



BSI Standards Publication

Electrostatics

Part 4-9: Standard test methods for
specific applications — Garments

National foreword

This British Standard is the UK implementation of EN 61340-4-9:2016. It is identical to IEC 61340-4-9:2016.

The UK participation in its preparation was entrusted to Technical Committee GEL/101, Electrostatics.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

**Electrostatics - Part 4-9: Standard test methods for specific applications - Garments
(IEC 61340-4-9:2016)**

Électrostatique - Partie 4-9: Méthodes d'essai normalisées
pour des applications spécifiques - Vêtements
(IEC 61340-4-9:2016)

Elektrostatik - Teil 4-9: Standard-Prüfverfahren für spezielle
Anwendungen - Bekleidung
(IEC 61340-4-9:2016)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

European foreword

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The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-03-16
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-09-16

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Endorsement notice

The text of the International Standard IEC 61340-4-9:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated :

IEC 61340-5-1 NOTE Harmonized as EN 61340-5-1.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61340-2-3	-	Electrostatics - Part 2-3: Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation	EN 61340-2-3	-
IEC 61340-4-6	-	Electrostatics - Part 4-6: Standard test methods for specific applications - Wrist straps	EN 61340-4-6	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROSTATICS –**Part 4-9: Standard test methods for
specific applications – Garments****FOREWORD**

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International Standard IEC 61340-4-9 has been prepared by IEC technical committee 101: Electrostatics.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) classification of three types of garments
 - static control garments,
 - groundable static control garments, and
 - groundable static control garment system;

- b) additional measurements according to the the garment type including cuff measurements, panel to groundable point, testing with a person in the garment system;
- c) sleeve to sleeve measurements allowed with probes or by hanging;
- d) additional recommended values for new garment types as set out in Annex A.

The text of this standard is based on the following documents:

FDIS	Report on voting
101/500/FDIS	101/502/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61340 series, published under the general title *Electrostatics*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

This part of IEC 61340 provides test methods for evaluating the electrical resistance of garments that contain surface conductive or dissipative components or materials used in the electronics industry for the control of electrostatic discharge. This standard defines procedures for measuring electrical resistance, including a system resistance test for garments that provide a ground path for personnel.

Clothing made from synthetic fibres is a common source of electrostatic charge. Wearing an appropriate static control garment over personal clothing can minimize the effect of this charge. To effectively control electrostatic charges, the static control garment should be grounded.

Three categories of garments are considered in this standard.

- a) A static control garment may suppress or otherwise affect an electric field from clothing worn underneath the garment without being attached to ground. However, without grounding, a charge may accumulate on conductive or dissipative elements of a garment, if present, resulting in a charged source.
- b) A groundable static control garment may provide a higher level of suppression when the lower resistance fabric is connected to ground.
- c) A groundable static control garment system provides a ground path for a person that suppresses the electrical field from clothing worn underneath the garment and also bonds the skin of the wearer to an identified ground path. Groundable static control garment systems may also be used in conjunction with a continuous or constant monitoring system in a manner similar to those used in continuous monitoring of wrist straps in an ESD protected area (EPA).

Resistive characterization is only one aspect to consider in evaluating garments for any specific application. To fully characterize a garment, electrical field attenuation, static decay, peak voltage, residual voltage and triboelectric charging may need to be considered. Other attributes related to applications and environments, such as cleanroom compatibility, chemical and fire resistance, should be evaluated in the garment selection process but are beyond the scope of this standard.

Garments constructed from fabrics made with fibres that are not surface conductive but may have other related properties that impart some level of electrostatic charge dissipation or suppression when connected to ground, are not specifically measured by the methods provided in this standard.

This being the case, some garment fabrics and construction may allow for surface voltage accumulation and charge transfer to occur which may be detrimental to electronic items.

ELECTROSTATICS –

Part 4-9: Standard test methods for specific applications – Garments

1 Scope

This part of IEC 61340 provides test methods for measuring the electrical resistance of garments used for static control applications. These test methods can be used for evaluating outer garments that are homogeneously conductive or homogeneously dissipative, or that utilize surface conductive or surface dissipative components or elements.

NOTE The test methods defined in this standard may not be able to measure materials with buried conductive layers.

The resistance point-to-point test method tests the electrical resistance between the two sleeves, any two panels or any two or more electrically interconnected components of the static control garment, including the electrical resistance across the seams and cuffs of the garment as applicable.

An alternate sleeve-to-sleeve test method is allowed, using clamps to hang a garment.

Static control garments that electrically bond to the wearer and provide a path to ground from the wearer are evaluated using the resistance point-to-point test method, the resistance point to groundable point test method, as well as a system test to determine the resistance from the person through the garment to the groundable point of the garment system.

A band resistance measurement test is provided in IEC 61340-4-6 which can be used for garments so equipped with cuffs that are intended to perform the same function as a wrist strap band.

The system test with a person wearing a groundable static control garment system includes the ground cord that connects to the groundable point of the garment.

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.

IEC 61340-2-3, *Electrostatics – Part 2-3: Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation*

IEC 61340-4-6, *Electrostatics – Part 4-6: Standard test methods for specific applications – Wrist straps*

3 Terms and definitions

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