



SLOVENSKI STANDARD
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Nadomešča:

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Stroji za zemeljska dela - Varnost - 3. del: Zahteve za nakladalnike

Earth-moving machinery - Safety - Part 3: Requirements for loaders

Erdbaumaschinen - Sicherheit - Teil 3: Anforderungen für Lader

Engins de terrassement - Sécurité - Partie 3 : Prescriptions applicables aux chargeuses

Ta slovenski standard je istoveten z: EN 474-3:2022

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ICS:

53.100

Stroji za zemeljska dela

Earth-moving machinery

SIST EN 474-3:2022

en,fr,de

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EUROPEAN STANDARD

EN 474-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English Version

Earth-moving machinery - Safety - Part 3: Requirements for loaders

Engins de terrassement - Sécurité - Partie 3 :
Prescriptions applicables aux chargeuses

Erdbaumaschinen - Sicherheit - Teil 3: Anforderungen
für Lader

This European Standard was approved by CEN on 14 February 2022.

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

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Contents	Page
European foreword.....	3
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Safety requirements and/or protective/risk reduction measures	9
4.1 General.....	9
4.2 Operator's station	9
4.3 Seat.....	9
4.4 Operator's controls and indicators.....	9
4.5 Protective measures and devices.....	10
4.6 Stability.....	10
4.7 Lifting operation.....	13
5 Verification of the safety requirements and/or protective/risk reduction measures	13
6 Information for use	14
6.1 General.....	14
6.2 Machine safety labels.....	14
6.3 Operator's manual.....	15
Annex A (informative) List of significant hazards	16
Annex B (normative) Telescopic loaders	21
B.1 General.....	21
B.2 Stability.....	21
B.3 Limitation of stroke.....	25
B.4 Verification of LLMI and LLMC.....	25
B.5 Information for use	25
B.6 Verification of safety requirements and/or protective/risk reduction measures	27
Annex C (informative) Illustrations	29
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC machinery, and amending Directive 95/16/EC (recast) [2006 L157] aimed to be covered	32
Bibliography	37

European foreword

This document (EN 474-3:2022) has been prepared by Technical Committee CEN/TC 151 “Construction equipment and building material machines - Safety”, the secretariat of which is held by DIN.

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 September 2022, and conflicting national standards shall be withdrawn at the latest by March 2024.

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 supersedes EN 474-3:2006+A1:2009.

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).

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

For bibliographic references, see EN 474-1:2022.

EN 474 “Earth-moving machinery — Safety” comprises the following parts:

- Part 1: General requirements
- Part 2: Requirements for tractor-dozers
- Part 3: Requirements for loaders [SIST EN 474-3:2022](https://standards.iteh.ai/catalog/standards/sist/611d56f8-14b8-4909-9111-182db/sist-en-474-3-2022)
- Part 4: Requirements for backhoe-loaders <https://standards.iteh.ai/catalog/standards/sist/611d56f8-14b8-4909-9111-182db/sist-en-474-3-2022>
- Part 5: Requirements for hydraulic excavators
- Part 6: Requirements for dumpers
- Part 7: Requirements for scrapers
- Part 8: Requirements for graders
- Part 9: Requirements for pipelayers
- Part 10: Requirements for trenchers
- Part 11: Requirements for earth and landfill compactors
- Part 12: Requirements for cable excavators
- Part 13: Requirements for rollers

This document is intended for use in combination with part 1 of the series.

EN 474-3:2022 (E)

The main differences between this document and EN 474-3:2006+A1:2009 are as follows:

- a) safety-related functions of control systems (excluded);
- b) normative references (updated);
- c) safety requirements and information for use for telescopic loaders (Annex B) (added);
- d) verification methods table (Clause 5) (added);
- e) list of significant hazards (Annex A) (updated);
- f) Annex ZA (updated).

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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.

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Introduction

This document is a type-C standard as stated in EN ISO 12100.

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 or hazardous events are covered are indicated in the Scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

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EN 474-3:2022 (E)**1 Scope**

This document together with EN 474-1:2022 deals with all significant hazards, hazardous situations and events relevant to loaders when used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex A) associated with the whole lifetime of the machine as described in EN ISO 12100:2010, 5.4.

The requirements of this document are complementary to the common requirements formulated in EN 474-1:2022. This document does not repeat the requirements of EN 474-1:2022 but supplements or modifies the requirements for loaders.

