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Respiratory protective devices – Half masks and quarter masks – Requirements, testing, marking

The European Standard EN 140:1998 has the status of a Swedish Standard. This document contains the official English version of EN 140:1998.

This standard supersedes SS-EN 140, edition 1, from 1990 and SS-EN 140/A1, edition 1, from 1992.

Swedish Standards corresponding to documents referred to in this Standard are listed in "Catalogue of Swedish Standards", issued by SIS. The Catalogue lists, with reference number and year of Swedish approval, International and European Standards approved as Swedish Standards as well as other Swedish Standards.

Andningsskydd – Halv- och kvarts- masker – Fordringar, provning, märkning

Europastandarden EN 140:1998 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 140:1998.

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ICS 13.340.30

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English version

**Respiratory protective devices – Half masks and quarter masks –
Requirements, testing, marking**

Appareils de protection respiratoire – Demi-
masques et quarts de masques – Exigences,
essais, marquage

Atemschutzgeräte – Halbmasken und
Viertelmasken – Anforderungen, Prüfung,
Kennzeichnung

This European Standard was approved by CEN on 1998-09-04.

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, Czech Republic, 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 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 140:1989 and amendment EN 140:1989/A1:1992.

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 March 1999, and conflicting national standards shall be withdrawn at the latest by March 1999.

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.

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 successful 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 half masks and quarter masks for use as part of respiratory protective devices, except escape apparatus and diving apparatus.

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.

prEN 132	Respiratory protective devices - Definitions
EN 134	Respiratory protective devices - Nomenclature of components
prEN 148-1	Respiratory protective devices - Threads for facepieces - Part 1: Standard thread connection
prEN 148-2	Respiratory protective devices - Threads for facepieces - Part 2: Centre thread connection
EN ISO 6941	Textile fabrics - Burning behaviour - Measurement of flame spread properties of vertically oriented specimens (ISO 6941:1984, including Amendment 1:1992)

3 Definition

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

A half mask is a facepiece which covers the nose, mouth and chin. A quarter mask is a facepiece which covers the nose and mouth. They are intended to provide adequate sealing on the face of the wearer of a respiratory protective device against the ambient atmosphere, when the skin is dry or moist and when the head is moved.

4 Description

Air enters the facepiece and passes directly to the nose and mouth area of the facepiece. The exhaled air flows directly to the ambient atmosphere, via the exhalation valve(s) or by other appropriate means.

5 Designation

Half masks and quarter masks meeting the requirements of this standard shall be designated in the following manner:

Half mask EN 140:1998,
Quarter mask EN 140:1998.

6 Requirements

6.1 General

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

6.2 Nominal values and tolerances

Unless otherwise specified, the values stated in this standard are expressed as nominal values. Except for temperature limits, values which are not stated as maxima or minima shall be subject to a tolerance of $\pm 5\%$. Unless otherwise specified, the ambient temperature for testing shall be $(24 \pm 8)^\circ\text{C}$, the temperature limits shall be subject to an accuracy of $\pm 1^\circ\text{C}$ and the relative humidity shall be $(50 \pm 30)\%$.

6.3 Visual inspection

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

Testing shall be done in accordance with 7.3.

6.4 Materials

The use of aluminium, magnesium and titanium or alloys containing such proportions of these metals as will, on impact, give rise to frictional sparks capable of igniting flammable gas mixtures for exposed parts, i.e. those which may be subjected to impact during use of the apparatus shall be restricted to a minimum.

Testing shall be done in accordance with 7.3.

6.5 Resistance to temperature

Following the conditioning in accordance with 7.2 and after being allowed to return to ambient temperature the facepiece shall show no appreciable deformation and any incorporated connector to prEN 148-1 shall be gauged and shall comply with the appropriate standard.

Testing shall be done in accordance with 7.3 and 7.4.

After this test the facepiece shall meet the requirements for inward leakage as specified in 6.16.

Testing shall be done in accordance with 7.13.

6.6 Flammability

Parts of the facepiece that might be exposed to a flame during use shall either not burn or not continue to burn for more than 5 s after removal from the flame.

