



SLOVENSKI STANDARD

SIST EN 474-1:2000

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Earth-moving machinery - Safety - Part 1: General requirements

Earth-moving machinery - Safety - Part 1: General requirements

Erdbaumaschinen - Sicherheit - Teil 1: Allgemeine Anforderungen

Engins de terrassement - Sécurité - Partie 1: Exigences générales

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53.100 Stroji za zemeljska dela Earth-moving machinery

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EUROPEAN STANDARD

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English version

Earth-moving machinery - Safety - Part 1: General requirements

Engins de terrassement - Sécurité - Partie 1:
Exigences générales

Erdbaumaschinen - Sicherheit - Teil 1:
Allgemeine Anforderungen

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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

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FOREWORD

This European Standard was 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 Commission of the European Communities and the European Free Trade Association, and supports essential requirements of EC Directive(s).

The Annex A is normative and contains "Operator's seat dimensions", the Annex B is normative and contains "Steering test for rubber-tyred machines", the Annex C is also normative and contains "List of hazards" and the Annex D is informative and contains a "Bibliography".

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 landfill compactors.

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of an identical text or by endorsement, at the latest by march 1995, and conflicting national standards shall be withdrawn at the latest by march 1995.

According to the CEN/CENELEC Internal Regulations, 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, United Kingdom.

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0 Introduction

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery shall comply as appropriate with EN 292 for hazards which are not covered by this standard.

In addition, machinery shall comply as appropriate with EN 292 for hazards which are not covered by this standard.

Those hazards that are relevant for all mechanical, electrical, hydraulic, pneumatic and other equipment of machinery and that are dealt with in standards for common use (Type A-, B 1- and B 2-standards) are not covered by this standard.

Reference to pertinent standards of this kind is made where such standards are applicable and so far necessary.

It is intended to revise EN 474 at an early date to take account of subsequent standards and legislation.

1 Scope

1.1 This Part of this standard specifies the general safety requirements for earth-moving machinery ¹⁾ described in ISO 6165 except rollers. Landfill compactors on the bases of a wheel loader and/or a wheel dozer are included in this standard.

This standard also applies to derivated machinery designed primarily for use with equipment to loosen, pick-up, move, transport, distribute and grade earth or rock.

Additional safety requirements are given for specific families of earth-moving machinery in machine specific parts 2 to 11 of this standard.

This part of this standard gives safety requirements for all earth-moving machinery families and shall be used in conjunction with one of the parts 2 to 11. These machine specific parts do not repeat the requirements from part 1 but add to or replace the requirements for the family in question.

Specific requirements in parts 2 to 11 take precedence over the respective requirements of this standard.

For earth-moving machinery families not dealt with in part 2 to 11 EN 474-1 applies.

For multipurpose machinery the parts of the standard, that cover the predominant application have to be used.

When operating in underground work additional requirements are needed which are under preparation. When operating in an explosive atmosphere e. g. coal mines, additional requirements are needed which are going to be covered in a special standard.

1.2 This standard deals with the significant hazards pertinent to earth-moving machinery, when used as intended and under the conditions foreseen by the manufacturer (see annex C).

¹⁾ For travelling on public roads the national traffic regulations shall be complied with.

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 286-2:1991 Simple unfired pressure vessels designed to contain air or nitrogen
Part 2: Simple unfired serially produced pressure vessels for air braking and auxiliary systems for motor-vehicles and trailers
- 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 23411:1988 Earth-moving machinery - Human physical dimensions of operators and minimum operator space envelope. (ISO 3411:1988)
- EN 25353:1988 Earth-moving machinery and tractors and machinery for agriculture and forestry - Seat index point (ISO 5353:1988)
- ENV 1070: 1993 Safety of machinery - Terminology
- ISO 2860:1992 Earth-moving machinery - Minimum access dimensions
- ISO/DIS 2867:1993 Earth-moving machinery - Access systems
- ISO 3449:1992 Earth-moving machinery - Falling-object protective structures - Laboratory tests and performance requirements.
- ISO 3450:1985 Earth-moving machinery - Wheeled machines - Performance requirements and test procedures for braking systems.
- ISO 3457:1986 Earth-moving machinery - Guards and shields - Definitions and specifications
- ISO 3471-1:1986 Earth-moving machinery - Roll-over protective structures - Laboratory tests and performance requirements -
Part 1: Crawler, wheel loaders and tractors, backhoe loaders, graders, tractor scrapers, articulated steer dumpers
- ISO 3795:1989 SIST EN 474-1:2000
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Road vehicles and tractors and machinery for agriculture and forestry - Determination of burning behaviour of interior materials
- ISO 3864:1984 Safety colours and safety signs
- ISO 5006-1:1991 Earth-moving machinery - Operator's field of view
Part 1: Test method
- ISO 5006-2:1993 Earth-moving machinery - Operator's field of view
Part 2: Evaluation method
- ISO 5006-3:1993 Earth-moving machinery - Operator's field of view
Part 3: Criteria

