



SLOVENSKI STANDARD
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Stroji za zemeljska dela - Varnost - Stroji za rušenje

Earth-moving machinery - Safety - Demolition machinery

Erdbaumaschinen - Sicherheit - Abrissmaschinen

Engins de terrassement - Sécurité - Engins de démolition

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ICS:

53.100 Stroji za zemeljska dela Earth-moving machinery

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démolition

Erdbaumaschinen - Sicherheit - Abrissmaschinen

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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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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (prEN 17998:2024) 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 has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document

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prEN 17998:2024(E)**Introduction**

This document is a type C standard as stated in EN ISO 12100:2010.

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 and events are covered is 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.

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1 Scope

This document specifies safety requirements for earth-moving machinery when used for demolition applications.

This document is only applicable to the following earth-moving machinery types as described in EN ISO 6165:2022:

- hydraulic excavators;
- cable excavators.

This document does not provide safety requirements for machinery used in conjunction with explosives for the demolition application.

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 deals with significant hazards, hazardous situations and events relevant to earth-moving machinery, when used for demolition application and under conditions foreseen but also taking into account any reasonably foreseeable misuse thereof (see Annex A).

The following significant and relevant hazards are not covered in this document:

- laser;
- lightning.

This document is not applicable to earth-moving machinery which are manufactured before the date of publication of this document 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 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 356:1999, *Glass in building - Security glazing - Testing and classification of resistance against manual attack*

EN 474-1:2022, *Earth-moving machinery - Safety - Part 1: General requirements*

EN 474-5:2022, *Earth-moving machinery - Safety - Part 5: Requirements for hydraulic excavators*

EN 474-12:2022, *Earth-moving machinery - Safety - Part 12: Requirements for cable excavators*

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

EN ISO 6165:2022, *Earth-moving machinery - Basic types - Identification and vocabulary (ISO 6165:2022)*

EN ISO 14120:2015, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards (ISO 14120:2015)*

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EN ISO 14122-1:2016, *Safety of machinery - Permanent means of access to machinery - Part 1: Choice of fixed means and general requirements of access (ISO 14122-1:2016)*

EN ISO 14122-2:2016, *Safety of machinery - Permanent means of access to machinery - Part 2: Working platforms and walkways (ISO 14122-2:2016)*

EN ISO 14122-3:2016, *Safety of machinery - Permanent means of access to machinery - Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2016)*

EN ISO 14122-4:2016, *Safety of machinery - Permanent means of access to machinery - Part 4: Fixed ladders (ISO 14122-4:2016)*

EN ISO 16001:2017, *Earth-moving machinery - Object detection systems and visibility aids - Performance requirements and tests (ISO 16001:2017)*

ISO 8643:2024, *Earth-moving machinery - Hydraulic excavator and backhoe loader lowering control device - Requirements and tests*

ISO 10262:1998, *Earth-moving machinery - Hydraulic excavators - Laboratory tests and performance requirements for operator protective guards*

ISO 13031:2016, *Earth-moving machinery - Quick couplers - Safety*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 474-1:2022, EN 474-5:2022, EN 474-12:2022, EN ISO 6165:2022 and EN ISO 12100:2010 and the following apply.

Earth-moving machinery and their families are defined in EN ISO 6165:2022.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org>
- ISO Online browsing platform: available at <https://www.iso.org/obp/>

3.1

demolition application

demolishing by pushing or pulling or fragmenting by crushing or shearing buildings and/or other civil engineering structures and their component parts and/or separating the resultant debris

[SOURCE: ISO 20474-5:2017, 3.5, modified]

3.2

demolition machine

machine based on earth-moving machinery and including equipment and attachment (working tool – e.g. processor or breaker) specifically designed for use in demolition application

3.3

base machine

demolition machine without equipment or attachments but possessing the necessary mountings for such equipment and attachments

Note 1 to entry: See Figure 1.

[SOURCE: EN ISO 6165:2022, 3.1.11, modified]

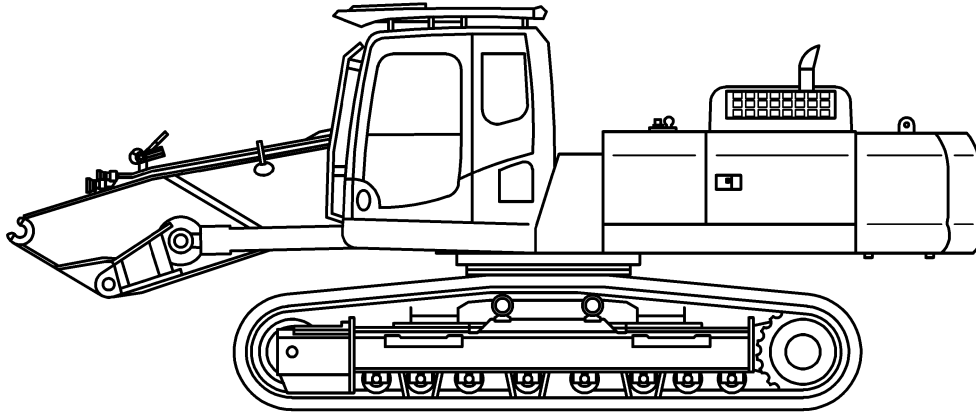


Figure 1 — Base machine

3.4

high reach equipment

multi piece rigid or telescopic equipment with the primary function of operating specialized attachments for the demolition of structures at working heights of 15 m and above, measured from the ground on which the machine is sitting

