

Specification for

Half masks and quarter masks for respiratory protective devices

This European Standard EN 140:1989 has the status of a British Standard

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National foreword

This British Standard has been prepared under the direction of the Personal Safety Equipment Standards Policy Committee and is the English language version of EN 140 *“Respiratory protective devices: half-masks and quarter-masks: requirements, testing, marking”* including amendment A1 published by the European Committee for Standardization (CEN). EN 140 was produced as a result of international discussions in which the United Kingdom took an active part.

There is no existing equivalent British Standard to EN 140 although reference is made to half-masks in BS 2091.

BS 2091 will be withdrawn when appropriate European Standards have been published.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 22, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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English version

Respiratory protective devices; Half-masks and quarter-masks; Requirements, testing, marking

(includes amendment A1:1992)

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Demi-masques et quarts de masques;
Exigences, essais, marquage
(inclut l'amendement A1:1992)

Atemschutzgeräte; Halbmasken und
Viertelmasken; Anforderungen, Prüfung
und Kennzeichnung
(enthält Änderungen A1:1992)

This European Standard was accepted by CEN on 31 May 1989.

CEN members are bound to comply with the requirements of the CEN/CENELEC Common Rules 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 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 CEN Central Secretariat has the same status as the official versions.

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CEN

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Brief history

This European Standard was drawn up by CEN/TC 79 "*Respiratory protective devices*", the secretariat of which is held by DIN.

In 1975 the Sub-Group 3 (SG 3) with DIN secretariat started to work on the Draft Proposal.

At the Plenary Meeting of CEN/TC 79 in The Hague in November 1978 this Draft Proposal was presented and unanimously accepted by CEN/TC 79. It was then submitted to the secretariat of CEN/TC 79 for publication as Draft European Standard.

In January 1981 the Draft European Standard prEN 140 was circulated by the CEN Central Secretariat in Brussels to all CEN Members for vote and comments. Within the voting period 9 Members have approved and 7 Members disapproved the document.

The detailed comments received were discussed and decided on during the following meetings of SG 3.

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.

At the Plenary Meeting of CEN/TC 79 in Brussels in September 1991 this Draft Proposal was presented and accepted by CEN/TC 79. It was then submitted to the secretariat of CEN/TC 79 to submit it to the CEN Central Secretariat for formal vote. The result was positive.

National standards identical to this European Standard shall be published at the latest by 1992-12-31 and conflicting national standards shall be withdrawn at the latest by 1992-12-31.

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.

Foreword to Amendment A1

This Amendment No. 1 was drawn up by CEN/TC 79 "*Respiratory protective devices*", the secretariat of which is held by DIN.

This amendment will be incorporated into EN 140:1989 on the occasion of the next revision.

The amendment is based on the work of CEN/TC 79/SC3/WG1 and was accepted unanimously by CEN/TC 79 at the Plenary Meeting in Munich in April 1990. It was then submitted to the secretariat of CEN/TC 79 for publication as Draft European Standard.

In December 1990 the Draft European Standard EN 140/prA1 was circulated by the CEN Central Secretariat in Brussels to all the Members for vote and comments. Within the voting period 14 Members approved and 1 Member abstained from vote, while 1 Member did not vote.

The comments received were discussed and decided on during the following meetings of CEN/TC 79/SC3.

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 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 Object and field of application

This European Standard refers to half masks and quarter masks for respiratory protective devices, except escape apparatus and diving apparatus. It specifies minimum requirements for half masks and quarter masks for use as part of respiratory protective devices.

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

2 References

EN 148-1:1987, *Respiratory Protective Devices; Threads for facepieces; Standard thread connection.*

3 Definition and description

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.

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.

4 Requirements

4.1 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.

4.2 Cleaning and disinfecting

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

4.3 Replaceable components

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

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

Testing according to 5.1.

4.4 Practical performance test

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 standard. In addition to the tests described in this 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 5.2.

Where in the opinion of the test station approval is not granted because practical performance tests show the apparatus has imperfections related to wearer's acceptance, the test station shall provide full details of those parts of practical performance tests which revealed these imperfections. This will enable other test stations to duplicate the tests and assess the results thereof.

4.5 Resistance to temperature

After storing in accordance with 5.3 and return to room temperature the facepiece shall not show appreciable deformation.

After the resistance to temperature test the facepiece shall be tested for inward leakage and has to meet the requirements of 4.6.

