



**SLOVENSKI STANDARD**  
**oSIST prEN 13794:2021**  
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**Oprema za varovanje dihal - Samoreševalni avtonomni dihalni aparat z zaprtim krogom - Zahteve, preskušanje in označevanje**

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

Atemschutzgeräte Ꞥ Isoliergeräte für Selbstrettung Ꞥ Anforderungen, Prüfung, Kennzeichnung

Appareils de protection respiratoire - Appareils isolants autonomes à circuit fermé pour l'évacuation - Exigences, essais, marquage

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

Appareils de protection respiratoire - Appareils isolants autonomes à circuit fermé pour l'évacuation - Exigences, essais, marquage

Atemschutzgeräte ; Isoliergeräte für Selbstrettung ; Anforderungen, Prüfung, Kennzeichnung

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## prEN 13794:2021 (E)

### European foreword

This document (prEN 13794:2020) has been prepared by Technical Committee CEN/TC 79 “Respiratory protective devices”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13794:2002.

This document has been prepared under a standardization request 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, see informative Annex ZA, which is an integral part of this document.

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## 1 Scope

This document specifies minimum requirements for self-contained closed-circuit breathing RPD for escape (short: oxygen escape RPD)

- a) chemical oxygen type
  - potassium superoxide (KO<sub>2</sub>),
  - sodium chlorate (NaClO<sub>3</sub>) and
- b) compressed oxygen type.

This document does not apply to RPD 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

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 134:1998, *Respiratory protective devices - Nomenclature of components*

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

EN 13274-1:2001, *Respiratory protective devices - Methods of test - Part 1: Determination of inward leakage and total inward leakage*

EN 13274-2:2019, *Respiratory protective devices - Methods of test - Part 2: Practical performance tests*

EN 13274-3:2002, *Respiratory protective devices - Methods of test - Part 3: Determination of breathing resistance*

EN 13274-4:2020, *Respiratory protective devices - Methods of test - Part 4: Flame test*

EN 13274-5:2001, *Respiratory protective devices - Methods of test - Part 5: Climatic conditions*

EN ISO 16321-1:-,<sup>1</sup> *Eye and face protection for occupational use - Part 1: General requirements (ISO/FDIS 16321-1:2020)*

EN ISO 16972:2020, *Respiratory protective devices - Vocabulary and graphical symbols (ISO 16972:2020)*

EN ISO 18526-3:2020, *Eye and face protection - Test methods - Part 3: Physical and mechanical properties (ISO 18526-3:2020)*

ISO 80079-36:2016, *Explosive atmospheres — Part 36: Non-electrical equipment for explosive atmospheres — Basic method and requirements*

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<sup>1</sup> Under preparation. Stage at time of publication: FprEN ISO 16321-1:2020

**prEN 13794:2021 (E)****3 Terms and definitions**

For the purposes of this document, the following terms and definitions given in EN ISO 16972:2020, EN 134:1998 and the following apply.

**3.1 quick start system**  
mechanism which activates the generation or flow of breathable gas whilst opening the container or by pulling the facepiece

**3.2 ready for use configuration**  
complete respiratory protective device, which may not be fully assembled, but is in a state which allows the immediate start of the donning procedure as described by the manufacturer

**4 Description**

An oxygen escape RPD 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<sub>2</sub> RPD - humidity and generates also oxygen.

In case of a NaClO<sub>3</sub> RPD, a chemical oxygen source (NaClO<sub>3</sub> candle) generates the oxygen to be needed.

In case of a compressed oxygen RPD, 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 to the surrounded atmosphere via a relief valve.

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**5 Classification****5.1 General**

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

RPD intended to be carried on a person, machine or vehicle shall be classified as "M", otherwise it shall be classified as "R".

**5.2 Types of oxygen escape RPD**

- Type C NaClO<sub>3</sub> RPD;
- Type D Compressed oxygen RPD;
- Type K KO<sub>2</sub> RPD.

**5.3 Classes of oxygen escape RPD**

Oxygen escape RPD classes are defined by rated working duration with increments of 5 min up to and including duration of 30 min and thereafter in steps of 10 min.

The minimum class has a rated working duration of 5 min and is class 5.

The classes are assessed by the requirements of 6.18.2.1.



## 6 Requirements

### 6.1 General

All test samples specified in the related test clauses shall meet the relevant requirements.

Where it is required in a specific clause, the manufacturer shall declare that a risk assessment e.g. a Failure Modes and Effect Analysis (FMEA) concerning these specific requirements has been conducted.

NOTE Further information is given in EN 60812 [1].

### 6.2 Nominal values and tolerances

Unless otherwise specified, the values stated in this document 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 conditions for testing shall be between  $16^{\circ}\text{C}$  and  $32^{\circ}\text{C}$  and  $(50 \pm 30)\%$  relative humidity. Any temperature limits specified shall be subject to an accuracy of  $\pm 1^{\circ}\text{C}$ .

