

Dvigala (žerjavi) - Nakladalna dvigala

Cranes - Loader Cranes

Krane - Ladekrane

Appareils de levage a charge suspendue - Grues de chargement

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ICS:

53.020.20 Dvigala Cranes

oSIST prEN 12999:2007

en

July 2007

ICS

Will supersede EN 12999:2002

English Version

Cranes - Loader Cranes

Appareils de levage à charge suspendue - Grues de
chargement

Krane - Ladekrane

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Foreword

This document (prEN 12999:2007) has been prepared by Technical Committee CEN/TC 147 “Cranes - Safety”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12999:2002.

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 & ZB which is an integral part of this document.

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Introduction

This European Standard is a harmonised standard to provide one means for loader cranes to conform to the essential health and safety requirements of the Machinery Directive 98/37/EEC and the Machinery Directive 2006/42/EC.

This European Standard is a type C standard as stated in EN 1070.

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

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1 Scope

This European Standard specifies minimum requirements for design, calculation, examinations and tests of hydraulic powered loader cranes and their mountings onto vehicles or static foundations.

This standard does not apply to loader cranes used on board ships or floating structures and to articulated boom system cranes which are designed as total integral parts of special equipment such as forwarders.

The hazards covered by this standard are identified in clause 4.

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

This standard applies to loader cranes (including timber handling cranes) which are manufactured after the date of approval by CEN of this standard.

NOTE The use of cranes for the lifting of persons may be subject to specific national regulations.

2 Normative references

The following referenced documents are indispensable for the application 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 294:1992, *Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs.*

EN 349:1993, *Safety of machinery – Minimum distances to avoid crushing of parts of the human body.*

EN 811:1996, *Safety of machinery – Safety distances to prevent danger zones being reached by the lower limbs.*

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

EN 982:1996, *Safety requirements for fluid power systems and components – Hydraulics*

EN 1050:1996, *Safety of machinery – Principles for risk assessment*

EN 1070:1998, *Safety of machinery - Terminology*

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

EN 14492-2: 2006 *Cranes - Power driven winches and hoists - Part 2: Power driven hoists*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (EN ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (EN ISO 12100-2:2003)*

EN 12644-1:2001, *Cranes – Information for use and testing – Part 1: Instructions*

EN 12644-2:2000, *Cranes – Information for use and testing – Part 2: Marking*

EN 13001-1:2004, *Cranes — General design — Part 1: General principles and requirements*

EN 13001-2:2004, *Cranes — General design — Part 2: Load actions*

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

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

EN 13586:2004, *Cranes - Access*

EN 61000-6-2:2005, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2:1999, modified)*

EN 61000-6-4:2001, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4:1997, modified)*

EN 60204-32:1998, *Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines.*

EN ISO 5353:1998, *Earth-moving machinery and tractors and machinery for agriculture and forestry — Seat index point (ISO 5353:1995)*

3 Terms and definitions

3.1 Definitions

For convenience of reference the definitions are - with the exception of 3.1.1 loader crane - grouped in alphabetical order in the English version.

For the purposes of this standard, the definitions given in EN 1070:1998 apply, together with the following:

3.1.1

loader cranes

powered crane comprising of a column, which slews about a base, and a boom system which is attached on to the top of the column. The crane is usually fitted on a commercial vehicle (including trailer) with a residual load carrying capability. Loader cranes are designed for loading and unloading the vehicle as well for as for other duties as specified by the manufacturer in the operator's manual.

NOTE 1 A crane, as defined above, installed on a static foundation is still considered a loader crane.

NOTE 2 Annex A give examples of configuration and mountings.

3.1.2

articulated

movement of boom members pivoting about a pin joint

3.1.3

base

housing incorporating anchoring points and bearings for the slewing column

3.1.4

boom

structural member in the boom system of the loader crane

3.1.5

boom extension, hydraulic

part of the boom which is capable of hydraulic telescopic movement to vary its length

3.1.6

boom extension, manual

part of the boom which can be manually extended or retracted

3.1.7

boom system

complete system, consisting of booms, boom extensions and cylinders

3.1.8

column

structural member which supports the boom system

3.1.9

control system

interface between the operating levers and the actuating components which provide movements of the loader crane

3.1.10

control station

position from which the loader crane may be operated

3.1.11

danger zone

any zone within and/or around the machinery in which a person is exposed to risk of injury or damage to health. (EN 1070:1998)

3.1.12

dead loads

forces due to the masses of the fixed and movable crane parts which act permanently on the structure while the crane is being used

3.1.13

dynamic pressure

pressure in a hydraulic system component or part of hydraulic system caused by dynamic forces on actuators when handling the load

3.1.14

fixed load lifting attachment

equipment from which the net load may be suspended and which is fitted directly to the boom head as an integral part of the crane. This comprises e.g. hooks, grabs,

3.1.15

flow sensitive check valve

valve which stops the flow when a pre-set pressure drop level is exceeded

3.1.16

gross load

sum of payload, lifting attachments and if applicable a portion of the hoist rope

