SLOVENSKI STANDARD
SIST EN 145:1998

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Nadomešča:
SIST EN 145:1996
SIST EN 145-2:1996

Oprema za varovanje dihal - Avtonomni dihalni aparat z zaprtim krogom z dovodom stisnjenega kisika ali stisnjenega kisika in dušika - Zahteve, preskušanje, označevanje

Respiratory protective devices - Self-contained closed-circuit breathing apparatus compressed oxygen or compressed oxygen-nitrogen type - Requirements, testing, marking

Atemschutzgeräte - Regenerationsgeräte mit Drucksauerstoff oder Drucksauerstoff/-stickstoff - Anforderungen, Prüfung, Kennzeichnung

Appareils de protection respiratoire - Appareils de protection respiratoire isolants autonomes a circuit fermé, du type a oxygene comprimé ou a oxygene-azote comprimé - Exigences, essais, marquage

Ta slovenski standard je istoveten z: **EN 145:1997**

ICS:

13.340.30	Varovalne dihalne naprave	Respiratory protective devices

SIST EN 145:1998 **en**

EUROPEAN STANDARD **EN 145**

NORME EUROPÉENNE

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ICS

Supersedes EN 145:1988
and EN 145-2:1992

Descriptors: personal protective equipment, accident prevention, respiratory protective equipment, compressed gas, oxygen, nitrogen, designation, specifications, safety, tests, marking

English version

Respiratory protective devices - Self-contained closed-circuit breathing apparatus compressed oxygen or compressed oxygen-nitrogen type - Requirements, testing, marking

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This European Standard was approved by CEN on 1997-04-03. 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.

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CEN

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 79 "Respiratory protective devices", the secretariat of which is held by DIN.

This European Standard supersedes EN 145:1988 and EN 145-2:1992.

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 February 1998, and conflicting national standards shall be withdrawn at the latest by February 1998.

The significant technical differences between this European Standard and the previous European Standards are:

- specifications for positive pressure devices;

- specifications for oxygen - nitrogen devices.

For relationship with EU Directive, see informative annex ZA, which is an integral part of this standard.

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.

Introduction

A given respiratory protective device can only be approved when the individual components satisfy the requirements of the test specification which may be a complete standard or part of a standard and practical performance tests have been carried out on complete apparatus where specified in the appropriate standard. If for any reason a complete apparatus is not tested then simulation of the apparatus is permitted provided the respiratory characteristics and mass distribution are similar to those of the complete apparatus.

1 Scope

This European Standard specifies minimum requirements for self-contained closed-circuit breathing apparatus, compressed oxygen (O_2) and compressed oxygen-nitrogen (O_2 - N_2) types, used as respiratory protective devices, except escape apparatus and diving apparatus.

Laboratory and practical performance tests are included for the assessment of compliance with the requirements.

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 132:1990	Respiratory protective devices - Definitions
EN 134:1990	Respiratory protective devices - Nomenclature of components
EN 136:1997	Respiratory protective devices - Full face masks - Requirements, testing, marking
EN 142:1989	Respiratory protective devices - Mouthpiece assemblies - Requirements, testing, marking
EN 144-1:1991	Respiratory protective devices - Gas cylinder valves - Thread connection for insert connector
EN 148-1:1987	Respiratory protective devices - Threads for facepieces - Standard thread connection
EN 148-2:1987	Respiratory protective devices - Threads for facepieces - Centre thread connection
EN 148-3:1992	Respiratory protective devices - Threads for facepieces - Thread connection M 45 x 3
EN 50014:1992	Electrical apparatus for potentially explosive atmospheres - General requirements
EN 50020:1994	Electrical apparatus for potentially explosive atmospheres - Intrinsic safety "i"

3 Definition and description

For the purpose of this European Standard the definitions given in EN 132:1990 and the nomenclature given in EN 134:1990 apply together with the following description:

Self-contained closed-circuit breathing apparatus, compressed oxygen or compressed oxygen-nitrogen type, designed and constructed so that exhaled breathing gas is ducted from the facepiece into a circuit which contains a carbon dioxide absorption cartridge and a breathing bag where it is available for re-breathing. The carbon dioxide absorption cartridge contains chemicals which absorb exhaled carbon dioxide. Oxygen or oxygen-nitrogen are fed into the apparatus at a suitable point by means of a constant injected flow or by a lung governed flow or by a suitable combination of both. The gas flow may be of the pendulum or loop type and excess gas is ejected via a relief valve.

