



SLOVENSKI STANDARD
oSIST prEN IEC 61340-4-7:2022
01-junij-2022

Elektrostatika - 4-7. del: Standardne preskusne metode za posebno uporabo - Ionizacija

Electrostatics - Part 4-7: Standard test methods for specific applications - Ionization

Elektrostatik - Teil 4-7: Standard-Prüfverfahren für spezielle Anwendungen – Ionisation

Electrostatique - Partie 4-7: Méthodes d'essai normalisées pour des applications spécifiques - Ionisation

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ICS:

17.220.99	Drugi standardi v zvezi z električno in magnetizmom	Other standards related to electricity and magnetism
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SECRETARIAT: Germany	SECRETARY: Mr Hartmut Berndt
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
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<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:
Electrostatics - Part 4-7: Standard test methods for specific applications - Ionization

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROSTATICS –

Part 4-7: Standard test methods for specific applications –
Ionization

FOREWORD

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International Standard IEC 61340-4-7 has been prepared by IEC technical committee 101: Electrostatics.

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

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

- A reference to Annex A was added for regarding theoretical background and additional information on the standard test method for the performance of ionizers.
- NOTE 3, Figure 5 as added to clarify for AC bars and grids a single emitter alternating between +/- polarity is used.
- Updated Annex B relative error for measurement equipment to include the consideration for the resolution of the voltmeter

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

FDIS	Report on voting
101/xxx/FDIS	101/xxx/RVD

136

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

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

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

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

- 145 • reconfirmed,
- 146 • withdrawn,
- 147 • replaced by a revised edition, or
- 148 • amended.

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151

INTRODUCTION

152 Grounding is the primary method used to limit static charge when protecting electrostatic
153 discharge sensitive items in the work environment. However, grounding methods are not
154 effective in removing static charges from the surfaces of non-conductive (insulative) or isolated
155 (ungrounded) conductive materials. Air ionization techniques, by means of ionizer systems, can
156 be utilized to reduce this charge.

157 The preferred way of evaluating the ability of an ionizer to neutralize a static charge is to directly
158 measure the rate of charge decay. Charges to be neutralized may be located on insulators as
159 well as on isolated conductors. It is difficult to charge an insulator reliably and repeatably.
160 Charge neutralization is more easily evaluated by measuring the rate of decay of the voltage of
161 an isolated conductive plate. The measurement of this decay should not interfere with or change
162 the nature of the actual decay. Four practical methods of air ionization are addressed in this
163 document:

- 164 a) radioactive emission;
- 165 b) high-voltage corona from a.c. electric fields;
- 166 c) high-voltage corona from d.c. electric fields;
- 167 d) soft X-ray emission.

168 This part of IEC 61340 provides test methods and procedures that can be used when evaluating
169 ionization equipment. The objective of the test methods is to generate meaningful, reproducible
170 data. The test methods are not meant to be a recommendation for any particular ionizer
171 configuration. The wide variety of ionizers, and the environments within which they are used,
172 will often require test methods different from those described in this document. Users of this
173 document should be prepared to adapt the test methods as required to produce meaningful data
174 in their own application of ionizers.

175 Similarly, the test conditions chosen in this document do not represent a recommendation for
176 acceptable ionizer performance. There is a wide range of item sensitivities to static charge.
177 There is also a wide range of environmental conditions affecting the operation of ionizers.
178 Performance specifications should be agreed upon between the user and manufacturer of the
179 ionizer in each application. Users of this document should be prepared to establish reasonable
180 performance requirements for their own application of ionizers.

181 Annex B provides a method for measuring capacitance of the isolated conductive plate.

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ELECTROSTATICS –

Part 4-7: Standard test methods for specific applications – Ionization

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191 **1 Scope**

192 This part of IEC 61340 provides test methods and procedures for evaluating and selecting air
193 ionization equipment and systems (ionizers).

194 This document establishes measurement techniques, under specified conditions, to determine
195 offset voltage (ion balance) and decay (charge neutralization) time for ionizers.

196 This document does not include measurements of electromagnetic interference (EMI), or the
197 use of ionizers in connection with ordnance, flammables, explosive items or electrically initiated
198 explosive devices.

199 As contained in this document, the test methods and test conditions can be used by
200 manufacturers of ionizers to provide performance data describing their products. Users of
201 ionizers are urged to modify the test methods and test conditions for their specific application
202 in order to qualify ionizers for use, or to make periodic verifications of ionizer performance. The
203 user will decide the extent of the data required for each application.

204 See Annex A for information regarding theoretical background and additional information on the
205 standard test method for the performance of ionizers.

206 CAUTION: Procedures and equipment described in this document can expose personnel to hazardous electrical and
207 non-electrical conditions. Users of this document are responsible for selecting equipment that complies with
208 applicable laws, regulatory codes and both external and internal policy. Users are cautioned that this document
209 cannot replace or supersede any requirements for personnel safety. See Annex C for safety considerations.

