



SLOVENSKI STANDARD
SIST EN 1809:1998

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Diving accessories - Buoyancy compensators - Functional and safety requirements, test methods

Tauch-Zubehör - Tariermittel - Funktionelle und sicherheitstechnische Anforderungen, Prüfverfahren

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Accessoires de plongée - Bouées d'équilibrage - Exigences fonctionnelles et de sécurité, méthodes d'essai

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ICS:

97.220.40	Oprema za športe na prostem in vodne športe	Outdoor and water sports equipment
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EUROPEAN STANDARD

EN 1809

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 1997

ICS 97.220.40

Descriptors: sports, skin diving, sport equipment, safety devices, buoys, definitions, specifications, accessories, tests, buoyancy, instructions, marking

English version

Diving accessories - Buoyancy compensators - Functional and safety requirements, test methods

Accessoires de plongée - Bouées d'équilibrage - Exigences fonctionnelles et de sécurité, méthodes d'essai

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This European Standard was approved by CEN on 30 October 1997.

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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 the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 136 "Sports, playground and other recreational equipment", 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of an identical text or by endorsement, at the latest by May 1998, and conflicting national standards shall be withdrawn at the latest by May 1998.

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

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).

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.

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1 Scope

This standard specifies functional, safety requirements and test methods applicable to inflatable type buoyancy compensating devices intended to provide divers with a means for controlling buoyancy.

This standard is not applicable to other kinds of personal equipment such as life preservers, personal flotation or rescue devices including combined buoyancy and rescue devices.

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 250

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

SS 019102

Colour atlas – NCS Natural Colour System

IEC 50 (845) : 1987

International Electrotechnical Vocabulary; Chapter 845: Lighting

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 buoyancy compensator; BC: Inflatable type device that provides the diver with a means for controlling buoyancy.

3.2 buoyancy: The upward force exerted upon the immersed volume of a body.

3.3 maximum buoyancy: The maximum lifting force of a BC as determined in accordance with 5.4 of this standard.

3.4 SCUBA: Acronym for self contained underwater breathing apparatus, e.g. as described in EN 250.

3.5 oral inflation device: A device that permits inflation of the BC by mouth.

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3.6 mechanical inflation device: A device to inflate the BC with breathable gas mixture from the SCUBA or an independent source.

3.7 manual deflation device: A manually operated device that permits deflation of the BC.

3.8 automatic pressure relief device: A device that automatically prevents overpressurisation possibly harmful to the BC.

3.9 harness: The means by which the BC is secured to the user's body.

3.10 fixture: The means by which the SCUBA cylinder(s) is (are) fixed to the BC.

3.11 auxiliary inflation device: An inflation device which is actuated manually to effect a rapid increase in buoyancy independent of the supply of breathable gas mixture from the SCUBA.

3.12 cylinder: Container for breathable gas mixture under high pressure.

3.13 cartridge: A non-reusable container for breathable gas mixture which is opened not by a valve but by actuating a mechanism which allows the contents of the cartridge to transfer fully into the BC.

3.14 breathing mixture: Air or a gas mixture indicated by the manufacturer providing an oxygen partial pressure higher than 0,16 bar and having a percentage of oxygen not higher than 40 % by volume.

3.15 rated intermediate pressure: The maximum rated intermediate pressure as indicated in the instructions for use of the BC as maximum working pressure for the mechanical inflator.

4 Requirements

4.1 General

When tested in accordance with 5.7 and 5.11, the BC shall not give evidence of any risk of injury of the diver, nor shall impair the operability of any of its component or that of a SCUBA.

The BC shall be equipped with several devices permitting respectively oral and mechanical inflation, manual deflation, automatic pressure relief, drainage of entrapped water, and with a harness for securing it to the body. It can be fixed to the cylinder(s) of a SCUBA or used as the relevant body harness, can be equipped with hoses for oral inflation or for deflation, with auxiliary inflation devices, or with visual means of signalization of the diver at the surface.

