



SLOVENSKI STANDARD
SIST EN 474-3:2000

01-april-2000

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

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

Erdbaumaschinen - Sicherheit - Teil 3: Anforderungen für Lader

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

Ta slovenski standard je istoveten z: EN 474-3:1996

[SIST EN 474-3:2000](https://standards.iteh.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-b4e1a09e0186/sist-en-474-3-2000)

<https://standards.iteh.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-b4e1a09e0186/sist-en-474-3-2000>

ICS:

53.100 Stroji za zemeljska dela Earth-moving machinery

SIST EN 474-3:2000

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 474-3:2000

<https://standards.iteh.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-b4e1a09e0186/sist-en-474-3-2000>

EUROPEAN STANDARD

EN 474-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 1996

ICS 53.100

Descriptors: earth-moving equipment, loaders, safety of machine, accident prevention, safety requirements, specifications

English version

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

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

Erdbaumaschinen - Sicherheit - Teil 3:
Anforderungen für Lader

This European Standard was approved by CEN on 1995-11-03. 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.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents	Page
FOREWORD	4
0 Introduction	5
1 Scope	5
2 Normative references	5
3 Definitions	7
3.1 Common definitions	7
3.2 Additional definitions	7
3.2.1 Loader	7
3.2.2 Compact loader	7
3.2.3 Skid steer loader	7
3.2.4 Attachment bracket	7
3.2.5 Attachment	7
4 Safety requirements	8
4.1 Access	8
4.1.1 Access to crawler machines	8
4.1.2 Access to compact loaders	8
4.1.2.1 Primary access opening	8
4.1.2.2 Alternative egress opening	8
4.2 Operator's station	8
4.2.1 Minimum space envelope	8
4.2.2 Heating and ventilation	8
4.2.3 Rear visibility	9
4.3 Operator's protection	9
4.3.1 Roll-over protective structures (ROPS)	9
4.3.2 Roll-over protective structures (ROPS) on derivated machinery	10
4.3.3 Falling object protective structures (FOPS)	10
4.3.4 Fenders	10
4.3.5 Securing of controls for compact loaders having front access	10
4.3.6 Guarding for compact loaders	11
4.4 Operator's seat	11
4.5 Lift arm support device	11
4.6 Operator's controls	11
4.6.1 Remote control	11
4.6.1.1 Control box	11
4.6.1.1.1 General requirements	12
4.6.1.1.2 Emergency stop	12
4.6.1.1.3 Controls	12
4.6.1.2 Selecting switch	12
4.6.1.3 Warning devices	12
4.6.1.4 Travelling	12
4.6.1.5 Instructions	12
4.7 Lighting, signalling and marking lights and reflex-reflector devices	12
4.8 Tyres and rims	12

STANDARD PREVIEW
(standards.itech.ai)

[SIST EN 474-3:2000](#)

<https://standards.itech.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-b4e1a09e0186/sist-en-474-3-2000>

	Page
4.9	Stability 13
4.9.1	Stability in different applications 13
4.9.1.1	Bucket application 13
4.9.1.2	Fork application 13
4.9.1.2.1	Stability factor 13
4.9.1.2.2	Hydraulic capacity 13
4.9.1.2.3	Rated operating load 13
4.9.1.2.4	Fork size 14
4.9.1.3	Object handling application 14
4.9.1.3.1	Stability factors 14
4.9.1.3.2	Hydraulic capacity 15
4.9.1.3.3	Rated operating load 15
4.9.1.3.4	Load hooking device 15
4.9.1.4	Log handling application 15
4.9.1.4.1	Stability factors 15
4.9.1.4.2	Hydraulic capacity 15
4.9.1.4.3	Rated operating load 15
4.9.2	Other applications 15
4.9.3	Load capacity information 16
4.10	Airborne noise 16
4.11	Attachment bracket 16
4.11.1	Locking 16
4.11.2	Identification 16
4.11.3	Instructions 17
4.12	Attachment 17
4.12.1	Identification 17
4.12.2	Instructions 18
5	Warning signs and hazard pictorials 18
6	Instruction handbook 18
Annex A (normative)	List of additional hazards 19
Annex B (informative)	Illustrations 21

ITeH STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 474-3:2000](https://standards.iteh.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-b4e1a09e0186/sist-en-474-3-2000)

<https://standards.iteh.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-b4e1a09e0186/sist-en-474-3-2000>

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 "List of additional hazards" and the Annex B 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 publication of an identical test 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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 474-3:2000

<https://standards.iteh.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-b4e1a09e0186/sist-en-474-3-2000>

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 loaders defined in ISO/DIS 6165:1994, and gives additional requirements for attachments and for derivated machinery.

This standard applies also for compact loaders as defined in 3.2.2 and figure B.2.