4 Designation

Designation of a self-contained closed-circuit compressed oxygen or compressed oxygen-nitrogen breathing apparatus meeting the requirements of this European Standard:

Self-contained closed-circuit breathing apparatus EN 145 / type / class

e. g. Self-contained closed-circuit breathing apparatus EN 145 / O_2 - N_2 / 2 N.

5 Classification

The apparatus are classified according to the nominal working duration. See table 1.

Table 1: Class of apparatus

Class of apparatus		Nominal working duration	Minute volume		
negative pressure	positive pressure	h	cycles/min	l/stroke	l/min
1 N	1 P	1	25	2,0	50,0
2 N	2 P	2	20	2,0	40,0
4 N	4 P	4	20	1,5	30,0

6 Requirements

6.1 Design

The apparatus should be of simple and reliable construction and as compact as possible. The design of the apparatus shall be such as to allow its inspection for reliable and safe operation.

The apparatus shall be sufficiently robust to withstand the rough usage it is likely to receive in service and designed so that it will continue to function satisfactorily while, temporarily, accidentally submerged in water in a normal wearing position (upright) and, thereafter, until the gas in the cylinder is exhausted.

WARNING: The apparatus is not designed for use under water.

The apparatus shall be designed so that there are no parts or sharp edges likely to be caught on projections in narrow passages.

The apparatus shall be designed so that the wearer can remove it, and, while still wearing the facepiece, continue to breathe from the apparatus.

The apparatus shall be designed to ensure its full function in any orientation.

The main valve of the gas cylinder(s) shall be arranged so that the wearer can operate it while wearing the apparatus.

All individual components of the apparatus, except the breathing hoses and the pressure gauge tube with pressure gauge shall be provided with a protective cover to provide protection against external damage. The gas cylinder valve shall be protected against damage from external elements. The protective cover shall not be able to open accidentally whilst the apparatus is in use.

The apparatus shall be so designed and constructed as to prevent ingress of the external atmosphere within the limits set out in this European Standard.

The apparatus shall be so designed that chemicals of the apparatus, saliva or condensate shall not interfere with the function of the apparatus or cause any harmful effect to the wearer.

Parts which are designed for training apparatus shall not be interchangeable with the working apparatus and shall be clearly marked accordingly or manufactured in such a way that they cannot be inadvertently fitted to a working apparatus.

Testing shall be done in accordance with 7.2 and 7.3.

6.2 Material

All materials used in the construction shall have adequate mechanical strength, durability and resistance to deterioration, e.g. by influence of heat and/or moisture.

Exposed parts of the apparatus, excluding facepiece and breathing hoses, shall have a surface resistance of less than 10^9 Ω.

Exposed parts of the apparatus, i.e. those which may be subjected to impact during use, shall not be made of magnesium, titanium, aluminium or alloys containing such pro-portions of these metals as will, on impact, give rise to frictional sparks capable of igniting flammable gas mixtures.

Materials which come in direct contact with the wearer's skin and the breathable gas shall not be known to be likely to cause irritation or any other adverse effect to health.

Care shall be taken in selecting materials that may come into contact with high pressure oxygen.

Testing shall be done in accordance with 7.2, 7.3 and 7.9.

6.3 Cleaning and disinfecting

All parts requiring cleaning and disinfecting shall be able to withstand the cleaning and disinfecting agents and procedures recommended by the manufacturer.

Testing shall be done in accordance with 7.2 and 7.3.

6.4 Mass

The mass of the apparatus as ready for use with facepiece and fully charged cylinder(s) shall not exceed the values given in table 2.

Table 2: Mass of the apparatus

Class of apparatus		Maximum mass of apparatus
negative pressure	positive pressure	kg
1 N	1 P	12
2 N	2 P	16
4 N	4 P	16

6.5 Connectors

6.5.1 General

Components of the apparatus shall be readily separated for cleaning, examining and testing.

