



SLOVENSKI STANDARD
SIST EN 474-4:2000

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

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

Erdbaumaschinen - Sicherheit - Teil 4: Anforderungen für Baggerlader

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

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

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

Erdbaumaschinen - Sicherheit - Teil 4:
Anforderungen für Baggerlader

This European Standard was approved by CEN on 1995-11-12. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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FOREWORD

This European Standard has been prepared by CEN/TC 151 "Construction equipment and building material machines - Safety" of which the secretariat is held by DIN.

This European Standard 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).

The Annex A is normative and contains "Test method for rated operating load", Annex B is normative and contains "List of additional hazards" and Annex C is informative and contains "Illustrations".

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
Part 4	Requirements for backhoe loaders
Part 5	Requirements for hydraulic excavators
Part 6	Requirements for dumpers
Part 7	Requirements for tractor-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 rope excavators.

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 August 1996, and conflicting national standards shall be withdrawn at the latest by August 1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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0 Introduction

This European Standard is a Type C-standard in the structure of A-/B-/C-standards as defined in EN 292-1:1991.

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

1 Scope

This standard specifies additional requirements to and/or exceptions from EN 474-1:1994 "Earth-moving machinery - Safety - Part 1: General requirements".

This standard applies to wheel and crawler backhoe loaders defined in ISO/DIS 6165:1994, and gives additional requirements for attachments and for derivated machinery.

This standard applies for crawler backhoe loaders as defined in 3.2.1 and figure C.2.

This standard deals with the significant hazards pertinent to backhoe loaders when they are used as intended and under the conditions foreseen by the manufacturer (see Annex B of this standard and Annex C of EN 474-1:1994).

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-1:1991	Safety of machinery - Basic concepts - General principles for design - Part 1: Basic terminology, methodology
EN 292-2:1991	Safety of machinery - Basic concepts - General principles for design - Part 2: Technical principles and specifications
EN 474-1:1994	Earth-moving machinery - Safety - Part 1: General requirements
ENV 1070:1993	Safety of machinery - Terminology
EN 25353:1988	Earth-moving machinery and tractors and machinery for agriculture and forestry - Seat index point
EN 60204-1:1992	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 2330:1991	Fork lift trucks - Fork arms - Technical characteristics and testing
ISO 3457:1986	Earth-moving machinery - Guards and shields - Definitions and specifications
ISO 4250-2:1991	Narrow and wide base off-road tyres and rims - Part 2: Loads and inflation pressure

ISO/DIS 4250-3:1993	Earth-mover tyres and rims - Part 3: Rims
ISO 5006-1:1991	Earth-moving machinery - Operator's field of view - Part 1: Test method
ISO 5998:1986	Earth-moving machinery - Rated operating load for crawler and wheel loaders
ISO 6014:1986	Earth-moving machinery - Determination of ground speed
ISO 6016:1982	Earth-moving machinery - Methods of measuring the masses of whole machines, their equipment and components
ISO/DIS 6165:1994	Earth-moving machinery - Basic types - Vocabulary
ISO 6393:1985	Acoustics - Measurement of airborne noise emitted by earth-moving machinery - Method for determining compliance with limits for exterior noise - Stationary test condition
ISO 6682:1986	Earth-moving machinery - Zones of comfort and reach for controls
ISO 7096:1994	Earth-moving machinery - Laboratory evaluation of operator seat vibration
ISO/DIS 7451:1994	Earth-moving machinery - Volumetric ratings for hydraulic excavator buckets and backhoe loader buckets
ISO 7546:1983	Earth-moving machinery - Loader and front loading excavator buckets - Volumetric ratings
ISO 8313:1989	Earth-moving machinery - Loaders - Methods of measuring tool forces and tipping load
ISO 8643:1988	Earth-moving machinery - Hydraulic excavator and backhoe-loader boom lowering control device - Requirements and tests
ISO 9244:1995	Earth-moving machinery - General principles for safety signs and hazard pictorials
ISO 9248:1992	Earth-moving machinery - Units for dimensions, performance and capacities, and their measurement accuracies
ISO/DIS 9249:1995	Earth-moving machinery - Engine test code - Net power
ISO 10263-2:1994	Earth-moving machinery - Operator enclosure environment - Part 2: Air filter test
ISO 10263-4:1994	Earth-moving machinery - Operator enclosure environment - Part 4: Operator enclosure ventilation, heating and/or air-conditioning test method
ISO 10533:1993	Earth-moving machinery - Lift-arm support devices
ISO/DIS 10968:1993	Earth-moving machinery - Operator's controls
ISO 12509:1995	Earth-moving machinery - Lighting, signalling and marking lights, and reflex-reflector devices

3 Definitions

For the purposes of this standard the definitions stated in ENV 1070:1993 apply.

Additional definitions specifically needed for this standard are added below:

3.1 Common definitions

Definitions used in EN and ISO standards referred to in this standard are also valid for this standard. Backhoe loaders are illustrated in Annex C of this standard.

3.2 Additional definitions

3.2.1 Backhoe loader: self-propelled wheeled or crawler machine, having a main structural support designed to carry both a front-mounted loader linkage and a rear mounted excavator linkage.

NOTE: When used in backhoe mode, the machine is stationary and normally digs below ground level with bucket motion toward the machine in a backhoe work cycle which contains excavating, elevating, swinging, and discharging material.

