SLOVENSKI STANDARD
SIST EN 14225-2:2018

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Potapljaške obleke - 2. del: Suhe obleke - Zahteve in preskusne metode

Diving suits - Part 2: Dry suits - Requirements and test methods

Tauchanzüge - Teil 2: Trockentauchanzüge - Anforderungen und Prüfverfahren

Vêtements de plongée - Partie 2:Combinaisons étanches - Exigeneces et méthodes d'essai

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

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Diving suits - Part 2: Dry suits - Requirements and test methods

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 14225-2:2017) 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of an identical text or by endorsement, at the latest by June 2018, and conflicting national standards shall be withdrawn at the latest by June 2018.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 14225-2:2005.

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 C 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 dry diving suits has been prepared to meet the needs of persons engaged in underwater activities where the user is breathing underwater, and where thermal comfort and required thermal protection is higher than that provided by a wet suit. A dry suit is also designed to enable the wearers to adjust the gas volume in the suit according to their requirements.

A dry suit may be comprised of one or more pieces. Dry suits may be used in conjunction with a range of accessories including passive and active undergarments, gloves, a hood and other head protection equipment.

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

A dry suit manufactured for special purposes may also:

a) provide or enable thermal insulation;

b) provide special protection.

The level of protection and performance offered by a dry suit may be altered by a number of factors, including the water temperature, the depth of the dive, the diver's work rate and behaviour, and the manner in which the suit has been maintained. The adequacy of the protection provided by a dry suit also depends upon the individual diver's level of cold tolerance. The degree of thermal protection offered by a dry suit is especially problematic. Appropriate material and manikin tests are being developed and refined, but at best they will only be able to provide broad indications of the likely protection provided by a particular suit to an individual diver.

1 Scope

This European Standard specifies the construction and performance of dry 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.

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 530:2010, *Abrasion resistance of protective clothing material — Test methods*

EN 1809:2014+A1:2016, *Diving equipment — Buoyancy compensators — Functional and safety requirements, test methods*

EN 14126:2003, *Protective clothing — Performance requirements and tests methods for protective clothing against infective agents*

EN 14225-1:2017, *Diving suits — Part 1: Wet suits — Requirements and test methods*

EN 16523-1, *Determination of material resistance to permeation by chemicals — Part 1: Permeation by liquid chemical under conditions of continuous contact*

EN 20811, *Textiles — Determination of resistance to water penetration — Hydrostatic pressure test (ISO 811:1981)*

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

EN ISO 13935-2, *Textiles — Seam tensile properties of fabrics and made-up textile articles — Part 2: Determination of maximum force to seam rupture using the grab method (ISO 13935-2)*

EN ISO 13995, *Protective clothing — Mechanical properties — Test method for the determination of the resistance to puncture and dynamic tearing of materials (ISO 13995)*

EN ISO 15027-3:2012, *Immersion suits — Part 3: Test methods (ISO 15027-3:2012)*

ISO 1817, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 4046-3:2016, *Paper, board, pulps and related terms — Vocabulary — Part 3: Paper-making terminology*

SOLAS:1974, *as amended, Chapter III as amended by IMO Resolution MSC 47(66) and LSA Code. Use and fitting of retro-reflective materials on life-saving appliances, adopted by Res. A.658(16), Annex 2, issued by the International Maritime Organisation (IMO)*

3 Terms and definitions

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

3.1
ankle seal
closure used to make a water and gas tight seal around the ankle

3.2
attachment
item attached to the diving suit

3.3
closure
device to close openings provided for the donning and use of a diving suit

Note 1 to entry: Closures include slide fasteners (3.21).

3.4
component
part of a suit system

3.5
consumer information at the point of sale
information available at the point of sale, to allow the consumers to select the correct suit for the activity they intend to undertake

3.6
deflation device
device that allows gas to be released from the internal gas volume of a dry suit

Note 1 to entry: Deflation can be either manually or automatic or a combination of both.

3.7
diving suit
suit designed for intended underwater activities, in which the user is breathing underwater

3.8
dry suit
diving suit which covers all or particular regions of the body and which is designed to prevent the ingress of water upon immersion

3.9
face seal
closure used to make a water and gas tight seal around the face

3.10
hazard
source of possible injury or damage to health

3.11
hyperthermia
condition of the human body in which the core temperature is above 39 °C

3.12
hypothermia
condition of the human body in which the core temperature is below 35 °C

3.13
inflation device
device that allows gas to be added to the internal volume of a dry suit

3.14
inflation hose
hose used to supply pressurized gas to the inflation device

3.15
label
item permanently attached to a product that carries information related to parts or special features of the product

3.16
manually operated deflation device
deflation device activated by the diver

3.17
medium pressure
pressure between a pressure reducer and a gas control system

3.18
neck seal
closure used to make a water and gas tight seal around the neck

3.19
overpressure device
device automatically activated by a differential pressure between the inside and the outside of the suit

3.20
penetrator
system or device that links the inside and the outside of the suit

3.21
quick release connection
safety connection which can be released with one hand in one single action

3.22
slide fastener
closure with a fastening device consisting for instance of two interlocking strips and a slider

3.23
suit system
combination of diving suit components, undergarments and attachments

3.24
undergarment
garment worn under a dry suit to provide thermal insulation

3.25
wrist seal
closure used to make a water and gas tight seal around the wrist

4 Requirements

4.1 General

Dry suits shall conform to the requirements listed in Table 1, as applicable. Dry suits incorporating optional features shall also conform to the requirements listed in Table 2, as applicable.

