



SLOVENSKI STANDARD

SIST EN 12942:1999

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Respiratory protective devices - Power assisted filtering devices incorporating full face masks, half masks or quarter masks - Requirements, testing, marking

Atenschutzgeräte - Gebläsefiltergeräte mit Vollmasken, Halbmasken oder Viertelmasken - Anforderungen, Prüfung, Kennzeichnung

Appareils de protection respiratoire - Appareils filtrants a ventilation assistée avec masques complets, demi-masques ou quarts de masques - Exigences, essais, marquage

Ta slovenski standard je istoveten z: EN 12942:1998

ICS:

13.340.30 Varovalne dihalne naprave Respiratory protective devices

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en

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English version

Respiratory protective devices - Power assisted filtering devices incorporating full face masks, half masks or quarter masks - Requirements, testing, marking

Appareils de protection respiratoire - Appareils filtrants à ventilation assistée avec masques complets, demi-masques ou quarts de masques - Exigences, essais, marquage

Atemschutzgeräte - Gebläsefiltergeräte mit Vollmasken, Halbmasken oder Viertelmasken - Anforderungen, Prüfung, Kennzeichnung

This European Standard was approved by CEN on 20 September 1998.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 79 "Respiratory protective devices", the secretariat of which is held by DIN.

This European Standard supersedes EN 147:1991.

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 April 1999, and conflicting national standards shall be withdrawn at the latest by April 1999.

The significant difference between this European Standard and EN 147:1991 is:

- specifications for devices with gas and combined filters.

This European Standard has been prepared under a mandate 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 standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

A given respiratory protective device can only be approved when its individual components satisfy the requirements of the test specification which can be a complete standard or part of a standard, and practical performance tests have been carried out successfully on a complete device where specified in the appropriate standard. If, for any reason a complete device is not tested then simulation of the device can be done provided the respiratory characteristics and weight distribution are similar to those of the complete device.

1 Scope

This European Standard specifies minimum requirements for power assisted respiratory protective devices which incorporate a full face mask, half mask or a quarter mask together with gas, particle or combined filter(s) used as respiratory protective devices. It does not cover devices designed for use in circumstances where there is or might be an oxygen deficiency (concentration in oxygen less than 17% by volume). Also, it does not cover respiratory protective devices designed for escape purposes.

Laboratory tests and practical performance tests are included for the assessment of compliance with the requirements.

2 Normative references

This European Standard incorporates by dated or undated reference, 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.

prEN 132:1996	Respiratory protective devices - Definitions
EN 134:1998	Respiratory protective devices - Nomenclature of components
EN 136:1998	Respiratory protective devices - Full face masks - Requirements, testing, marking
EN 140:1998	Respiratory protective devices - Half masks and quarter masks - Requirements, testing, marking
prEN 143:1997	Respiratory protective devices - Particle filters - Requirements, testing, marking
prEN 148-1:1998	Respiratory protective devices - Threads for facepieces - Standard thread connection
EN 166:1995	Personal eye protection - Specifications
EN 169:1992	Personal eye protection - Filters for welding and related techniques - Transmittance requirements and recommended utilisation
EN 170:1992	Personal eye protection - Ultraviolet filters - Transmittance requirements and recommended use
EN 171:1992	Personal eye protection - Infrared filters - Transmittance requirements and recommended use
EN 379:1994	Specification for welding filters with switchable luminous transmittance and welding filters with dual luminous transmittance
EN ISO 6941:1995	Textile fabrics - Burning behaviour - Measurement of flame spread properties of vertically oriented specimens (ISO 6941:1984, including Amendment 1:1992)
EN 50 014:1992	Electrical apparatus for potentially explosive atmospheres - General requirements

EN 50 020:1994	Electrical apparatus for potentially explosive atmospheres - Intrinsic safety 'I'
EN 60 651	Sound level meters

3 Definitions and description

3.1 Definitions

For the purposes of this European Standard the definitions given in prEN 132:1996 and the nomenclature given in EN 134:1998 apply together with the following:

3.1.1 power-assisted filtering device: A device incorporating a full face mask, a half mask or a quarter mask, dependent on the ambient air and providing protection against solid, or solid and liquid aerosols of negligible volatility and decomposition, gases and vapours as specified by the manufacturer, or combinations, when fitted with particulate, gas and combined gas and particulate filters respectively. The filtering device can provide a continuous supply of air or be breath responsive.

3.1.2 facepiece: Any reference to a facepiece includes a full face mask, a half mask or a quarter mask.

