SLOVENSKI STANDARD
SIST EN 16716:2017

01-julij-2017

Gorniška oprema - Sistem zračnih blazin za zaščito v snežnih plazovih - Varnostne zahteve in preskusne metode

Mountaineering equipment - Avalanche Airbag systems - Safety requirements and test methods

Bergsteigerausrüstung - Lawinen-Airbag-Systeme - Sicherheitstechnische Anforderungen und Prüfverfahren

Équipement d'alpinisme et d'escalade - Systèmes de sac gonflable anti-ensevelissement lors d'une avalanche - Exigences de sécurité et méthodes d'essai

Ta slovenski standard je istoveten z: **EN 16716:2017**

ICS:

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

SIST EN 16716:2017 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16716

February 2017

ICS 13.340.99; 97.220.20; 97.220.40

English Version

Mountaineering equipment - Avalanche airbag systems - Safety requirements and test methods

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 16716:2017 E

Contents

European foreword

This document (EN 16716:2017) has been prepared by Technical Committee CEN/TC 136 “Sports, playground and other recreational facilities and equipment”, 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of an identical text or by endorsement, at the latest by August 2017, and conflicting national standards shall be withdrawn at the latest by August 2017.

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

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Introduction

This European Standard is one of a package of standards for mountaineering equipment, see Annex A.

1 Scope

This European Standard specifies safety requirements and test methods for avalanche airbag systems to reduce the risk of being buried by a snow avalanche.

This European Standard does not consider personal protection against impact or cold temperature.

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 12277, *Mountaineering equipment — Harnesses — Safety requirements and test methods*

EN 55014-1, *Electromagnetic compatibility — Requirements for household appliances, electric tools and similar apparatus — Part 1: Emission (CISPR 14-1)*

EN 55014-2, *Electromagnetic compatibility — Requirements for household appliances, electric tools and similar apparatus — Part 2: Immunity — Product family standard (CISPR 14-2)*

EN 60335-1, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1)*

EN 60335-2-29, *Household and similar electrical appliances — Safety — Part 2-29: Particular requirements for battery chargers (IEC 60335-2-29)*

EN 60335-2-30, *Household and similar electrical appliances — Safety — Part 2-30: Particular requirements for room heaters (IEC 60335-2-30)*

EN 60335-2-80, *Household and similar electrical appliances — Safety — Part 2-80: Particular requirements for fans (IEC 60335-2-80)*

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

EN 61000-6-2, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2)*

EN 61000-6-3, *Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3)*

EN 61558-2-16, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V — Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units (IEC 61558-2-16)*

EN 62133, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications (IEC 62133)*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227)*

EN ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2015)*

EN ISO 13934-1, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method (ISO 13934-1)*

EN ISO 13937-2, *Textiles — Tear properties of fabrics — Part 2: Determination of tear force of trouser-shaped test specimens (Single tear method) (ISO 13937-2)*

ISO 7000, *Graphical symbols for use on equipment — Registered symbols*

ASTM F2153, *Standard Test Method for Measurement of Backpack Capacity*

3 Terms and definitions

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

3.1
activation system
device to initiate the deployment of the avalanche airbag system (e.g. deployment handle)

3.2
airbag
part of the avalanche airbag system which changes the shape for increasing the volume of the avalanche airbag system

3.3
airbag volume
volume of the fully inflated airbag which changes shape during deployment

3.4
avalanche airbag system
personal protective equipment worn by the user, which reduces the probability of being buried in a snow avalanche by rapidly increasing the volume of the user in combination with the device

3.5
carrying system
part of the avalanche airbag system attaching the activation system, inflating system and airbag to the user

EXAMPLE back pack, vest

3.6
detachable airbag system
avalanche airbag system where the inflation system, activation system and airbag can be removed as a unit from the carrying system by the user by design

3.7
fully inflated airbag
airbag inflated to a point that it achieves its intended shape and maintains that shape under its own weight

3.8
inflation system
part of the avalanche airbag system which deploys the airbag after the activation system has been used

EXAMPLE Gas cylinder with venturi valve

3.9
inflation time
time between initiation of deployment and fully inflated airbag

3.10
non-refillable cartridge
pressurized gas cartridge for single use or refillable only by the manufacturer or someone authorized and trained by the manufacturer to do these refills

3.11
operating pressure
maximum pressure above atmospheric pressure in the airbag achieved during deployment of the airbag at ambient temperature

3.12
refillable cartridge
pressurized gas cartridge with a technical application for making a refill by qualified personnel

4 Safety requirements

4.1 Function

4.1.1 Activation system

4.1.1.1 General

Components of the avalanche airbag system should comply with applicable EU Directives (e.g. Transportable pressure equipment (TPED) – Directive 2010/35/EU).

4.1.1.2 Activation force

When tested in accordance with 5.2, the activation force for a mechanical activation system shall be between 50 N and 150 N.

4.1.1.3 Activation distance

When the mechanical activation system is tested in accordance with 5.3, the maximum activation distance of 100 mm shall be met.

4.1.1.4 Airbag inflation

When tested in accordance with 5.4, full inflation of the airbag (see 3.7) shall be achieved within 5 s after activation and the airbag shall remain fully inflated for at least 3 min.

4.1.1.5 Airbag volume

The fully inflated airbag shall achieve a minimum volume of 150 l. The volume test of the airbag is specified in 5.5.

