



SLOVENSKI STANDARD

SIST EN 147:1996

01-april-1996

Oprema za varovanje dihal - Zaščitna obrazna, polobrazna ali četrtinska maska s tlačno filtracijo zraka - Zahteve, preskušanje, označevanje

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

Atemschutzgeräte - Vollmasken, Halbmasken oder Viertelmasken mit Partikelfilter und Gebläse - Anforderungen, Prüfung, Kennzeichnung

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

<https://standards.iteh.ai/catalog/standards/sist/aea05be4-0194-4284-944f-9a116735d0a6/sist-en-147-1996>

Ta slovenski standard je istoveten z: EN 147:1991

ICS:

13.340.30 Varovalne dihalne naprave Respiratory protective devices

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en

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EUROPEAN STANDARD

EN 147:1991

NORME EUROPEENNE

EUROPAISCHE NORM

September 1991

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Descriptors: Respiratory protective equipment, accident prevention, safety masks, filters, filtration, equipment specifications, specifications, pipe fitting, dimensions, tests, performance tests, marking

English version

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

Appareils de protection respiratoire -	Atemschutzgeräte - Vollmasken,
Appareils filtrants contre les	Halbmasken oder Viertelmasken mit
particules à ventilation assistée avec	Partikelfilter und Gebläse -
masques complets, demi-masques ou	Anforderungen, Prüfung, Kennzeichnung
quarts de masques - Exigences, essais,	
marquage	

STANDARD PREVIEW
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This European Standard was approved by CEN on 1991-09-16. 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.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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FOREWORD

This European Standard was drawn up by CEN/TC 79 'Respiratory Protective Devices', the Secretariat of which is held by DIN.

In 1979, Sub-group 3/4 (SG 3/4), 'Powered Respirators', with BSI as Secretariat started work on this Draft Proposal.

At the Plenary meeting of CEN/TC 79 in Helsinki in October 1981 the Draft Proposal was presented and unanimously accepted by CEN/TC 79. It was then presented to the Secretariat of CEN/TC 79 for publication as a Draft European Standard.

In March 1984 the draft European Standard prEN 147 was circulated by CEN Central Secretariat to all CEN members for vote and comments. Within the voting period 8 Member Bodies approved and 3 Member Bodies disapproved the document.

The comments received were discussed and changes agreed during subsequent meetings of SG 3/4 and the resultant document was submitted to CEN members for formal vote.

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At the meeting of SG 3/4 held in May 1988 in Paris it was confirmed that the document should go forward for formal vote and subsequent publication. It was also agreed that it would be withdrawn on publication of a specification to be developed which would cover powered filtering devices, incorporating full face masks, half masks or quarter masks, and which would afford protection against particles, gases/vapours and combinations of these.

In accordance with the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Preamble

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

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 a particle filter. It does not cover devices designed for use in circumstances where there is or might be an oxygen deficiency (oxygen less than 17% by volume). It also does not cover respiratory protective devices designed for escape purposes.

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

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2**References**

<https://standards.iteh.ai/catalog/standards/sist/aea05be4-0194-4284-944f-9a116735d0a6/sist-en-147-1996>

- EN 136:1989 Respiratory protective devices: Full face masks; Requirements, testing, marking
- EN 140:1989 Respiratory protective devices: Half masks and quarter masks: Requirements, testing, marking
- EN 143:1989 Respiratory protective devices: Particle filters; Requirements, testing, marking
- EN 148:1987 Respiratory protective devices: Threads for facepieces: Standard thread connection
- EN 50 020 Part 7:1977 Electrical apparatus for potentially explosive atmospheres: Intrinsic safety "i"
- IEC 651:1979 Sound level meters

3 Definitions and description

- 3.1 A power assisted particle filtering device incorporating a full face mask, a half mask or a quarter mask is a device dependent on the ambient air.

The device provides protection against solid, or solid and liquid aerosols, negligible volatility and decomposition.



The device consists of:

- (a) a full face mask, half mask or quarter mask;
- (b) a power-operated blower which supplies filtered ambient air to the facepiece at a flow rate which maintains positive pressure inside the facepiece up to a peak inhalation flow of 120 l/min. The energy supply for the blower may or may not be carried on the person;
- (c) a filter or filters through which all the air supplied to the facepiece passes and which gives protection against solid and/or liquid aerosols. Where the aerosol is wholly or partly liquid then the liquid shall either be water or have negligible volatility;
- (d) an exhalation valve(s) through which excess and exhaled air is discharged.

