

---

**Elektrostatika - 4-9. del: Standardne preskusne metode za posebno uporabo -  
Oblačila - Uporovne značilnosti (IEC 61340-4-9:2024)**

Electrostatics - Part 4-9: Standard test methods for specific applications - Garments -  
Resistive Characterization (IEC 61340-4-9:2024)

Elektrostatik – Teil 4-9: Standard-Prüfverfahren für spezielle Anwendungen – Kleidung –  
Resistive Charakterisierung (IEC 61340-4-9:2024)

Électrostatique - Partie 4-9: Méthodes d'essai normalisées pour des applications  
spécifiques - Vêtements - Caractéristiques résistives (IEC 61340-4-9:2024)

**Ta slovenski standard je istoveten z: EN IEC 61340-4-9:2024**

[SIST EN IEC 61340-4-9:2025](https://standards.slovenski-institut.si/standards/sist-en-iec-61340-4-9-2025)

<https://standards.slovenski-institut.si/standards/sist-en-iec-61340-4-9-2025>

**ICS:**

13.340.10	Varovalna obleka	Protective clothing
17.220.99	Drugi standardi v zvezi z elektriko in magnetizmom	Other standards related to electricity and magnetism

**SIST EN IEC 61340-4-9:2025****en**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN IEC 61340-4-9**

November 2024

ICS 17.200.99; 29.020

Supersedes EN 61340-4-9:2016

English Version

**Electrostatics - Part 4-9: Standard test methods for specific applications - Garments - Resistive characterization (IEC 61340-4-9:2024)**

Électrostatique - Partie 4-9: Méthodes d'essai normalisées pour des applications spécifiques - Vêtements - Caractéristiques résistives (IEC 61340-4-9:2024)

Elektrostatik - Teil 4-9: Standard-Prüfverfahren für spezielle Anwendungen - Kleidung - Resistive Charakterisierung (IEC 61340-4-9:2024)

This European Standard was approved by CENELEC on 2024-11-27. CENELEC 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 CEN-CENELEC Management Centre or to any CENELEC member.

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 CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/33486bfb-e609-4dfc-832d-47b53afa351a/sist-en-iec-61340-4-9-2025>



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

## EN IEC 61340-4-9:2024 (E)

### European foreword

The text of document 101/718/FDIS, future edition 3 of IEC 61340-4-9, prepared by TC 101 "Electrostatics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61340-4-9:2024.

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) 2025-11-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2027-11-30

This document supersedes EN 61340-4-9:2016 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

**Endorsement notice**  
(<https://standards.iteh.ai>)

The text of the International Standard IEC 61340-4-9:2024 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:

<https://standards.iteh.ai/catalog/standards/sist/33486bfb-e609-4dfc-832d-47b53afa351a/sist-en-iec-61340-4-9-2025>

IEC 61340-5-1 NOTE Approved as EN IEC 61340-5-1

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where 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.cencenelec.eu](http://www.cencenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61010-1	-	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements	EN 61010-1	-
IEC 61010-2-030	-	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-030: Particular requirements for equipment having testing or measuring circuits	EN IEC 61010-2-030	-
IEC 61340-2-3	-	Electrostatics - Part 2-3: Methods of test for determining the resistance and resistivity of solid 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	-





IEC 61340-4-9

Edition 3.0 2024-10

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Electrostatics –**

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

**Électrostatique –**

**Partie 4-9: Méthodes d'essai normalisées pour des applications spécifiques – Vêtements – Caractéristiques résistives**

<https://standards.iteh.ai/catalog/standards/sist/33486bfb-e609-4dfc-832d-47b53afa351a/sist-en-iec-61340-4-9-2025>

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 17.200.99, 29.020

ISBN 978-2-8322-9801-5

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references .....	7
3 Terms and definitions .....	8
4 Atmosphere for conditioning and testing.....	8
5 Equipment and materials .....	9
5.1 Resistance measurement apparatus .....	9
5.1.1 General .....	9
5.1.2 Product qualification .....	9
5.1.3 Acceptance testing .....	9
5.1.4 Ohmmeter for testing personnel ground path .....	9
5.2 Resistance measurement electrodes.....	9
5.2.1 Cylindrical electrodes .....	9
5.2.2 Clamps or electrodes.....	10
5.2.3 Cuff test fixture .....	10
5.2.4 Hand-held electrode .....	10
5.3 Support surface .....	10
5.3.1 Insulative support surface.....	10
5.3.2 Insulative sleeve inserts .....	10
5.3.3 Insulative hangers .....	10
6 Test procedure .....	10
6.1 Sample preparation.....	10
6.1.1 General .....	10
6.1.2 Number of samples.....	11
6.2 Humidity requirements .....	11
6.3 Test procedures.....	11
6.3.1 General .....	11
6.3.2 Resistance point-to-point .....	11
6.3.3 Resistance point-to-groundable point.....	12
6.3.4 Cuff measurements .....	12
6.3.5 Groundable static control garment system .....	12
7 Product qualification .....	13
8 Reporting.....	13
Annex A (informative) Garment types and resistance values .....	20
Annex B (informative) Data collection sheet (example) .....	21
Bibliography.....	23
Figure 1 – Test set-up – Resistance point-to-point (sleeve-to-sleeve procedure with insulative sleeve inserts).....	14
Figure 2 – Test set-up – Resistance point-to-point (insulative sleeve insert inserted into sleeve detail) .....	14
Figure 3 – Test set-up – Resistance point-to-point (panel-to-panel procedure with insulative support surface).....	14
Figure 4 – Test set-up – Resistance point-to-point (cuff-to-cuff procedure) .....	15



Figure 5 – Test set-up – Resistance point-to-point (electrode inserted into cuff detail) .....	15
Figure 6 – Test set-up – Resistance point-to-point (hanging clamp sleeve-to-sleeve procedure) .....	16
Figure 7 – Clamps or electrodes for hanging garment test .....	16
Figure 8 – Test set-up – Resistance point-to-groundable point (cuff-to-groundable-point procedure with insulative sleeve inserts) .....	17
Figure 9 – Test set-up – Resistance point-to-groundable point (sleeve-to-groundable-point procedure with insulative sleeve inserts) .....	17
Figure 10 – Groundable garment cuff test .....	18
Figure 11 – Test set-up – Groundable static control garment system resistance (groundable garment in combination with a person using a meter and hand-held electrode) .....	18
Figure 12 – Test set-up – Groundable static control garment system resistance (groundable garment in combination with a person using an integrated tester).....	19
Table 1 – Product qualification.....	13
Table A.1 – Garment types and resistance values.....	20

**iTeh Standards**  
**(<https://standards.iteh.ai>)**  
**Document Preview**

[SIST EN IEC 61340-4-9:2025](https://standards.iteh.ai/catalog/standards/sist/33486bfb-e609-4dfc-832d-47b53afa351a/sist-en-iec-61340-4-9-2025)

<https://standards.iteh.ai/catalog/standards/sist/33486bfb-e609-4dfc-832d-47b53afa351a/sist-en-iec-61340-4-9-2025>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## ELECTROSTATICS –

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

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

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

This third edition cancels and replaces the second edition published in 2016. This edition constitutes a technical revision.

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

- a) IEC 61010-1 and IEC 61010-2-030 added as requirements for measurement equipment;
- b) testing voltage range for personnel ground path changed from "7 V DC to 30 V DC" to "7 V DC to 100 V DC";