Norma Española

UNE-EN 1149-5:2018

Idioma: Inglés

Ropas de protección. Propiedades electrostáticas. Parte 5: Requisitos de comportamiento de material y diseño. (Ratificada por la Asociación Española de Normalización en noviembre de 2018.)

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Ropas de protección. Propiedades electrostáticas. Parte 5: Requisitos de comportamiento de material y diseño. (Ratificada por la Asociación Española de Normalización en noviembre de 2018.)

Protective clothing - Electrostatic properties - Part 5: Material performance and design requirements (Endorsed by Asociación Española de Normalización in November of 2018.)

Vêtements de protection - Propriétés électrostatiques - Partie 5 : Exigences de performance des matériaux et de conception (Entérinée par l'Asociación Española de Normalización en novembre 2018.)

En cumplimiento del punto 11.2.5.4 de las Reglas Internas de CEN/CENELEC Parte 2, se ha otorgado el rango de documento normativo español UNE al documento normativo europeo EN 1149-5:2018 (Fecha de disponibilidad 2018-09-12)

Este documento está disponible en los idiomas oficiales de CEN/CENELEC/ETSI.

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La correspondiente versión oficial de este documento se encuentra disponible en la Asociación Española de Normalización (Génova 6 28004 MADRID, www.une.org).

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 1149-5

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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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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 CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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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.

The combined thickness of any outer layer of non-dissipative material plus the thickness of any non-dissipative attachment shall be less than 2 mm.

NOTE 1 The test method for the determination of the thickness described in EN ISO 5084 [11] or similar can be used.

Any hood that has a non-dissipative material that is exposed when the hood is not worn shall be capable of being removed or stowed within the garment such that non-dissipative materials are covered by dissipative materials.

Touch and close fasteners are permitted provided they comply with the above thickness, width and area restrictions. In this case, the thickness limit applies to the thickness of the substrate tape excluding the pile. Use instructions shall include a warning that touch and close fasteners shall not be opened when operating in hazard zones.

Exposed cords, drawstrings, etc. shall not exceed 20 mm in width.

Attachments to the outside of garments greater in thickness, width or area than the specified limits are only permitted if test data are available to prove incendiary discharges cannot occur under worst case conditions. Users are recommended to take expert advice to select and conduct suitable testing and test conditions.

NOTE 2 Test methods for evaluating full garment systems are under consideration. Guidance on testing is given for example in CEN/CLC/TR 16832 [1], IEC/TS 60079–32–1 [5] and in EN 60079–32–2.

Attachment to the outside of garments shall be done in such a way that separation between the attached elements and the electrostatic dissipative material is avoided.

4.2.2.3 Conductive parts

Conductive parts (slide fasteners, buttons, etc.) are permitted provided they are fully covered by the outermost electrostatic dissipative materials when in use.

Conductive parts that cannot be covered in this way are only permitted if the capacitance of the item is less than 3 pF, measured according to EN 60079-32-2:2015.

NOTE Guidance on measuring the capacitance of isolated conductive parts is also given in A.3.3 of CEN/CLC /TR 16832: 2015[1], G.9 of IEC/TS 60079–32–1:2013[5].

5 Marking

Marking shall be according to EN ISO 13688 and shall include the graphical symbol in accordance with Figure 1.

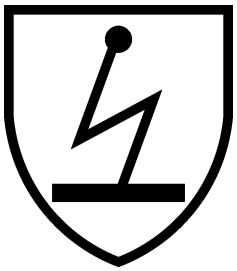

Figure 1 — Graphical symbol ISO 7000-2415:— Protection against static electricity

In addition, the graphical symbol in accordance with Figure 2 indicating that the manufacturer's instructions have to be consulted shall be used.

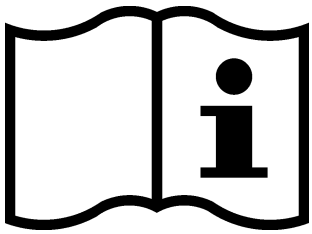

Figure 2 — Graphical symbol ISO 7000-1641:— Consult operating instructions

6 Information supplied by the manufacturer

The information supplied by the manufacturer shall be in accordance with EN ISO 13688.

In addition, for electrostatic dissipative protective clothing that complies with the requirements of this standard, the following warning notices shall be provided:

— the person wearing the electrostatic dissipative protective clothing shall be properly earthed. The resistance between the person's skin and earth shall be less than 10^8 Ω, e.g. by wearing adequate footwear on dissipative or conductive floors;

— electrostatic dissipative protective clothing shall not be open or removed whilst in presence of flammable or explosive atmospheres or while handling flammable or explosive substances;

— electrostatic dissipative protective clothing is intended to be worn in Zones 1, 2, 20, 21 and 22 (see EN 60079-10-1 [7] and EN 60079-10-2 [8]) in which the minimum ignition energy of any explosive atmosphere is not less than 0,016 mJ;

— electrostatic dissipative protective clothing shall not be used in oxygen enriched atmospheres, or in Zone 0 (see EN 60079-10-1 [7]) without prior approval of the responsible safety engineer;

— the electrostatic dissipative performance of the electrostatic dissipative protective clothing can be affected by wear and tear, laundering and possible contamination;

— electrostatic dissipative protective clothing shall be worn in such a way that it permanently covers all non-complying materials during normal use (including bending movements).