Table 1 — Dry suits – Overall requirements

Requirement	Requirement specified in Subclause	Test method
Whole suit		
Sizing	4.4.1	5.6.7.3 a)
Leakage resistance	4.4.6	5.5.2
Resistance to hot and cold storage	4.2.1	5.4.2.1 and 5.3
Sea water resistance	4.2.2	5.4.2.2 and 5.3
Resistance to cleaning, disinfection and decontamination	4.2.3	5.4.2.3 and 5.3
Provision for urination	4.4.5	5.6 and 5.3
Penetrators	4.4.4	5.4.3.5
Practical performance	4.5	5.6 and 5.6.7.2
Suit materials		
Resistance to puncture and dynamic tearing	4.3.1	5.4.3.1
Seam strength	4.3.2	5.3 and 5.4.3.2
Strength of closures	4.3.3	5.4.3.3
Joint strength of attachments	4.3.4	5.4.3.4 and 5.3
Integrity of slide fasteners	4.3.5	5.5.2
Inflation hose		
Tensile load resistance	4.4.2.3	5.5.1.1
Flexibility	4.4.2.3	5.5.1.1
Leakage resistance	4.4.2.3	EN 250
Air flow rate	4.4.2.3	5.5.1.1
Inflation device(s)		
Strength of bond to suit	4.4.2.2	5.5.1.2 a)

Requirement	Requirement specified in Subclause	Test method
Reliability and functionality	4.4.2.2	5.5.1.2 c), 5.5.1.2 d) and 5.5.1.2 e)
Air flow rate	4.4.2.2	5.5.1.2 b)
Leakage resistance	4.4.2.2	5.5.1.2 c), 5.5.1.2 d), 5.5.1.2 f) and 5.5.2
Disconnection of gas supply	4.4.2.3	5.5.1.2 g)
Deflation device(s)		
Strength of bond to suit	4.4.2.4	5.5.1.3 a)
Leakage resistance	4.4.2.4	5.5.1.3 b) and 5.5.1.3 d)
Air flow rate	4.4.2.4	5.5.1.3 c)
Over pressure device		
Flow capacity	4.4.2.5	5.5.1.4 a), 5.5.1.4 b)
Connectors		
Connector strength	4.4.3	5.5.3
Marking and Information		
Marking	Clause 6	5.3
Information to be supplied by manufacturer	Clause 7	5.3

Table 2 — Dry suits with special protection and other optional features

Feature	Requirement specified in Subclause	Test method	Symbol
Hoods	4.6.1	5.6	
Thermal insulation — material — suit	4.6.2.1	EN 14225–1:2017, 5.4.3 5.7.1	TH
Resistance against chemicals	4.6.2.2	5.7.2	HZ
Resistance against biological hazards	4.6.2.3	EN 14126:2003, 4.1.4.1	BIO
Resistance against abrasion	4.6.2.4	5.7.4	ABR
Suits to aid visibility	4.6.2.5	5.7.5	VIS

4.2 Mechanical performance

4.2.1 Resistance to cold and hot storage

After the leakage test (5.5.2) a suit, complete with all attachments including valves and hose and samples of suit materials and of each material combination, shall be subjected to hot and cold storage

followed by an inflation resistance test, in accordance with 5.4.2.1. After each hot and cold storage cycle and after the inflation resistance test the suit shall be visually inspected in accordance with 5.3. There shall be no visible signs of damage.

4.2.2 Sea water resistance

After the tests for resistance to hot and cold storage and inflation resistance, the suit, complete with all attachments including valves and hose and samples of suit materials and of each material combination shall be subjected to the seawater resistance test in accordance with 5.4.2.2. After each cycle the suit shall be visually inspected in accordance with 5.3. There shall be no visible signs of damage.

4.2.3 Resistance to cleaning, disinfection and decontamination

The suit system, complete with all attachments including valves and hose and samples of suit materials and of each material combination shall be subject to cleaning, disinfection and, where applicable, to decontamination, in accordance with 5.4.2.3 and shall then be visually inspected in accordance with 5.3. There shall be no visible signs of damage or degradation.

4.3 Mechanical performance of the material, seams and attachments

4.3.1 Resistance of material to puncture and dynamic tearing

Following preliminary tests of resistance to cold and hot storage (5.4.2.1), resistance to seawater (5.4.2.2) and resistance to cleaning, disinfection and decontamination (5.4.2.3) the suit material samples shall be tested in accordance with 5.4.3.1. The mean tear length shall be less than 40 mm.

4.3.2 Strength of suit seams

The seam joining each combination of materials used to manufacture the suit, but excluding wrist, ankle, neck and face seals, shall withstand a tensile load of (100 ± 5) N for 5 minutes applied perpendicular to the seam. After the load test has been carried out, the seam shall not leak or show any visible evidence of permanent deformation or tearing. Testing shall be performed in accordance with 5.3 and 5.4.3.2.

4.3.3 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 5.4.3.3.

4.3.4 Joint strength of attachments

The material samples (with attachments) or the suit that has been subjected to the tests specified in 5.4.2 the joints between the basic suit material and the hood, gloves, neck seal (if applicable), wrist seals, boots and socks, where these are attached to the suit, shall each withstand a tensile load of (100 ± 5) N for 5 min without visible evidence of permanent deformation or tearing, when visually inspected according to 5.3. Testing shall be performed in accordance with 5.4.3.4.

4.3.5 Integrity of slide fasteners

Any slide fasteners shall not leak when the suit is tested in accordance with 5.5.2.