SLOVENSKI STANDARD
SIST EN 17969:2026

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Stroji za zemeljska dela - Varnost - Sistemi za zaščito pred onesnaženjem

Earth-moving machinery - Safety - Contamination protective systems

Erdbaumaschinen - Sicherheit - Schutzbelüftungsanlagen

Engins de terrassement - Sécurité - Systèmes de protection contre les contaminations

Ta slovenski standard je istoveten z: **EN 17969:2026**

ICS:

53.100	Stroji za zemeljska dela	Earth-moving machinery

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English Version

Earth-moving machinery - Safety - Contamination protective systems

Engins de terrassement - Sécurité - Systèmes de protection contre les contaminations

Erdbaumaschinen - Sicherheit - Schutzbelüftungsanlagen

This European Standard was approved by CEN on 13 April 2026.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 17969:2026) 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of an identical text or by endorsement, at the latest by November 2026 and conflicting national standards shall be withdrawn at the latest by November 2026.

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 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 Annexes ZA and ZB, which are an integral part of this document.

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 organizations 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, Türkiye and the United Kingdom.

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:

— contamination protective device manufacturers;

— 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;

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e.g. for maintenance;

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate in the drafting process of this document.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document. When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

When operating earth-moving machinery in contaminated areas, the operator can be exposed to hazardous agents such as chemical agents in the form of dust, aerosols, gases or vapours or biological agents in the form of aerosols. Protective ventilation systems for earth-moving machinery providing protection against these hazardous agents can reduce operator exposure to airborne contaminants present in contaminated areas, where the protection provided by a standard filtration system (e.g. as required in EN 474-1:2022) is not sufficient.

The objective of this document is to improve the operator protection by using the protective ventilation systems of earth-moving machinery used in contaminated areas. For this purpose, this document specifies requirements, test procedures and the operator information to be provided, in particular with regard to installation, use and maintenance operations.

1 Scope

This document is applicable to protective ventilation systems to provide breathing air to operator's stations on earth-moving machinery used in contaminated areas. Its purpose is to limit the exposure of the operator (driver) to hazardous agents when earth-moving machinery is used in contaminated areas.

This document describes requirements, test procedures and information to be provided by the manufacturer of protective ventilation systems to provide breathing air to operator's stations on earthmoving machinery used in contaminated areas.

This document gives requirements additional to the common safety requirements of EN 474-1:2022 “Earthmoving machinery - Safety - Part 1: General requirements” and to the machine specific parts of the EN 474:2022 series.

This document does not repeat the requirements from the EN 474:2022 series but adds or replaces the requirements as applicable for Earth-moving machinery.

This document does not cover:

— the safety requirements to be used for any specific application;

— the choice of the system for a specific application site;

— the filter performance or the relevant filtration class for any particular application;

— the choice of type of filter for a specific application;

— the cab performance requirement when in-use;

— the filter durability when in-use.

This document is not applicable to protective ventilation systems which are manufactured before the date of its publication as an EN.

For the list of significant hazards, see informative Annex A.

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

EN 474-6:2022, *Earth-moving machinery — Safety — Part 6: requirements for dumpers*

EN 474-9:2022, *Earth-moving machinery — Safety — Part 9: requirements for pipelayers*

EN 474-10:2022, *Earth-moving machinery — Safety — Part 10: requirements for trenchers*

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

EN 474-13:2022, *Earth-moving machinery — Safety — Part 13: requirements for rollers*

EN 1822-1:2019, *High efficiency air filters (EPA, HEPA and ULPA) — Part 1: Classification, performance testing, marking*

EN 12021:2014, *Respiratory equipment — Compressed gases for breathing apparatus*

EN 12341:2023, *Ambient air — Standard gravimetric measurement method for the determination of the PM10 or PM2,5 mass concentration of suspended particulate matter*

EN 13274-8:2002, *Respiratory protective devices — Methods of test — Part 8: Determination of dolomite dust clogging*

EN 14387:2021, *Respiratory protective devices — Gas filter(s) and combined filter(s) — Requirements, testing, marking*

EN 15695-1:2017, *Agricultural tractors and self-propelled sprayers — Protection of the operator (driver) against hazardous substances — Part 1: Cab classification, requirements and test procedures*

EN 60204-1:2018, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

EN 60529:1991,[1] *Degrees of protection provided by enclosures (IP Code)*

EN IEC 62990-2:2021, *Workplace atmospheres — Part 2: Gas detectors — Selection, installation, use and maintenance of detectors for toxic gases and vapours*

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 10121-1:2014, *Test method for assessing the performance of gas-phase air cleaning media and devices for general ventilation — Part 1: Gas-phase air cleaning media (ISO 10121-1:2014)*

EN ISO 13766-1:2018, *Earth-moving and building construction machinery — Electromagnetic compatibility (EMC) of machines with internal electrical power supply — Part 1: General EMC requirements under typical electromagnetic environmental conditions (ISO 13766-1:2018)*

EN ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2019)*

EN ISO 19014-3:2018, *Earth-moving machinery — Functional safety — Part 3: Environmental performance and test requirements of electronic and electrical components used in safety-related parts of the control system (ISO 19014-3:2018)*

ISO 10263-4:2009, *Earth-moving machinery — Operator enclosure environment — Part 4: Heating, ventilating and air conditioning (HVAC) test method and performance*

[1] As impacted by EN 60529:1991/corrigendum May 1993, EN 60529:1991/A1:2000, EN 60529:1991/A2:2013, EN 60529:1991/AC:2016-12 and EN 60529:1991/A2:2013/AC:2019-02.

