

SLOVENSKI STANDARD
SIST EN 405:2002**01-junij-2002****BUXca Yý U**
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Respiratory protective devices - Valved filtering half masks to protect against gases or
gases and particles - Requirements, testing, marking

Atenschutzgeräte - Filtrierende Halbmasken mit Ventilen zum Schutz gegen Gase oder
Gase und Partikeln - Anforderungen, Prüfung, Kennzeichnung

Appareils de protection respiratoire - Demi-masques filtrants a soupapes contre les gaz
ou contre les gaz et les particules - Exigences, essais, marquage

Ta slovenski standard je istoveten z: EN 405:2001

ICS:

13.340.30 Varovalne dihalne naprave Respiratory protective
devices

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English version

Respiratory protective devices - Valved filtering half masks to protect against gases or gases and particles - Requirements, testing, marking

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Atemschutzgeräte - Filtrierende Halbmasken mit Ventilen zum Schutz gegen Gase oder Gase und Partikeln - Anforderungen, Prüfung, Kennzeichnung

This European Standard was approved by CEN on 8 November 2001.

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 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 Management Centre has the same status as the official versions.

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

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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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 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2002, and conflicting national standards shall be withdrawn at the latest by June 2002.

This European Standard supersedes EN 405:1992.

This draft 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 89/686/EEC.

For relationship with EU Directive, see informative annex ZA, which is an integral part of this standard.

The annexes A and ZA are informative.

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 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 successfully 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.

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1 Scope

This European Standard specifies the performance requirements, test methods and marking requirements for valved filtering half masks incorporating either gas or combined filters as respiratory protective devices except for escape purposes. It does not cover gas filtering half masks which do not have valves or are fitted only with exhalation valves. It does not cover devices designed for use in circumstances where there is or might be an oxygen deficiency (oxygen less than a volume fraction of 17 %).

Laboratory 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 (including amendments).

EN 132, *Respiratory protective devices - Definition of terms and pictograms.*

EN 134, *Respiratory protective devices - Nomenclature of components*

EN 141, *Respiratory protective devices - Gas filters and combined filters - Requirements, testing, marking.*

EN 143, *Respiratory protective devices - Particle filters - Requirements, testing, marking.*

EN 371, *Respiratory protective devices - AX gas filters and combined filters against low boiling organic compounds - Requirements, testing, marking.*

EN 372, *Respiratory protective devices - SX gas filters and combined filters against specific named substances - Requirements, testing, marking.*

3 Terms and definitions

For the purposes of this European Standard the terms and definitions in EN 132 and the nomenclature given in EN 134 apply.

4 Description

A valved filtering half mask covers the nose and mouth and the chin and has both inhalation and exhalation valves and

- a) consists entirely or substantially of filter material or,
- b) comprises a facepiece in which the gas filter(s) form(s) an inseparable part of the device and where particle filters can be replaceable.

It provides adequate sealing for the intended use on the face of the wearer against the ambient atmosphere, when the skin is dry or moist and when the head is moved.

Inhaled air enters through the filter material and through an inhalation valve(s). Exhaled air passes through an exhalation valve(s) to the ambient atmosphere.

Since the devices are discarded on depletion of the gas filter, it is not expected that replaceable components will be provided, e.g. valves or head harness.

In addition to providing protection against gases and vapours these devices can be designed to also protect against solid and liquid aerosols.

Gas filters remove specified gases and vapours. Combined filters remove dispersed solid and liquid particles and specified gases and vapours.

5 Classification

5.1 General

Gas and combined valved filtering half masks are classified into types and classes according to their application and protection capacity.

5.2 Types of gas filtering half masks

5.2.1 Valved gas filtering half masks

Type FFA — for use against certain organic gases and vapours with a boiling point higher than 65 °C as specified by the manufacturer.

Type FFB — for use against certain inorganic gases and vapours as specified by the manufacturer (excluding carbon monoxide).

Type FFE — for use against sulfur dioxide and other acid gases and vapours as specified by the manufacturer.

Type FFK — for use against ammonia and organic ammonia derivatives as specified by the manufacturer.

Type FFAX — for use against certain low boiling organic compounds as specified by the manufacturer.

