnets (battery fed and mains-fed);
- permanent lifting magnets;
- electro-permanent lifting magnets;
- lifting beams;
- C-hooks;
- lifting forks;
- clamps;

as defined in Clause 3.

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This standard does not specify the additional requirements for:

- non fixed load lifting attachments in direct contact with foodstuffs or pharmaceuticals requiring a high level of cleanliness for hygiene reasons;
- hazards resulting from handling specific hazardous materials (e.g. explosives, hot molten masses, radiating materials);
- hazards caused by operation in an explosive atmosphere;
- hazards caused by noise;
- electrical hazards;
- hazards due to hydraulic and pneumatic components.

For high risk applications not covered by this standard, EN 13001-2 gives guidance to deal with them.

This standard covers the proof of static strength, the elastic stability and the proof of fatigue strength. For attachments designed for less than 16 000 lifting cycles, the proof of fatigue strength is covered by the proof of static strength (elastic and yielded conditions, see 5.1.1.1)

This standard does not generally cover attachments intended to lift above people. Some attachments are suitable for that purpose if equipped with additional safety features. In such cases the additional safety features are specified in the specific requirements.

This standard does not cover slings, ladles, expanding mandrels, buckets, grabs, or grab buckets.



The hazards covered by this European Standard are identified in clause 4.

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

This standard is not applicable to non-fixed load lifting attachments for crane, hoists and manually controlled load manipulating devices which are manufactured before the date this publication as EN

## 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 349:1993+A1:2008, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 818-4:1996+A1:2008, *Short link chain for lifting purposes — Safety — Part 4: Chain slings — Grade 8*

EN 818-5:1999+A1:2008, *Short link chain for lifting purposes — Safety — Part 5: Chain slings — Grade 4*

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

EN 981:1996+A1:2008, *Safety of machinery — System of auditory and visual danger and information signals*

EN 1492-1:2000+A1:2009, *Textile slings — Safety — Part 1: Flat woven webbing slings, made of man-made fibres, for general purpose use*

EN 1492-2:2000+A1:2009, *Textile slings — Safety — Part 2: Roundslings, made of man-made fibres, for general purpose use*

EN 13001-1: 2004+A1:2009, *Cranes — General design. General principles and requirement*

EN 13001-2: 2011, *Crane — General design. Load actions*

EN 13001-3-1: 2012+A1:2013, *Crane — General design. Limit States and proof competence of steel structure*

EN 13414-1:2003+A2:2008, *Steel wire rope slings — Safety — Part 1: Slings for general lifting service*

EN ISO 5817:2014, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817)*

EN ISO 9606-1:2013, *Qualification testing of welders — Fusion welding. Steels (ISO 9606-1)*

EN ISO 12100:2010, *General principle for design risk assessment and risk reduction (ISO 12100)*

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

## 3 Terms and definitions

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

### 3.1

#### **adhesion force**

force required to remove the load from a vacuum lifter

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### 3.2 building area

area where buildings, bridges, roads etc are being erected or renovated or demolished

Note 1 to entry: In these areas the environment is permanently changing. Any risks are higher than in plants or warehouses.

### 3.3 C-hook

equipment in the form of a 'C' used for lifting hollow loads e.g. coils, pipes

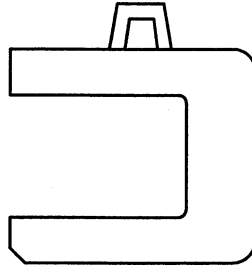


Figure 1 — Example of a C-hook

### 3.4 working coefficient

arithmetic ratio between the maximum load which a lifting accessory is able to hold and the maximum working load marked.

### 3.5 static test coefficient

arithmetic ratio between the load used to carry out the static tests on a lifting accessory and the maximum working load.

### 3.6 clamp

equipment used to handle loads by clamping on a specific part of the load.

Note 1 to entry: Clamps are also known as tongs. For definition of plate clamps see 3.14.

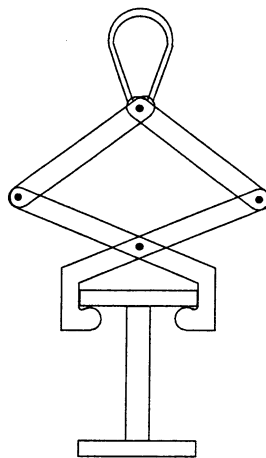


Figure 2 — Example of a clamp

**3.7****individual verification**

verification carried out on every item produced

**3.8****lifting beam**

equipment consisting of one or more members equipped with attachment points to facilitate the handling of loads which require support at several points, this includes load rotating beams.