### 6.3 Design

The RPD shall be designed so as not to interfere with work activities when being carried. It shall be used in accordance with the information supplied by the manufacturer.

The surface of any part of the RPD likely to be in contact with the wearer shall be free from sharp edges, burrs and no protruding parts, that can be caught on projections in narrow passages, or by moving parts.

Check in accordance with 7.2 and test in accordance with 7.11

The RPD shall be so designed and constructed as to prevent ingress of external atmosphere within the limits specified in this document.

Testing shall be performed in accordance with 7.3.

The RPD shall be so designed as to prevent that saliva or condensate to interfere with the function of the RPD or cause any harmful effect to the wearer.

Check in accordance with 7.2 and test in accordance with 7.11.

The RPD shall be so designed to prevent the chemical used in the RPD entering the wearer's respiratory tract.

No migration to the RI of any powdered chemical shall be possible.

After pre-conditioning in accordance with 7.4, check in accordance with 7.3 using a cotton pad with chemical reagent which reacts with  $\text{KO}_2$  powder e.g. phenolphthalein.

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

It shall not be possible to don the RPD without initiating the quick start system, if fitted.

For RPD designed for underground use, the additional requirements specified in Annex A shall be fulfilled.

Test in accordance with Annex A.

RPD shall be designed in such a way to minimize the risk to be caught up. Special mechanism or carrying methods can be used to minimize the risk.

The manufacturer shall supply a declaration that this was addressed by a risk assessment, e.g. a FMEA.

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If a training RPD is available, it shall be clearly distinguishable from the working RPD and shall be marked as such and explained in the information supplied by the manufacturer.

If a training RPD is available, it shall follow the general guidelines in Annex B.

**WARNING** —Training RPD according to Annex B are not Personal Protective Equipment and therefore, they shall never be used in hazardous conditions.

Check in accordance with 7.2.

**6.4 Materials****6.4.1 Corrosion**

The carrying container and the locking system, where present, shall be adequately protected against corrosion.

The manufacturer shall supply a declaration that this was addressed by a risk assessment, e.g. a FMEA.

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.

Check in accordance with 7.2 and test in accordance with 7.4, 7.5.1 and 7.11.

**6.4.2 RPD used in potentially explosive atmospheres****6.4.2.1 General**

If the RPD is intended to be used in potentially explosive atmospheres the RPD shall be marked accordingly.

**6.4.2.2 Exposed components**

RPD intended to be used in potentially explosive atmospheres shall not have exposed unprotected metal components manufactured from Aluminium, Magnesium, Titanium, Zirconium or their alloys containing such proportions of these metals which, on impact with rusted iron or steel, are likely to produce sparks capable of igniting flammable gas/air mixtures.

The manufacturer shall supply a declaration that this was addressed by a risk assessment, e.g. a FMEA.

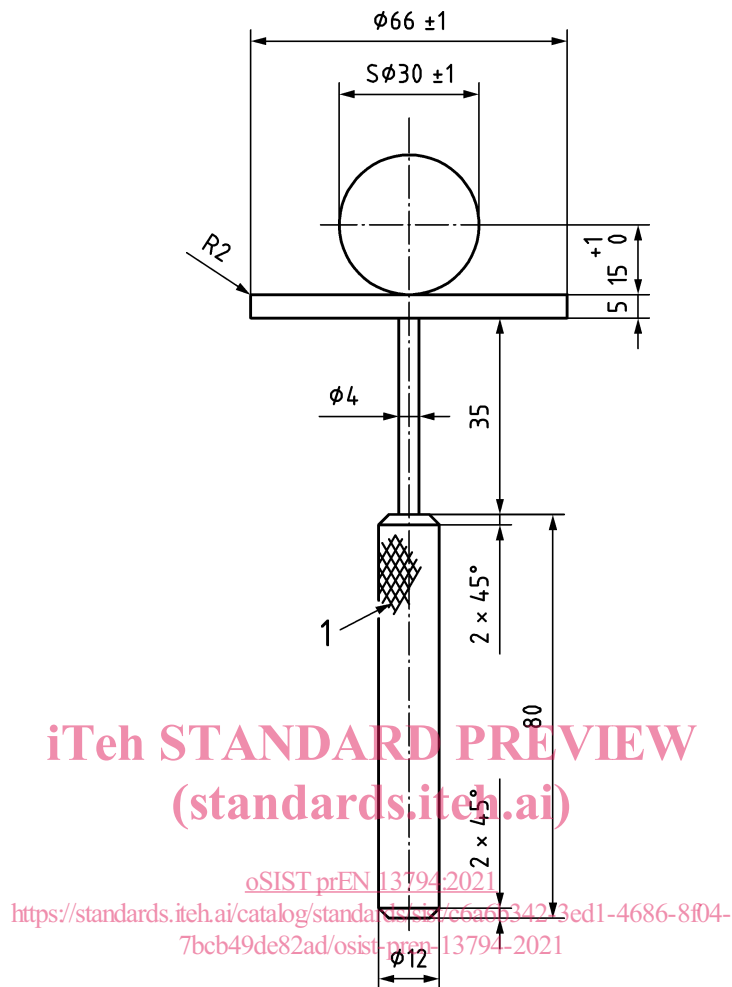
Check in accordance with 7.2.

**6.4.2.3 Antistatic properties**

RPD and exposed components in the ready for use packaging and during the donning of the RPD and in the donned configuration shall be tested in accordance with ISO 80079-36:2016. Testing by charging with a DC high voltage power supply (ISO 80079-36:2016, D.4.2.3,) can be excluded, as long as highly efficient charge generating mechanisms (fast separation processes, e.g. films moving over rollers, drive belts, loading arm operation and bulk hydrocarbon transfer) are unlikely to be present. A warning shall be given in the information supplied by the manufacturer.

Exposed components are those that can be touched, during use, by the exposed surface identification probe given in Figure 1.

Dimensions in millimetres

**Key**

- 1 surface, corrugated at the discretion of the manufacturer

**Figure 1 — Exposed surface identification probe****6.4.2.4 Use of RPD in potentially explosive atmospheres**

If in the information supplied by the manufacturer the RPD is claimed that it can be used in potentially explosive atmospheres it shall comply with the IEC Ex Certified Equipment Program.

**6.4.3 Skin compatibility**

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.

The manufacturer shall supply a declaration that this was addressed by a risk assessment, e.g. a FMEA.

Check in accordance with 7.2.

**prEN 13794:2021 (E)****6.4.4 Oxygen compatibility**

Materials that can come into contact with oxygen shall not cause an oxygen ignition.

The manufacturer shall supply a declaration that this was addressed by a risk assessment, e.g. a FMEA.

RPD using oxygen generating chemicals shall be known not to ignite or combust due to the elevated temperatures of the RPD (caused by the exothermic chemical reaction) as a result of intended use.

The manufacturer shall supply a declaration that this was addressed by a risk assessment, e.g. a FMEA..

Check in accordance with 7.2.

**6.5 Mass**

The mass of the RPD in the donned configuration during escape shall not exceed 5 kg.

The mass of the complete RPD including carrying container shall not exceed 5 kg when designed to be carried.

Check in accordance with 7.2.

**6.6 Connections**

If the manufacturer claims that parts of the RPD needs to be maintained during lifetime, then the design and construction of the RPD shall permit its components to be easily disassembled for cleaning, inspecting and testing. If demountable connections are used to achieve this, they shall be easily 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.

Check in accordance with 7.2.

**6.7 Harness**

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

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

Check in accordance with 7.2 and test in accordance with 7.11.

**6.8 Handling**

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

The design of the RPD container shall be such that it cannot be opened inadvertently.

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

Check in accordance with 7.2 and test in accordance with 7.11.

**6.9 Leaktightness**

One RPD in ready for use configuration and preconditioned in accordance with 6.14 and 6.15 shall be tested.

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

Testing shall be performed in accordance with 7.3.2, carrying container opened and, if applicable, be removed but without the quick start system activated.

## 6.10 Respiratory Interface (RI)

Two RPD in ready for use configuration and preconditioned in accordance with 6.14 and 6.15 shall be tested.

The RI shall be either a mouthpiece assembly or a full face mask and shall be attached to the RPD in such a way that the connection shall withstand a pull force of 50 N for 10 s.

Testing shall be performed in accordance with 7.13.

Type D- RPD with 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 RPD 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 flexible attached to the mouthpiece assembly so that, when fitting the mouthpiece, the wearer's attention is automatically drawn to the nose clip.

Check in accordance with 7.2 and test in accordance with 7.11.

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

- the full face mask shall be provided with an adjustable or self-adjusting head harness;
- the requirements of EN 136:1998, 7.11.1 and 7.11.3.1 shall be met.

The lens of the full face mask shall meet the requirements for eyepieces and visors of EN 136:1998, 7.14, except the requirement for the field of vision.

Check in accordance with 7.2 and test in accordance with 7.11 and EN 136:1998, 8.3, 8.11, 8.13 and 8.18.

The field of vision shall be sufficient to allow escape and tested in accordance with 7.11.

The face seal leakage of the full face mask shall be tested separately and shall meet the requirements of EN 136:1998, 7.20, when tested in accordance with EN 13274-1:2001.

## 6.11 Goggles, if fitted

If the RPD 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 easy to adjust or self-adjusting.

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

Check in accordance with 7.2 and test in accordance with 7.11.

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

Check in accordance with 7.2 and test in accordance with 7.11.

The leaktightness of the two goggles shall meet the requirements of EN ISO 16321-1:-,<sup>1</sup> 7.18, when tested in accordance with EN ISO 18526-3:2020, 6.14.