4.1.1.6 Rated number of deployments

When tested in accordance with 5.6, the device shall be able to withstand twice the rated number of deployments stated by the manufacturer. The rated number of deployments shall at least be 20. All deployments of the avalanche airbag system shall meet the requirements in 4.1.1.2 and 4.1.1.4.

4.1.1.7 Condensation effects

When tested in accordance with 5.7, the avalanche airbag system shall meet the requirements of 4.1.1.2 and 4.1.1.4 and condensation effects shall not lead to malfunction or damage.

4.1.1.8 Working time span

The avalanche airbag system shall work at least over a time period of 24 h at −30 °C without any external support (e.g. power supply, pressure support). When tested in accordance with 5.8 the avalanche airbag system shall meet the requirements of 4.1.1.2 and 4.1.1.4.

4.1.1.9 Temperature range

Airbag systems shall achieve full inflation within the temperature range given by the manufacturer or between −30 °C and +50 °C, whichever is greater, without damage. Testing shall be carried out in accordance with the relevant clauses of 5.8, 5.9 and 5.10. The requirements of 4.1.1.2 and 4.1.1.4 shall be met and there shall be no damage to the airbag system.

4.1.1.10 Battery reserve time of electronic components

Electrically powered avalanche airbag systems shall have an integrated indication system which shows when the battery for the activation and inflation is low. When this occurs, the activation and inflation systems shall still be able to be deployed within the next 6 h. When tested in accordance with 5.11, the requirements of 4.1.1.2 and 4.1.1.4 shall be met.

4.1.1.11 Pressure performance

When tested in accordance with 5.12, all components of the airbag system that will be pressurized during full inflation shall withstand at least a pressure of the operating pressure plus 0,1 bar for 30 min without damage. Leakage shall be compensated. After that, the airbag system shall be able to perform a further activation. The test requirement of 4.1.1.4 shall be met.

When tested in accordance with 5.13, all components of the airbag system that will be pressurized during full inflation shall withstand at least a pressure of the operating pressure plus 0,25 bar without bursting.

4.1.1.12 Airbag impact

When tested in accordance with 5.14, the airbag impact test shall not damage the airbag.

The airbag shall still meet the minimum inflation requirement as described in 4.1.1.4.

4.1.1.13 Airbag fabric strength

The airbag fabric shall meet the following minimum requirements:

— tensile strength according to EN ISO 13934-1: warp: (1 500 N/5 cm)/ weft: (1 500 N/5 cm);

— tearing strength according to EN ISO 13937-2: warp: (70 N (−2))/ weft: (70 N (−2)).

Verification may be carried out by airbag fabric manufacturer's certificate (not older than 1 year) or test.

4.1.1.14 Snow influence

When tested in accordance with 5.15, the air intake components of the airbag shall not be negatively affected by snow during deployment and full inflation shall be achieved. The requirements of 4.1.1.4 shall be met.

4.1.1.15 Practical deployment

When tested in accordance with 5.16, the avalanche airbag system shall meet the requirements of 4.1.1.4 after deployment.

4.1.2 Carrying system

4.1.2.1 General

The carrying system shall keep the avalanche airbag system firmly connected to the user during the avalanche, including the potential where the person could slip out of the carrying system.

4.1.2.2 Connecting strength

When tested in accordance with 5.17 the avalanche airbag system shall withstand a load of 3 kN for at least 1 min. The avalanche airbag system shall not become detached from the dummy, and the airbag shall not become detached from the avalanche airbag system.

The avalanche airbag system and airbag shall remain in their original intended position.

4.1.2.3 Pull-off-strength

When tested in accordance with 5.18, slippage of the carrying system above the head of the user shall be prevented. If a leg loop or vest is used, it shall withstand a load of 800 N applied in the direction of use for at least 1 min. The leg loop shall not break and its fixation buckles shall not slip ≥ 20 mm. The vest shall not break and its fixation buckles shall not slip ≥ 20 mm.

When other systems are used to prevent slippage of the carrying system over the head of the user, they shall be tested in the same manner.

4.2 Design

4.2.1 Performance

The following requirements shall be verified by visual/practical evaluation. Where required, tests shall be performed in accordance with 5.19.

The avalanche airbag system shall be easy for the user to put on in the proper position and keep in their position during wearing under the consideration of external impacts such as necessary movements and postures. It shall have a simple adjustment to provide a correct fit for the user. It shall be easy to put on and take off.

The inflation system, activation system and airbag shall not be affected by anything that the avalanche airbag system is intended to carry (e.g. residues of food, drinks, sweet gels, snow shovel, probe, crampons).

Avalanche airbag systems shall be designed so that the user, under the intended conditions, can effectively perform the risk-related activity (skiing, ski touring, snowshoeing, snowmobiling, etc.) while having appropriate protection of the highest possible level.

If the bag is intended to carry outside devices like ice axes or skis, as recommended by the manufacturer, the inflated airbag shall not be damaged and the deployment of the airbag shall not be blocked.

When the airbag is deployed the user shall be able to continue their relevant activity (e.g. skiing, snowboarding, snowshoeing, snowmobiling) without losing sense of orientation, affecting field of vision or having movement restricted due to the inflated airbag in order to escape an avalanche.

Adequate measures in the construction of the device shall be taken to protect components of the airbag system from damage, when used in accordance with the manufacturer's recommendations.