4.6 Inward leakage of facepieces

The laboratory tests shall indicate that the mask can be used by the wearer to protect with high probability against the potential hazard to be expected.

For masks fitted in accordance with the instructions for use, at least 46 out of the 50 individual results for the inward leakage over each of the exercise periods as defined in 5.4.1.3 (i.e. 10 subjects × 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 in accordance with 5.4.

4.7 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 adverse effect to health.

4.8 Flammability

The material used shall not present a danger for the wearer and shall not be of highly flammable nature.

When tested in accordance with 5.5 the facepiece shall not continue to burn after removal from the flame.

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

4.9 Carbon dioxide content of the inhalation air

When tested in accordance with 5.6 the carbon dioxide content of the inhalation air (dead space) shall not exceed an average of 1,0 per cent (by volume).

4.10 Head harness

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

Testing according to 5.2.

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

Testing according to 5.2.

4.10.3 Each strap of the head harness shall withstand a pull of 50 N applied for 10 s in the direction of pulling when the facepiece is donned.

4.11 Facepiece connector

Testing according to 5.1.

4.11.1 The connections between the facepiece and the apparatus may be achieved by a permanent or special (e.g. insert) type of connection or by a standard thread connection. If a standard thread connection is used e.g. for a single filter mask then the relevant requirements of EN 148-1:1987 shall be satisfied.

4.11.1.1 A facepiece shall not have more than one standard thread connection.

4.11.1.2 If any other screw thread is used it shall not be possible to connect it to the standard thread.

4.11.1.3 If a screw thread is used for a twin filter facepiece it shall not be possible to connect it to the standard thread.

4.11.1.4 Half masks and quarter masks shall not be equipped with a centre thread connector.

4.11.2 The connection between the faceblank and the connector shall be sufficiently robust to withstand axially a tensile force of 50 N when tested in accordance with 5.7.

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

4.12 Field of vision

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

NOTE If comparative testing of the field of vision is carried out the method described in 5.8 shall be used.

4.13 Inhalation and exhalation valves

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.

Testing according to 5.1.

4.13.1 Inhalation valve(s)

4.13.1.1 The facepiece should preferably be provided with one or more inhalation valve(s). If a standard thread connection is used, an inhalation valve shall be incorporated in the facepiece. If the facepiece has to be used with filters it shall be provided with an integral inhalation valve, if there is no valve in the filter.

4.13.1.2 Inhalation valve(s) shall function correctly in all orientations.

4.13.2 Exhalation valve(s)

4.13.2.1 Exhalation valve(s) shall function correctly in all orientations.

4.13.2.2 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 by the air supply.

4.13.2.3 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 4.6.

4.13.2.4 The exhalation valve(s) shall continue to operate correctly after a continuous exhalation flow of 300 l/min over a period of 30 s. Test specimen shall be in the state as received.

4.13.3 When the exhalation valve housing is attached to the faceblank, it shall withstand axially a tensile force of 50 N applied for 10 s. Test specimens shall be in the state as received.

4.14 Breathing resistance

Testing in accordance with 5.9.

The breathing resistance of the facepiece shall not exceed 2,0 mbar¹⁾ for inhalation and 3,0 mbar for exhalation when tested with a breathing machine (25 × 2 l/min) 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.

4.15 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.

5 Testing

Table 1 — Summary of tests

No. of samples ^a	Test(s) required	Pre-conditioning (Yes/No)	Clauses
All	Visual inspection	No	4.3/4.11.1/4.13/5.1
5	Cleaning and disinfection for total inward leakage tests	As recommended by manufacturer	4.2/5.1/5.4
3	Head harness tests Pull test	No	4.10.3
3	Facepiece connector pull test	No	4.11.2/5.7
3	Exhalation valve housing Pull test	No	4.13.3
5	Facepieces Exhalation valves performance tests (i) continuous flow optional leakage test	No 2 conditioned 3 as received then use for leakage test	4.13.2/4.13.2.4 Annex A
3	Flammability	No	4.8/5.5
1	Carbon dioxide content	No	4.9/5.6
3	Breathing resistance	No	4.14/5.9
5	Inward leakage	2 conditioned ^b 3 as received	4.6/5.4
2	Practical performance test	No	4.4/4.10.1/4.10.2/4.12/5.2
^a Most samples are used for more than one test.			
^b Conditioning/resistance to temperature — clauses 4.5/5.3.			

¹⁾ 1 bar = 10⁵ N/m² = 100 kPa.