



SLOVENSKI STANDARD
oSIST prEN IEC 61340-5-1:2023
01-junij-2023

Elektrostatika - 5-1. del: Zaščita elektronskih naprav pred elektrostatskimi pojavi - Splošne zahteve

Electrostatics - Part 5-1: Protection of electronic devices from electrostatic phenomena - General requirements

Elektrostatik - Teil 5-1: Schutz von elektronischen Bauelementen gegen elektrostatische Phänomene - Allgemeine Anforderungen

Électrostatique - Partie 5-1: Protection des dispositifs électroniques contre les phénomènes électrostatiques - Exigences générales

Ta slovenski standard je istoveten z: prEN IEC 61340-5-1:2023

ICS:

17.220.99	Drugi standardi v zvezi z elektriko in magnetizmom	Other standards related to electricity and magnetism
31.020	Elektronske komponente na splošno	Electronic components in general

oSIST prEN IEC 61340-5-1:2023 **en**



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SECRETARIAT: Germany	SECRETARY: Mr Hartmut Berndt
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 47	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input checked="" type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING
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- any relevant "in some countries" clauses to be included should this proposal proceed. Recipients are reminded that the enquiry stage is the final stage for submitting "in some countries" clauses. See AC/22/2007.

TITLE:
Electrostatics - Part 5-1: Protection of electronic devices from electrostatic phenomena - General requirements

PROPOSED STABILITY DATE: 2028

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CONTENTS

CONTENTS	2
FOREWORD	3
INTRODUCTION	5
1 Scope	7
2 Normative references	7
3 Terms and definitions	8
4 Personnel safety	10
5 ESD control program	10
5.1 General	10
5.1.1 ESD control program requirements	10
5.1.2 ESD coordinator	10
5.1.3 Tailoring	10
5.2 ESD control program administrative requirements	10
5.2.1 ESD control program plan	10
5.2.2 Training plan	11
5.2.3 Product qualification	11
5.2.4 Compliance verification plan	12
5.3 ESD control program plan technical requirements	12
5.3.1 General	12
5.3.2 Grounding/equipotential bonding systems	12
5.3.3 Personnel grounding	14
5.3.4 ESD protected areas (EPA)	15
5.3.5 Packaging	17
5.3.6 Marking	18
Annex A	19
Bibliography	21
Figure 1 – Schematic of an EPA with a ground reference	13
Figure 2 – Schematic of an equipotential bonding system	14
Table 1 – Grounding/bonding requirements	14
Table 2 – Personnel grounding requirements	15
Table 3 – EPA requirements	17
Table 4 – Packaging Requirements	18

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROSTATICS –

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**Part 5-1: Protection of electronic devices from
electrostatic phenomena – General requirements**

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FOREWORD

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International Standard IEC 61340-5-1 has been prepared by IEC technical committee 101: Electrostatics.

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

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

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- a) There were definitions added to the document
- b) Updates to product qualification requirements
- c) Personal grounding now included reference to groundable static control garment systems
- d) Table 2 was replaced
- e) Insulator section was updated to define what an insulator is
- f) Isolated conductors were updated to include a definition on what an isolated conductor is

- 93 g) Table 3 was updated, technical items added, included reference to IEC 61340-5-4 for
94 compliance verification testing
- 95 h) Table 4 was added as a summary of the requirements in IEC 61340-5-3 and to include
96 requirements for compliance verification of packaging
- 97 i) Annex A was replaced, the former Annex is no longer required. Annex A are examples of
98 tailoring

99 The text of this standard is based on the following document:

IEC 61340-5-1 Ed 2

100

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

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

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

- 107 • reconfirmed,
- 108 • withdrawn,
- 109 • replaced by a revised edition, or
- 110 • amended.

111 The contents of the corrigendum of May 2017 have been included in this copy.

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<https://standards.iteh.ai/catalog/standards/sist/f6b2a4f1-44a0-44ec-9ed3-06f3cba97585/osist-pren-iec-61340-5-1-2023>

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INTRODUCTION

115 This part of IEC 61340 covers the requirements necessary to design, establish, implement
116 and maintain an electrostatic discharge (ESD) control program for activities that: manufacture,
117 process, assemble, install, package, label, service, test, inspect, transport or otherwise
118 handle electrical or electronic parts, assemblies and equipment susceptible to damage by
119 electrostatic discharges greater than or equal to 100 V human body model (HBM), 200 V
120 charged device model (CDM) and 35 V on isolated conductors. Isolated conductors were
121 historically represented by machine model (MM). The 35 V limit is related to the level
122 achievable using ionizers specified in this standard. The MM test is no longer required for
123 qualification of devices, only the HBM and CDM tests are. The requirements relating to MM
124 are retained in this standard for process control of isolated conductors only.