3.1.3 interactive flow rate: The air flow rate resulting from the combined action of the turbo unit and a sinusoidal breathing pattern at the facepiece.

3.1.4 manufacturer's minimum design flow rate: The minimum flow rate as stated by the manufacturer at which the class requirements are met.

3.1.5 manufacturer's design duration: The time as stated by the manufacturer for which the manufacturer's minimum design flow rate is exceeded.

3.1.6 manufacturer's minimum design condition: The lowest level of the operating conditions of the device at which the complete device will still meet the requirements for the designated class.

3.1.7 breath-responsive: Actively or passively following the wearers demand for air.

3.2 Description

Each device typically consists of:

- a) one (or more) filter(s) or filters through which all the air supplied to the facepiece passes;
- b) a power operated turbo unit which supplies filtered ambient air to the facepiece directly or by means of a breathing hose. The energy supply for the turbo unit can or cannot be carried on the person;
- c) a full face mask, a half mask or a quarter mask;
- d) an exhalation valve or other outlet through which exhaled air and air in excess of the wearer's demand is discharged.

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4 Designation

Respiratory protective devices meeting the requirements of this European Standard shall be designated in the following manner:

Powered filtering device/EN 12942/ (class) (type) (options)

Powered filtering device/EN12942/TM3 A2P SL.

5 Classification

The complete devices are classified and designated according to the maximum inward leakage required as given in table 1.

Table 1: Classification of complete devices

Classification of complete device			Maximum inward leakage		Maximum particle filter penetration	
Class	Gasfilter type and class (if applicable)	Particle filter (if applicable)	%		NaCl	Paraffin oil
			Power			
			On	Off		
TM 1	A1, 2 or 3 B1, 2 or 3 E1, 2 or 3 K1, 2 or 3 AX SX	P	5	5	5	5
TM 2	A1, 2 or 3 B1, 2 or 3 E1, 2 or 3 K1, 2 or 3 AX SX	P	0,5	1	0,5	0,5
TM 3	A1, 2 or 3 B1, 2 or 3 E1, 2 or 3 K1, 2 or 3 AX SX Hg NO	P	0,05	0,1	0,05	0,05

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6 Requirements

6.1 Materials

6.1.1 General

The device shall be made of suitable materials to withstand normal usage and exposure to those temperatures, humidities and corrosive environments that are likely to be encountered.

Testing shall be done in accordance with 7.2.

6.1.2 Compatibility with skin

Materials that can come into contact with the wearer's skin shall not be known to be likely to cause skin irritation or any other adverse effect to health.

6.1.3 Cleaning and disinfection

The materials used in the construction of the device shall withstand the cleaning and disinfection agents and the methods recommended by the manufacturer.

Testing shall be done in accordance with 7.2 and 7.3.5.15.

6.1.4 Surface finish

The finish of any part of the device likely to be in contact with the wearer shall be free from sharp edges and burrs.

Testing shall be done in accordance with 7.2.

6.2 Resistance to temperature

After conditioning in accordance with 7.1, the complete device excluding filters shall show no appreciable deformation of major components, nor shall these components separate in the complete device. The requirements of 6.3 to 6.10 and 6.12 to 6.17 shall continue to be met.

Testing shall be done in accordance with 7.1.

NOTE 1: The complete device is deemed to exclude the battery charger, unless the charger is integral with the device.

NOTE 2: The requirements for conditioning of filters, prior to testing, are given in 7.1.

6.3 Facepiece

6.3.1 General

Where the facepiece is fitted with the standard thread connection as defined in prEN 148-1:1998 it shall comply with the requirements of EN 136:1998 or EN 140:1998 as appropriate.

Additions to the equipment specified by the manufacturer shall not impair the respiratory protective performance of the equipment complying with this European Standard.

Where the facepiece is designed solely for use as part of a power-assisted filtering device it shall not be fitted with the standard thread connection to prEN 148-1:1998 and shall meet the requirements of 6.3.2 or 6.3.3 or of EN 136:1998 or EN 140:1998 as appropriate.

6.3.2 Full face masks (other than those complying with EN 136:1998)

6.3.2.1 Connection to full face mask

The connection to the full face mask shall be leaktight.

When tested in accordance with 5.7 of EN 136:1998 it shall withstand a tensile force of (500 ± 50) N applied axially for (10 ± 1) s whilst the facepiece is held by the faceblank.

