



SLOVENSKI STANDARD
oSIST prEN 474-4:2017
01-junij-2017

Stroji za zemeljska dela - Varnost - 4. del: Zahteve za bagre

Earth-moving machinery - Safety - Part 4: Requirements for backhoe loaders

Engins de terrassement - Sécurité - Partie 4 : Prescriptions applicables aux chargeuses-pelleteuses

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EUROPEAN STANDARD
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English Version

Earth-moving machinery - Safety - Part 4: Requirements for backhoe loaders

Engins de terrassement - Sécurité - Partie 4 :
Prescriptions applicables aux chargeuses-pelleteuses

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 151.

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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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.

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

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

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prEN 474-4:2017 (E)**European foreword**

This document (prEN 474-4:2017) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 474-4:2006+A2:2012.

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 bibliographic references, see prEN 474-1:2017.

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

- Part 1: General requirements
- Part 2: Requirements for tractor-dozers
- Part 3: Requirements for loaders
- Part 4: Requirements for backhoe-loaders
- 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 European Standard is intended for use in combination with part 1 of the series.

Introduction

This part of prEN 474 is a type C standard as stated in EN ISO 12100:2010.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this European 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 machines that have been designed and built according to the provisions of this type C standard.

1 Scope

This part of prEN 474 deals with all significant hazards, hazardous situations and events relevant to wheel and crawler backhoe loaders as defined in EN ISO 6165:2012.

This part also deals with fork application, lifting operations and log handling.

The requirements of this part are complementary to the common requirements formulated in prEN 474-1:2017.

This does not repeat the requirements from prEN 474-1:2017, but adds or replaces the requirements for application for backhoe loaders.

This European Standard deals with all significant hazards, hazardous situations and events relevant to earth-moving machinery, when used under the conditions foreseen but also taking into account any reasonable foreseeable misuse thereof (see Clause 4). This European Standard specifies the appropriate technical measures to reduce risks arising from the significant hazards, hazardous situations and events during the whole foreseeable lifecycle of the machinery.

This European Standard is not applicable to machinery manufactured before the date of publication of this European Standard by CEN.

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

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.

prEN 474-1:2017, *Earth-moving machinery — Safety — Part 1: General requirements*

EN ISO 3164:2013, *Earth-moving machinery — Laboratory evaluations of protective structures — Specifications for deflection-limiting volume (ISO 3164:2013)*

EN ISO 6165:2012, *Earth-moving machinery — Basic types — Identification and terms and definitions (ISO/DIS 6165:2012)*

EN ISO 6682:2008, *Earth-moving machinery — Zones of comfort and reach for controls (ISO 6682:1986, including Amd 1:1989)*

EN ISO 7096:2008, *Earth-moving machinery — Laboratory evaluation of operator seat vibration (ISO 7096:2000)*

prEN 474-4:2017 (E)

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

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

ISO 6016:2008, *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components*

ISO 7451:2007, *Earth-moving machinery — Volumetric ratings for hoe-type and grab-type buckets of hydraulic excavators and backhoe loaders*

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

ISO 9248:1992, *Earth-moving machinery — Units for dimensions, performance and capacities, and their measurement accuracies*

ISO 9533:2010, *Earth-moving machinery — Machine-mounted audible travel alarms and forward horns — Test methods and performance criteria*

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*

ISO 14397-2:2007, *Earth-moving machinery — Loaders and backhoe loaders — Part 2: Test method for measuring breakout forces and lift capacity to maximum lift height*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 474-1:2017, EN ISO 12100:2010 and the following apply.

Note 1 to entry: Terminology for backhoe loaders is specified in ISO 8812:2016 and most common backhoe loaders are illustrated in Annex C of this European Standard.

Note 2 to entry: Definitions used in EN and ISO standards referred to in this European Standard are also valid for this document.

3.1 backhoe loader

self-propelled crawler or wheeled machine having a main frame designed to carry both front-mounted equipment and rear-mounted backhoe equipment, normally with stabilisers or outriggers (see EN ISO 6165:2012)

Note 1 to entry: When used in backhoe mode, the machine is stationary and normally digs below ground level, but when used in loader mode (bucket use), the machine loads through forward motion.

Note 2 to entry: A backhoe work cycle normally comprises excavating, elevating, swinging and discharging material. A loader work cycle normally comprises filling, elevating, transporting and discharging material. Lifting operations can be carried out by the loader and backhoe portion

3.2 compact backhoe loader

wheeled backhoe loader with an operating mass (see ISO 6016:2008) of $\leq 4\,500$ kg, or crawler backhoe loader with an operating mass of $\leq 6\,000$ kg designed to work in confined spaces with the associated needs for greater manoeuvrability

3.3

standard load centre distance

distance “D” in mm from the centre of gravity “G” of the load measured horizontally to the front face of the fork shanks and vertically to the upper face of the fork blades as specified in Table 1

4 List of significant hazards

See Annex A.