210 **2 Normative references**

211 IEC 6101-1, *Safety requirements for electrical equipment for measurement, control, and*
212 *laboratory use – Part 1*

213 **3 Terms and definitions**

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

215 ISO and IEC maintain terminological databases for use in standardization at the following
216 addresses:

- 217 • IEC Electropedia: available at <http://www.electropedia.org/>
- 218 • ISO Online browsing platform: available at <http://www.iso.org/obp>

219 **3.1**

220 **air conductivity**

221 ability of air to conduct (pass) an electric current under the influence of an electric field

- 222 **3.2**
223 **air ions**
224 molecular clusters of about ten molecules (water, impurities, etc.) bound by polarization forces
225 to a singly charged oxygen or nitrogen molecule
- 226 **3.3**
227 **charge decay**
228 decrease and/or neutralization of a net electrostatic charge
- 229 **3.4**
230 **charged plate monitor**
231 CPM
232 instrument using a charged metal plate of a defined capacitance and geometry which is
233 discharged in order to measure charge dissipation/neutralization properties of products or
234 materials
- 235 Note 1 to entry: This note applies to the French language only.
- 236 **3.5**
237 **compressed gas ionizer**
238 ionization device that can be used to neutralize charged surfaces and/or remove surface
239 particles with pressurized gas
- 240 Note 1 to entry: This type of ionizer may be used to ionize the gas within production equipment.
- 241 **3.6**
242 **corona**
243 production of positive or negative ions by a very localized high electric field
- 244 Note 1 to entry: The field is normally established by applying a high voltage to a conductor in the shape of a sharp
245 point or wire.
- 246 **3.7**
247 **decay time**
248 time necessary for a voltage (due to an electrostatic charge) to decay from an initial value to
249 some chosen final value
- 250 **3.8**
251 **emitter**
252 conducting sharp object, usually a needle or wire, which will cause a corona discharge when
253 kept at a high potential
- 254 **3.9**
255 **horizontal laminar flow**
256 non-turbulent airflow in a horizontal direction
- 257 **3.10**
258 **ionizer**
259 device designed to generate positive and/or negative air ions
- 260 **3.11**
261 **isolated conductor**
262 non-grounded conductor
- 263 **3.12**
264 **laminar flow hood ionization**
265 device or systems that provide local area ionization coverage in vertical or horizontal laminar
266 flow hoods or benches

267 **3.13**
268 **non-contacting voltage measurement**
269 measurement technique using an electrostatic fieldmeter or voltmeter to monitor the voltage
270 induced on an isolated conductive plate where there is no direct connection from the
271 measurement sensor to the isolated conductive plate

272 **3.14**
273 **offset voltage**
274 **ion balance**
275 observed voltage on the isolated conductive plate of a charged plate monitor (CPM) that has
276 been placed in an ionized environment

277 **3.15**
278 **peak offset voltage**
279 for pulsed ionizers, maximum value of the offset voltage for each polarity, as the ionizer cycles
280 between positive and negative ion outputs

281 **3.16**
282 **room ionization**
283 ionization systems that provide large area coverage with air ions

284 **3.17**
285 **work surface ionization**
286 ionization devices or systems used to control static charges at a work surface

287 Note 1 to entry: This type includes benchtop ionizers, overhead work surface ionizers and laminar flow hood
288 ionizers.

289 **3.18**
290 **vertical laminar flow**
291 non-turbulent airflow in a vertical direction

292 **3.19**
293 **contacting voltage measurement**
294 measurement technique using high input impedance circuitry used to monitor the voltage induced on
295 an isolated conductive plate where there is a direct connection from the circuitry to the conductive
296 plate

297 **4 Test fixture and instrumentation**

298 The instrument described in this document to make performance measurements on air
299 ionization equipment is the charged plate monitor (CPM); refer to Figure 1 and Figure 2. The
300 conductive plate shall be $(15,0 \pm 0,1) \text{ cm} \times (15,0 \pm 0,1) \text{ cm}$ and the total capacitance of the test
301 circuit, with plate, while the instrument is in its normal operating mode, shall be $20 \text{ pF} \pm 2 \text{ pF}$
302 (refer to Annex B). See Figure 3 and Figure 4. The instrument described in this document may
303 also be used for compliance verification of air ionizers.

304 For the isolated conductive plate design shown in Figure 3, there shall be no objects, grounded
305 or otherwise, closer than dimension "A" of the conductive plate, except the supporting insulators
306 or plate voltage contacts, as shown in Figure 3 (refer to Annex B). For the conductive plate
307 assembly shown in Figure 4, there shall be no objects, grounded or otherwise, within 2,5 cm of
308 the plate assembly in any direction, other than a support structure (e.g. a tripod) located below
309 the ground plate of the assembly.

310 The conductive plate, when charged to the desired test voltage, shall not decay more than 10 %
311 of the test voltage within 5 min, in the absence of ionization.