4.2 Mandatory features

4.2.1 Oral inflation device

Parts of the device which come into contact with the user's mouth shall be smoothly finished.

When tested in accordance with 5.11, the oral inflation device shall be assessed as readily accessible to the mouth and either hand in any stage of inflation of the BC. It shall be operable even when wearing protective gloves (three fingers, 6 ± 1 mm, double-lined).

When tested in accordance with 5.5.1, the oral inflation device shall show a differential pressure drop of not more than 35 hPa.

4.2.2 Mechanical inflation device

This comprises a medium pressure hose and a valve, that shall be actuated subsequent to one positive, manual operation such as pressing a button.

The coupling between the valve and the hose shall be rapidly detachable even when wearing protective gloves (three fingers, 6 ± 1 mm, double-lined). The mechanical inflation device shall be subjected to a pressure test. The medium pressure hoses shall comply with the appropriate requirements of EN 250.

The maximum buoyancy, determined in accordance with 5.4, shall be built up within not more than 20 s at maximum flow and a rated intermediate pressure according to manufacturer's instructions and in no case higher than 7 bar.

Testing in accordance with 5.5.2, 5.5.3 and 5.11.

4.2.3 Manual deflation device

4.2.3.1 This shall be activated subsequent to one positive manual operation, such as pressing a button or pulling a cord. It shall be operable even when wearing protective gloves (three fingers, 6 ± 1 mm, double-lined). It shall either be incorporated in the oral inflation device and comply with 4.2.1 and/or a separately operated device. This device (or at least one of these devices) shall be readily accessible to either hand in any stage of inflation of the BC.

Testing in accordance with 5.11.

4.2.3.2 At the maximum manually settable position the outflow of gas shall be greater than the maximum possible inflow by either one of the mechanical inflation devices fed with at least 7 bar at a buoyancy of not more than 20 % of the maximum buoyancy.

Testing in accordance with 5.6.1.

4.2.3.3 After operating the manual deflation device until the outflow of gas stops, the residual buoyancy of the BC shall be not more than 10 % of the rated maximum buoyancy.

Testing in accordance with 5.6.2.

4.2.3.4 If the manual deflation device is operated by means of a pulling cord, it shall remain operable when tested in accordance with 5.6.3.

4.2.4 Automatic pressure relief device

This shall prevent damage to the BC through overpressurisation.

When tested in accordance with 5.8, the pressure inside the BC shall not exceed 50 % of its burst pressure if inflated continuously with the mechanical inflator at 120 % of its rated intermediate pressure and the BC shall have a minimum burst pressure of 0,5 bar above atmospheric pressure.

After the last cycle defined in 5.8.2 the BC sample shall remain in a serviceable condition and the air leakage shall reduce its maximal buoyancy not more than 20 N during a time of $1 \text{ h} \pm 5 \text{ min}$.

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4.2.5 Means for drainage of entrapped water

When tested in accordance with 5.9, the weight of entrapped water shall be less than 2 % of the maximum buoyancy of the BC.

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4.2.6 Harness

This feature, which incorporates strapping or other means of attachment shall perform its function of securing the BC to the body taking into account different body sizes. The means of attachment shall not interfere with the removal of the user's ballast weights when the BC is donned in accordance with the manufacturer's instructions.

Testing in accordance with 5.11.

4.3 Optional features

4.3.1 Influence on mandatory features

If BCs are equipped with optional features, these shall be assessed as not compromising the effectiveness of the mandatory features during the practical performance test in accordance with 5.11.

4.3.2 Fixing of the SCUBA

If the BC is fixed to the cylinder(s) of a SCUBA, it shall not become loose, in or out of water, when tested in accordance with 5.7 and 5.11.

4.3.3 Body harness

If the BC is used as the body harness of a SCUBA, it shall comply with the appropriate requirements of EN 250.