Testing shall be done in accordance with 7.3 and 7.5.

It is not required that the facepiece still has to be useable after the test.

6.7 Cleaning and disinfecting

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

Testing shall be done in accordance with 7.6.

6.8 Demountable parts

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 7.3.

6.9 Replaceable components

Unless integral with the half mask or quarter mask the following components (if fitted) shall be replaceable:

Head harness, connector(s), inhalation and exhalation valves.

Testing shall be done in accordance with 7.3.

6.10 Head harness

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

Testing shall be done in accordance with 7.13 and 7.14.

6.10.2 The head harness shall be adjustable or self-adjusting and shall hold the facepiece firmly and comfortably in position.

Testing shall be done in accordance with 7.13 and 7.14.

6.10.3 Each strap of the head harness, buckles and other adjusting means shall withstand a pull of 50 N applied for 10 s in the direction of pulling when the facepiece is donned. No breaks or sliding of the straps shall occur.

The requirement applies to the buckles and attachment lugs as well as to the straps.

Testing shall be done in accordance with 7.7.

6.11 Connector

6.11.1 The connection between the facepiece and the apparatus may be achieved by a permanent or special (e.g. insert) type of connection or by a thread connection to prEN 148-1.

Testing shall be done in accordance with 7.3.

6.11.1.1 A facepiece shall not have more than one thread connection to prEN 148-1.

Testing shall be done in accordance with 7.3.

If more than one connector is fitted the design of the facepiece or of the remainder of the equipment shall be such that the use of different types or combinations of respiratory protective devices does not present a risk.

6.11.1.2 If any other screw thread is used it shall not be possible to connect it directly to the thread to prEN 148-1.

Testing shall be done in accordance with 7.3.

6.11.1.3 Half masks and quarter masks shall not be equipped with a thread connection to prEN 148-2.

Testing shall be done in accordance with 7.3.

6.11.2 The connection between the faceblank and the connector shall be sufficiently robust to withstand axially a tensile force of 50 N.

Testing shall be done in accordance with 7.8.

6.11.3 Correct and reliable connection between facepiece and other parts of the equipment shall be assured.

Testing shall be done in accordance with 7.3.

6.12 Inhalation valves and exhalation valves

6.12.1 General

Valve assemblies shall be such that they can be readily maintained and correctly replaced.

It shall not be possible to fit an exhalation valve assembly into the inspiratory circuit or an inhalation valve assembly into the exhalation circuit.

Inhalation and exhalation valve assemblies, sub-assemblies and piece parts that are by the manufacturer designed to be identical, are acceptable.

Differently designed inhalation and exhalation valves are acceptable if a precise and comprehensible description is given in the information manual supplied by the manufacturer. The description in the information manual supplied by the manufacturer should be supported by illustrations (photographs, drawings) on how to assemble the unit correctly.

To enable correct assembly, the parts have to be precisely and comprehensibly described or marked.

An appropriate method of checking correct assembly shall be described, e.g. visual inspection; check by the wearer; test by maintenance personnel etc.

Testing shall be done in accordance with 7.3.

6.12.2 Inhalation valve

6.12.2.1 The facepiece should preferably be provided with one or more inhalation valve(s). If a thread connection to prEN 148-1 is used, an inhalation valve shall be incorporated in the facepiece. Where the facepiece is intended to be used with filters it shall be provided with an integral inhalation valve, if there is no valve in the filter.

6.12.2.2 Inhalation valves shall function correctly in all orientations and shall meet the requirements of 6.15.

Testing shall be done in accordance with 7.12.

6.12.3 Exhalation valve

6.12.3.1 Exhalation valves shall function correctly in all orientations and shall meet the requirements of 6.15.

Testing shall be done in accordance with 7.12.

6.12.3.2 The facepiece shall have at least one exhalation valve or appropriate means to allow the escape of exhaled air and, where applicable, any excess air delivered from a supplied air source.

Testing shall be done in accordance with 7.3.