All demountable connections shall be readily connected and secured, where possible by hand. Any means of sealing used shall be retained in position when the connection is disconnected during normal maintenance.

Testing shall be done in accordance with 7.2.

6.3.2.2 Exhalation means

6.3.2.2.1 A full face mask shall have a means of allowing the escape of exhaled air and, where applicable, any excess air delivered by the air supply.

6.3.2.2.2 Exhalation means shall be such that they can be readily maintained and correctly replaced.

Testing shall be done in accordance with 7.2.

6.3.2.2.3 Exhalation means shall function correctly in orientations specified in 7.6.3.

Testing shall be done in accordance with 7.6.3.

6.3.2.2.4 Exhalation means shall be protected against or shall be resistant to dirt and mechanical damage. It may be shrouded or include any other device that may be necessary to comply with 6.4.

6.3.2.2.5 Exhalation means shall operate correctly as assessed by the procedures of 7.2, 7.3 and 7.6 after a continuous exhalation flow of (300 ± 15) l/min for a period of (60 ± 6) s.

6.3.2.2.6 When the housing of the exhalation means is attached to the faceblank it shall withstand axially a tensile force of (150 ± 15) N for a period of (10 ± 1) s. The test is repeated 10 times at 10 s intervals.

6.3.2.3 Head harness

The head harness shall be designed so that the facepiece can be donned and removed easily.

The head harness shall be adjustable and shall hold the facepiece firmly and comfortably in position.

Testing shall be done in accordance with 7.2 and 7.4.

Each strap shall withstand a tensile force of (150 ± 10) N for (10 ± 1) s in the direction of pull when the full face mask is donned.

6.3.2.4 Oculars and visor(s)

6.3.2.4.1 Visors shall not distort vision nor shall any misting occur which significantly affects vision as subjectively determined in the course of testing in accordance with 7.3 and 7.4.

Where anti-misting compounds are used or specified by the manufacturer they shall be compatible with eyes, skin and the device under the foreseeable conditions of use.

6.3.2.4.2 When tested in accordance with 5.8 of EN 136:1998, the field of vision of the complete device shall meet the following requirements:

- the effective field of vision of a full face mask fitted with a single visor shall be not less than 70 % related to the natural field of vision, and the overlapped field of vision related to the natural overlapped field of vision shall be not less than 80%;
- a full face mask with two eyepieces shall be designed so that the effective field of vision shall be not less than 70 % and the overlapped field of vision shall be not less than 20 %.

6.3.2.4.3 If it is intended additionally to fit protection against certain types of non-ionizing radiation then the protection shall comply with the appropriate clauses of EN 166:1995, EN 169:1992, EN 170:1992, EN 171:1992 or EN 379:1994 as appropriate.

If the means of protection against non-ionizing radiation is integral with the equipment covered by this European Standard then the field of vision shall be measured as described in 5.8 of EN 136:1998 and reported for information only and the device shall comply with the appropriate clauses of EN 166:1995, EN 169:1992, EN 170:1992 or EN 171:1992, or EN 379:1994 as appropriate.

6.3.2.4.4 When tested in accordance with 5.9 of EN 136:1998, but using two samples only, the oculars or visor shall not be damaged in any way that causes the facepiece to fail to meet the requirements of 6.4 of this European Standard.

6.3.2.5 Speech diaphragm

Where the facepiece includes a speech diaphragm it shall be protected against mechanical damage and shall withstand a positive pressure of 15 mbar and a negative pressure of 80 mbar (static pressure).

When a speech diaphragm can be subjected to an external force it shall withstand axially a tensile force of 150 N applied for 10 s. The test shall be repeated 10 times at 10 s intervals.

6.3.3 Half masks and quarter masks (other than those complying with EN 140:1998)

6.3.3.1 Facepiece connector

All demountable connections shall be readily connected and secured, where possible by hand. Any means of sealing used shall be retained in position when the connection is disconnected during normal maintenance.

Testing shall be done in accordance with 7.2.

The connection to the half mask or quarter mask shall be leaktight. It shall withstand a tensile force of (50 ± 5) N applied axially, for (10 ± 1) s whilst the facepiece shall be held by the faceblank.

Testing shall be done in accordance with 5.7 of EN 140:1998.

6.3.3.2 Exhalation means

6.3.3.2.1 A half mask or quarter mask shall have a means of allowing the escape of exhaled air and, where applicable, any excess air delivered by the air supply.

6.3.3.2.2 Any exhalation means shall be such that it can be readily maintained and correctly replaced.

Testing shall be done in accordance with 7.2.