Type FFSX — for use against specific named gases and vapours.

5.2.2 Valved multi-type gas filtering half masks

Gas valved filtering half masks which are a combination of two or more of the above types and which meet the requirements of each type separately.

5.2.3 Valved combined filtering half masks

Gas or multi-type valved gas filtering half masks incorporating a particle filter.

5.3 Designs of combined valved filtering half masks

There are two designs of valved combined filtering half masks described in this European Standard: one with integral particle filter(s), the second one with replaceable particle filter(s). Examples of classifications are:

FFA1P1; FFA1P2; FFA1P3D.

„D“ stands for optional clogging with dolomite.

5.4 Classes of valved gas filtering half masks

Valved filtering half masks may incorporate gas filters of types listed in 5.2.1 or 5.2.2, belonging to one of the two following classes relating to their capacity:

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Class 1 — low capacity FFGas1 filtering half mask e.g. FFA1;

Class 2 — medium capacity FFGas2 filtering half mask e.g. FFB2.

The protection provided by Class 2 devices includes that provided by the corresponding Class 1 device of the same type.

FFAX and FFSX devices are not classified in accordance with this clause.

6 Designation

Valved filtering half masks meeting the requirements of this European Standard shall be designated in the following manner:

Valved filtering half mask EN 405, type class, option

EXAMPLE Valved filtering half mask EN 405 FFA2P3D

7 Requirements

7.1 General

In all tests, all test samples shall meet the requirements.

7.1.1 Materials used shall be suitable to withstand handling and wear over the period for which the valved filtering half mask is designed to be used.

Testing shall be done in accordance with 8.4.

After undergoing the treatment described in 8.3.2 and 8.3.3 none of the devices shall collapse or shall have suffered mechanical failure of the facepiece body or straps.

7.1.2 Any material of the filter media or any gaseous products that may be released by the airflow through the filter shall not be known to constitute a hazard or nuisance for the wearer.

Testing shall be done in accordance with 8.2.

7.1.3 Where the device can be used for more than a single shift (single-use), the materials used shall withstand the cleaning and disinfecting agents recommended by the manufacturer.

Testing shall be done in accordance with Table 6 and 8.2.

7.2 Nominal values and tolerances

Unless otherwise specified, the values stated in this European Standard are expressed as nominal values. Except for temperature limits, values which are not stated as maxima or minima shall be subject to a limit deviation of $\pm 5\%$. Unless otherwise specified, the ambient temperature for testing shall be from 16 °C to 32 °C, and the temperature limits shall be subject to a limit deviation of ± 1 °C.

7.3 Visual inspection

The visual inspection shall also include the marking and information supplied by the manufacturer.

7.4 Packaging

Valved filtering half masks shall be offered for sale packaged in such a way that they are protected against mechanical damage and contamination before use.

They shall be factory sealed to protect the filter media against environmental influences in such a way, that the breaking of the factory sealing can be identified.

Testing shall be done in accordance with 8.2.

7.5 Practical performance

The device shall undergo practical performance tests under realistic conditions. These general tests serve the purpose of checking the equipment for imperfections that cannot be determined by the tests described elsewhere in this European Standard.

Where practical performance tests show the apparatus has imperfections related to wearer's acceptance, the test house shall provide full details of those parts of the practical performance tests which revealed these imperfections.

Testing shall be done in accordance with 8.4.

7.6 Leakage

When the valved filtering half mask is tested in accordance with 8.5, the values of inward leakage (total inward leakage excluding filter penetration) shall comply with the following.

At least 46 out of the 50 individual results for the inward leakage over each of the exercise periods as defined in 8.5 (i.e. 10 subjects \times 5 exercise periods) shall be not greater than 5 %.

In addition, at least 8 out of the 10 individual wearer arithmetic means of measured values (10 subjects) for the inward leakage, averaged over all exercise periods shall be not greater than 2 %.

Testing shall be done in accordance with 8.5.

7.7 Filter penetration/capacity

7.7.1 Particle filter penetration

For all devices the penetration of the particle filter of the valved filtering half mask, whether with integral or separable filters, shall meet the requirements given in Table 1.

