SLOVENSKI STANDARD
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Stroji za zemeljska dela - Varnost - 2. del: Zahteve za buldožerje

Earth-moving machinery - Safety - Part 2: Requirements for tractor-dozers

Erdbaumaschinen - Sicherheit - Teil 2: Anforderungen für Planiermaschinen

Engins de terrassement - Sécurité - Partie 2 : Prescriptions applicables aux bouteurs

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53.100 Stroji za zemeljska dela Earth-moving machinery

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English Version

Earth-moving machinery - Safety - Part 2: Requirements for tractor-dozers

Engins de terrassement - Sécurité - Partie 2 : Prescriptions applicables aux bouteurs

Erdbaumaschinen - Sicherheit - Teil 2: Anforderungen für Planiermaschinen

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

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European foreword

This document (EN 474-2:2022) 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of an identical text or by endorsement, at the latest by September 2022, and conflicting national standards shall be withdrawn at the latest by March 2024.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 474-2:2006+A1:2008.

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

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

The main differences between this document and EN 474-2:2006+A1:2008 are as follows:

a) safety-related functions of control systems (excluded);

b) normative references (updated);

c) verification methods table (Clause 5) (added);

d) list of significant hazards (Annex A) (updated);

e) 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.

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.

1 Scope

This document together with EN 474-1:2022 deals with all significant hazards, hazardous situations and events relevant to tractor-dozers 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 following significant and relevant hazards are not covered in this document:

— Laser;

— Lightning.

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 tractor-dozers.

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).

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 tractor-dozers which are manufactured before the date of publication of this document by CEN.

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 ISO 3411:2007, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope (ISO 3411:2007)*

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

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)*

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

ISO 8084:2003, *Machinery for forestry — Operator protective structures — Laboratory tests and performance requirements*

ISO 8084:2003/Amd 1:2015, *Machinery for forestry — Operator protective structures — Laboratory tests and performance requirements — Amendment 1*

ISO 19472:2006+TC 1:2006, *Machinery for forestry — Winches — Dimensions, performance and safety*

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 following apply.

Terminology for tractor-dozers is specified in ISO 6747:2013 and the most common tractor-dozers are illustrated in Annex B of this document.

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

3.1
tractor-dozer
self-propelled crawler or wheeled machine with equipment having either dozing attachment which cuts, moves, and grades material through forward motion of the machine or a mounted attachment used to exert a push or a pull force (see EN ISO 6165:2012)

4 Safety requirements and/or protective/risk reduction measures

4.1 General

4.1.1 Context

Tractor-dozers 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

Tractor-dozers 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 tractor-dozers the corresponding hazard does not exist. For tractor-dozers 4.2.2, 4.3.5, 4.12, 4.14.2.3, 4.22.5, Annex B and Annex C in EN 474-1:2022, are not applicable.

4.2 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:

— EM6 for crawler dozers less than 50 000 kg operating mass according to ISO 6016:2008;

— EM5 for wheel dozers;

— for crawler dozer greater than or equal to 50 000 kg, see EN ISO 7096:2020.

4.3 Rear-mounted winch

4.3.1 General

If a rear-mounted winch is needed, 4.3.2, 4.3.3 and 4.3.4 apply.

4.3.2 Safety requirements

Mechanical safety shall comply with the safety requirements of ISO 19472:2006+TC1:2006, 6.1.

Drum shall comply with the safety requirements of ISO 19472:2006+TC1:2006, 6.2.

Rope shall comply with the safety requirements of ISO 19472:2006+TC1:2006, 6.3 and 6.4.

Brake shall comply with the safety requirements of ISO 19472:2006+TC1:2006, 6.5.

The means for securing a winch to the machine structure shall be designed to withstand a force of twice the maximum line-pull that can be exerted by the rope without permanent, visible deformation.

4.3.3 Controls

EN 474-1:2022, 4.5 applies with the following addition:

Controls related to rear-mounted winch shall comply with the requirements of ISO 19472:2006+TC1:2006, 6.6.

4.3.4 Protection

Where a rear-mounted winch is fitted, provision shall be made to allow for protection.

Constructional requirements of tractor-dozers equipped with a rear-mounted winch shall comply with ISO 8084:2003, ISO 8084:2003+Amd 1:2015, 5.2.3, or equivalent protection between the operator and the winch.

The screen width and height shall cover at least:

— the rear window, for machines fitted with cab;

— the rear of the minimum space envelope as specified in Figure 4 of EN ISO 3411:2007 for machines without a cab.

5 Verification of the safety requirements and/or protective/risk reduction measures

Safety requirements and/or protective/risk reduction measures of Clause 4 of this document shall be verified according to Table 1.

Table 1 sets out verification methods which shall be applied for each safety requirement in this document.

Where X(s) is indicated in the table, the corresponding verification method(s) shall be applied.

Table 1 shall be read in conjunction with the corresponding clauses.

Table 1 includes the following verification methods:

a) calculation: to establish that the requirements of this document have been met;

b) visual verification: to establish that something is present (e.g. a guard, a marking, a document);

c) measurement: to show that the required numerical values have been met (e.g. geometric dimensions, safety distances, resistance of insulation of the electric circuits, results of physical tests);

d) functional tests: to show that the adequate signals intended to be forwarded to the main control system of the complete machine are available and comply with the requirements and with the technical documentation;

e) special verification: by reference to a standard which is mentioned in the corresponding clause.

Table 1 — Verification of safety requirements and/or protective/risk reduction measures

Clause number	Title	a) Calculation	b) Visual verification	c) Measurement	d) Functional test	e) Special verification
4.1	General					X
4.2	Seat					X
4.3.2	Safety requirements					X
4.3.3	Controls					X
4.3.4	Protection					X

6 Information for use

6.1 General

Information for use shall be provided in accordance with EN ISO 12100:2010, 6.4.

6.2 Machine safety labels

EN 474-1:2022, 6.2 shall apply.

6.3 Operator's manual

EN 474-1:2022, 6.3 shall apply with the following additions:

The manufacturer shall provide information of the corresponding operating condition:

— rear-mounted winch according to 4.3.

The manufacturer shall provide marking of the maximum pull force of the winch in Newton (N) of the corresponding operating condition:

— rear-mounted winch according to 4.3.