The manufacturer shall also provide detailed instructions on how clothing shall be correctly earthed, fastened and worn.

Annex A
(informative)

Explanation

The human body has a low enough volume resistivity to act as a conductor and - if insulated from earth - it can accumulate electrostatic charge. The charge can be produced by contact electrification, for example by walking across an insulating floor, or by touching charged equipment or materials. It may also arise by induction due to charge on the clothing or adjacent charged objects. A dangerous consequence of the electrostatic potential on charged personnel is that it can be high enough to cause hazardous spark discharges. The control of undesirable static electricity on people is necessary in areas where flammable or explosive atmospheres exist or might be present. In such cases people have to be earthed either directly or through conductive or antistatic footwear (see EN ISO 20345:2011[6]).

In the case where the wearing of electrostatic dissipative protective clothing has been identified as necessary by risk assessment, clothing complying with the requirements of this European Standard can be suitable. These requirements can be necessary in addition to requirements of protective clothing basically designed for other hazards (e.g. chemicals or fire). Therefore, this European Standard should be used in such a way that the requirements supplement those of the specific protective clothing standard.

The material and design requirements as specified in this European Standard apply only to electrostatic dissipative protective clothing worn by persons that are earthed through a resistance lower than 10^8 Ω (e.g. by wearing appropriate footwear such as safety shoes specified in EN ISO 20345:2011, or by any other suitable means). Additional information about shoes, socks, etc. can be found in CEN/CLC/TR 16832:2015 [1]. The requirements of this standard are not intended to be applied to static dissipative gloves. For these gloves, the electrical resistance through the material is an important property.

The basis for the material and design requirements presented in this European Standard, was obtained through research funded by the European Commission. The research work comprised ignition testing in hydrogen atmospheres. This research has shown that test method 1 of EN 1149-3:2004 is not suited to discriminate between safe and unsafe fabrics. Test method 2 has been proven by extensive research to accurately predict incendiary behaviour of fabrics.

Annex B
(informative)

Significant technical changes between this document and the previous edition

This version of EN 1149-5:2018 incorporates the following major technical changes:

— the thickness of any non-dissipative layer forming the outermost surface of garments is limited to 2 mm;

— a requirement for earthing electrostatic dissipative garments is added to the design requirements;

— the thickness of any non-dissipative attachments to the outside of garments is limited to 2 mm and limits for area and/or width of non-dissipative attachments are added;

— alignment of the informative Annex ZA related to the application of the (EU) Regulation 2016/425.

Annex ZA
(informative)

Relationship between this European Standard and the essential requirements of Regulation (EU) 2016/425 of the European Parliament and of the Council of 9 March 2016 on personal protective equipment aimed to be covered

This European Standard has been prepared under a Commission's standardization request to provide one voluntary means of conforming to essential requirements of Regulation (EU) 2016/425 of the European Parliament and of the Council of 9 March 2016 on personal protective equipment.

Once this standard is cited in the Official Journal of the European Union under that Regulation (EU) 2016/425, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Regulation (EU) 2016/425 and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Regulation (EU) 2016/425

Essential requirements of Regulation (EU) 2016/425 EEC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
2.6 PPE for use in potentially explosive atmospheres	4.2	
2.12 PPE bearing one or more identification markings or indicators directly or indirectly relating to health and safety	Clause 5	
1.4 Manufacturer's instructions and information	4.1, Clause 6	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] CEN/CLC/TR 16832:2015, *Selection, use, care and maintenance of personal protective equipment for preventing electrostatic risks in hazardous areas (explosive atmospheres)*

[2] EN ISO 6330, *Textiles — Domestic washing and drying procedures for textile testing (ISO 6330)*

[3] EN ISO 15797, *Textiles — Industrial washing and finishing procedures for testing of workwear (ISO 15797)*

[4] EN ISO 3175-2, *Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments — Part 2: Procedure for testing performance when cleaning and finishing using tetrachloroethene (ISO 3175-2)*

[5] IEC/TS 60079-32-1:2013, *Explosive atmospheres — Part 32-1: Electrostatic hazards, Guidance*

[6] EN ISO 20345:2011, *Personal protective equipment — Safety footwear (ISO 20345:2011)*

[7] EN 60079-10-1, *Explosive atmospheres — Part 10-1: Classification of areas — Explosive gas atmospheres (IEC 60079-10-1)*

[8] EN 60079-10-2, *Explosive atmospheres — Part 10-2: Classification of areas — Explosive dust atmospheres (IEC 60079-10-2)*

[9] ISO 7000:2014, *Graphical symbols for use on equipment — Registered symbols*

[10] EN 16350:2014, *Protective gloves — Electrostatic properties*

[11] EN ISO 5084:1996, *Textiles — Determination of thickness of textiles and textile products (ISO 5084:1996)*