



SLOVENSKI STANDARD
SIST EN 14225-4:2005

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

Tauchanzüge - Teil 4: Tauchanzüge für normobaren Atemdruck - Anforderungen an die personenbezogenen Faktoren und Prüfverfahren

Vêtements de plongée - Partie 4 : Vêtements de plongée a pression atmosphérique - Exigences relatives aux facteurs humains 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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English version

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This European Standard was approved by CEN on 21 April 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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, 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.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 14225-4:2005) 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of an identical text or by endorsement, at the latest by November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.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.

This standard for one atmosphere diving suits is Part 4 of a series. The other parts are:

- Diving Suits – Part 1: Wet suits – Requirements and test methods
- Diving Suits – Part 2: Dry suits – Requirements and test methods
- Diving Suits – Part 3: Actively heated or cooled suit (Systems) – Requirements and test methods

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

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 part of EN 14225 for one atmosphere diving suits (ADS) has been prepared to meet the human factors requirements of persons engaged in underwater activities where protection against environmental conditions and decompression hazards are essential.

A one atmosphere suit (ADS) is designed to:

- a) Protect the diver from the underwater pressure and thus remove the need for lengthy decompression procedures;
- b) Reduce the risk of hypothermia or hyperthermia;
- c) To enable the diver to move and conduct work by means of articulated arms and legs.

The performance of the suit system can be altered by a number of factors including additional equipment.

A one atmosphere suit (ADS) can be comprised of several sub-assemblies.

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1 Scope

This European Standard specifies the human factors performance of one atmosphere diving suits (ADS) where the diver can make use of articulated arms and legs and is able to conduct underwater activities while 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.

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 340, *Protective clothing — General requirements*

EN ISO 15027-3:2002, *Immersion suits - Part 3: Test methods (ISO 15027-3:2002)*

3 Terms and definitions

For the purposes of this European Standard, 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

hypothermia

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

3.3

hyperthermia

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

3.4

one atmosphere diving suit (ADS)

suit provided with both arms and legs, and in which the user is breathing gas at normobaric pressure

3.5

suit system

combination of a diving suit and all items which are used in conjunction with it

3.6

thermal stress

any change in the thermal relation between a human and his or her environment which, if uncompensated by temperature regulation, would result in hyper- or hypothermia

4 Requirements

4.1 Mechanical performance

4.1.1 Resistance to cleaning, disinfection and decontamination

Following actual use by divers the interior of the suit shall be subjected to cleaning, disinfection against biological contamination such as bacteria, virus, fungi and other biological contaminants in accordance with 5.4, and shall then be controlled with regards to efficiency of the recommended method of disinfection. Visual inspection shall reveal no indication of damage to the suit system as a result of the disinfection.

4.2 Construction

4.2.1 Sizing

The manufacturer shall use the sizing system specified in EN 340 if applicable or another sizing system. If the manufacturer uses a sizing system other than that specified in EN 340, the manufacturer shall state what body dimensions the suit is intended for in its different body compartments. When the suit is donned by a test diver in accordance with 5.6 the size of the suit shall correspond to the size specified by the manufacturer.

4.2.2 Internal pressure control

The internal pressure of the suit should remain between 900 mbar and 1200 mbar through the foreseen use time. Testing in accordance with 5.5 and 5.6.

4.2.3 Field of vision and visibility of controls and displays

When a suit is tested in accordance with 5.6, the diver's field of vision shall be not less than 120° in the horizontal plane and not less than 90° in the vertical plane.

The controls and displays inside the suit shall be so positioned that during the test in accordance with 5.6 the diver can view them comfortably and clearly with normal or corrected vision.

4.2.4 Provision for urination

The suit shall be provided with a system to allow the diver to urinate while inside the suit. During the test in accordance with 5.6, the diver shall be able to use this system without difficulty.

4.3 Internal temperature and humidity

When the suit is tested in accordance with 5.5 and 5.6 the mean internal temperature shall not exceed 30 °C and shall not fall below 15 °C in any part of the suit at any time during the test, and the relative humidity shall not exceed 60 % throughout the test. The body core temperature of the diver shall not vary by more than ± 1 °C throughout the test (5.6).

The suit shall have means by which the diver can adjust the thermal properties provided by the total system to compensate for variations in his or her physical activity and heat production.

4.4 Safety requirements

4.4.1 Oxygen level

When tested in accordance with 5.5.1 and 5.6 the oxygen (O₂) level in the atmosphere within the suit shall be (21 ± 2) % for maximum time of use, as specified by the manufacturer.

4.4.2 Carbon dioxide level

When tested in accordance with 5.5.1 and 5.6 the carbon dioxide (CO₂) level in the atmosphere within the suit shall be less than 0,5 % for maximum time of use, as specified by the manufacturer.

NOTE Attention is drawn to national legislation regarding the required threshold carbon dioxide level for an 8 h working day.

4.4.3 Emergency system

When tested in an emergency mode in accordance with 5.5.2, the mean air temperature and relative humidity and the oxygen levels of the atmosphere within the suit shall conform to 4.3 and 4.4.1 respectively, for a minimum time of 48 h or any operative time for the emergency system as specified by the manufacturer. The CO₂ within the system shall remain below 2,0 % for a 48 h in emergency operative mode, or for the minimum time foreseen by the manufacturer.

4.5 Practical performance

4.5.1 Ergonomics

The diving suit shall fulfil general ergonomic requirements for fit (EN 340) when tested in accordance with 5.6.

4.5.2 Food and drink

For an ADS designed for a normal dive duration of more than 2 h, means shall be incorporated for providing the diver with sufficient food and fluid for the maximum duration of the dive indicated by the manufacturer. In addition, emergency supplies of food and fluid sufficient for a minimum of 48 h shall be provided.

During the test in accordance with 5.6, the test diver shall be able to eat and drink comfortably inside the suit.

5 Test methods

5.1 General

One suit shall be submitted for testing. The suit shall be subjected to cleaning, disinfection, and, if applicable, decontamination, in accordance with 5.4 and the suit shall be subjected to unmanned and manned testing in accordance with 5.5 and 5.6.

5.2 Test sequence

The tests on the ADS shall be conducted in accordance with the flow chart shown in Figure 1.

Tests on suits

- Resistance to cleaning and disinfection (5.4.)
- Unmanned tests (5.5)
- Internal pressure control (5.5.1 and 5.5.2)
- Internal temperature and humidity (5.5.1 and 5.5.2)