6.3.3.2.3 Exhalation means shall function correctly in orientations specified in 7.6.3.

Testing shall be done in accordance with 7.6.3.

6.3.3.2.4 Exhalation means shall be protected against or be resistant to dirt and mechanical damage. It may be shrouded or include any other device that can be necessary to comply with 6.4.

6.3.3.2.5 Exhalation means shall continue to operate correctly as assessed by the procedures of 7.2, 7.3 and 7.6 after a continuous exhalation flow of (300 ± 15) l/min for a period of (60 ± 6) s.

6.3.3.2.6 The housing of the exhalation means shall be attached to the facepiece such that it can withstand axially a tensile force of (50 ± 5) N for a period of (10 ± 1) s.

6.3.3.3 Head harness

The head harness shall be so designed that the half mask or quarter mask can be donned and removed easily.

The head harness shall be adjustable and shall hold the half mask or quarter mask firmly and comfortably in position.

Testing shall be done in accordance with 7.2 and 7.4.

Each strap shall withstand a tensile force of (50 ± 5) N for (10 ± 1) s in the direction of pulling when the half mask or quarter mask is donned.

6.3.3.4 Field of vision

The field of vision is acceptable if determined so in the practical performance test.

If comparative testing of the field of vision is carried out the method described in 5.8 of EN 140:1998 shall be used with the complete device.

6.4 Inward leakage

6.4.1 Power on

The device shall be tested at the manufacturer's minimum design condition during which the inward leakage of the test substance for each of the exercises shall not exceed the levels given in the appropriate class from column 4 of table 1, for each of the 10 test subjects.

Testing shall be done in accordance with 7.3.

6.4.2 Power off

For 3 of the 10 test subjects and after the power on test, without removing the device, the inward leakage shall be tested in the power off state during which the inward leakage shall be not greater than the levels given in the appropriate class from column 5 of table 1, for each of the 3 test subjects.

Testing shall be done in accordance with 7.3.

6.5 Breathing resistance

6.5.1 General

The breathing resistances as specified in 6.5.2 and 6.5.3 shall be met before and after the clogging test specified in 7.9.

6.5.2 Inhalation resistance

When tested in accordance with 7.6.1, the peak inhalation resistance shall not exceed 11 mbar. When tested in accordance with 7.6.2 and 7.6.4, the peak inhalation resistance shall not exceed 3,5 mbar.

6.5.3 Exhalation resistance

When tested in accordance with 7.6.3, the peak exhalation resistance shall not exceed 7 mbar.

6.6 Air supply

6.6.1 The performance of the complete device shall equal or exceed the performance of the manufacturer's minimum design condition for the manufacturer's stated design duration which shall be not less than 4 h. Testing shall be carried out at ambient temperature in accordance with 7.7.

Where the manufacturer's minimum design condition is a manufacturer's minimum design flow rate the determination of the air supply flow rate shall be as given in 7.8.

The flow rate and distribution of the air under the facepiece shall not cause distress to the wearer (for example by excessive local cooling of the head and face or by causing eye irritation) when assessed in accordance with 7.3 and 7.4.

6.6.2 It shall not be possible to switch off the air supply inadvertently as assessed during the practical performance test.

6.6.3 If a means is provided to adjust the air supply to give a particular classification, it shall not be possible to change the classification during use. The mechanism which adjusts the flow rate shall simultaneously indicate the appropriate reference to the selected classification (see table 1) as specified in the manufacturer's Information. The mechanism shall be so designed that it is not possible inadvertently to change the air flow.

A means for adjusting the airflow during use within a classification may be provided.

Testing shall be done in accordance with 7.2 and 7.4.

6.7 Checking facilities

A facility shall be provided to check directly or indirectly that the manufacturer's minimum design condition is exceeded prior to each use. The facility shall be tested to ensure that it operates at or in excess of the manufacturer's minimum design condition.

6.8 Resistance to clogging

Where particle or combined filters (including special filters) are fitted then the device shall be tested for clogging in accordance with 7.9.

On completion of this test the device shall meet the breathing resistance requirements defined in 6.5 and the performance shall equal or exceed the manufacturer's minimum design condition, and the filter(s) shall meet the appropriate penetration requirements of columns 6 and 7 of table 1, when tested in accordance with 7.14 at a flow rate that corresponds to the peak value of the interactive flow rate measured in 7.12.

6.9 Electrical components

Electrical components shall be so designed that it is not possible inadvertently to reduce or reverse the air flow.