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

Telescopic loaders are not covered in EN 474.

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 294:1992	Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs
EN 474-1:1994	Earth-moving machinery - Safety - Part 1: General requirements
ENV 1070:1993	Safety of machinery - Terminology
EN 23411:1988	Earth-moving machinery - Human physical dimensions of operators and minimum operator space envelope
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 2330:1995 Fork lift trucks - Fork arms - Technical characteristics and testing
- ISO 2867:1994 Earth-moving machinery - Access systems
- ISO 3164:1992 Earth-moving machinery - Laboratory evaluations of roll-over and falling object protective structures - Specifications for deflection-limiting volume
- ISO 3449:1992 Earth-moving machinery - Falling Object Protective Structures - Laboratory tests and performance requirements
- ISO 3457:1986 Earth-moving machinery - Guards and shields - Definitions and specifications
- ISO 3471:1994 Earth-moving machinery - Roll-over Protective Structures - Laboratory tests and performance requirements
- ISO 4250-2:1991 Narrow and wide base off-road tyres and rims - Part 2: Loads and inflation pressures
- 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 loader
- 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 6683:1981 Earth-moving machinery - Seat belts and seat belt anchorages
- ISO 7096:1994 Earth-moving machinery - Laboratory evaluation of operator seat vibration
- ISO 7131:1984 Earth-moving machinery - Loaders - Terminology and commercial specification SIST EN 474-3:2000
- ISO 7546:1983 https://standards.iteh.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-811a0010/sist-474-3-2000 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 9244:1995 Earth-moving machinery - General principles for safety signs and hazard pictorials
- 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 - Performance requirements
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

Terminology and commercial specifications for loaders are specified in ISO 7131:1984 and illustrated in Annex B of this standard.

Definitions used in EN and ISO standards referred to in this standard are also valid for this standard.

3.2 Additional definitions

3.2.1 Loader: self-propelled wheeled or crawler machine, having a front-mounted supporting loader linkage, primarily designed for bucket loading or excavating through a forward motion of the machine.

NOTE: A work cycle comprises filling, elevating, transporting and discharging material.

3.2.2 Compact loader: loader having an operating mass (see ISO 6016:1982) of 4500 kg or less, designed to work in confined spaces and the associated needs for greater maneuverability.

3.2.3 Skid steer loader: loader steered by using variation of speed and/or direction of rotation between traction drives on opposite sides of a machine having fixed axles.

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

3.2.5 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

4.1.1 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.

4.1.2 Access to compact loaders

EN 474-1:1994, clause 4.1 applies. For compact loaders the reference to ISO 2867:1994 applies with the following provisions:

4.1.2.1 Primary access opening

The primary opening shall not be less than:

- height: 875 mm
- width: 550 mm

4.1.2.2 Alternative egress opening

An alternative opening shall be provided. The rectangular dimension shall not be less than 470 x 600 mm.

4.2 Operator's station

4.2.1 Minimum space envelope

EN 474-1:1994, clause 4.2 applies with the following provision:

For compact loaders the minimum space envelope width (dimension 920 mm, EN 23411:1988, figure 5) may be reduced to 650 mm at elbow height.

4.2.2 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):

[SIST EN 474-3:2000](https://standards.iteh.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-)

- at 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.

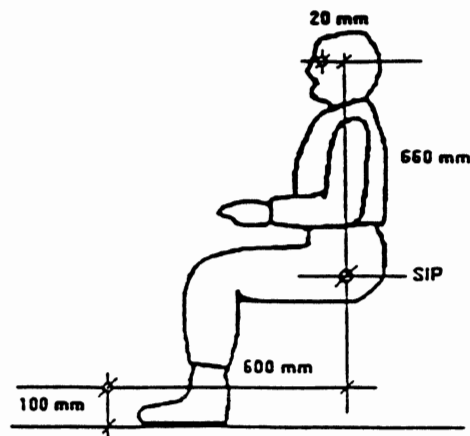


Figure 1: Location of measuring points

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.

4.2.3 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.

Loaders with a cab width ≤ 750 mm may be excepted.

4.3 Operator's protection

4.3.1 Roll-over protective structures (ROPS)

For compact loaders the test procedure of ISO 3471:1994 is modified as follows:

The portion of the deflection-limiting volume (DLV) above the LA (SIP) line (see ISO 3164:1992) is allowed to deviate (lean) up to 15 degrees laterally as shown in figure 2, when the minimum energy requirement is met. The portion below the LA (SIP) line of the DLV can be disregarded.

SIST EN 474-3:2000

<https://standards.iteh.ai/catalog/standards/sist/b5cdefc1-9e92-4e45-a9e5-b4e1a09e0186/sist-en-474-3-2000>