

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

The European Standard EN 250:2000 has the status of a
British Standard

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National foreword

This British Standard is the official English language version of EN 250:2000, including amendment A1:2006. It supersedes BS EN 250:1993 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment 1:2006 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted by Technical Committee PH/4, Respiratory protection, to Subcommittee PH/4/7, Underwater 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 UK interests informed;
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This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 17 and a back cover.

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

(includes amendment A1:2006)

Appareils respiratoires — Appareils de plongée autonomes à air comprimé et à circuit ouvert — Exigences, essai, marquage
(inclut l'amendement A1:2006)

Atemgeräte — Autonome Leichttauchgeräte mit Druckluft — Anforderungen, Prüfung, Kennzeichnung
(enthält Änderung A1:2006)

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CEN

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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 replaces EN 250:1993.

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of an identical text or by endorsement, at the latest by July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

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.

Foreword to amendment A1

This European Standard (EN 250:2000/A1:2006) has been prepared by Technical Committee CEN/TC 79 "Respiratory protective devices", the secretariat of which is held by DIN.

This Amendment to the European Standard EN 250:2000 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2006, and conflicting national standards shall be withdrawn at the latest by November 2006.

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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.

1 Scope

This European Standard applies to self-contained open-circuit compressed air underwater breathing apparatus and their sub-assemblies.

The object of the requirements and tests set out in this European Standard is to ensure a minimum level of safe operation for apparatus down to a maximum depth of 50 m.

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.

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

EN 144-1, *Respiratory protective devices — Gas cylinder valves — Thread connection 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 45x3.*

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

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

ISO 5145, *Cylinder valve outlets for gases and gas mixtures — Selection and dimensioning.*

ISO 12209-1, *Gas cylinders — Outlet connections for gas cylinder valves for compressed breathable air — Part 1: Yoke type connections.*

ISO 12209-2, *Gas cylinders — Outlet connections for gas cylinder valves for compressed breathable air — Part 2: Threaded connections.*

ISO 12209-3, *Gas cylinders — Outlet connections for gas cylinder valves for compressed breathable air — Part 3: Adaptor for 230 bar valves.*

3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 132 and the following 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

The SCUBA, 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 SCUBA 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 air cylinder(s)

3.3

medium pressure

pressure between the pressure reducer and the demand valve

3.4

low pressure

pressure within the facepiece, approximately ambient pressure

3.5

rated working pressure

maximum working pressure of the respective components

3.6

reference pressure

equilibrium pressure which exists in the facepiece when there is no respiratory gas flow

3.7

respiratory pressure

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

3.8

opening negative pressure (cracking pressure)

respiratory pressure during inhalation required to open the inhalation valve

3.9

displaced (tidal) volume

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

3.10

breathing frequency

setting of the breathing simulator measured in cycles per minute

3.11

respiratory minute volume (RMV)

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

3.12

pressure volume diagram

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

3.13

work of breathing

work expended during one breathing cycle measured in J/l

This work 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.

3.14

facepiece

device for connecting the apparatus to the wearer. It may be a mouthpiece assembly, a diving half mask or a full face mask.

3.15

mouthpiece assembly

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

3.16

full face mask

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

3.17

diving half mask

facepiece, covering mouth and chin and retained by straps

3.18

dead space

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

3.19

package of air cylinder(s)

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

3.20

demand regulator

contains a pressure reducer and a demand valve fitted to a facepiece

3.21

demand valve

device, that forms part of a demand regulator which reduces the medium pressure air to ambient pressure

3.22

carrying system

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

3.23

pressure reducer

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

4 Description

4.1 General

The SCUBA may consist of sub-assemblies.

4.2 Sub-assemblies

During use the minimum sub-assemblies elements shall be the elements a) to e):

- a) air cylinder(s) with cylinder valve(s);
- b) demand regulator;
- c) safety device(s);
- d) facepiece: mouthpiece assembly or a diving half mask or full face mask;
- e) carrying system.

NOTE Each sub-assembly will be provided with information according to clause 8.

5 Requirements

5.1 Design

The SCUBA and sub-assemblies shall be so designed that its components are located so that protection is achieved against mechanical damage caused by external influence and 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 apparatus.

In the case of several interconnected cylinders it shall be ensured that pressure equalization between opened cylinder valves and/or open reserve valves is not impeded.

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

All parts which have to be actuated by the diver during use shall be accessible and controllable even when wearing protective gloves (3-finger, 6 mm to 7 mm, padding on either side). They shall be designed such that their setting cannot be altered inadvertently during use.

Testing shall be done in accordance with 6.2 to 6.11.