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 6165:2022 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

3.1.1
contaminated area
area where hazardous agent is present in the ambient air

3.1.2
hazardous agents
chemical agent in the form of dust, aerosol, vapour or gas, or biological agent in the form of aerosol, which can expose an operator to a health risk

EXAMPLES Asbestos, crystalline silica dust, hydrogen sulphide, ammonia, bacterium.

[SOURCE: Directive 98/24/EC (chemical agent) and Directive 2000/54/EC (biological agent)]

3.1.3
aerosol
suspension in air of solid particles, liquid particles or solid and liquid particles having a negligible falling velocity

3.1.4
dust
finely divided, airborne and sedimented solid particles

3.1.5
protective ventilation system
protective system providing breathable air comprising either a fan and a particle filter unit (3.1.7) or gas filter unit (3.1.8), or a breathing compressed air unit (3.1.9)

Note 1 to entry: See informative Annex B.

3.1.6
prefilter
device to reduce the amount of particles before entering particle filter

Note 1 to entry: The prefilter efficiency is lower than the particle filter efficiency.

Note 2 to entry: The prefilter can be conducted as a mechanical device, e.g. cyclone, air precleaner or with a filter material.

3.1.7
particle filter unit
air handling device to provide air with a reduced amount of dust and aerosol to the operator's cab

Note 1 to entry: Chemical and biological aerosols can be filtered by particle filters.

3.1.8
gas filter unit
air handling device to provide air with a reduced amount of dust, aerosol, vapour and gas to the operator's cab

3.1.9
breathing compressed air unit
air handling device supplying breathable air independent of the atmosphere outside the cab and consisting of:

— compressed air bottles, lines and fittings, or

— lines and fittings providing breathing air to the operator's station

3.1.10
filter housing
enclosure where gas- and/or particle filters are placed

3.1.11
ambient air
indicates the air of the area where the machine is used

3.1.12
monitoring device
stand-alone unit or integrated part in the machinery dash panel for monitoring and indicating the operating status of the protective ventilation system and generating alarms

3.1.13
recirculation unit

air handling device which solely filters the air inside the cab without taking fresh air

Note 1 to entry: See informative Annex B.

3.1.14
overpressure
positive static differential pressure in the cab of the earth-moving machinery

Note 1 to entry: See informative Annex C.

3.1.15
filters/filter elements
pack of filtration media

3.1.16
breathing air
filtered ambient air or air from compressed air units, and filtered recirculating air

3.1.17
operator's station
area on a ride-on machine from which an operator controls the functions of the machine

[SOURCE: EN 474-1:2022, 3.8]

3.1.18
operator's cab
enclosure on a ride-on machine from which an operator controls the travel and work functions of the machine

[SOURCE: EN 474-1:2022, 3.9]

3.2 Abbreviations

HVAC Heating, Ventilation and Air Conditioning

4 Safety requirements and/or protective/risk reduction measures

4.1 General

This document describes requirements, test procedures and information to be provided by the manufacturer for protective ventilation systems to provide breathing air to operator's stations on earthmoving machinery used in contaminated areas.

NOTE A filter's performance level can depend on a risk assessment and national regulations.

4.2 General requirements

4.2.1 Requirements for the operator's cab

4.2.1.1 Design of protective ventilation system

The units of the protective ventilation system placed in the operator's station shall be free of sharp edges or acute angles/corners so as to be able to comply with requirements of EN 474-1:2022, 4.3.1.5 and 4.14 when implemented in the operator's station.

4.2.1.2 HVAC system

EN 474-1:2022, 4.3.2 applies with the following addition:

The operator's cab shall be equipped with a HVAC in accordance with ISO 10263-4:2009.

4.2.1.3 Doors and windows

Doors, windows, flaps and their locking devices shall be so designed that no hazards will be created to the operator during opening under pressure, e.g. by abrupt movements.

4.2.1.4 Respiratory protective device

A place for keeping an appropriate respiratory protective device (depending on the kind of protective ventilation systems) to rescue oneself (means of escape) shall be provided at the operator's cab and be easily accessible.

4.2.2 Requirements for providing breathing air

4.2.2.1 Recirculating air

Consistent breathing air inlet and distribution shall be provided at the operator's cab. Resuspension of dust shall be avoided.