6.12.3.3 Exhalation valves (if fitted) shall be protected against or be resistant to dirt and mechanical damage. They may be shrouded or include any other device that may be necessary to comply with 6.16.

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6.12.3.4 Exhalation valves shall continue to operate correctly after a continuous exhalation flow of 300 l/min over a period of 30 s and meet the requirements of 6.15.

Testing shall be done in accordance with 7.9.

6.12.4 When the exhalation valve housing is attached to the faceblank, it shall withstand axially a tensile force of 50 N applied for 10 s.

Testing shall be done in accordance with 7.10.

6.13 Compatibility with skin

Materials that can 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.

Testing shall be done in accordance with 7.3, 7.13 and 7.14.

6.14 Carbon dioxide content of inhalation air

The carbon dioxide content of the inhalation air (dead space) shall not exceed an average of 1,0 % (by volume).

Testing shall be done in accordance with 7.11.

6.15 Breathing resistance

The breathing resistance of the facepiece shall not exceed 2,0 mbar for inhalation and 3,0 mbar for exhalation when tested with a breathing machine (25 cycles/min, 2,0 l/stroke) or a continuous flow of 160 l/min.

The inhalation resistance shall not exceed 0,5 mbar at 30 l/min continuous flow and 1,3 mbar at 95 l/min continuous flow.

Testing shall be done in accordance with 7.12.

6.16 Inward leakage

When the facepieces are fitted in accordance with the information supplied by the manufacturer, at least 46 out of the 50 individual results for the inward leakage over each of the exercise periods as defined in 7.13.1.3 (i.e. 10 subjects x 5 exercise periods) shall be not greater than

5 %

and, in addition, at least 8 out of the 10 individual wearer arithmetic means (10 subjects) for the inward leakage, averaged over all exercise periods shall be not greater than

2 %.

Testing shall be done in accordance with 7.13.

6.17 Field of vision

The field of vision shall be subjectively assessed for acceptability.

Testing shall be done in accordance with 7.14.

6.18 Practical performance

The complete apparatus 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. In addition to the tests described in this European Standard

details of practical performance tests for breathing apparatus are given in the relevant European Standard. Where a half mask or quarter mask is to be used for filtering devices testing shall be in accordance with 7.14.

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 practical performance tests which revealed these imperfections. This will enable other test houses to duplicate the tests and assess the results thereof.

7 Testing

7.1 General

If no special measuring devices and measuring methods are specified commonly used devices and methods shall be used.

Before performing tests involving human subjects account should be taken of any national regulations concerning the medical history, examination or supervision of the test subjects.

7.2 Conditioning

Two samples in the state as received shall be subjected to the following thermal cycle:

- a) 24 h in a dry atmosphere of (70 ± 3) °C,
- b) 24 h at a temperature of (-30 ± 3) °C.

The conditioning shall be carried out in a manner which ensures that no thermal shock occurs.

7.3 Visual inspection

The visual inspection is carried out where appropriate by the test house prior to laboratory or practical performance tests. This may involve some partial dismantling of the product.

7.4 Resistance to temperature

Two samples shall be tested: both in the state as received.

The threaded connectors shall be gauged at room temperature.

7.5 Flammability

Two samples shall be tested: both in the state as received.

The single burner test is carried out according to the following procedure. The facepiece is put on a metallic dummy head which is motorized such that it describes a horizontal circle with a linear speed, measured at the tip of the nose, of (60 ± 5) mm/s.

The head is arranged to pass over a propane burner the position of which can be adjusted. By means of a suitable gauge, the distance between the top of the burner and the lowest part of the facepiece (when positioned directly over the burner) shall be set to (20 ± 2) mm.

A "TEKLU" burner or that described in EN ISO 6941 has been found suitable¹⁾.

With the head turned away from the area adjacent to the burner, the propane gas is turned on, the pressure adjusted to between 0,2 bar and 0,3 bar and the gas ignited. By means of a needle valve and fine adjustments to the supply pressure, the flame height shall be set to (40 ± 4) mm. This is measured with a

¹⁾ Information on a source of supply of a suitable burner can be obtained from the secretariat of CEN/TC 79.