SLOVENSKI STANDARD
SIST EN 14225-1:2005

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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

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

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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.

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Foreword

This document (EN 14225-1:2005) 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of an identical text or by endorsement, at the latest by September 2005, and conflicting national standards shall be withdrawn at the latest by September 2005.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 EU Directive 89/686/EEC.

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

This standard for wet suits is Part 1 of 4. The other parts are:

Diving Suits – Part 2: Dry suits – Requirements and test methods.

Diving Suits – Part 3: Actively heated or cooled suits (systems) – Requirements and test methods.

Diving Suits – Part 4: One atmosphere suits (ADS) – Human factors requirements and test methods.

This document includes a Bibliography.

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

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 document 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 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 over-garments, and separate accessories such as gloves, hoods and boots are not within the scope of this document.

2 Normative references

The following referenced documents are indispensable for the application 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 250, *Respiratory equipment — Open-circuit self-contained compressed air diving apparatus — Requirements, testing, marking*

EN 340, *Protective clothing — General requirements*

EN 1809:1997, *Diving accessories — Buoyancy compensators — Functional and safety requirements, test methods*

EN 23758, *Textiles — Care labelling code using symbols (ISO 3758:1991)*

3 Terms and definitions

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

3.1
diving suit
suit designed for intended underwater activities, in which the user is breathing underwater

3.2
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 skin

3.3
thermal insulating material
material designed to provide a degree of insulation of the wearer from external temperatures

3.4
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 The dry heat flux can consist of one or more conductive, convective and radiant components.

3.5
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

3.6
closure
device to close openings provided for the donning and use of a diving suit

NOTE Closures include slide fasteners (3.9).

3.7
seam
permanent fastening between two or more pieces of material

3.8
seal
device that limits or prevents water flow into or out of the suit

3.9
slide fastener
closure with a fastening device consisting of two flexible interlocking strips and a slider

3.10
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 he or she intends to undertake

3.11
instruction for use
information to enable trained and qualified persons to select, wear, and use the suit in a safe manner

4 Requirements

4.1 Mechanical performance

4.1.1 Resistance to high and low temperature

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) under the conditions specified in EN 1809:1997, 5.2.2 and 5.2.3, respectively. 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 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, complete with all attachments and 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

When tested in accordance with 5.4.2, the thermal insulating material used in the construction of the suit shall not loose more than 5 % of its original thickness.

4.1.5 Tensile strength of material

When samples of thermal insulating material that have been subjected to testing in accordance with 5.4.2 are tested in accordance with 5.4.4 the material shall withstand a tensile load of 150 N for 10 s without breaking.

4.1.6 Resistance to permanent deformation

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

4.1.7 Strength of suit seams

When tested in accordance with 5.4.5, each type of seam used to manufacture the suit shall withstand a tensile load of 100 N for 10 s without breaking.

4.1.8 Strength of closures

When tested in accordance with 5.4.6, each type of closure (including touch and close fasteners and slide fasteners) shall withstand a tensile load of 100 N for 10 s without opening.

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 when tested 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 when tested 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 when tested 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 a different immersed thermal resistance are used for wrist, ankle and neck openings their surface shall not be larger than 20 % of the total of the suit surface. This will be allowed only as a seal or for comfort purpose.

4.4 Sizing

The manufacturer shall use the sizing system specified in EN 340 or another sizing system. If the manufacturer uses a sizing system other than that specified in EN 340, the manufacturer shall 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 5.5.6.2 the size of the suit shall correspond to the size marked on it by the manufacturer.

4.5 Practical performance

When tested in accordance with 5.5.6.2 it shall be possible for the suit to be donned and doffed with the assistance of no more than one person.

When wet suits are subjected to practical performance tests in accordance with 5.5 the test divers shall be able to carry out all the procedures listed in 5.5.6.2 and 5.5.6.3 and not report a practical performance score of 5 or more (given in Annex B) for more than 3 of the separate test procedures and no score higher than 8 for any procedure.

When tested in accordance with 5.5.6.2 the satisfactory surface condition of the suit in contact with the user shall be confirmed by showing no excessive irritation, abrasions or other skin injuries.

5 Test methods

5.1 General

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), and at least three wet suits, including one of each size if applicable, 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, the samples of material shall undergo laboratory tests in accordance with 5.4 and all three suits shall undergo practical performance tests under realistic conditions in accordance with 5.5.

5.2 Test sequence

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

a) Tests on samples of material:

— resistance to high and low temperature (5.4.1.1, EN 1809:1997, 5.2.2 and 5.2.3);

— sea water resistance (5.4.1.2);

— resistance to cleaning and disinfection (5.4.1.3);

— test for resistance to repeated pressurization in water (5.4.2);

— immersed thermal resistance (5.4.3);

— tensile strength of thermal insulating material (5.4.4);

— tensile strength of seams (5.4.5);

— tensile strength of closures (5.4.6);

— resistance to permanent deformation of thermal insulating material (5.4.7).

b) Tests on suits:

— resistance to high and low temperature (5.4.1.1, EN 1809: 1997, 5.2.2 and 5.2.3);

— sea water resistance (5.4.1.2);

— resistance to cleaning and disinfection (5.4.1.3);

— practical performance tests (5.5).