This document does not provide requirements for main electrical circuits and drives of machinery when the primary source of energy is an external electrical supply.

This document does not provide performance requirements for safety related functions of control system(s).

The following significant and relevant hazards are not covered in this document:

- Laser;
- Lightning.

This document does not deal with towing of trailers.

This document does not deal with demolition machinery.

This part also deals with fork application, log handling application, single heavy object handling application and lifting operation application.

This document is not applicable to loaders which are manufactured before the date of publication of this document by CEN.

NOTE For travelling on public roads, national traffic regulations apply (e.g. braking, steering, lighting, towing, etc.) until harmonized requirements are available.

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2 Normative references

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 474-1:2022, *Earth-moving machinery — Safety — Part 1: General requirements*

EN 1459-1:2017+A1:2020, *Rough-terrain trucks — Safety requirements and verification — Part 1: Variable reach trucks*

EN ISO 3449:2008, *Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements (ISO 3449:2005)*

EN ISO 3457:2008, *Earth-moving machinery — Guards — Definitions and requirements (ISO 3457:2003)*

EN ISO 7096:2020, *Earth-moving machinery — Laboratory evaluation of operator seat vibration (ISO 7096:2020)*

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

EN ISO 13851:2019, *Safety of machinery — Two-hand control devices — Principles for design and selection (ISO 13851:2019)*

ISO 2330:2002, *Fork-lift trucks — Fork arms — Technical characteristics and testing*

ISO 7546:1983, *Earth-moving machinery — Loader and front loading excavator buckets — Volumetric ratings*

ISO 14397-1:2007, *Earth-moving machinery — Loaders and backhoe loaders — Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 474-1:2022, EN ISO 12100:2010 and the definitions below apply.

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

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

NOTE Terminology for loaders is specified in ISO 7131:2009 and the most common loaders are illustrated in Annex C of this document.

3.1 loader

self-propelled crawler or wheeled machine having a front mounted equipment, primarily designed for loading operation (bucket use), which loads or excavates through forward motion of the machine

Note 1 to entry: A loader work cycle normally comprises filling and elevating, and the transporting and discharging of material.

3.2 swing loader

loader (3.1) having a swing-type lift arm which can rotate to the left and the right of the straight position

Note 1 to entry: A swing-loader work cycle is similar to a loader cycle, but additional work can be done with the equipment offset from the longitudinal axis of the machine.

3.3 skid steer loader

loader (3.1) normally having an operator station between or to the side of the attachment-supporting structure(s) and steered by using variation of speed, and/or direction of rotation between traction drives on the opposite sides of a machine having fixed axles on wheels or tracks

3.4 compact loader

loader (3.1) having an operating mass (see ISO 6016:2008, 3.2.1) of 4 500 kg or less for wheeled loaders and 6 000 kg or less for crawler loaders, designed to work in areas with limited space, with the associated need for greater manoeuvrability

EN 474-3:2022 (E)**3.5****telescopic loader**

loader (3.1) having a centre mounted telescopic boom with the pivot point in front of the operator's station

3.6**Longitudinal Load Moment**

moment produced by the load, the attachment and the lifting means of the telescopic loader which acts at the load centre of gravity from the tipping line in the forward direction

[SOURCE: EN 15000:2008, 3.1; modified]

3.7**Longitudinal Load Moment Indicator****LLMI**

device that warns the operator of a change to the load handling geometry which would increase the longitudinal load moment, beyond pre-determined limit(s)

[SOURCE: EN 15000:2008, 3.2]

3.8**Longitudinal Load Moment Control****LLMC**

device that prevents the operator changing the load handling geometry in direction(s) which would increase the longitudinal load moment, beyond the allowable limit(s)

[SOURCE: EN 15000:2008, 3.3]

3.9**load handling geometry**

relationship of points, lines and angles, described by the position of the load centre of gravity (the position of the boom, carriage and attachment) and tipping line

[SOURCE: EN 15000:2008, 3.4; modified]

3.10**boom float**

operating mode that uses gravity to allow an attachment at the end of the boom to follow a contour (e.g. the ground)

[SOURCE: EN 1459-1:2017+A1:2020, 3.17]

3.11**rated operating capacity of telescopic loader**

load in kg, permitted by the manufacturer, that the telescopic loader is capable of transporting or lifting under normal operations

Note 1 to entry: The permitted load changes depended on the angle and extension of the boom as defined in the load chart

4 Safety requirements and/or protective/risk reduction measures

4.1 General

4.1.1 Context

Loaders shall comply with the safety requirements and/or protective/risk reduction measures of this clause. In addition, the machines shall be designed according to the principles of EN ISO 12100:2010 for relevant but not significant hazards which are not dealt with by this document.