Table 1 — Particle filter penetration

Classification	Maximum initial penetration of test aerosols at 95 l/min	
	Sodium chloride %	Paraffin oil %
FFGasP1	20	20
FFGasP2	6	6
FFGasP3	1	1

This requirement shall be met before and after conditioning procedures specified in 8.3.3.

Testing shall be done in accordance with EN 143.

Separable particle filters, other than prefilters, designed to be used additionally with devices other than devices according to this standard shall meet the requirements of EN 143.

7.7.2 Gas filtering capacity

7.7.2.1 When tested in accordance with 8.6 the devices shall meet the requirements given in Table 2 for minimum breakthrough times for FFGas1 and/or FFGas2 devices and/or the requirements of EN 371 or EN 372 as appropriate.

Table 2 — Gas filtering capacity

Classification	Test agent	Test gas concentration in air		Breakthrough concentration	Minimum breakthrough time
		% by volume	mg/l	ml/m ³	min
FFA1	Cyclohexane (C ₆ H ₁₂)	0,1	3,5	10	70
FFB1	Chlorine (Cl ₂)	0,1	3,0	0,5	20
	Hydrogen sulfide (H ₂ S)	0,1	1,4	10	40
	Hydrogen cyanide (HCN)	0,1	1,1	10 ^a	25
FFE1	Sulfur dioxide (SO ₂)	0,1	2,7	5	20
FFK1	Ammonia (NH ₃)	0,1	0,7	25	50
FFA2	Cyclohexane (C ₆ H ₁₂)	0,5	17,5	10	35
FFB2	Chlorine (Cl ₂)	0,5	15,0	0,5	20
	Hydrogen sulfide (H ₂ S)	0,5	7,1	10	40
	Hydrogen cyanide (HCN)	0,5	5,6	10 ^a	25
FFE2	Sulfur dioxide (SO ₂)	0,5	13,3	5	20
FFK2	Ammonia (NH ₃)	0,5	3,5	25	40
<p>NOTE The minimum breakthrough time is intended only for laboratory tests under standardized conditions. It does not give an indication of the possible service time in practical use. Possible service times can differ from the breakthrough times determined according to this European Standard in both directions positive or negative depending on the conditions of use.</p>					
<p>^a C₂N₂ may sometimes be present in the effluent air. The total concentration of (C₂N₂ + HCN) shall not exceed 10 ml/m³.</p>					

7.7.2.2 Where a device is a combination of types, it shall meet the requirements of each type separately.

7.7.2.3 Test requirements shall apply to the capacity of the complete device.

7.8 Finish of parts

Parts of the device likely to come into contact with the wearer shall have no sharp edges or burrs.

Testing shall be done in accordance with 8.2.

7.9 Inhalation and exhalation valves

7.9.1 Inhalation valve(s) and exhalation valve(s) shall function correctly in all orientations.

Testing shall be done in accordance with 8.9.

7.9.2 Exhalation valve(s) shall be protected against or be resistant to dirt and mechanical damage. They may be shrouded or may include any other device that may be necessary to comply with 7.6.

Testing shall be done in accordance with 8.2.

7.9.3 Exhalation valve(s) shall continue to operate correctly after a continuous exhalation flow of 300 l/min over a period of 30 s.

Testing shall be done in accordance with 8.9.

7.9.4 The exhalation valve housing shall show no signs of damage or of being loosened.

Testing shall be done in accordance with 8.10.

7.10 Breathing resistance

7.10.1 General

The breathing resistances of the various classes of valved gas and combined filtering half masks shall meet the requirements of 7.10.2 and 7.10.3.

7.10.2 Inhalation resistance

7.10.2.1 Valved gas filtering half masks

When tested in accordance with 8.9 the inhalation resistance shall meet the requirements given in Table 3.

Table 3 — Inhalation resistance: valved gas filtering half masks

Classification	Maximum inhalation resistance mbar	
	30 l/min	95 l/min
FFGas1	1,0	4,0
FFGas2	1,4	5,6
FFAX	1,4	5,6
FFSX	1,4	5,6

7.10.2.2 Valved combined filtering half masks

When tested in accordance with 8.9, the inhalation resistance of all devices, whether with separable or integral particle filters, shall meet the requirements given in Table 4.