NOTE Annex A (normative) 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.

5 Safety requirements and/or measures

5.1 General

Backhoe loaders shall comply with the requirements of prEN 474-1:2017, as far as not modified or replaced by the requirements of this part.

5.2 Protection

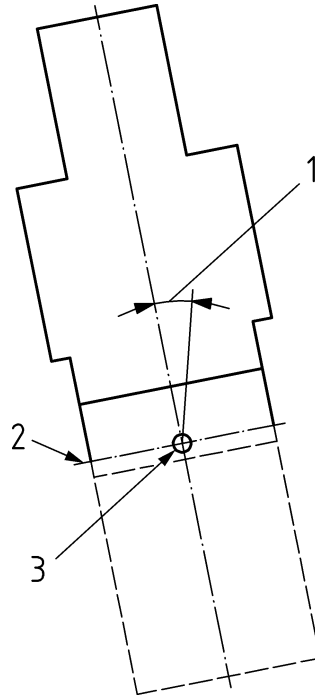
5.2.1 Roll-over protective structures (ROPS)

prEN 474-1:2017, 5.3.3 applies with the following addition for compact backhoe loaders:

The portion of deflection-limiting volume (DLV) above the LA (SIP) line according to EN ISO 3164:2013 is allowed to deviate (lean) up to 15° laterally as shown in Figure 1, when the minimum energy requirement is met. Portion below the LA (SIP) line of DLV can be disregarded.

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**Key**

- 1 up to 15°
- 2 LA
- 3 Seat index point (SIP)

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Figure 1 — Deflection-limiting volume (DLV), front view

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5.3 Operator's station**5.3.1 Minimum space envelope**

prEN 474-1:2017, 5.3.2.5 applies with the following additions:

On backhoe loaders with retractable rear window, the cab height above SIP shall not be less than 920 mm measured with the window retracted into the cab.

5.3.2 Operator's controls**5.3.2.1 Outriggers**

prEN 474-1:2017, 5.5 applies with the following additions on backhoe loaders equipped with outriggers, an acoustic and visual warning device shall be installed to warn the operator when the travel motion is engaged with lowered outriggers. The acoustic warning shall meet the requirements of ISO 9533:2010, 7.5.3.

5.3.2.2 Alternative operator position

If the backhoe loader is provided with an alternative operator position with alternative travel controls, all controls in the alternative position shall meet the performance requirements for travel. For example, steering, brakes, indicators, stopping/starting etc.

5.3.2.3 Inadvertent activation of controls

prEN 474-1:2017, 5.5.3 applies with the following modifications:

Controls which can cause a hazard due to inadvertent activation shall be so arranged or deactivated or guarded as to minimise the risk when the operator gets into or out of the operator's station and from the operator's movement in the cab from one operating position to another operating position, and the movement of the operator's seat. The deactivation device shall either be self-acting or acting by compulsory actuation of the relevant device.

5.3.3 Operator's seat

prEN 474-1:2017, 5.4.1 applies with the addition that the seat shall meet the requirements of the following input spectral class according to EN ISO 7096:2008:

Table 1 — Seat criteria for backhoe loaders

Wheeled backhoe loader	EM5
Compact wheeled backhoe loader	EM8
Crawler backhoe loader	EM6

5.4 Forward and rearward horns

prEN 474-1:2017, 5.9, first indent, applies to the forward loader portion and an additional rearward horn(s) shall be installed for the backhoe portion.

The backhoe warning device(s) sound level shall be greater than or equal to 93 dB (A) at 7 m distance to the rear of the backhoe, with the backhoe moved to the least favourable position to provide maximum masking at position 8 of ISO 9533:2010, 7.1, so that the swing frame, boom or an attachment provide maximum masking to the warning device(s). The operator shall be able to activate the backhoe warning device(s) from the backhoe operation position.

5.5 Stability

5.5.1 General

prEN 474-1:2017, 5.11 applies with the additions below:

All rated capacities as defined hereafter are based on tests and/or calculations of machines being on 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 attachment bracket, if fitted, shall be included in the determination of the rated operating capacity and the size/capacity of the attachment.

Loader portion of Backhoe Loaders do not need to meet prEN 474-1:2017, 5.12.3, 5.12.4, 5.12.5, 5.12.6 and 5.12.7.

To provide a sufficient stability the rated operating capacity/rated lift capacity in intended operations shall be determined as specified in 5.5.2 and 5.5.3.

5.5.2 Loader portion

5.5.2.1 General

The rated capacities of the backhoe loader used in loader application shall be determined as follows with the backhoe in its transport position as specified by the manufacturer.