3.2 Manufacturer's minimum design flow rate is the flow rate, as stated by the manufacturer, above which the class requirements are met.

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Classification and designation

Devices are classified and designated as a function of their maximum total inward leakage as given in table 1.

Table 1 Classification of devices

Class	Max. total inward leakage (%) (power-on)
TMP1	5
TMP2	1
TMP3	0,05

The total inward leakage shall be measured against sodium chloride at the manufacturer's minimum design flow rate which shall not be less than 120 l/min.

Note The 'power-off' state is considered to be an abnormal situation: under these circumstances total inward leakage is measured as required in 5.3.

5 Requirements**5.1 Materials****5.1.1 Compatibility with skin**

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

5.1.2 Cleaning and disinfection

The materials used shall withstand the cleaning and disinfecting agents recommended by the manufacturer.

5.2 Facepiece**5.2.1 General**

Where the facepiece is fitted with the standard thread connection as defined in EN 148 : Part 1 and therefore can be used with other equipment, for example with filters, it shall comply with the requirements of EN 136 or EN 140 as appropriate.

Where the facepiece is designed solely for use with a power assisted device it shall not be fitted with the standard thread connection and shall meet the requirements of 5.2.2 for full face masks and of 5.2.3 for half masks and quarter masks.

5.2.2 Full face masks**5.2.2.1 Facepiece connector**

5.2.2.1.1 The connection to the full face mask shall be gastight and shall withstand a tensile force of 500 N applied axially. Test time shall be 10 s. The facepiece shall be held by the faceblank, as specified in EN 136.

5.2.2.1.2 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.

5.2.2.2 Exhalation valve(s)

5.2.2.2.1 A full face mask shall have at least one exhalation valve to allow the escape of exhaled air and, where applicable, any excess air delivered by the air supply.

5.2.2.2.2 The exhalation valve(s) shall be protected against dirt and mechanical damage and shall be shrouded or shall include any other device that may be necessary to comply with 5.3.

- 5.2.2.2.3 The exhalation valve(s) shall continue to operate correctly after a continuous exhalation flow of 300 l/min for 1 min. This shall be checked immediately after the test in 6.4.
- 5.2.2.2.4 The exhalation valve shall be so designed that it does not reverse when tested in accordance with 6.3.1.
- 5.2.2.2.5 The exhalation valve housing, mounted in the facepiece shall withstand axially a tensile force of 150 N for 10 s.
- 5.2.2.3 Head harness
- 5.2.2.3.1 The head harness shall be designed so that the full face mask can be donned and removed quickly.
- 5.2.2.3.2 The head harness shall be adjustable and shall hold the full face mask firmly and comfortably in position.
- 5.2.2.3.3 Each strap shall withstand a pull of 150 N for 10 s in the direction of pulling when the full face mask is donned.
- 5.2.2.4 Ocular(s) and visor(s)
- 5.2.2.4.1 Oculars and anti-fog discs designed to serve as oculars shall be attached in a reliable and gastight manner to the faceblank. <https://standards.iteh.ai/catalog/standards/sist/aea05be4-0194-4284-944f-9a11673540a6/sist-en-147-1996>
- 5.2.2.4.2 Oculars shall not distort vision nor shall misting occur as subjectively determined in the course of testing as in 6.2.
- 5.2.2.4.3 The field of vision shall be satisfactory as determined during the exercises described in 6.2.4, and when tested in accordance with 5.8 of EN 136 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 %.
- The effective field of vision of a full face mask with two oculars 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 20 %.
- 5.2.2.4.4 When tested in accordance with 5.9 of EN 136 oculars or visor shall not be damaged in any way that may make the facepiece ineffective. The effectiveness is tested in accordance with 5.9 of EN 136 by comparing the tightness of the full face mask before and after the test; when tested for leak tightness, the facepiece shall not indicate increased leakage after the test.

5.2.2.5 Speech diaphragm

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

5.2.2.6 Resistance to temperature

After undergoing the conditions specified in 6.1 the facepiece shall show no appreciable deformation and shall comply with the requirements of 5.3.

5.2.3 Half and quarter masks

5.2.3.1 Facepiece connector

5.2.3.1.1 The connection shall be gastight and robust.

5.2.3.1.2 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.

5.2.3.2 Exhalation valve(s)

5.2.3.2.1 A half or quarter mask shall have at least one exhalation valve to allow the escape of exhaled air and, where applicable, any excess air delivered by the air supply.

5.2.3.2.2 The exhalation valve(s) shall be protected against dirt and mechanical damage and shall be shrouded or shall include any other device that may be necessary to comply with 5.3.

5.2.3.2.3 The exhalation valve(s) shall continue to operate correctly after a continuous exhalation flow of 300 l/min for 1 min. This shall be checked immediately after the test in 6.4.

5.2.3.2.4 The exhalation valve shall be so designed that it does not reverse when tested in accordance with 6.3.1.

5.2.3.2.5 Where the exhalation valve housing is attached to the facepiece, it shall withstand an axial tensile force of 50 N for 10 s.

5.2.3.3 Headharness

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

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

5.2.3.3.3 Each strap shall withstand a pull of 50 N in the direction of pulling when the half or quarter mask is donned for 10 s.

5.2.3.4 Field of vision

The field of vision shall be satisfactory as determined during the exercises described in 6.2.4.

If the field of vision has to be tested by an independent test method the half or quarter mask shall meet the appropriate requirements of EN 140. This also applies when the rest of the equipment intended to be used with the half or quarter mask is connected.

5.3 Total inward leakage

When tested using the power assisted air supply at the manufacturer's minimum design flow rate by the method described in 6.2 the mean total inward leakage (TIL) of the test aerosol for each of the exercises shall be within the levels set out in clause 4, for each of 10 test subjects. The equipment shall also be tested on three test subjects only for TIL with the power off. Maximum TIL results shall be not greater than those given in table 2 for each class.

Table 2 'Power-on' and 'power-off' classification requirements

Class	Maximum total inward leakage (%)	
	Power-on	Power-off
TMP1	5	10
TMP2	1	10
TMP3	0,05	5

5.4 Breathing resistance

5.4.1 General

The breathing resistance as specified in 5.4.2 and 5.4.3 shall be met before and after the clogging tests specified in 6.5 have been completed.

5.4.2 Inhalation resistance

When tested in accordance with 6.3.1 the inhalation resistance shall not exceed 11 mbar. When tested in accordance with 6.3.2 the peak inhalation resistance shall not exceed 3,5 mbar.

5.4.3 Exhalation resistance

When tested in accordance with 6.3.2 the exhalation resistance shall not exceed 7 mbar.

5.5 Air supply

5.5.1 When tested in accordance with 6.4 at the extremes of operating temperatures and humidities as claimed in the instructions for use the flow into the facepiece shall exceed the minimum design flow rate which shall not be less than 120 l/min for the manufacturer's design duration which shall not be less than 4 h.

5.5.2 The air supply shall not be capable of being switched off inadvertently.

5.6 Clogging

At the end of the clogging test in accordance with 6.5 the flow rate shall not drop below the minimum design flow rate and the filters shall still meet the penetration requirements of 5.9.

5.7 Electrical components

Where a battery is used it shall be a non-spillable type, and where necessary shall be provided with a safe venting device.

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 it shall comply with the requirements of EN 50 020 Part 7.

5.8 Hoses

Any breathing hose shall permit free head movement and shall not restrict or close off the air supply under chin or arm pressure as assessed during measurement of total inward leakage (see 6.2).

5.9 Filters

Filters, other than pre-filters shall be designed to be irreversible. Filters shall be readily replaceable without the use of tools. The performance of the filters shall conform to table 3 and shall be tested using the test methods described in EN 143 at the initial flow rate measured in 6.4.

Table 3 Performance requirements and designation of filters

Class	Maximum initial penetration (%)	
	Sodium chloride	Paraffin oil
TMP1	5	2
TMP2	1	0,5
TMP3	0,05	0,03

Note 1

Filters suitable for use against solid and liquid aerosols shall be tested against sodium chloride and paraffin oil.

Note 2

Filters suitable only for use against solid aerosols and water based aerosols shall be tested against sodium chloride only.

5.10 Noise

The noise generated by the device shall not exceed 75 dB(A) when measured using the method described in 6.6 and shall be measured using the complete set of filters designed to be used with the device.

If national regulations are more stringent than this requirement, they shall be met.