

INTERNATIONAL STANDARD

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

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INTERNATIONAL STANDARD

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

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ELECTROSTATICS –

Part 4-6: Standard test methods for specific applications – Wrist straps

FOREWORD

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International Standard IEC 61340-4-6 has been prepared by IEC technical committee 101: Electrostatics.

The text of this standard is based on ANSI/ESD S1.1-2006. It was submitted to the National Committees for voting under the Fast Track Procedure.

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

FDIS	Report on voting
101/291/FDIS	101/296/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, 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 maintenance result date indicated on the IEC web site 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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

This part of IEC 61340 has been developed to establish test methods for evaluating the electrical and mechanical attributes of wrist straps used in an electrostatic control program. Wrist straps are intended to connect the user to electrical ground, thus preventing electrostatic charge on a user's body from attaining a level that may damage ESD susceptible devices or assemblies.

Test methods and performance limits for evaluation, acceptance, and functional testing are provided. Application and construction guidance is included in the annexes.

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ELECTROSTATICS –

Part 4-6: Standard test methods for specific applications – Wrist straps

1 Scope

This part of IEC 61340 provides electrical and mechanical test methods and performance limits for evaluation, acceptance and functional testing of wrist straps.

This standard is intended for testing wrist straps and wrist strap systems used for the grounding of personnel engaged in working with ESD sensitive assemblies and devices.

It does not address constant monitoring systems.

2 Normative references

The following referenced documents are indispensable for the application 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.

ESD ADV1.0, *Glossary of terms*¹

3 Terms and definitions

For the purposes of this document, the following terms and definitions, in addition to those specified in the ESD association glossary of terms, shall apply.

3.1

wrist strap

assembled device consisting of a wrist cuff and ground cord that provides electrical connection of a person's skin to ground

3.2

wrist strap system

wrist strap when properly worn by a person, where the electrical path includes the person, the cuff and the ground cord

3.3

cuff

portion of the wrist strap worn on the wrist

NOTE The cuff maintains electrical contact with a person's skin.

3.4

ground cord

portion of the wrist strap that provides flexibility of movement while completing the electrical circuit between the cuff and ground

¹ ESD Association, 7900 Turin Rd, Bldg. 3, Ste. 2, Rome, NY 13440-2069, 315-339-6937, www.esda.org

**3.5
evaluation testing**

stringent testing of a wrist strap to determine its electrical and mechanical performance abilities

NOTE Data are in the form of values from laboratory testing.

**3.6
acceptance testing**

incoming tests to confirm proper marking and electrical functionality

NOTE Data are in the form of visual inspection records, and values or pass/fail notation.

**3.7
functional testing**

end-use testing to confirm electrical functionality

NOTE Data are in the form of pass/fail notation or values.

**3.8
current-limiting resistance**

resistance value incorporated in series with the wrist strap's electrical path to ground

NOTE This resistance limits electrical current that could pass through the ground cord in the event of inadvertent user contact with electrical potential.

**3.9
resistance range**

user-specified upper and lower resistance values which define the user-acceptable resistance values of a wrist strap or wrist strap system

**3.10
strain relief**

construction feature designed to protect the connections and cord from premature failure

**3.11
breakaway force**

force required to disconnect the ground cord from the cuff

4 Testing levels and performance limits

This part of IEC 61340 specifies different types of testing for wrist straps. Tables 1, 2 and 3 detail the three types of testing with the associated limits and paragraph references to test methods. The methods provide appropriate tests for the different levels of wrist strap examination. The "evaluation tests" are laboratory tests for measuring the performance of a wrist strap or for the comparison of wrist straps. "Acceptance tests" provide methods for incoming goods inspection. Finally, the "functional test" is a simple check of electrical continuity. This test shall be used on a regular, user-defined basis, to ensure that the wrist strap is electrically functional.

Table 1 – Evaluation testing

Electrical	Limit	Test ref.
Wrist strap continuity and resistance	1 mΩ ± 20 %, or user defined value	5.1
Cuff resistance Interior: Exterior:	≤100 kΩ or user defined value ≥10 mΩ	5.2
Mechanical	Limit	Test ref.
Cuff size	Defined	5.3
Breakaway force	> 0,45 kg (1 lb), < 2,3 kg (5 lb)	5.4
Connector and cord integrity	> 2,3 kg (5 lb) and > 66 % of cord strength	5.5
Ground cord extendibility	Extension to manufacturer's specified length with no continuity loss	5.6
Bending life	≥ 16 000 cycles	5.7
Marking	Limit	Test ref.
Manufacturer's identification	Logo and/or name	5.8
Identification of non-standard Resistance value	Red feature. Value marked.	5.9

Table 2 – Acceptance testing

Electrical	Limit	Test ref.
Wrist strap resistance	1 mΩ ± 20 %, or user defined value	5.10
Marking	Limit	Test ref.
Manufacturer's identification	Logo and/or name	5.8
Identification of non-standard Resistance value	Red feature. Value marked	5.9

Table 3 – Functional testing

Electrical	Limit	Test ref.
Wrist strap system continuity	"Pass" or ≤ 10 mΩ, or user defined value	5.11

5 Test methods

Refer to Tables 1, 2 and 3 for test method applications.

5.1 Wrist strap continuity and resistance test

This test measures the value of the current-limiting resistance and assures continuity between the discrete parts of the wrist strap.

5.1.1 Equipment

The equipment shall consist of the following: