

# **SLOVENSKI STANDARD**

## **SIST EN 250:2014**

**01-julij-2014**

**Nadomešča:**

**SIST EN 250:2000**

**SIST EN 250:2000/A1:2006**

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**Oprema za dihanje - Potapljaški dihalni aparat z odprtim krogom na stisnjen zrak -  
Zahteve, preskušanje, označevanje**

Respiratory equipment - Open-circuit self-contained compressed air diving apparatus -  
Requirements, testing, marking

Atemgeräte - Autonome Leichttauchgeräte mit Druckluft - Anforderungen, Prüfung,  
Kennzeichnung

Appareils respiratoires - Appareils de plongée autonomes à air comprimé et à circuit  
ouvert - Exigences, essai, marquage

**Ta slovenski standard je istoveten z: EN 250:2014**

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**ICS:**

13.340.30	Varovalne dihalne naprave	Respiratory protective devices
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EUROPEAN STANDARD  
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EUROPÄISCHE NORM

**EN 250**

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**Respiratory equipment - Open-circuit self-contained compressed  
air diving apparatus - Requirements, testing and marking**

Appareils respiratoires - Appareils de plongée autonomes à  
air comprimé et à circuit ouvert - Exigences, essai et  
marquage

Atemgeräte - Autonome Leichttauchgeräte mit Druckluft -  
Anforderungen, Prüfung und Kennzeichnung

This European Standard was approved by CEN on 3 February 2014.

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## Foreword

This document (EN 250:2014) 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of an identical text or by endorsement, at the latest by October 2014, and conflicting national standards shall be withdrawn at the latest by October 2014.

This document supersedes EN 250:2000.

Annex D provides details of significant technical changes between this European Standard and the previous edition.

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(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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## Introduction

A given self-contained open-circuit compressed air underwater breathing apparatus 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 are similar to those of the complete apparatus.

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## 1 Scope

This European Standard specifies minimum requirements for self-contained open-circuit compressed air underwater breathing apparatus and their sub-assemblies to ensure a minimum level of safe operation of the apparatus down to a maximum depth of 50 m.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 144-1, *Respiratory protective devices - Gas cylinder valves - Part 1: Thread connections for insert connector*

EN 148-1, *Respiratory protective devices - Threads for facepieces - Part 1: Standard thread connection*

EN 148-2, *Respiratory protective devices - Threads for facepieces - Part 2: Centre thread connection*

EN 148-3, *Respiratory protective devices - Threads for facepieces - Part 3: Thread connection M 45 x 3*

EN 12021, *Respiratory protective devices - Compressed air for breathing apparatus*

EN ISO 12209, *Gas cylinders - Outlet connections for gas cylinder valves for compressed breathable air (ISO 12209)*

ISO 263, *ISO inch screw threads — General plan and selection for screws, bolts and nuts — Diameter range 0,06 to 6 in*

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## 3 Terms and definitions

For the purposes of this document the following terms and definitions apply.

### 3.1

#### **self-contained, open-circuit Compressed air Underwater Breathing Apparatus SCUBA**

apparatus which has a portable supply of compressed air carried by the diver, allowing him to breathe under water and exhale into the ambient water

Note 1 to entry: The self-contained, open-circuit compressed air underwater breathing apparatus, when ready to use, consists of a number of compatible sub-assemblies each of which complies with the appropriate requirements of this standard. When connected together, the complete self-contained, open-circuit compressed air underwater breathing apparatus is designed to enable the wearer to breathe air on demand from a high pressure cylinder (or cylinders) via a demand regulator connected to a facepiece. The exhaled air passes, without recirculation, from the demand regulator via the exhalation valve to ambient water.

### 3.2

#### **high pressure**

pressure inside the cylinder(s) and between the cylinder(s) and any pressure reducer

### 3.3

#### **medium pressure**

pressure between the pressure reducer and the demand valve

**EN 250:2014 (E)****3.4****rated working pressure**

maximum working pressure of the respective components

**3.5****reference pressure**

equilibrium pressure which exists in the face piece when there is no respiratory flow at the end of exhalation

**3.6****respiratory pressure**

differential pressure in the face piece relative to the reference pressure measured during inhalation and exhalation

**3.7****opening negative pressure (cracking pressure)**

respiratory pressure during inhalation required to open the inhalation valve

**3.8****displaced (tidal) volume**

volume of breathing gas displaced by the breathing simulator during one half cycle (inhalation or exhalation) measured in litres

**3.9****breathing frequency**

setting of the breathing simulator measured in cycles per minute

**3.10****Respiratory Minute Volume (RMV)**

product of the tidal volume and breathing frequency measured in litres per minute

**3.11****pressure volume diagram**

diagram generated during one breathing cycle by plotting the respiratory pressure against the displaced volume

**3.12****Work Of Breathing (WOB)**

external work expended during one breath divided by the tidal volume of that breath, measured in Joule per litre, i.e. specific work

Note 1 to entry: This is equivalent to volume average respiratory pressure (kPa). This work of breathing is, in general, proportional to the area bounded by the pressure volume diagram. Work associated with positive pressures during inhalation does not count towards the total work of breathing.

**3.13****facepiece**

device that connects the apparatus to the wearer's respiratory tract and isolates the respiratory tract from the environment

Note 1 to entry: It may be a mouthpiece assembly, an oro-nasal half mask or a full face mask.