When used in loader mode, normally with bucket, the machine loads through a forward motion of the machine in a loader work cycle which contains filling, elevating, transporting, and discharging material.

3.2.2 Attachment bracket: device to facilitate quick interchange of attachments.

3.2.3 Attachment: removable device (working tool) mounted either directly to the linkage or on an attachment bracket to fulfil the primary function of the machine or for a specific use.

EXAMPLE: Bucket, log grapple, blade, ripper.

4 Safety requirements

4.1 Access to crawler machines

EN 474-1:1994, clause 4.1 applies with the following exceptions. An access step integrated in the track frame can be retracted up to 30 mm from the outer edge of the track shoe.

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4.2 Operator's station

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4.2.1 Heating and ventilation system

If a heating and ventilation system according to EN 474-1:1994, clause 4.2.2.6, is required the following applies. The heating and ventilation system shall:

- either comply with ISO 10263-4:1994
- or have the capacity of increasing the temperature of the air inside the cab and maintain a temperature of + 18 °C at prevailing ambient temperature. The minimum capacity of the heating system shall have a T of 25°C measured at - 10°C ambient temperature.

Measurement of the system capacity shall be made at three points. The three points shall be located in a vertical plane through the SIP and parallel to the longitudinal axis of the machine as follows (see figure 1):

- at the filament position centre-point as defined in ISO 5006-1:1991;
- at the SIP as defined in EN 25353:1988;
- 100 mm above floor plate and 600 mm in front of the SIP.

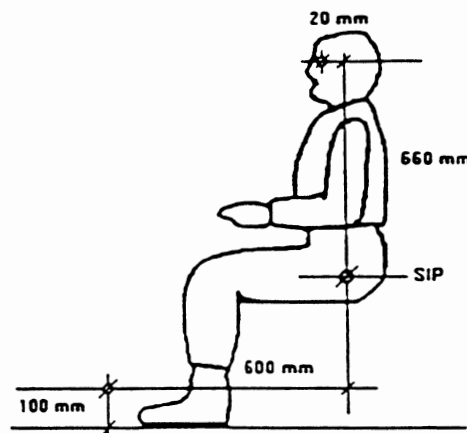


Figure 1: Location of measuring points

Alternatively the heating capacity can be determined by calculation.

The ventilation system shall be capable of providing the cab with filtered fresh air at the minimum of 43 m³/h. The filter should be tested according to ISO 10263-2:1994.

NOTE: The filter element selection depends on the operating environment conditions.

4.2.2 Rear visibility

EN 474-1:1994, clause 4.7.1, third paragraph, applies also for rear window(s) with the following provisions:

- arrangement to defrost the rear window(s) shall be made;
- the rear window(s) shall be fitted with a motorized wiper and washer.

4.3 Operator's protection

4.3.1 Roll-over protective structures (ROPS) on derivated machinery
Backhoe loaders equipped with an attachment other than a bucket application shall have a ROPS (see EN 474-1:1994, clause 4.2.3) related to the maximum operating mass (see ISO 6016:1982), as specified by the manufacturer. When used as derivated machinery (e. g. pole erecting equipment), the maximum machine mass, which the ROPS structure meets, may be exceeded.

4.3.2 Fenders

Backhoe loaders without a cab shall have fenders which comply with ISO 3457:1986. Backhoe loaders with a maximum designed speed (see ISO 6014:1986) > 30 km/h shall be equipped with fenders that protect the operator's station from debris ejected by the tyres if the risk exists.

4.4 Operator's seat vibration

EN 474-1:1994, clause 4.3.1.3 applies with the following provisions:

- the value of vibration transmitted to the operator's seat shall comply with ISO 7096:1994 with an input vibration of class 3.

4.5 Lift arm support device

A mechanical lift arm support device shall be provided for the loader portion, if the lift arm is to be held in an elevated position for maintenance, service or non operational purposes. The support device shall comply with ISO 10533:1993.

4.6 Operator's controls

EN 474-1:1994, clause 4.4.2 applies with the following additions:

- operator's controls shall comply with ISO/DIS 10968:1993;
- the normal engine stopping device shall be within the zone of reach (see ISO 6682:1986).
- backhoe loader fitted with outriggers shall have an audible warning device. This device shall warn the operator if he tries to raise the outriggers when the travel motion is engaged;
- if the backhoe loader is provided with an alternative operator position with alternative travel controls, there shall also be controls for braking and steering, which meet the performance requirements for the primary functions.

4.6.1 Remote control

EN 474-1:1994, clause 4.4.2.6 applies with the following additions:

4.6.1.1 Control box

Activation of controls shall only be possible from a portable remote control box.

The remote control box shall have a key switch for activating/deactivating the remote control.

4.6.1.1.1 General requirements

By design the control box shall not obstruct the machine operator's freedom of movement, and not be affected by impact and shock which could cause inadvertent machine movements.

4.6.1.1.2 Emergency stop

The remote control box shall be fitted with an emergency stop that fulfils the requirements of 10.7 of EN 60204-1:1992.

4.6.1.1.3 Controls

The control box shall have clearly marked directions of movements for the machine and its attachment and be safeguarded against unintentional actuation e.g. pushbuttons with protective collars. It shall be possible to lock the controls in the deactivated mode against unintentional or unauthorized actuation.