3.1.17

high seat

control station connected to the column, consequently rotating with the crane

3.1.18

hoist

machines for lifting and lowering suspended loads over predetermined distances, using ropes or chains

3.1.19**hydraulic line rupture**

failure of a hydraulic line which results in a loss of pressure in the line

3.1.20**load holding valve**

valve which is normally closed and is opened by an external force to allow the flow of fluid out of a hydraulic actuator

3.1.21**main relief valve**

valve which limits the pressure supplied to the hydraulic system of the crane

3.1.22**maximum working pressure**

maximum pressure in pump circuit or individual working function

3.1.23**net lifting moment**

rated capacity multiplied by outreach

3.1.24**non-fixed load lifting attachment**

interchangeable equipment which can be fitted directly or indirectly to the hook or any other coupling device of a crane by the user without affecting its integrity

3.1.25**outreach**

the horizontal distance between the axis of rotation of the boom/boom system/jib in a vertical plane and point of load attachment.

3.1.26**outreach, hydraulic**

outreach which can be obtained with hydraulically actuated parts of the boom system

3.1.27**payload**

load, which is lifted by the crane and suspended from the non-fixed load-lifting attachment(s) or, if such an attachment is not used, directly from the fixed load-lifting attachment(s)

3.1.28**port relief valve**

valve which limits the pressure supplied to a hydraulic actuator

3.1.29**pressure relief valve**

valve which automatically relieves the hydraulic oil to the tank when the pressure exceeds a specified value

3.1.30**raised control station**

control station at a height above the ground level, i.e. a high seat attached to the column of the loader crane or a platform positioned above the base of the loader crane (see annex K)

3.1.31**rated capacity**

load that the crane is designed to lift for a given operating condition (e.g. configuration, position of the load)

3.1.32

rated capacity indicator

device which gives, within specified tolerance limits, at least a continuous indication that the rated capacity is exceeded, and another continuous indication (on certain crane types) of the approach to the rated capacity

3.1.33

rated capacity limiter

device that automatically prevents the crane from handling loads in excess of its rated capacity, taking into account the dynamic effects during normal operations use

3.1.34

setting-up function

crane function used to prepare the crane for lifting

3.1.35

sink rate

distance in a given time at which the load lowers due to internal leakage of hydraulic components

3.1.36

slewing

rotational movement of the column and boom system about a vertical axis

3.1.37

stabilizer

aid to the supporting structure connected to the base of the crane or to the vehicle to provide stability, without lifting the vehicle from the ground

3.1.38

stabilizer extension

part of the stabilizer capable of extending the stabilizer leg laterally from the transport position to the operating position

3.1.39

stabilizer leg

part of a stabilizer capable of contacting the ground to provide the required stability

3.1.40

static foundation

fixed support incorporating mounting points for a crane

3.1.41

timber handling crane

loader crane specifically designed, manufactured and equipped with a grapple for loading/unloading of unprepared timber (e.g. tree trunks, branches). The operator controls the crane from a high seat or from a cabin.

3.1.42

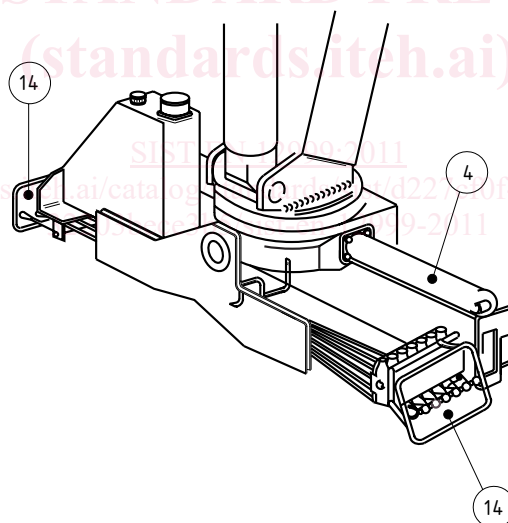
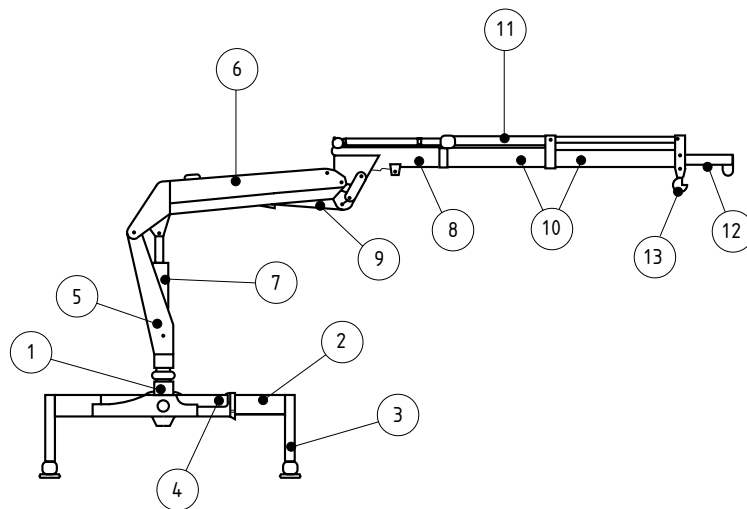
total lifting moment

sum of net lifting moment and the moment produced by dead loads.