If the device is claimed to be intrinsically safe for use in potentially explosive atmospheres it shall comply with the appropriate requirements of EN 50 014:1992 and EN 50 020:1994.

If the power supply is a battery it shall be a non-spillable type.

Protection against the effects of an occurrence of a short circuit shall be provided for the battery.

Testing shall be done in accordance with 7.2 and 7.4.

NOTE: Long power leads should be avoided. The use of very low voltages is recommended which in this context means less than 60 V (D.C.) or less than 25 V (A.C.) (50 Hz).

6.10 Breathing hose

6.10.1 Any breathing hose shall permit free head movement without danger of being caught up as subjectively assessed by test subjects involved in tests in accordance with 7.3 and 7.4.

6.10.2 The peak inhalation resistance shall not be changed by more than 0,5 mbar and shall not exceed 3,5 mbar.

There shall be no distortion 5 min after completion of the test.

Testing shall be done in accordance with 7.10.

6.10.3 Hoses and couplings shall meet the requirements given in table 2 and shall not become disconnected or physically damaged. Where multiple hoses are fitted to the device each hose shall meet the requirements given in table 2.

Testing shall be done in accordance with 7.11.

Table 2: Strength of hose and couplings

Classification	Strength N
TM 1	50
TM 2	100
TM 3	250

6.11 Filters

6.11.1 Penetration and capacity

6.11.1.1 Particle filters

Power assisted particle filtering devices shall be classified according to the maximum particle filter penetration as given in columns 6 and 7 of table 1 when tested in accordance with 7.14 at a flow rate that corresponds to the peak value of the interactive flow rate measured in 7.12. Three levels are specified and shall be described in the form:

TMyP

where:

y is the inward leakage class, 1, 2 or 3.

The protection provided by a class 2 or class 3 filter includes that provided by the corresponding filter of lower class or classes.

6.11.1.2 Gas filters

Power assisted gas filtering devices shall be classified according to their application and protection capacity when tested in accordance with 7.14 at a flow rate that corresponds to the average value of the interactive flow measured in 7.12. Filters shall be described in the form

TMyGasz

where :

- y is the inward leakage class, 1, 2 or 3;
- z is the capacity of the gas filter 1, 2 or 3; and
- 'Gas' means one or more of the types listed in (i), (ii) or (iii).

a) types of filters

Gas filters are contained in one of the following types or combinations of them. If a filter is a combination of types, it shall meet the requirements of each type separately;

(i) types A, B, E, and K

type A: For use against certain organic gases and vapours with a boiling point higher than 65 °C, as specified by the manufacturer;

type B: For use against certain inorganic gases and vapours, as specified by the manufacturer (excluding carbon monoxide);

type E: For use against sulfur dioxide and other acidic gases and vapours, as specified by the manufacturer;

type K: For use against ammonia and organic ammonia derivatives, as specified by the manufacturer.

(ii) special filters

type NO: For use against oxides of nitrogen, e.g. NO, NO₂, NO_x;

type Hg: For use against mercury.

Special filters shall include a particle filter on the influent side and shall only be used in conjunction with a TM3 device.

(iii) AX and SX filters

type AX: For use against certain low boiling organic compounds (boiling point ≤ 65 °C) as specified by the manufacturer;

type SX: For use against specific named compounds.

(b) classes of filters

(i) gas filters of types A, B, E, and K are classified in one of the following classes:

class 1 Low capacity

class 2 Medium capacity

class 3 High capacity.

The gas capacity provided by a class 2 or class 3 filter includes that provided by the corresponding filter of lower class or classes.

Only one class of special filter is specified.

6.11.1.3 Combined filters

A combined filter shall be specified and described as separate entities in accordance with 6.11.1.1 and 6.11.1.2, that is:

TMy Gasz P

where:

y is 1, 2 or 3;

z is 1, 2 or 3; and

'Gas' is one or more of the types of gas filter (see also 6.11.1.2).

6.11.2 Filter requirements

6.11.2.1 Construction

The connection between filter(s) and mating part of the device shall be robust and leaktight.

The connection between filter and mating part can be achieved by a permanent or special type of connection or by a screw thread connection (including threads other than the standard thread).

The standard thread is defined in prEN 148-1:1998.

Filters other than prefilters shall be designed to be irreversible and shall be readily replaceable without use of special tools.

The particle filter of combined filters shall be on the influent side of the gas filter.

Testing shall be done in accordance with 7.2.

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