125 Any contact and physical separation of materials or flow of solids, liquids, or particle-laden
126 gases can generate electrostatic charges. Common sources of ESD include charged:
127 personnel, conductors, common polymeric materials, and processing equipment. ESD
128 damage can occur when:

- 129 • a charged person or object comes into contact with an ESD sensitive device (ESDS);
- 130 • an ESDS comes into direct contact with a highly conductive surface while exposed to an
131 electrostatic field;
- 132 • a charged ESDS comes into contact with another conductive surface which is at a different
133 electrical potential. This surface can be grounded or ungrounded.

134 Examples of ESDS are microcircuits, discrete semiconductors, thick and thin film resistors,
135 hybrid devices, printed circuit boards and piezoelectric crystals. It is possible to determine
136 device and item susceptibility by exposing the device to simulated ESD events. The ESD
137 withstand voltage determined by sensitivity tests using simulated ESD events does not
138 necessarily represent the ability of the device to withstand ESD from real sources at that
139 voltage level. However, the levels of sensitivity are used to establish a baseline of
140 susceptibility data for comparison of devices with equivalent part numbers from different
141 manufacturers. Three different models have been used for qualification of electronic
142 components – HBM, MM, and CDM. In current practice devices are qualified only using HBM
143 and CDM susceptibility tests.

144 This standard covers the ESD control program requirements necessary for setting up a
145 program to handle ESDS, based on the historical experience of both military and commercial
146 organizations. The fundamental ESD control principles that form the basis of this standard are
147 as follows.

- 148 • Avoid a discharge from any charged, conductive object (personnel and especially
149 automated handling equipment) into the ESDS. This can be accomplished by bonding or
150 electrically connecting all conductors in the environment, including personnel, to a known
151 ground or contrived ground (as on board ship or on aircraft). This attachment creates an
152 equipotential balance between all conducting objects and personnel. Electrostatic
153 protection can be maintained at a potential different from a “zero” voltage ground potential
154 as long as all conductive objects in the system are at the same potential.
- 155 • Avoid a discharge from any charged ESD sensitive device. Charging can result from direct
156 contact and separation or it can be induced by an electric field. Necessary insulators in
157 the environment cannot lose their electrostatic charge by attachment to ground. Ionization
158 systems provide neutralization of charges on these necessary insulators (circuit board
159 materials and some device packages are examples of necessary insulators). The ESD
160 hazard created by electrostatic charges on the necessary insulators in the work place is
161 assessed to ensure that appropriate actions are implemented, according to the risk.
- 162 • Once outside of an electrostatic discharge protected area (hereinafter referred to as an
163 EPA) it is generally not possible to control the above items, therefore, ESD protective
164 packaging can be required. ESD protection can be achieved by enclosing ESD sensitive
165 products in static protective materials, although the type of material depends on the
166 situation and destination. Inside an EPA, static dissipative materials can provide adequate
167 protection. Outside an EPA, static discharge shielding materials are recommended. Whilst
168 all of these materials are not discussed in this standard, it is important to recognize the

169 differences in their application. For more information see IEC 61340-5-3 and IEC TR
170 61340-5-5.

171 Each organization has different processes, and so will require a different blend of ESD
172 prevention measures for an optimum ESD control program. Measures should be selected,
173 based on technical necessity and carefully documented in an ESD control program plan, so
174 that all concerned can be sure of the program requirements.

175 Training is an essential part of an ESD control program in order to ensure that the personnel
176 involved understand the equipment and procedures they are to use in order to be in
177 compliance with the ESD control program plan. Training is also essential in raising awareness
178 and understanding of ESD issues. Without training, personnel are often a major source of
179 ESD risk. With training, they become an effective first line of defence against ESD damage.
180 Product qualification ensures that equipment sourced for use in the ESD control program
181 meets the technical requirements before it is placed in service. A product qualification plan
182 details the criteria to be used for selection of ESD control items.

183 Regular compliance verification checks and tests are essential to ensure that equipment
184 remains effective and that the ESD control program is correctly implemented in compliance
185 with the ESD control program plan.

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ELECTROSTATICS –

Part 5-1: Protection of electronic devices from electrostatic phenomena – General requirements

194 **1 Scope**

195 This part of IEC 61340 applies to organizations that: manufacture, process, assemble, install,
196 package, label, service, test, inspect, transport or otherwise handle electrical or electronic
197 parts, assemblies and equipment with withstand voltages greater than or equal to 100 V
198 human body model (HBM) and 200 V charge device model (CDM). Also, protection from
199 isolated conductors is addressed by limiting the voltage on isolated conductors to less than
200 35 V. ESDS with lower withstand voltages can require additional control elements or adjusted
201 limits. Processes designed to handle items that have lower ESD withstand voltage(s) may still
202 claim compliance to this standard.

203 This standard provides the requirements for an ESD control program. IEC TR 61340-5-2 [9]¹
204 provides guidance on the implementation of this standard.

