SLOVENSKI STANDARD
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Varovalna obleka - Elektrostatične lastnosti - 5. del: Lastnosti materialov in zahteve za načrtovanje

Protective clothing - Electrostatic properties - Part 5: Material performance and design requirements

Schutzkleidung - Elektrostatische Eigenschaften - Teil 5: Leistungsanforderungen an Material und Konstruktionsanforderung

Vêtements de protection - Propriétés électrostatiques - Partie 5 : Exigences de performance des matériaux et de conception

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English Version

Protective clothing - Electrostatic properties - Part 5: Material performance and design requirements

Vêtements de protection - Propriétés électrostatiques - Partie 5 : Exigences de performance des matériaux et de conception

Schutzkleidung - Elektrostatische Eigenschaften - Teil 5: Leistungsanforderungen an Material und Konstruktionsanforderungen

This European Standard was approved by CEN on 30 April 2018.

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European foreword

This document (EN 1149-5:2018) 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of an identical text or by endorsement, at the latest by March 2019, and conflicting national standards shall be withdrawn at the latest by March 2019.

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 1149-5:2008.

A list of the significant technical differences between this edition and the previous can be found in Annex B.

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(s).

For relationship with Regulation (EU) 2016/425, see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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 European Standard is part of a series of standards for test methods and requirements for electrostatic properties of protective clothing. Different parts are necessary, because of the various fields of application and materials.

EN 1149 consists of the following parts, under the general title “Protective clothing – Electrostatic properties”:

— Part 1: Test method for measurement of surface resistivity

— Part 2: Test method for measurement of the electrical resistance through a material (vertical resistance);

— Part 3: Test methods for measurement of charge decay;

— Part 4: Garment test (under development);

— Part 5: Material performance and design requirements.

A complete garment test is under study. As long as such a test is not available, it may not be possible to perform full assessment of the electrostatic properties of protective clothing. This set of standards reflects the current state of knowledge.

Further guidance on the EN 1149 series and on the selection, use, care and maintenance of electrostatic dissipative protective clothing is given in CEN/CLC/TR 16832:2015 [1][1)].

1) Numbers in square brackets refer to the bibliography.

1 Scope

This European Standard specifies material and design requirements for electrostatic dissipative protective clothing, including hoods and caps, used as part of a total earthed system, to avoid incendiary discharges, where the minimum ignition energy of an explosive atmosphere is not less than 0,016 mJ.

In the context of this European Standard, a total earthed system is one in which personnel and other conductors are connected to earth via a resistance of less than 10^8 Ω.

The material and design requirements do not presume adequate earthing of additional equipment worn or carried in contact with clothing, e.g. breathing apparatus, etc. If such additional equipment is required to be earthed, other requirements beyond the scope of this European Standard may be necessary.

The scope of this standard does not include electrostatic dissipative protective gloves or footwear that are separate and not integral parts of garments.

The material and design requirements may not provide sufficient protection in oxygen enriched flammable atmospheres.

NOTE Additional information about oxygen enriched flammable atmospheres can be found in CEN/CLC/TR 16832:2015 [1].

This European Standard is not applicable for protection against mains voltages.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1149-1:2006, *Protective clothing — Electrostatic properties — Part 1: Test method for measurement of surface resistivity*

EN 1149-3:2004, *Protective clothing — Electrostatic properties — Part 3: Test methods for measurement of charge decay*

EN 60079-32-2:2015, *Explosive atmospheres — Part 32-2: Electrostatics hazards — Tests (IEC 60079-32-2:2015)*

EN ISO 13688:2013, *Protective clothing — General requirements (ISO 13688:2013)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 13688:2013, EN 1149-1:2006, EN 1149-3:2004 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
attachment
item that is not an integral part of material, but is permanently or temporarily attached to clothing, e.g. fastener, detachable pocket, label, high visibility tape, etc.

3.2
clothing
garment or ensemble of garments

3.3
electrostatic dissipative
static dissipative
dissipative
describing material or item that dissipates electrostatic charge to an acceptable level within an acceptable period of time

3.4
garment
article made from material that is worn to cover the body, head or limbs

3.5
hardware
attachment made from metal, plastic, wood or other hard substance

EXAMPLE Metal or plastic buttons or fasteners etc.