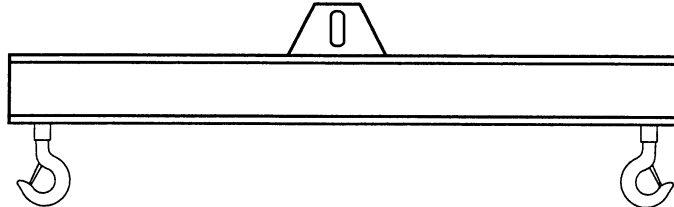


Figure 3 — Example of a lifting beam

**3.9****lifting forks**

equipment consisting of two or more arms fixed to an upright with an upper arm, essentially to lift palletised or similar loads

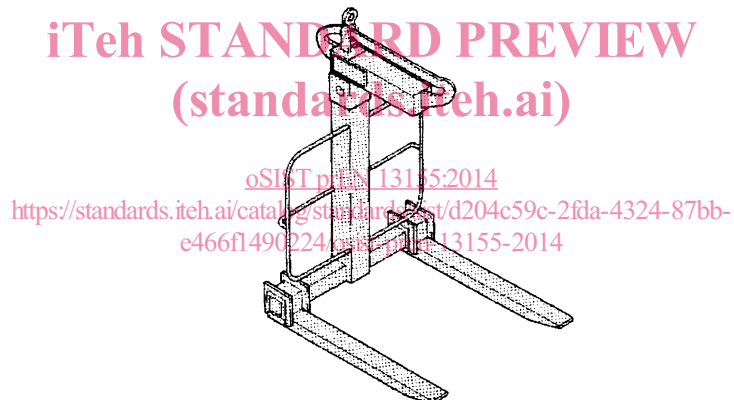


Figure 4 — Example of lifting forks

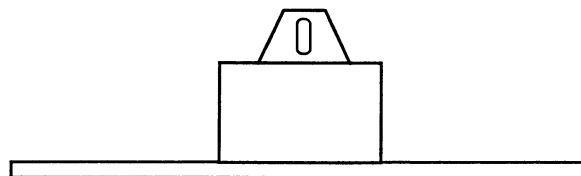
**3.10****lifting magnet**

Figure 5 — Example of a lifting magnet

**3.10.1****electric lifting magnet**

equipment with a magnetic field generated by an electric current creating sufficient force for gripping, holding and handling loads with ferro-magnetic properties.

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**3.10.2****permanent lifting magnet**

equipment with a permanent magnetic field which creates sufficient force for gripping, holding and handling loads with ferro-magnetic properties. The magnetic field is controlled by mechanical means

**3.10.3****electro-permanent lifting magnet**

equipment with a permanent magnetic field which creates sufficient force for gripping, holding and handling loads with ferro-magnetic properties. The magnetic field is controlled by an electric current which is not required to sustain the magnetic field

Note 1 to entry: Electro-permanent lifting magnets can be energized by the mains or by battery or stand-alone generator.

**3.11****minimum working load**

the minimum load that the non-fixed load lifting attachment is designed to lift under the conditions specified by the manufacturer

**3.12****no-go area**

area from which persons are excluded during normal operation

**3.13****non-fixed load lifting attachment**

lifting attachment which can be fitted directly or indirectly to the hook or any other coupling device of a crane, hoist or manually controlled manipulating device by the user without affecting the integrity of the crane, hoist or manually controlled manipulating device

**3.14****plate clamps**

non powered equipment used to handle steel plates by clamping them between jaws

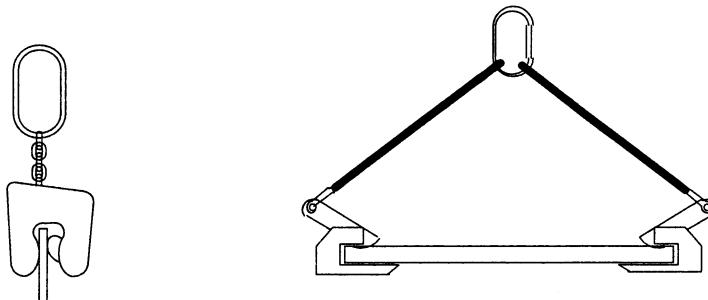


Figure 6 — Example of plate clamps

**3.15****positive holding device**

device making a direct mechanical connection to the load and which does not rely solely on friction, suction or magnetic adhesion to the load

**3.16****secondary positive holding device**

device to hold loads if the primary holding means fails and which does not rely on friction, suction or magnetic adhesion to the load

**3.17****tear-off force**

force applied at a right angle to the plane of the magnet poles which is required to detach the load from the switched-on magnet

**3.18****two-action control**

control which, in order to be operative, requires the performance of two separate actions with one or two hands, such as:

- a) operation of two separate hold-to-run controls;
- b) sequential operation of two movements of a control device;
- c) previous unlocking of the control with self-locking in the neutral position.

