SLOVENSKI STANDARD
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Potapljaške obleke - 1. del: Mokre obleke - Zahteve in preskusne metode

Diving suits - Part 1: Wet suits - Requirements and test methods

Tauchanzüge - Teil 1: Nasstauchanzüge - Anforderungen und Prüfverfahren

Vêtements de plongée - Partie 1: Combinaisons isothermes - Exigences et méthodes d'essai

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Diving suits - Part 1: Wet suits - Requirements and test methods

Vêtements de plongée - Vêtements isothermes - Partie 1 : Exigences et méthodes d'essai

Tauchanzüge - Teil 1: Nasstauchanzüge - Teil 1: Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 7 June 2017.

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

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European foreword

This document (EN 14225-1:2017) has been prepared by Technical Committee CEN/TC 162 “Protective clothing including hand and arm protection and lifejackets”, 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of an identical text or by endorsement, at the latest by June 2018, and conflicting national standards shall be withdrawn at the latest by June 2018.

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

This document supersedes EN 14225-1:2005.

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 Regulation (EU) 2016/425.

For relationship with Regulation (EU) 2016/425, see informative Annexes ZA and ZB, which are an integral part of this document.

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

EN 14225 consists of the following parts, under the general title *Diving suits*:

— *Part 1: Wet suits — Requirements and test methods*;

— *Part 2: Dry suits — Requirements and test methods*;

— *Part 3: Actively heated or cooled suit systems and components — Requirements and test methods*.

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document for wet diving suits has been prepared to meet the needs of persons engaged in underwater activities where the user is breathing underwater, and where water temperature and exposure duration are such that the person's thermal requirement can be met using a wet suit.

A wet suit may be comprised of one or more pieces.

The conformity of a wet suit to this document does not imply that it is suitable for all circumstances nor does the document make detailed provision for all special uses for which wet suits may be utilized.

The thermal protection provided by a wet suit may be affected by a number of factors including the following:

— water temperature;

— diver's morphology (body surface area and shape, amount of body fat, sex);

— diver's physiology;

— diver's rate of work and working conditions;

— thermal properties of the material of the wet suit.

Most of these factors are individual and significantly change from diver to diver and from dive to dive.

1 Scope

This European Standard specifies the construction and performance requirements (including thermal) of wet suits for wear by divers for underwater activities where the user is breathing underwater. Marking, labelling, information meant to be provided at the point of sale, and instructions for use are also specified.

Laboratory and practical performance tests are specified.

Short sleeve jackets, short-leg trousers, under- and overgarments, and separate accessories such as gloves, hoods and boots are not within the scope of this document.

NOTE Suits and shorties for snorkelling including underwater activities are not covered by this standard.

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

EN 1809, *Diving equipment — Buoyancy compensators — Functional and safety requirements, test methods*

EN ISO 3758, *Textiles — Care labelling code using symbols (ISO 3758)*

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1
closure
device to close openings provided for the donning and use of a diving suit

Note 1 to entry: Closures include slide fasteners (3.7).

3.2
consumer information at the point of sale
information, available at the point of sale, to allow the consumer to select the correct wet suit for the activity they intend to undertake

3.3
diving suit
suit designed for intended underwater activities, in which the user is breathing underwater

3.4
immersed thermal resistance
thermal resistance of a textile material or composite when the material is immersed in water and subjected to the effect of hydrostatic compression

3.5
seal
device that limits or prevents water flow into or out of the suit

3.6
seam
permanent fastening between two or more pieces of material

3.7
slide fastener
closure with a fastening device consisting for instance of two interlocking strips and a slider

3.8
thermal insulating material
material designed to provide a degree of insulation of the wearer from external temperatures

3.9
thermal resistance
temperature difference between the two faces of a textile material or composite divided by the resultant dry heat flux per unit area in the direction of the temperature gradient, expressed in square metre Kelvin per watt ($m^2 \cdot K \cdot W^{-1}$)

Note 1 to entry: The dry heat flux can consist of one or more conductive, convective and radiant components.

3.10
wet suit
diving suit, made of thermal insulating material, which covers all or part of the body and that is designed to reduce the flow of the water next to the diver's body

4 Requirements

4.1 Mechanical performance

4.1.1 Resistance to cold and hot storage

A suit, samples of each suit material and of each suit material combination shall be subjected to a high temperature resistance test followed by a low temperature resistance test (5.4.1.1). The suit shall then be inspected in accordance with 5.3. There shall be no visible evidence of tears or damaged seams, or of cracks or distortion in the surface of the suit material.

4.1.2 Sea water resistance

The suit, samples of each suit material and of each suit material combination shall be subjected to the seawater exposure resistance test in accordance with 5.4.1.2. After each cycle the samples shall be visually inspected in accordance with 5.3. There shall be no visible signs of damage.