3.6
material
woven, non-woven, or knitted fabric, which may be uncoated, coated or laminated, leather or polymeric sheet, or various combinations thereof, of which clothing is made

4 Requirements

4.1 General

Electrostatic dissipative protective clothing shall comply with EN ISO 13688.

The requirements specified in 4.2.1 shall be verified by testing garments or materials after cleaning. If the manufacturer's instructions indicate that cleaning is not allowed, i.e. single-use garments, then testing shall be carried out on new material.

Cleaning shall be in line with the manufacturer's instructions, on the basis of standardized processes. If the number of cleaning cycles is not specified, the tests shall be carried out after five cleaning cycles (a cleaning cycle is one wash and one dry cycle). This shall be reflected in the information supplied by the manufacturer. If the garment can be washed and dry-cleaned, it shall only be washed. If only dry-cleaning is allowed, the garment shall be dry-cleaned in accordance with the manufacturer's instructions.

NOTE 1 Manufacturer's instructions typically indicate one or several of the various methods and processes of EN ISO 6330[2], EN ISO 15797[3], EN ISO 3175-2[4], or equivalent as standardized processes for cleaning.

NOTE 2 Normal wear and tear and contamination may adversely affect electrostatic dissipative properties.

4.2 Electrostatic requirements

4.2.1 Material requirements

An electrostatic dissipative material shall meet at least one of the following requirements for half decay time, or for shielding factor, or for surface resistance (not necessarily all three requirements):

— either geometric mean of t_{50} < 4 s tested according to EN 1149-3:2004, test method 2 (induction charging),

or

— arithmetic mean of S > 0,2 tested according to EN 1149-3:2004, test method 2 (induction charging)

or

— geometric mean of surface resistance of less than or equal to $2{,}5 \times 10^9$ Ω, on at least one surface, tested according to EN 1149-1.

NOTE 1 A material that does comply with all three requirements is not necessarily better in the context of this standard than a material that only complies with one or two of the requirements.

For a material containing conducting threads (surface or core conducting fibres) in a stripe or grid pattern, the spacing of the conducting threads in one direction shall not exceed 10 mm in any part of the material.

If the outermost material is a composite material comprising two or more fully bonded layers (e.g. coated or laminated fabric), either all layers shall meet the material requirements, or the inside or outside surface shall meet the material requirements when tested as a composite material. If the outside surface does not meet the material requirements, the combined thickness of any non-dissipative layers shall not exceed 2 mm.

NOTE 2 The test methods specified in EN 1149-1 and EN 1149-3 do not necessarily confirm the presence or distribution of conducting threads.

NOTE 3 The test method for the determination of the thickness described in EN ISO 5084 [11] or similar can be used.

4.2.2 Design requirements

4.2.2.1 General

Electrostatic dissipative protective clothing shall permanently cover all non-complying materials during normal use (inclusive of bending and movements), and shall provide proper fitting with sizing according to EN ISO 13688, and shall allow full body movement with all closures fastened according to manufacturer's instructions (see 4.3 and Annex C of EN ISO 13688:2013).

If the electrostatic dissipative protective clothing comprises multiple, separate layers (e.g. liner, insulation, outer), the outermost material shall meet the material requirements.

Electrostatic dissipative garments shall be earthed either directly or via the body of the wearer, who shall be earthed. If electrostatic dissipative materials in a garment are intended to be earthed via the wearer but are not suitable for skin contact, an intermediate material that is suitable for skin contact shall be used to maintain continuity between the skin and the electrostatic dissipative materials.

4.2.2.2 Attachments to the outside of garments

Attachments that are fully bonded (e.g. coated or laminated) to the outermost material shall meet the requirements of 4.2.1 when tested as composite material.

Non-dissipative attachments to the outside of garments, such as labels, reflective stripes, etc., are permitted without length restriction providing they do not exceed 50 mm in width and are permanently attached to electrostatic dissipative materials. Non-dissipative attachments to the outside of garments greater in width than 50 mm shall be restricted to a maximum area of 10 000 mm^2, and shall be permanently attached to electrostatic dissipative materials.