4.1.2 Specific relation to EN 474-1

Loaders shall comply with the requirements of EN 474-1:2022, as far as not modified or replaced by the requirements of this part.

There are general requirements specified in EN 474-1:2022 that are not applicable because the risk assessment has shown that for loaders the corresponding hazard does not exist. For loaders 4.22.5 in EN 474-1:2022, is not applicable.

4.2 Operator's station

4.2.1 General

EN 474-1:2022, 4.3 applies as modified in 4.2.2 and 4.2.3.

4.2.2 Doors and windows

EN 474-1:2022, 4.3.2.5 applies with the following addition:

No motorized wiper(s) and washers are required for loaders with a cab width less than or equal to 750 mm measured outside of the cab in the height of SIP.

4.2.3 Falling object protective structures (FOPS)

EN 474-1:2022, 4.3.4 applies with the following modifications:

- loaders, except compact loaders, shall be fitted with FOPS, meeting the requirements of EN ISO 3449:2008 Level II;
- compact loaders shall be fitted with FOPS, meeting the requirements of EN ISO 3449:2008 Level I.

4.3 Seat

EN 474-1:2022, 4.4 applies with the following addition:

The seat shall meet the input spectral according to EN ISO 7096:2020:

- EM3 for wheel loaders greater than 4 500 kg;
- EM6 for crawler loaders;
- EM8 for compact wheel loaders less or equal than 4 500 kg;
- EM9 for skid steer loaders.

4.4 Operator's controls and indicators

EN 474-1:2022, 4.5.3 applies with the following exception for compact loaders with front access:

EN 474-3:2022 (E)

Controls for lifting and lowering the loader linkage, machine movement and hydraulically controlled attachments (e.g. multi-purpose bucket) shall be either automatically mechanically secured or automatically deactivated when the operator leaves/enters the operator's compartment.

4.5 Protectives measures and devices**4.5.1 General**

EN 474-1:2022, 4.14 applies as modified in 4.5.2 and 4.5.3.

4.5.2 Fenders

EN 474-1:2022, 4.14.4 does not apply to compact loaders with front access.

4.5.3 Guarding for front access loaders

Loaders shall be fitted with side and front guarding in accordance with EN ISO 3457:2008 that prevents the operator from reaching the trapping parts between the side lift arms and fixed parts of the machine when the operator is seated in the operator's position.

Opening in the side guards shall comply with EN ISO 3457:2008, Table 4.

Front guarding shall be provided for the operator's lower limbs if the lift arm componentry passes within 1,5 m in front and horizontal line to the SIP. This front guarding shall have a minimum height of 200 mm from the floor plate.

4.6 Stability**4.6.1 General**

EN 474-1:2022, 4.11 applies with the additions given in 4.6.2 to 4.6.5 below.

All rated operating capacities as defined hereafter are based on tests, calculations, or both, of machines on a level and firm supporting surface.

The mass of the load, its density and the location of its centre of gravity as well as the mass of the attachment and the quick coupler, if fitted, shall be included in the determination of the rated operating capacity and the size/capacity of the attachment.

To provide a sufficient stability the rated operating capacity in intended operations shall be determined as specified in 4.6.2 to 4.6.5.

4.6.2 Bucket application

The rated operating capacity shall be determined according to ISO 14397-1:2007.

The volumetric rating of bucket shall be determined according to ISO 7546:1983.

The mass, volumetric rating of bucket and density of the material have to be taken into account when the bucket capacity is selected for a specific application.

4.6.3 Fork application**4.6.3.1 General**

The rated operating capacity is based on the use of forks and shall be determined according to ISO 14397-1:2007 (except for the stability factor (k) stated in ISO 14397-1:2007, 5.1, Table 1) and with the fork in a horizontal position. Stability factors (k) specified in Table 1 shall apply.