**3.14****mouthpiece assembly**

device usually held by the teeth, sealing against the lips and through which air is inhaled and exhaled

**3.15****full face mask**

facepiece covering mouth, nose, eyes and chin which may be fitted with either a mouthpiece or an inner mask

**3.16****oro-nasal half mask**

facepiece, covering mouth, nose and chin and retained by straps

**3.17****dead space**

volume of the cavity formed between the mouth and the inhalation and exhalation parts

**3.18****package of air cylinder(s)**

assembly of one or more air cylinders with cylinder valve(s) and a carrying frame (if applicable)

**3.19****demand regulator**

device which consists of a pressure reducer connected to a demand valve that is fitted to a facepiece

**3.20****demand valve**

that part of a demand regulator which reduces the medium pressure air to approximately ambient pressure

**3.21****carrying system**

carrying frame or holding device for air cylinder(s) with possibility to mount the harness (if applicable)

**3.22****pressure reducer**

that part of a demand regulator which reduces the high pressure air to medium pressure

**3.23****auxiliary emergency breathing system**

additional breathing system as part of the apparatus

Note 1 to entry: This can also be referred to as an octopus.

**3.24****upstream demand valve**

demand valve that will close and not let gas out with an increasing medium pressure

**3.25****downstream demand valve**

demand valve that will open and let gas out with an increasing medium pressure

**3.26****dive/pre-dive control**

switch on the demand regulator that in the pre-dive position prevents free-flow when not connected to the respiratory tract

**3.27****hose assembly**

hose with an interface connection at each end that are intended to be fitted to other interfaces

**3.28****breathing hose**

flexible hose that contains air at approximately ambient pressure

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**EN 250:2014 (E)****4 Minimum equipment**

The apparatus consists of sub-assemblies. During use the sub-assemblies shall comprise at least:

- a) cylinder(s) with cylinder valve(s);
- b) demand regulator;
- c) pressure indicator;
- d) facepiece;
- e) carrying system.

The apparatus shall also be delivered with information supplied by the manufacturer.

Any further sub-assembly which is integral to the apparatus shall comply with the relevant requirements of this European Standard.

The apparatus may also include the following sub-assemblies:

- f) auxiliary breathing system;
- g) lifting harness;
- h) depth/time measuring device;
- i) additional safety device(s);
- j) voice communication system.

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**5 Requirements****5.1 Design**

The apparatus and sub-assemblies shall be so designed that its components are located so that it is possible to perform the required pre-dive functional checks.

The combination of sub-assemblies shall not adversely affect the safe operation and use of the apparatus.

The apparatus and sub-assemblies shall not have any projecting parts or corners and edges which may injure the diver.

All parts, which have to be manually actuated during use, shall be accessible and controllable even when wearing protective gloves (three fingers, with 6 mm to 7 mm padding on either side). These parts shall be designed such that their setting cannot be altered inadvertently during use.

Check compliance by visual inspection (see 6.3) and test in accordance with 6.14.

**5.2 Auxiliary emergency breathing system**

If the manufacturer allows more than one diver to use the apparatus at the same time, to protect the diver, the requirements of Annex B shall apply.

All applicable requirements and tests of this standard shall be applied to each demand regulator when used and tested alone.

Test in accordance with Annex B.

### 5.3 Materials

Materials that may come into contact with the wearer's skin, mouth and/or the respirable gas shall not be known to be likely to cause irritation or any other adverse effects to health.

Check compliance by visual inspection (see 6.3) and test in accordance with 6.14.

The materials used shall have adequate mechanical strength and feature sufficient resistance to changes caused by the effect of temperature individually and in the assembled, ready-to-use apparatus.

Check compliance by visual inspection (see 6.3) and test in accordance with 6.5, 6.12 and 6.14.

### 5.4 Air cylinder(s)

The air cylinder(s) shall comply with the appropriate national or European specifications and shall be approved and tested with respect to the rated working pressure.

The air cylinder shall be marked with the appropriate neck thread designation according to EN 144-1 where the preferred threads are M 18 x 1,5 and M 25 x 2.

Cylinder(s) shall be designed for use at the maximum diving depth.

Check compliance by visual inspection (see 6.3).

### 5.5 Cylinder valves

Cylinder valves(s) shall comply with EN 144-1 and shall be tested and approved for use at the rated working pressure and gas.

**NOTE** When designing cylinder valves for use in apparatus covered by this standard, manufacturers can use information and guidance from other standards, e.g. EN ISO 10297.

Check compliance by visual inspection (see 6.3).

The threads shall be as specified in EN 144-1 where the preferred threads are M 18 × 1,5 and M 25 × 2.

Safe connection between the cylinder valve(s) and the demand regulator shall be ensured by applying EN ISO 12209.

The valve shall be so designed or so located that it cannot be closed inadvertently. This is met, e.g. by at least two turns from fully open to fully closed position.

Check compliance by visual inspection (see 6.3) and test in accordance with 6.14.

The function of the cylinder valve shall not be impaired by the ingress of water.

The cylinder valve shall be protected against the entrainment of dirt, solid particles and water from inside the cylinder. If provided, an additional filter shall have a surface area of at least 900 mm<sup>2</sup> and be reliably connected to the protective tube.

**EXAMPLE** By means of a protective tube with a length of at least 30 mm and an inside diameter of at least 2,5 mm.