4.1.3 Resistance to cleaning, disinfection and decontamination

The suit, samples of suit materials and each suit material combination, shall be subjected to cleaning, disinfection and, where applicable, to decontamination, in accordance with 5.4.1.3 and shall then be visually inspected in accordance with 5.3. There shall be no visible signs of damage or degradation.

4.1.4 Resistance to repeated pressurization in water

After repeated pressurization in water the thermal insulating material used in the construction of the suit shall not lose more than 5 % of its original thickness. Testing shall be performed in accordance with 5.4.2.

4.1.5 Tensile strength of material

Thermal insulating material that have been subjected to testing in accordance with 5.4.2 shall withstand a tensile load of (150 ± 5) N for 10 s without breaking. Testing shall be performed in accordance with 5.4.4.

4.1.6 Resistance to permanent deformation

After the testing for tensile strength (5.4.4), the permanent elongation of the suit material shall be less than 5 % of the original length. Testing shall be performed in accordance with 5.4.7.

4.1.7 Strength of suit seams

Each type of seam used to manufacture the suit shall withstand a tensile load of (100 ± 5) N for 5 minutes without breaking. Testing shall be performed in accordance with 5.4.5.

4.1.8 Strength of closures

Each type of closure (including touch and close fasteners and slide fasteners) shall withstand a tensile load of (100 ± 5) N for 10 s without opening. Testing shall be performed in accordance with 5.4.6.

4.2 Limitation of water flow into and out of the suit

4.2.1 Seams

All seams between thermal insulating material components of the suit shall be provided with means (e.g. glue, weld, tape) to prevent free flow of water through the seam. Testing shall be performed in accordance with 5.3 and 5.4.5.

4.2.2 Closures

All closures, including touch and close fasteners and slide fasteners shall be provided with means of reducing the free flow of water through the closure, for example a flap that can be secured over the closure. Testing shall be performed in accordance with 5.3.

4.3 Thermal performance of suit materials

The thermal insulating material used for the construction (see 4.1.4) of the suit shall be of one of the thermal performance classes specified in Table 1. Testing shall be performed in accordance with 5.4.3.

Table 1 — Thermal performance classes of materials based on their immersed thermal resistance at 1 bar and 6 bar

Thermal performance class	Immersed thermal resistance at surface $m^2 \cdot K \cdot W^{-1}$	Immersed thermal resistance at 6 bar $m^2 \cdot K \cdot W^{-1}$
A	≥ 0,15	≥ 0,03
B	0,10 – 0,149	≥ 0,02
C	0,07 – 0,099	≥ 0,01
D	0,05 – 0,069	≥ 0,01

If materials with different immersed resistance are used for seal or comfort purposes their total surface shall not be larger than 20 % of the suit surface.

4.4 Sizing

The manufacturer shall use a sizing system and state at least two body dimensions including at least the height and chest girth of the intended user.

When the suit is donned by a test diver in accordance with 5.5.5.2 the size of the suit shall correspond to the size marked on it by the manufacturer.

4.5 Practical performance requirements

The suit shall be donned and doffed with the assistance of no more than one person. The time for donning shall not exceed 10 minutes. Testing shall be performed in accordance with 5.5.5.2.

During the practical performance tests the test divers shall be able to carry out all the procedures and not report a practical performance score of 4 or more (given in Annex B) for any procedure. Testing shall be performed in accordance with 5.5.

The suit shall not cause any excessive irritation, abrasion or other skin injuries. Testing shall be performed in accordance with 5.5.5.2.

5 Test methods

5.1 General

Three wet suits of different sizes shall be submitted for visual inspection (see 5.3) and testing. One suit shall undergo laboratory tests in accordance with 5.4.1.1, 5.4.1.2 and 5.4.1.3. All three suits shall undergo practical performance tests under realistic conditions in accordance with 5.5.

Samples of the material used in the manufacture of the wet suit, where applicable assembled in the same way as in the suit (e.g. in the case of seams), shall be submitted for visual inspection (see 5.3).The samples of material shall undergo laboratory tests in accordance with 5.4.

5.2 Test sequence

The tests shall be conducted in the following order as given in Figure 1:

a) tests on samples of material:

   1) resistance to cold and hot storage (5.4.1.1);

2) sea water resistance (5.4.1.2);

3) resistance to cleaning and disinfection (5.4.1.3);

4) resistance to repeated pressurization in water (5.4.2);

5) immersed thermal resistance (5.4.3);

6) tensile strength of thermal insulating material (5.4.4);

7) tensile strength of seams (5.4.5);

8) tensile strength of closures (5.4.6);

9) resistance to permanent deformation of thermal insulating material (5.4.7);

b) tests on suits:

1) tests on one suit:

i) resistance to cold and hot storage (5.4.1.1);

ii) sea water resistance (5.4.1.2);

iii) resistance to cleaning and disinfection (5.4.1.3);

iv) practical performance tests (5.5);

2) tests on two suits:

i) practical performance tests (5.5).