

Respiratory protective devices — Self-contained closed-circuit breathing apparatus for escape — Requirements, testing, marking

The European Standard EN 13794:2002 has the status of a
British Standard

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National foreword

This British Standard is the official English language version of EN 13794:2002. It supersedes BS EN 400:1993, BS EN 401:1993 and BS EN 1061:1997 which are withdrawn.

The UK participation in its preparation was entrusted by Technical Committee PH/4, Respiratory protection, to Subcommittee PH/4/6, Self-contained breathing apparatus, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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**Respiratory protective devices - Self-contained closed-circuit
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pour l'évacuation - Exigences, essais, marquage

Atemschutzgeräte - Isoliergeräte für Selbstrettung -
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Foreword

This document (EN 13794:2002) 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of an identical text or by endorsement, at the latest by May 2003, and conflicting national standards shall be withdrawn at the latest by May 2003.

This document supersedes EN 400:1993, EN 401:1993 and EN 1061:1996.

This document 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 89/686/EEC, see informative Annex ZA, which is an integral part of this document.

The annexes A, B and C are normative, annex D is 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, Malta, 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 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 mass distribution are similar to those of the complete apparatus.

1 Scope

This European Standard specifies minimum requirements for self-contained closed-circuit breathing apparatus, chemical oxygen (KO₂, NaClO₃) type and compressed oxygen type, for escape (short: oxygen escape apparatus). This European Standard does not apply to apparatus for work and rescue and to 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 (including amendments).

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

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

EN 136:1998, *Respiratory protective devices - Full face masks - Requirements, testing, marking.*

EN 166:1995, *Personal eye protection – Specifications.*

EN 168:1995, *Personal eye protection - Non-optical test methods.*

EN 13274-1, *Respiratory protective devices - Methods of test - Part 1: Determination of inward leakage and total inward leakage.*

EN 13274-2, *Respiratory protective devices - Methods of test - Part 2: Practical performance tests.*

EN 13274-3, *Respiratory protective devices - Methods of test - Part 3: Determination of breathing resistance.*

EN 13274-4, *Respiratory protective devices - Methods of test - Part 4: Flame tests.*

EN 13274-5, *Respiratory protective devices - Methods of test - Part 5: Climatic conditions.*

3 Terms and definitions

For the purpose of this European Standard, the terms and definitions given in EN 132 and the nomenclature given in EN 134 together with the following apply.

3.1

quick start system

mechanism which activates the oxygen generation/flow whilst opening the storage container or by pulling the facepiece

4 Description

An oxygen escape apparatus is designed and constructed so that exhaled breathing gas is ducted from the facepiece into a circuit which contains a cartridge and a breathing bag where it is available for re-breathing. The cartridge contains chemicals which absorb exhaled carbon dioxide and - in case of a KO_2 apparatus - humidity and generates also oxygen.

In case of a NaClO_3 apparatus a chemical oxygen source (NaClO_3 candle) generates the oxygen to be needed.

In case of a compressed oxygen apparatus oxygen is fed into the circuit at a suitable point by means of a constant flow device or by a lung governed demand valve or by a suitable combination of both.

The breathing gas flow may be of the pendulum or loop type and excess gas is ejected via a relief valve.

5 Classification

5.1 General

Oxygen escape apparatus are classified according to their oxygen source and rated working duration in types and classes.

5.2 Types of oxygen escape apparatus

$\frac{3}{4}$ Type C NaClO_3 apparatus;

$\frac{3}{4}$ Type D Compressed oxygen apparatus;

$\frac{3}{4}$ Type K KO_2 apparatus.

5.3 Classes of oxygen escape apparatus

Oxygen escape apparatus are classified according to the rated working duration (see 6.19.1) which is defined by performing a breathing machine test in accordance with 7.10.1 with a minute volume of 35 l/min (20 cycles/min; 1,75 l/stroke).

Rated working duration will be defined in increments of 5 min up to and including a duration of 30 min and thereafter in steps of 10 min.

6 Requirements

6.1 General

All test specimens shall meet all requirements.

6.2 Design

The apparatus shall be of reliable construction and as compact as possible.

The apparatus shall be designed so as not to interfere with work activities when carried out in accordance with the manufacturers instruction.

The apparatus shall be so designed that there are no protruding parts or sharp edges likely to be caught on projections in narrow passages.

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

The apparatus shall be so designed and constructed as to prevent ingress of external atmosphere within the limits set out in this European Standard.

The apparatus shall be so designed that the outside of the container can be cleaned easily.

The apparatus shall be so designed as to prevent the chemical from entering the wearer's respiratory tract and that saliva or condensate shall not interfere with the function of the apparatus or cause any harmful effect to the wearer.

Testing shall be done in accordance with 7.3 and 7.16.

It shall not be possible to initiate a quick start system (if fitted) inadvertently.

Apparatus for special use, i.e. in mining shall meet the requirements given in annex A when tested in accordance with annex A.

Apparatus for training purposes only shall meet the requirements given in annex C when tested in accordance with annex C. Training may also be carried out with the working apparatus.

Testing shall be done in accordance with 7.3.

6.3 Materials

The carrying container and the locking device (where present) shall be adequately protected against corrosion. The materials used shall be able to withstand temperatures and mechanical stress to be expected whilst being carried on the person as well as being stored on machines and vehicles.

Testing shall be done in accordance with 7.3, 7.9.1 and 7.16.

Exposed parts, i.e. those which may be subjected to impact during use of the apparatus shall not be made of aluminium, magnesium, titanium or alloys containing such proportions of these metals as will, on impact, give rise to frictional sparks capable of igniting flammable gas mixtures.

Testing shall be done in accordance with 7.3.

Any container or carrying container making use of such materials shall be adequately protected.

If national regulations allow the use of such containers or carrying containers then when tested for impact and scraping no metal shall be exposed.

Non-metallic carrying containers shall be antistatic. The insulation resistance shall not exceed 10^9 . Where the apparatus is required to be antistatic during escape, materials used shall be antistatic as far as practicable.

Testing shall be done in accordance with 7.4.

Materials which come into direct 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 and 7.16.

Care shall be taken in selecting materials that may come into contact with oxygen to ensure that no oxygen ignition takes place.

Testing shall be done in accordance with 7.3.

6.4 Cleaning and disinfecting

All parts requiring cleaning and disinfecting shall be able to withstand cleaning and disinfecting agents and procedures as recommended by the manufacturer.

Testing shall be done in accordance with 7.15.

6.5 Mass

The mass of the complete apparatus including carrying container shall not exceed 5 kg when designed to be carried for at least 8 h.

Testing shall be done in accordance with 7.3.

6.6 Connections (couplings)

The design and construction of the apparatus shall permit its components to be readily separated for cleaning, inspecting and testing. Demountable connections to achieve this shall be readily connected and secured, preferably by hand.

Any means for sealing used shall be retained in position when the connection(s) is (are) disconnected during normal maintenance.

Testing shall be done in accordance with 7.3 and 7.16.

6.7 Harness

The apparatus in use shall have a harness, or other means of support, so that the wearers hands are left free, when the apparatus is in use.

Any harness shall be designed to allow quick, easy and correct donning of the apparatus without assistance.

Testing shall be done in accordance with 7.3 and 7.16.

6.8 Handling

The apparatus shall be capable of being donned and put into operation simply and without undue exertion under difficult conditions, e. g. in the dark and in restricted spaces.

If the apparatus container is fitted with a special fastening, the design shall be such that it cannot be opened inadvertently.

If the apparatus has been opened this shall be obvious by visual inspection.

Testing shall be done in accordance with 7.3 and 7.16.

6.9 Leaktightness

The ready-for-use apparatus shall be leak tight so that the pressure change does not exceed 0,3 mbar within 1 min.

Testing shall be done in accordance with 7.5.2.

6.10 Facepiece

The facepiece shall be either a mouthpiece assembly or a full face mask and shall be attached securely to the apparatus.

Type D-apparatus relying only upon a lung governed demand valve shall be fitted with a full face mask.

The mouthpiece assembly shall have two teeth bites and a permanently attached nose clip.

The mouthpiece assembly shall ensure reliable sealing and shall not be able to block inadvertently the breathing circuit when the apparatus is in operation.

The mouthpiece assembly shall be fitted with an adjustable or self-adjusting head harness if it is likely that an undue load is exerted on the wearer's mouth.

The nose clip shall provide an airtight seal of the nose. It shall be flexibly attached to the mouthpiece assembly such that when fitting the mouthpiece the wearer's attention is automatically drawn to the nose clip.

Testing shall be done in accordance with 7.3 and 7.16.

If a full face mask is used as a facepiece the following requirements shall be met:

¾ the full face mask shall be provided with an adjustable or self-adjusting head harness;

¾ the requirements of 7.11.1 and 7.11.3.1 of EN 136:1998 shall be met.

The lens of the full face mask shall meet the requirements for eyepieces and visors in EN 136 except the requirement for the field of vision.

Testing shall be done in accordance with 7.3, 7.16 and the relevant clauses in EN 136.

The face seal leakage of the full face mask shall be tested separately and shall meet the requirements in 7.20 of EN 136:1998, when tested in accordance with EN 13274-1.

6.11 Goggles

If the device is used with goggles, then the lenses of the goggles shall be protected against fogging. The head straps of the goggles shall be flexible and easily adjustable or self-adjusting.

The goggles shall be attached to the apparatus to prevent loss when opening the carrying container. The goggles shall not interfere with the donning of the apparatus.

Testing shall be done in accordance with 7.3 and 7.16.

After the test for mechanical strength of the eyepiece(s) in accordance with 8.11 of EN 136:1998 the goggles shall not be damaged in any way that may make it ineffective or cause injury to the wearer.

Testing shall be done in accordance with 7.3 and 7.16.

The leaktightness of the goggles shall meet the requirements of 7.2.5 of EN 166:1995 when tested in accordance with clause 13 of EN 168:1995.

Testing shall be done in accordance with clause 13 of EN 168:1995.

6.12 Inhalation and exhalation valves

The valves shall function correctly in all orientations.

Valve assemblies shall be such that they can be readily maintained and cannot be incorrectly replaced.

Inhalation and exhalation valve assemblies, sub-assemblies and piece parts that are by the manufacturer's design identical, are acceptable.

Differently designed inhalation valves and exhalation valves are acceptable if an unambiguous description is given in the information supplied by the manufacturer. The information in the information 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 unambiguously described or marked.

Means to check the correct assembly shall be described in the manufacturer's information.

Testing shall be done in accordance with 7.3 and 7.16.

6.13 Relief valve

6.13.1 General

When the apparatus is provided with a relief valve it shall function properly irrespective of the orientation of the apparatus and shall be protected against or be resistant to dirt and mechanical damage.

Means shall be provided for sealing the relief valve to permit leak testing of the apparatus.

Testing shall be done in accordance with 7.3.

6.13.2 Opening pressure

The relief valve shall open at a positive pressure of not less than 1 mbar.

When the relief valve is positioned in the breathing circuit before the regeneration cartridge then the pressure drop between the relief valve and the entry of the breathing bag shall at no time during the rated working duration of the set be greater than the minimum opening pressure of the relief valve.

Testing shall be done in accordance with 7.7.

6.13.3 Tensile force

The connection between the relief valve housing and the attachment part shall withstand axially a tensile force of 50 N applied for (10 ± 1) s.

Testing shall be done in accordance with 7.13.

6.14 Breathing bag

The breathing bag, or additional protective measures provided, shall withstand the foreseeable conditions of use.

The volume of the breathing bag shall be at least 6 l.