4.3.4 Hoses for oral inflation

If the BC is equipped with hoses for inflation by mouth or deflation, these shall withstand the test in accordance with 5.10.2 without damage or separation from the BC or the oral inflator.

4.3.5 Auxiliary inflation devices

4.3.5.1 If the BC is equipped with an auxiliary inflation device this shall comply with the requirements of 4.3.5.2 to 4.3.5.6.

4.3.5.2 The auxiliary inflation device shall contain a breathable mixture.

4.3.5.3 The device actuating the release of gas shall be accessible and operable even when wearing protective gloves (three fingers, 6 ± 1 mm, double-lined).

Testing in accordance with 5.11.

4.3.5.4 At atmospheric pressure, the BC shall inflate to its maximum buoyancy given in 6.2 e) within 5 s after operating the auxiliary device when tested in accordance with 5.10.1.

4.3.5.5 For cartridges, the force required to actuate the release of gas shall be between 20 N and 80 N, when tested in accordance with 5.10.3. If a pull-cord system is used to actuate the cartridge it shall withstand the tensile force test defined in 5.10.3 without failing.

4.3.5.6 The auxiliary inflation device shall be fixed such that it cannot be loosened unintentionally, when tested in accordance with 5.7 and 5.11.

4.3.6 Means of location of the diver at the surface

Any visual means intended to aid the location of the wearer using colour surfaces shall have at least a total area of 200 cm² of orange, red or yellow colour and shall be checked against colour samples from the NCS colour atlas, and comparisons shall be made in daylight. The exposed portions shall have easily visible colours within the tolerance range defined by the following ranges:

0070 –
1070 – in tones
0080 – Y30R to Y80R
1080 –
0090 –
and
0070 –
0080 – in tones
0090 – Y to Y20R

If fluorescent colours are used they shall be red to yellow or pink, luminance factor $\beta \geq 0,25$ (for definition see 845-04-69 of IEC 50(845) : 1987).

4.4 Long-term usability

After submission to the high temperature, low temperature and sea water conditioning defined in 5.2.2 to 5.2.4 and then tested in accordance with 5.7, the BC sample shall remain in a serviceable condition, show no signs of physical damage such as tears, loose seams, broken or distorted hardware. The cylinder(s) (if any) shall show no dislocation as to impair the operability of the SCUBA.

After submission to the wearing resistance test defined in 5.2.5 and the subsequent check of the mechanical inflation device for leakage, the maximum allowed leakage of air either into the body of the BC or to the outside shall be 0,5 l/min at room temperature.

4.5 Resistance to hydrostatic pressure

After submission to the hydrostatic pressure test defined in 5.3, the BC shall remain in a serviceable condition. The ingress of water in the BC during the test shall not exceed 1 l.

5 Test methods

5.1 General

If the same model of BC is in different sizes, one sample of each size shall be submitted to visual inspection and to buoyancy test in accordance with 5.4.

All buoyancy tests shall be conducted in fresh water, all other tests can be done in fresh or in sea water.

Except as otherwise indicated, the waist belt and shoulder belt shall be securely closed during testing.

Submission to all of the following tests shall occur after the BC sample has been tested in accordance with 5.2.

5.2 Wearing and environmental resistance tests

5.2.1 Order of test procedures

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Carry out the following resistance tests in the order of 5.2.2, 5.2.3 and 5.2.4 before subjecting the same sample to test in accordance with 5.7.

5.2.2 High temperature resistance

Place the uninflated BC in a circulating air oven maintained at $(70 \pm 3) ^\circ\text{C}$ for $16 \text{ h} \pm 30 \text{ min}$ at a relative humidity between 80 % and 95 %. After removal from the circulating air oven, store the BC at a temperature between $18 ^\circ\text{C}$ and $25 ^\circ\text{C}$ and a relative humidity of at least 50 % for at least 3 h. Record any tackiness, blisters or other visible defects after this test.