All demountable connections shall be readily connected and secured, where possible by hand.

Any means of sealing used shall be retained in position when the joints and couplings are disconnected during normal maintenance.

Testing shall be done in accordance with 7.2 and 7.3.

6.5.2 Couplings

The apparatus shall be constructed so that any twisting of the breathing hoses does not affect the fit or performance of the apparatus, or cause the breathing hoses to become disconnected.

The design of the coupling shall be such as to prevent unintentional interruption of gas flow.

Testing shall be done in accordance with 7.2 and 7.3.

6.5.3 Strength of breathing hose connections

The connections of the breathing hoses between apparatus and equipment connector shall withstand axially a tensile force of 250 N for 10 s.

Testing shall be done in accordance with 7.10.

6.5.4 Connection between apparatus and facepiece

The connection between the facepiece and the remainder of the apparatus may be achieved by a permanent or special type of connection or by a thread type connection.

The apparatus shall not have threads defined in EN 148-1:1987 and EN 148-3:1992 or any thread type which can be connected to such threads.

Testing shall be done in accordance with 7.2 and 7.3.

If a centre thread connection is used, then the coupling-elbow BA according to clause 3.1 of EN 148-2:1987 shall be used.

6.6 Body harness

The body harness shall be designed to allow the user to don and to doff the apparatus quickly and easily without assistance and shall be adjustable. All adjusting devices shall be so constructed that once adjusted they will not slip inadvertently.

The body harness shall be constructed such that when tested in practical performance tests the apparatus shall be worn without avoidable discomfort, the wearer shall show no undue sign of strain attributable to wearing the apparatus, and that the apparatus shall impede the wearer as little as possible when in a crouched position or when working in a confined space.

Testing shall be done in accordance with 7.2 and 7.3.

The material of the straps and buckles shall be flame resistant, i. e. considered as such if it does not burn or does not continue to burn for more than 5 s after removal from the test flame.

Testing shall be done in accordance with 7.11.

The harness shall be considered to be satisfactory if during the practical performance test it does not slip and continues to hold the apparatus securely to the wearer's body throughout the duration of the test.

Testing shall be done in accordance with 7.3.

6.7 Inhalation valves and exhalation valves

Valve assemblies shall be such that they can be readily maintained and cannot be incorrectly replaced.

Inhalation and exhalation valve assemblies, sub-assemblies and piece parts that are by the manufacturer's design identical, are acceptable.

Differently designed inhalation valves and exhalation valves are acceptable if an unambiguous description is given in the information supplied by the manufacturer. The information in the information supplied by the manufacturer should be supported by illustrations (photographs, drawings) on how to assemble the unit correctly.

To enable correct assembly, the parts have to be unambiguously described or marked.

Means to check the correct assembly shall be described in the manufacturer's information.

Testing shall be done in accordance with 7.2.

6.8 Relief valve

6.8.1 General

The apparatus shall be provided with a relief valve operated automatically by pressure in the breathing circuit. The valve shall operate correctly in all orientations and shall be protected against dirt and mechanical damage.

Means shall be provided for sealing the relief valve to permit leak testing of the apparatus.

If the relief valve is positioned in the breathing circuit before the absorption cartridge and is activated there then the pressure difference between the relief valve and the entry of the breathing bag shall be in no case greater than the minimum opening pressure of the relief valve.

Apparatus shall have a relief valve which consists of two single consecutive valves or any other means which allow the requirements of this European Standard to be achieved.

Testing shall be done in accordance with 7.2.

6.8.2 Negative pressure apparatus

The opening pressure of the moist relief valve measured at a constant flow of 1,0 l/min shall be between 1,5 and 4,0 mbar in any orientation of the valve.

The resistance of the relief valve shall not exceed 5 mbar in any orientation of the valve when tested:

a) at 50 l/min continuous flow for sets with a continuous gas flow rate greater than 2 l/min;

b) at 30 l/min continuous flow for sets with a continuous gas flow rate of less than 2 l/min.

Testing shall be done in accordance with 7.12.

