IEC 61340-4-9

Edition 3.0 2024-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

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

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IEC 61340-4-9:2024-10 (en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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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";

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c) cleaning requirements changed from a minimum of five cycles of cleaning to a minimum of three cycles of cleaning;

d) moderate humidity requirements deleted;

e) figures replaced with generic drawings.

The text of this International Standard is based on the following documents:

Draft	Report on voting
101/718/FDIS	101/721/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
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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 document 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 personnel clothing can minimize the effect of this charge. To effectively control electrostatic charges of the static control garments and effectively shield the electrostatic field of personnel clothing, the static control garment should be grounded.

Three categories of garments are considered in this document.

a) A static control garment can suppress or otherwise affect an electric field from clothing worn underneath the garment without being attached to ground. However, without grounding, a charge can accumulate on conductive or dissipative elements of a garment, if present, resulting in a charged source.

b) A groundable static control garment can 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 can 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, it can be necessary to take into consideration electrical field attenuation, static decay, peak voltage, residual voltage and triboelectric charging. 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 document.

Garments constructed from fabrics made with fibres that are not surface conductive but can 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 document. This being the case, some garment fabrics and construction can allow for surface voltage accumulation and charge transfer to occur which can be detrimental to electronic items.

Alternate methods for evaluating the electrostatic properties of garments are described in IEC TS 61340-4-2 [1][1].

[1] Numbers in square brackets refer to the Bibliography.

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ELECTROSTATICS –

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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 homogenously conductive or homogeneously dissipative, or that utilize surface conductive or surface dissipative components or elements.

NOTE It is possible that the test methods defined in this document will 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 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 described, 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 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.

IEC 61010-1, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

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*

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*

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

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