ISO 5010:1992	Earth-moving machinery - Rubber-tyred machines - Steering capability
ISO 6165:1987	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 6394:1985	Acoustics - Measurement of airborne noise emitted by earth-moving machinery - Operator's position - Stationary test condition
ISO 6405-1:1991	Earth-moving machinery - Symbols for operator controls and other displays Part 1: Common symbols
ISO 6405-2:1993	Earth-moving machinery - Symbols for operator controls and other displays Part 2: Specific symbols for machines, equipment and accessories
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 6746-1:1987	Earth-moving machinery - Definitions of dimensions and symbols Part 1: Base machine
ISO 6750:1984	Earth-moving machinery - Operation and maintenance - Format and content of manuals
ISO 7096:1982	Earth-moving machinery - Operator seat - Transmitted vibration
ISO 9247:1990	Earth-moving machinery - Electrical wires and cables - Principles of identification and marking
ISO 9249:1989	Earth-moving machinery - Engine test code - Net power
ISO 10264:1990	Earth-moving machinery - Key-locked starting systems
ISO 10570:1992	Earth-moving machinery - Articulated frame lock - Performance requirements

3 Definitions

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3.1 Common definitions

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For the purposes of this standard the definitions stated in ENV 1070 apply. Earth-moving machinery are defined in ISO 6165. 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 tractor-dozer: Self-propelled crawler or wheel machine having dozing equipment, which cuts, moves and grades material through a motion of the machine.

3.2.2 special earth-moving machinery: Machines with equipment to loosen, pick up, move, transport distribute or grade primarily earth or rock (e.g. trencher) whereby due to design these machines can only be used for special earth-work.

3.2.3 landfill compactor: Self-propelled wheel machine with loading or dozing equipment which loads, moves or grades material through a motion of the machine and also compacts material through its weight and motion.

3.2.4 derivated machinery: Self-propelled crawler or wheel machine with an optional attachment which modifies the application for use. For additional information see EN 474 part 2 to part 11.

4 Safety requirements and/or measures

This clause gives the requirements and/or measures on those hazards for which particular action appears necessary.

So far applicable requirements/measures are already contained in other standards - specifically in EN 292 part 1 and part 2 and Annex A of EN 292 part 2 or in Type B-standards - reference is made to them, to relevant sub-clauses and/or to applicable performance category.

4.1 Access

Adequate access systems which provide a safe access to the operator's station and maintenance areas shall be provided. Access systems shall comply with ISO/DIS 2867.

On machines with articulated steering a minimum clearance of 150 mm shall be available in the path of the access system to the operator's station, at the fully articulated steering position, as illustrated in figure 1.

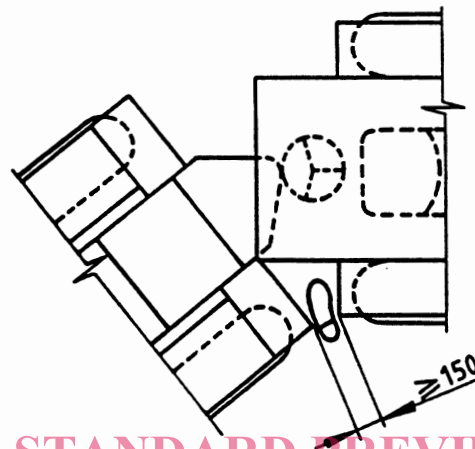


Figure 1: Minimum clearance of access to the operator's station on machines with articulated steering.
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4.2 Operator's station

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4.2.1 General

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Machines with an engine performance above 30 kW (see ISO 9249) shall be designed and built so that an operator's cab can be fitted.

Machines with an engine performance above 30 kW (see ISO 9249) shall be equipped with a cab, unless all-year climate conditions allow comfortable operation without a cab.

Machines with an engine performance below 30 kW shall be fitted with a cab when intended for use in specific or unhealthy environments.

The minimum space available to the operator shall be as defined in EN 23411 (except as amended in 4.2.2.5 of this standard). It shall allow for all manoeuvres necessary for the operation of the machinery to be carried out safely by the operator and without excessive fatigue. It shall meet the requirements specified in ISO 6682.

No accidental contact shall be possible with the wheels, tracks and working equipment from the operating position.

The engine exhaust system shall release the exhaust gas in such a way that the operator is not endangered.

4.2.2 Operator's station with a cab

When the operator's station is equipped with a cab, the cab shall meet the following requirements:

4.2.2.1 Climatic conditions

The cab shall protect the operator against foreseeable adverse weather conditions.

4.2.2.2 Sharp edges

The ceiling, the inner walls and the operator's working space within the cab shall not present any sharp edges or acute angles which are liable to hurt the operator.

4.2.2.3 Pipes and hoses

Pipes and hoses located inside the cab which contain fluids that are dangerous, for example because of their pressure, temperature etc, shall be guarded.

NOTE: Any part or component placed between pipes or hoses and the operator, which may divert a hazardous jet of fluid can be considered a sufficient protection device.

4.2.2.4 Emergency exit

An emergency exit, in a different direction from the regular exit, shall be provided. The dimensions shall comply with ISO/DIS 2867.

4.2.2.5 Space envelope height

The minimum space envelope height (radius 1 050 mm) as defined in figure 5 of EN 23411 and measured from the seat index point (SIP) as defined in EN 25353 shall depend on the machine engine performance according to the values given in table 1.

Table 1: Space envelope height related to machine engine performance

Machine engine performance measured in kw according to ISO 9249	Minimum space envelope height measured in mm from the SIP
< 30	920
30 up to 150	1 000
> 150	1 050

4.2.2.6 Heating, ventilation

Machines shall be fitted with a heating system of sufficient capacity unless all year climate conditions allow comfortable operation without such a system. See the machine specific parts of EN 474 for technical measures dealing with this requirement.

The cab shall be ventilated and prevent any health risk due to lack of oxygen.