6.8.3 Positive pressure apparatus

The opening pressure of the moist relief valve measured at a constant flow of 1,0 l/min shall not exceed 10 mbar.

The resistance of the relief valve shall not exceed 11 mbar when tested:

a) at 50 l/min continuous flow for sets with a continuous gas flow rate greater than 2 l/min;

b) at 30 l/min continuous flow for sets with a continuous gas flow rate of less than 2 l/min.

Testing shall be done in accordance with 7.12.

6.8.4 Leaktightness of relief valve

The relief valve shall withstand an outside pressure of 10 mbar operating against the opening direction of the valve without exceeding a maximum pressure drop of 1 mbar in 1 min.

Testing shall be done in accordance with 7.17.

6.9 Breathing bag

6.9.1 General

The breathing bag shall be made of strong flexible material and shall be protected against compression by external forces.

The breathing bag shall be reliably and tightly joined to the connection. The connector at the inhalation side shall be shaped in such a way that its opening cannot be closed by the bag itself.

6.9.2 Volume

The effective volume of the breathing bag shall be at least 5 l. It shall be measured between 7,5 mbar and -5 mbar relative to atmospheric pressure.

NOTE: For apparatus using a constant flow supply it may be necessary to increase the volume of the breathing bag.

Testing in shall be done accordance with 7.2 and 7.13.

6.10 Practical performance

In addition to the machine tests described, the apparatus shall also undergo practical performance tests under realistic conditions. These practical performance tests serve the purpose to check the apparatus for imperfections that cannot be determined by the tests described elsewhere in this European Standard.

At the time when the apparatus is rejected by the wearer or when the inhalation breathing resistance reaches 35 mbar, the level of oxygen in the inhalation air shall be at least 21 % (by volume) and the level of CO_2 shall not exceed 3 % (by volume).

Where, in the opinion of the testing authority, approval is not granted because practical performance tests show the apparatus has imperfections related to the wearer's acceptance, the testing authority shall describe the tests which revealed these imperfections. This will enable other test houses to duplicate the tests and assess the results thereof.

Testing shall be done in accordance with 7.3.

6.11 Resistance to temperature, flammability and resistance to radiant heat

6.11.1 Resistance to temperature

Trouble free operation shall be ensured after storage at temperatures ranging from -30 °C to 60 °C.

Testing shall be done in accordance with 7.4.1.1, 7.4.1.2, 7.4.2.1 and 7.4.2.2.

6.11.2 Performance

6.11.2.1 Performance at -6 °C to 30 °C

The apparatus shall operate trouble free over the temperature range -6 °C to 30 °C.

Testing shall be done in accordance with 7.4.1.2 and 7.4.2.2.

6.11.2.2 Low temperature performance (optional)

Where the apparatus is designed for low temperatures below -6 °C it shall operate trouble free.

Testing in accordance with 7.4.1.3 and 7.4.2.3.

6.11.3 Conditioning of the apparatus

6.11.3.1 Facepiece connector

Subsequent to conditioning in accordance with 7.14 and returning to temperature of (20 ± 3) °C all connections between apparatus and facepiece shall be checked.

Where the centre thread is used it shall be checked with thread pitch gauges. After testing the facepiece connector shall remain dimensionally accurate to gauge.

For all facepiece connectors a pull test in accordance with 7.12.4 of EN 136:1997 shall be applied. No separation shall occur.

Testing shall be done in accordance with 7.2.

6.11.3.2 Function of the apparatus

Subsequent to conditioning in accordance with 7.14 and returning to ambient temperature the apparatus shall meet the requirements of 6.28 at a minute volume of 50 l/min. The materials used shall not show any deterioration, e.g. deformations, cracks or corrosion.

Testing shall be done in accordance with 7.2 and 7.8.

6.11.4 Flammability

The breathing hoses leading to the facepiece, the facepiece connector and the lung governed demand valve (if connected to the facepiece) shall be "self-extinguishing", i.e. the material shall not be of a highly flammable nature and the parts shall not ignite or continue to burn for more than 5 s after removal from the test flame.

Testing shall be done in accordance with 7.15.