3.2 Terminology

The terms which are used in this standard for the main parts of a loader crane are indicated in figure 1.

Boom system consists of items 6-12.



Key

| | | | |
|----------------------|----------------------------------|-------------------------|-------------------------------|
| 1. Base | 2. Stabilizer extension | 3. Stabilizer leg | 4. Slewing mechanism |
| 5. Column | 6. 1st boom | 7. 1st boom cylinder | 8. 2nd boom |
| 9. 2nd boom cylinder | 10. Boom extension, hydraulic | 11. Extension cylinders | 12. Boom extension, manual |
| 13. Hook | 14. Controls | | |

Figure 1 — Main parts of a loader crane

4 List of significant hazards

Table 1 shows a list, arranged according to EN 1050, of significant hazardous situations and hazardous events that could result in risks to persons during normal use and foreseeable misuse. It also contains corresponding cross-references to the relevant clauses in this standard that are necessary to reduce or eliminate the risks associated with those hazards.

Table 1 — List of significant hazards and associated requirements

| No. | Hazards | Relevant clause(s) in this standard | |
|---|---|---|---|
| Hazards, hazardous situations and hazardous events | | | |
| 1 | Mechanical hazards due to: | | |
| | - Inadequacy of mechanical strength of the crane and its parts | 5.1, 5.2, 5.3, 5.5.1, 5.5.4, 5.5.5, 5.5.8, 5.8.2.1, 5.8.2.2, 5.10.2.1, 5.10.2, 7.2.3.7. | |
| 1.1 | Crushing hazard | 5.8.1, 5.8.2.2, 5.8.2.3, 5.10.2.3 | |
| 1.2 | Shearing hazard | | |
| 1.3 | Cutting or severing hazard | | |
| 1.4 | Entanglement hazard | | |
| 1.5 | Drawing-in or trapping hazard | | |
| 1.6 | Impact hazard | | |
| 1.7 | Stabbing or puncture hazard | | |
| 1.8 | Friction or abrasion hazard | | |
| 1.9 | High pressure fluid injection or ejection hazard | | 5.5.1, 5.5.5, 5.10.7, 7.2.3.5, 7.2.4.2 |
| 1.10 | Ejection of parts | | 5.4.1.1, 5.4.1.2, 5.4.1.3, 5.4.2, 5.4.3 |
| 1.11 | Loss of stability | 5.6.1, 5.6.2, 5.6.4, 5.6.5, 5.6.6.2, 5.10.3 | |
| 1.12 | Slip, trip, fall | 5.8.2.2, 5.8.2.3, 5.8.2.4, 5.10.8 | |
| 2 | Electrical hazards due to: | | |
| 2.1 | Contact of persons with live parts (direct contact) | 5.6.1.3, 5.9, 5.10.6, 7.2.3.1d) | |
| 2.2 | Contact of persons with parts which have become live under faulty conditions (indirect contact) | | |
| 2.3 | Approach to live parts under high voltage | | |
| 2.4 | | | |

| No. | Hazards | Relevant clause(s) in this standard |
|----------|--|--|
| 2.5 | Thermal radiation or other phenomena such as the projection of molten particles and chemical effects from short circuits, overloads, etc | |
| 3 | Thermal hazards, resulting in: | |
| 3.1 | Burns, scalds and other injuries by a possible contact of persons with objects or materials with an extreme high or low temperature, by flames or explosions and also by the radiation of heat sources | 5.5.5, 5.10.2.3, 7.2.4.1 |
| 3.2 | Damage to health by hot or cold working environment | 7.2.3.7 |
| 4 | Hazards generated by noise | "Not significant for cranes that do not include the power source. See 7.2.3.8 regarding information on noise". |
| 5 | Hazards generated by vibration | 5.10.5 |
| 7 | Hazards generated by materials and substances (and their constituent elements) processed or used by the machinery | 5.10.2.3 |
| 7.1 | Hazards from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts | 7.2.4.1 |
| 8 | Hazards generated by neglecting ergonomic principles in machinery design, as e.g. hazards from: | |
| 8.1 | Unhealthy postures or excessive effort | 5.4.1.3, 5.4.2, 5.4.3, 5.7, 5.8, 5.10.8 |
| 8.2 | Inadequate consideration of hand-arm or foot-leg anatomy | 5.7, 5.8 |
| 8.3 | Neglected use of personal protection equipment | 7.2.4.1 |
| 8.4 | Inadequate local lighting | 5.8.1, 7.2.4.1, 7.2.3.6d) |
| 8.6 | Human error, human behaviour | 5.6, 5.7.1, 5.7.2, 7.2.3, 7.2.4 |