205 This standard does not apply to electrically initiated explosive devices, flammable liquids,
206 gases and powders.

207 The purpose of this standard is to provide the administrative and technical requirements for
208 establishing, implementing and maintaining an ESD control program (hereinafter referred to
209 as the “program”).

210 **2 Normative references**

211 The following documents, in whole or in part, are normatively referenced in this document and
212 are indispensable for its application. For dated references, only the edition cited applies. For
213 undated references, the latest edition of the referenced document (including any
214 amendments) applies.

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

217 IEC 61340-4-1, *Electrostatics – Part 4-1: Standard test methods for specific applications –*
218 *Electrical resistance of floor coverings and installed floors*

219 IEC 61340-4-3, *Electrostatics – Part 4-3: Standard test methods for specific applications –*
220 *Footwear*

221 IEC 61340-4-5, *Electrostatics – Part 4-5: Standard test methods for specific applications –*
222 *Methods for characterizing the electrostatic protection of footwear and flooring in combination*
223 *with a person*

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

226 IEC 61340-4-7, *Electrostatics – Part 4-7: Standard test methods for specific applications –*
227 *Ionization*

¹ Numbers in square brackets refer to the bibliography.

228 IEC 61340-4-8, *Electrostatic – Part 4-8: Standard test methods for specific applications –*
229 *Electrostatic discharge shielding - Bags*

230 IEC 61340-4-9, *Electrostatics – Part 4-9: Standard test methods for specific applications –*
231 *Garments*

232 IEC 61340-5-3, *Electrostatics – Part 5-3: Protection of electronic devices from electrostatic*
233 *phenomena – Properties and requirements classification for packaging intended for*
234 *electrostatic discharge sensitive devices*

235 IEC TS 61340-5-4, *Electrostatics – Part 5-4: Protection of electronic devices from electrostatic*
236 *phenomena – Compliance Verification*

237 **3 Terms and definitions**

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

239 NOTE For the purposes of this document “earth” and “ground” have the same meaning.

240 **3.1**

241 **charged device model**

242 **CDM**

243 ESD stress model that approximates the discharge event that occurs when a charged
244 component is quickly discharged to another object at a different electrostatic potential

245 Note 1 to entry: Charged device model is described in IEC 60749028 [9].

246 Note 2 to entry: This note only applies to the French language.

247 **3.2**

248 **common ground point**

249 grounded device or location where the conductors of two or more ESD control items are
250 bonded

251 **3.3**

252 **common connection point**

253 device or location where the conductors of two or more ESD control items are connected in
254 order to bring the ESD control items to the same electrical potential through equipotential
255 bonding

256 **3.4**

257 **equipotential bond**

258 electrical connection of conductive parts (or items used to control ESD) so that they are at
259 substantially the same voltage under normal and fault conditions

260 **3.5**

261 **electrostatic discharge**

262 **ESD**

263 rapid transfer of charge between bodies that are at different electrostatic potentials

264 Note 1 to entry: This note only applies to the French language.

265 **3.6**

266 **ESD control items**

267 materials or products designed to prevent the generation of static charge and/or dissipate
268 static charges that have been generated so as to prevent damage to ESD sensitive devices

- 269 **3.7**
270 **ESD protected area**
271 **EPA**
272 area in which an ESDS can be handled with accepted risk of damage as a result of
273 electrostatic discharge or fields
- 274 Note 1 to entry: This note only applies to the French language.
- 275 **3.8**
276 **ESD sensitive device**
277 **ESDS**
278 sensitive device, integrated circuit or assembly that can be damaged by electrostatic fields or
279 electrostatic discharge
- 280 **3.9**
281 **ESD withstand voltage**
282 highest voltage level that does not cause device failure
- 283 Note 1 to entry: The device passes all tested lower voltages.
- 284 **3.10**
285 **functional ground**
286 terminal used to connect parts to ground for reasons other than safety
- 287 **3.11**
288 **human body model**
289 **HBM**
290 ESD stress model that approximates the discharge from the fingertip of a typical human being
291 onto a pin of a device with another pin grounded
- 292 Note 1 to entry: Human body model is described in IEC 60749-26 [2].
293 Note 2 to entry: This note only applies to the French language.
- 294 **3.12**
295 **machine model**
296 **MM**
297 ESD stress model that approximates the discharge from a tool or equipment onto a pin of a
298 device with another pin grounded
- 299 Note 1 to entry: Machine model is described in IEC 60749-27 [3].
300 Note 2 to entry: This note only applies to the French language.
- 301 **3.13**
302 **organization**
303 company, group or body that handles ESDS
- 304 Note 1 to entry: For the purposes of this document an organization can be an individual person.
- 305 **3.14**
306 **protective earth**
307 terminal used to connect parts to earth for safety reasons
- 308 **3.15**
309 **unprotected ESDS item**
310 ESDS without ESD protective packaging or coverings
- 311 **3.16**
312 **worksurface**
313 surface where any type of work or processing can be performed on an unprotected ESDS