3.5

front guard

device intended to provide object protection to the front of the operator station of ride-on demolition machines

[SOURCE: ISO 10262:1998, 3.2, modified]

3.6

counterweight

any additional weight and its support added to increase tipping load

[SOURCE: ISO 8811:2000, 3.1.8, modified]

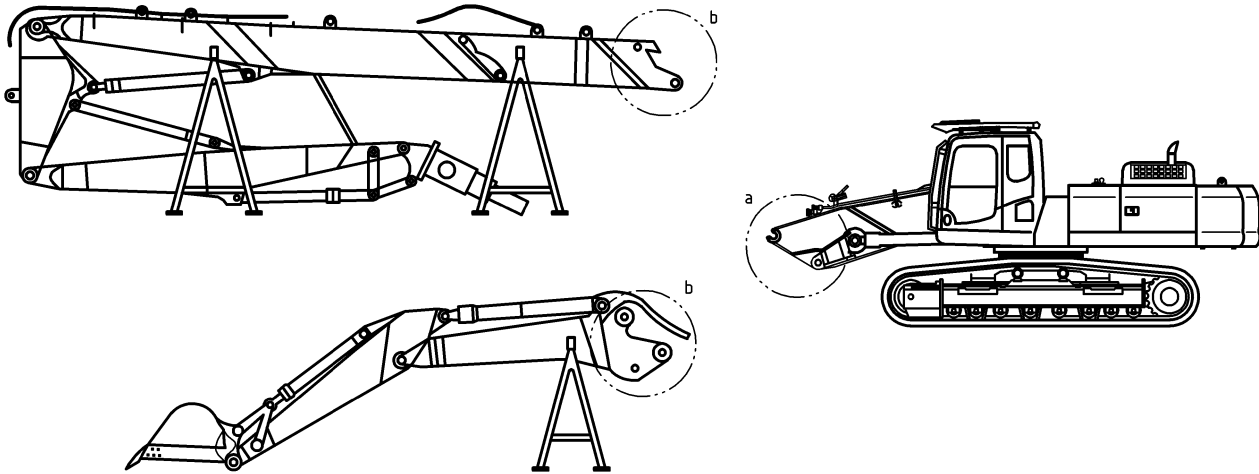
3.7

interchangeable equipment quick coupling joint

connector which enables coupling and uncoupling of interchangeable equipment

Note 1 to entry: See Figure 2.

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**Key**

- a interchangeable equipment quick coupling joint, base machine side
- b interchangeable equipment quick coupling joint, interchangeable equipment side

Figure 2 — Interchangeable equipment quick coupling joint

3.8**automatic interchangeable equipment quick coupling joint**

connector system which enables the operator to couple and uncouple interchangeable equipment without having to leave the operator's station or employ additional operators to assist coupling and/or uncoupling

4 Safety requirements and/or protective/risk reduction measures**4.1 General****4.1.1 Context**

Demolition machines shall comply with the safety requirements and/or protective/risk reduction measures of this clause. They shall be designed according to the principles of EN ISO 12100:2010 for relevant hazards which are not dealt with by this document.

4.1.2 Specific relation to EN 474:2002 "Earth-moving machinery - Safety"

Demolition machines shall comply with the requirements of EN 474-1:2022 "General requirements" and EN 474-5:2022 "Requirements for hydraulic excavators" for demolition hydraulic excavators, and EN 474-12:2022 "Requirements for cable excavators" for demolition cable excavators, as far as not modified or replaced by the requirements of this standard.

For demolition hydraulic excavators there are general requirements specified in EN 474-1:2022 that are not applicable because the risk assessment has shown that for demolition hydraulic excavators the corresponding hazard does not exist. For demolition hydraulic excavators, 4.4.2.2 and 4.14.2.3 in EN 474-1:2022 are not applicable.

4.2 Operator's station**4.2.1 General**

EN 474-1:2022, 4.3 applies with the following modifications:

For ride-on demolition hydraulic excavators EN 474-5:2022, 4.2 shall apply.

For ride-on demolition cable excavators EN 474-12:2022, 4.3.2 shall apply.

All ride-on demolition machines shall be equipped with a cab and a contamination protective system.

NOTE The following standard is being developed and could apply - NWIP TC_151_WI00151491 (Safety – Protective Ventilation systems).

For ride-on demolition machines fitted with high-reach equipment, provision shall be made for tilting the operator's position (e.g. tilting cab) to provide operator comfort and adequate visibility of the attachment within the intended working range.

4.2.2 Protective structures for ride-on demolition machines

4.2.2.1 Operator's protective guards (OPG)

EN 474-1:2022, 4.3.4 shall be replaced by the following:

For ride-on demolition machines with an operating mass equal or less than 6 000 kg, the minimum requirement for operator's protective guards is level I protection as per ISO 10262:1998.

For ride-on demolition machines with an operating mass greater than 6 000 kg, the minimum requirement for operator's protective guards is Level II as per ISO 10262:1998.

For demolition machines with a tilting cab, the front guard shall, in addition, be tested in accordance with ISO 10262:1998 Level II top guard test with the cab in a tilted position where the impact has the greatest effect.

4.2.2.2 Window protection iTeh Standards

To protect the operator against small flying or falling debris, the front window(s) and roof window (when fitted) shall be equipped with impact-resistant glass or any other material or arrangement providing equivalent protection according to EN 356:1999 class P5A. In addition, to protect the operator from glass spalling during impact of debris, the inside surface of the front window(s) and roof window (when fitted) shall be fitted with a plastic material. The performance shall meet the requirements set out in Annex B.

4.2.2.3 Cab floor protection oSIST prEN 17998:2024

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The bottom part of the cab shall be able to protect the operator against penetrating material.

This protection shall be established by armouring the floor plates of the cabin or similar structural elements of the machine-frame that are located beneath the cabin, such that the total floor-area of the cabin is covered.

The resistibility of this protection shall be equal or higher to a comparable system established by a fine grain steel-plate, if clamped in from all sides. The representative thickness of the fine-grain construction steel-plate, or steel-structure of this comparable system shall have a total work piece thickness of > 6 mm.

NOTE The design of the protective device is not limited to a special material. However, the reference level for the comparable system is based on the material properties of sheet metal EN 10149-2:2013 (S355MC) with material characteristic according to steel key 1.0976 under consideration of the related assembly situation.

Alternative materials shall have at least the same protection characteristics as the system described above.

Irrespective of the material used and the various cabin-designs applied, the protection shall meet at least the requirements of a fixed guard as defined in EN ISO 14120:2015, 3.2.

4.3 Operator's controls and indicators

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

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The controls for operating the tilting cab shall be located in front of the seat backrest, to be determined with the backrest in the vertical position and the seat in its mid position.

For demolition cable excavators, EN 474-12:2022, 4.5 shall also apply.

4.4 Visibility**4.4.1 General**

EN 474-1:2022, 4.8 applies with the following additions:

If a roof window is used to provide visibility to the working area, then it shall be equipped with motorized windscreen wiper(s) and washer(s).

4.4.2 High reach equipment visibility aids

For demolition machines fitted with high reach equipment and capable of working at heights above 30 m from the SIP, the operator visibility of the work area shall be enhanced by the use of a CCTV system with a camera mounted on the equipment sufficiently close to the attachment to provide adequate view of the work area. The system should be automatically in operation while the machine is running.

For demolition hydraulic excavators, EN 474-5:2022, 4.6.2 does not apply to high reach equipment visibility aids.

The CCTV system shall comply with EN ISO 16001:2017, Annex B.

4.5 Stability

EN 474-1:2022, 4.11 applies with the additions below.

For machines with high-reach equipment, to maintain stability, an integrated automatic device shall warn the operator (visual and/or audible) during operation when approaching the stability limit as specified by the manufacturer. The warning shall remain in place whilst the stability limit hazard exists.

For demolition hydraulic excavators with interchangeable equipment quick coupling joints, the manufacturer shall protect against risks of machine tip over arising from equipment configurations whereby machine stability is compromised, e.g. through physical limitation of the machine and/or visible warnings in the operator's station.

4.6 Lifting operation

For demolition hydraulic excavators, EN 474-5:2022, 4.8 applies with the following modification:

For demolition machines fitted with high reach equipment, EN 474-1:2022, 4.12 shall be replaced by the following clause.

A lowering control device on each raising boom and arm cylinder shall be fitted in order to maintain machine stability. For arm cylinders, the device(s) shall be installed at the end which is pressured in order to raise the arm away from the base machine. Lowering control devices for boom and arm cylinders shall be tested in accordance with ISO 8643:2024.

4.7 Hydraulic systems

EN 474-1:2022, 4.18 applies with the following modifications:

Pipes and hoses which have to be disconnected/reconnected during dismantling/mounting of equipment shall be fitted with self-sealing couplings or shut-off valves. Couplings/valves shall be marked to ensure correct reconnection.