**3.19****type verification**

verification carried out on one or more samples representative of a particular design and size of product before it is first placed on the market

**3.20****vacuum lifter or suction pad**

equipment which includes one or several suction pads operating by vacuum

**3.20.1****self priming vacuum lifter**

vacuum lifter using the load to create the vacuum

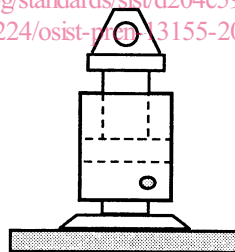


Figure 7 — Example of a self priming vacuum lifter

**3.20.2****non self priming vacuum lifter**

vacuum lifter using an external source of energy

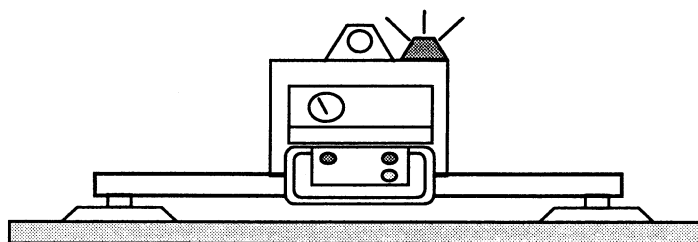


Figure 8 — Example of a non self priming vacuum lifter

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## 3.21

**working load limit**

maximum load that the non-fixed load lifting attachment is designed to lift under the conditions specified by the manufacturer

**4 List of significant hazards**

Tables 1 to 7 show a list of significant hazardous situations and hazardous events that could result in risks to persons during normal use and foreseeable misuse. They also contain the relevant clauses in this standard that are necessary to reduce or eliminate the risks associated with those hazards.

**Table 1 — Plate clamps - List of significant hazards and associated requirements**

Hazard	Relevant clause(s) in this standard
<b>Mechanical hazards</b>	
Generated by machine parts or workpieces caused, for example, by:	
Inadequacy of mechanical strength	5.1.1.1, 5.1.1.2,
Stability	5.1.5, 7.1.1
Crushing hazard	5.1.3, 7.1.1, 7.1.2.1
Shearing hazard	5.1.3, 7.1.1, 7.1.2.1
<b>Hazards generated by neglecting ergonomic principles</b>	
Unhealthy postures	5.1.3
Human errors	5.2.1.2
<b>Errors of fitting</b>	5.2.1.4, 5.2.1.6, 7.1.1, 7.1.2.1
<b>Mechanical hazards and hazardous events</b>	
From load falls, collisions, machine tipping caused by:	
Lack of stability	5.1.5, <b>7.1.1</b>
Unexpected/unintended movement of loads	5.2.1.1, 5.2.1.2, 5.2.1.3, 5.2.1.4, 5.2.1.5
Inadequate holding devices/accessories	5.2.1.5, 5.2.1.6, 7.1.1, 7.1.2
From insufficient mechanical strength of parts	5.1.1.1
From inadequate selection/integration into the machine of chains, ropes, lifting accessories	5.1.4, 5.2.1.7
From abnormal conditions of assembly/testing/use maintenance	5.2.1.6, 5.2.1.7, 7.1.1, 7.1.2, 7.2

Table 2 — Vacuum lifters - List of significant hazards and associated requirements

Hazard	Relevant clause(s) in this standard
<b>Mechanical hazards</b> Generated by machine parts or workpieces caused, for example, by:	
Inadequacy of mechanical strength	5.1.1.1, 5.1.1.2,
Stability	5.1.5, 7.1.1
The effect of vacuum	5.2.2
Crushing hazard	5.1.3, 7.1.1, 7.1.2
Shearing hazard	5.1.3, 7.1.1, 7.1.2.2
<b>Hazards generated by neglecting ergonomic principles</b>	
Unhealthy postures	5.1.3
Inadequate consideration of hand-arm anatomy	5.1.2
Human errors	5.2.2.1 to 5.2.2.10
Inadequate design of manual controls	5.1.2
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<b>Failure of the power supply</b>	5.2.2.5, 5.2.2.6, 5.2.2.7
<b>Failure of the control circuit</b>	7.1.1, 7.1.2.2
<b>Errors of fitting</b>	7.1.1, 7.1.2.2
<b>Falling objects</b>	5.2.2.1, 5.2.2.2, 5.2.2.3,, 5.2.2.4, 5.2.2.5, 5.2.2.7
<b>Loss of stability of machinery</b>	5.1.5
<b>Mechanical hazards and hazardous events</b>	
From load falls, collisions, machine tipping caused by:	
Lack of stability	5.1.1.2
Uncontrolled loading - overloading - overturning moments exceeded	5.1.1.1, 7.1.1
Uncontrolled amplitude of movements	5.2.2.10
Unexpected/unintended movement of loads	5.2.2.1, 5.2.2.2, 5.2.2.3, 5.2.2.4, 5.2.2.5, 5.2.2.6, 5.2.2.9, 5.2.2.10, 7.2.3
Inadequate holding devices/accessories	5.2.2.1, 7.1.1, 7.1.2
From insufficient mechanical strength of parts	5.1.1.1
From inadequate selection/integration into the machine of chains, ropes, lifting accessories	5.1.4
From abnormal conditions of assembly/testing/use maintenance	5.2.2.5, 5.2.2.6, 7.1.1, 7.1.2.2, 7.2