

STN	Požiadavky na návrh a skúšanie vysávačov do potenciálne výbušných atmosfér	STN EN 17348 38 9731
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Requirements for design and testing of vacuum cleaners for use in potentially explosive atmospheres

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/22

Obsahuje: EN 17348:2022

135332

EUROPEAN STANDARD

EN 17348

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2022

ICS 97.080

English Version

Requirements for design and testing of vacuum cleaners for use in potentially explosive atmospheres

Exigences relatives à la conception et aux essais des
aspirateurs destinés à être utilisés en atmosphère
explosible

Anforderungen an die Konstruktion und Prüfung von
Staubsaugern zur Verwendung in
explosionsgefährdeten Bereichen

This European Standard was approved by CEN on 20 April 2022.

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 CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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EN 17348:2022 (E)**European foreword**

This document (EN 17348:2022) has been prepared by Technical Committee CEN/TC 305 “Potentially explosive atmospheres – Explosion prevention and protection”, 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of an identical text or by endorsement, at the latest by November 2022, and conflicting national standards shall be withdrawn at the latest by November 2022.

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 given to CEN by the European Commission and the European Free Trade association and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), 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 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 12100:2010.

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 machinery concerned and the extent to which hazards, hazardous situations and 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.

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1 Scope

This document specifies requirements for design, construction, testing and marking of hand-held, portable and transportable vacuum cleaners, including their accessories, constructed to Group II, categories 2G or 3G (of explosion groups IIA, IIB, IIB plus hydrogen), and to Group II, categories 2D or 3D (of explosion groups IIIA, IIIB and IIIC), intended for the collection of combustible or non-combustible dusts and flammable or non-flammable liquids in potentially explosive atmospheres. A potentially explosive atmosphere could be generated by the equipment during its intended use.

NOTE 1 The accumulation of 1 mm or more of combustible dust on surfaces in a working area can create an explosive atmosphere (see reference to 1/32 in. of Depth of Dust Accumulation for Guidance for Area Electrical Classification in NFPA 654, 2017 Edition).

This document applies to equipment driven by electric power and by pneumatic power.

This document gives guidelines for dealing with significant hazards, hazardous situations and/or events relevant to vacuum cleaners when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer.

Typical applications for the concerned equipment are:

- collection of dust produced by machinery at the point of generation;
- general housekeeping around machinery and of working areas; and/or
- collection of spills;
- cleaning of equipment during maintenance operations; and/or
- collection of specific waste.

For the collection of dust in the presence of flammable liquids or vapours, a specific risk assessment is performed if this is part of the vacuum cleaners intended conditions of use and additional precautions beyond what is described in this document can be required.

NOTE 2 The passage of dust through a vacuum cleaner will generate high levels of electrostatic charge which, in most situations, will be a potential source of ignition to a flammable gas or vapour atmosphere.

For the collection of low-conductivity flammable liquids, a specific risk assessment is performed if this is part of the vacuum cleaners intended conditions of use and additional precautions beyond what is described in this document can be required.

NOTE 3 The resulting liquid velocities are likely to be in excess of the limits required to maintain electrostatic charge generation at a non-hazardous level according to CLC/TR 60079-32-1:2018.

This document does not apply to equipment used to collect toxic dusts where there is a health risk if dust passes through the filter elements. This document does not apply to the collection of dusts which have explosive and unstable properties (UN transport class 1, class 4.1 and class 5.2).

NOTE 4 Hazards related to the use of vacuum cleaners for the collection of hazardous dusts are the subject of other standards.

This document applies to vacuum cleaners with an internal dirty air volume of maximum 250 l.

NOTE 5 250l is the volume above which it is recognized a vacuum cleaner might not be considered as transportable by an operator, and above which additional explosion protections can be required.

The present version of the document does not apply to battery operated equipment.

NOTE 6 Battery operated equipment might be part of the scope of this document in a subsequent version.

This document does not apply to vacuum trucks.

This document applies to vacuum cleaners of canister and back-pack types. This document does not apply to upright vacuum cleaners.

This document does not apply to motorized cleaning head accessories.

NOTE 7 This document does not apply to household appliances which are the subject of other standards.

This document does not apply to applications where the substances are conveyed into a separate receiving container.

This document does not apply to equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines endangered by firedamp and/or combustible dust.

For an easier readability, all types of equipment concerned by this document are referred as a “vacuum cleaner”.

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.

CEN/TR 16793:2016, *Guide for the selection, application and use of flame arresters*

CLC/TR 60079-32-1:2018, *Explosive atmospheres — Part 32-1: Electrostatic hazards, guidance (IEC TS 60079-32-1:2013, IEC/TS 60079-32-1:2013/A1:2017)*

EN 1127-1:2019, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology*

EN 1149-1:2006, *Protective clothing — Electrostatic properties — Part 1: Test method for measurement of surface resistivity*

EN 13237:2012, *Potentially explosive atmospheres — Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres*

EN 14797:2006, *Explosion venting devices*

EN 14986:2017, *Design of fans working in potentially explosive atmospheres*

EN 60079-14:2014, *Explosive atmospheres — Part 14: Electrical installations design, selection and erection (IEC 60079-14:2013)*

EN 60079-31:2014, *Explosive atmospheres — Part 31: Equipment dust ignition protection by enclosure “t” (IEC 60079-31:2013)*

EN 60204-1:2018, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2016, modified)*

EN 60335-1:2012¹, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1:2010, modified)*

¹ As impacted by EN 60335-1:2012/A1:2019, EN 60335-1:2012/A2:2019, EN 60335-1:2012/A11:2014, EN 60335-1:2012/A13:2017, EN 60335-1:2012/A14:2019 and EN 60335-1:2012/A15:2021.

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EN IEC 60079-0:2018², *Explosive atmospheres — Part 0: Equipment — General requirements (IEC 60079-0:2017)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 4126-2:2019, *Safety devices for protection against excessive pressure — Part 2: Bursting disc safety devices (ISO 4126-2:2018)*

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

EN ISO 8031:2020, *Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity (ISO 8031:2020)*

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11203:2009, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203:1995)*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

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

EN ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2015)*

EN ISO 13849-2:2012, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2:2012)*

EN ISO 16852:2016, *Flame arresters — Performance requirements, test methods and limits for use (ISO 16852:2016)*

EN ISO 20643:2008, *Mechanical vibration — Hand-held and hand-guided machinery. Principles for evaluation of vibration emission (ISO 20643:2005)*

EN ISO 80079-36:2016³, *Explosive atmospheres — Part 36: Non-electrical equipment for explosive atmospheres — Basic method and requirements (ISO 80079-36:2016)*

ISO 14694:2003, *Industrial fans — Specifications for balance quality and vibration levels*

ISO 22883:2004, *Castors and wheels — Requirements for applications up to 1,1 m/s (4 km/h)*

² As impacted by EN IEC 60079-0:2018/AC:2020-02.

³ As impacted by EN ISO 80079-36:2016/AC:2019.

ISO 22884:2004, *Castors and wheels — Requirements for applications over 1,1 m/s (4 km/h) and up to 4,4 m/s (16 km/h)*

ISO 29463-1:2017, *High efficiency filters and filter media for removing particles from air — Part 1: Classification, performance, testing and marking*

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