



SLOVENSKI STANDARD
oSIST prEN IEC 61810-7-17:2023
01-oktober-2023

Električni releji - Preskusi in meritve - 7-17. del: Udar, pospešek in vibracije

Electrical relays - Tests and Measurements - Part 7-17: Shock, Acceleration and Vibration

iTeh STANDARD PREVIEW

Relais électriques - Essais et mesurages - Partie 7-17: Chocs, accélération et vibrations

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TITLE:

Electrical relays – Tests and Measurements – Part 7-17: Shock, Acceleration and Vibration

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL RELAYS – TESTS AND MEASUREMENTS

Part 7-17: Shock, Acceleration and Vibration

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IEC 61810-7 has been prepared by subcommittee WG3: Maintenance of basic relay standards, of IEC technical committee 94: All-or-nothing electrical relays. It is an International Standard.

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

CD	CC
94/813/CD	94/908/CC

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

89 at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
90 described in greater detail at <http://www.iec.ch/standardsdev/publications>.

91 A list of all parts of IEC 61810 series, published under the general title *Electromechanical*
92 *elementary relays*, can be found on the IEC website.

93 This International Standard is to be used in conjunction with IEC 61810-1:2015.

94 The committee has decided that the contents of this document will remain unchanged until the
95 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
96 specific document. At this date, the document will be

- 97 • reconfirmed,
- 98 • withdrawn,
- 99 • replaced by a revised edition, or
- 100 • amended.

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ELECTRICAL RELAYS – TESTS AND MEASUREMENTS

Part 7-17: Shock, Acceleration and Vibration

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109 **1 Scope**

110 This part of IEC 61810-7 is used for testing all kind of relays within the scope of technical
111 committee 94 and shall evaluate their ability to perform under expected conditions of
112 transportation, storage and all aspects of operational use.

113 The tests stated here within shall be done with test conditions and appropriate severities, as
114 well as suitable measurements conditions.

115 The object of this test is to define a standard test method to ensure that the DUT performs
116 satisfactorily at its specified energization values throughout the defined temperature range.

117 The standard is to prove the capability of the DUT to function during and/or after several stress
118 situations, that may occur in service, during handling or during transportation. This part
119 comprises test procedures to simulate shock impacts, steady acceleration environments (such
120 as moving vehicles, aircraft and projectiles) as well as vibration conditions.

121 Those procedures provide evidence about the structural integrity of DUTs and their
122 electromechanical design robustness. Based on the chosen test severity, the procedures may
123 also be used to deliberately reveal mechanical weaknesses of DUTs and allow grouping of parts
124 acc. to their stress resistance levels.

125 The tests are mainly intended for specimen without packaging. However, if the packaging is
126 considered an essential part of the specimen, then certain tests like shock tests may be carried
127 out with packaging as well.

128

129 **2 Normative references**

130 The following documents are referred to in the text in such a way that some or all of their content
131 constitutes requirements of this document. For dated references, only the edition cited applies.
132 For undated references, the latest edition of the referenced document (including any
133 amendments) applies.

134 IEC 60068-2-6, Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)

135 IEC 60068-2-7, Basic environmental testing procedures - Part 2-7: Tests - Test Ga and
136 guidance: Acceleration, steady state

137 IEC 60068-2-27, Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock

138 IEC 60068-2-64, Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband
139 random and guidance

140 IEC 61810-1:2015, Electromechanical elementary relays – Part 1: General and safety
141 requirements

142 IEC 61810-1:2015/AMD1:2019, Amendment 1 - Electromechanical elementary relays - Part 1:
143 General and safety requirements

144 IEC 61810-7-0, All-or-nothing relays – Tests and measurements – Part 7-0: Testing – General
145 and Guidance

146 IEC 61810-7-1, All-or-nothing relays – Tests and measurements – Part 7-1: Visual Inspection
147 and check of dimensions

148 IEC 61810-7-5, All-or-nothing relays – Tests and measurements – Part 7-5: Insulation
149 resistance

150 IEC 61810-7-6, All-or-nothing relays – Tests and measurements – Part 7-6: Contact-circuit
151 resistance

152 IEC 61810-7-7, All-or-nothing relays – Tests and measurements – Part 7-7: Functional tests

153

154 **3 Terms and definitions**

155 For the purposes of this document, the terms and definitions given in Clause 3 of IEC 61810-7-
156 0 apply.

157 ISO and IEC maintain terminological databases for use in standardization at the following
158 addresses:

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

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163 4 Test procedure

164 4.1 General

165 4.1.1 General purpose

166 The standard describes three different test procedure

- 167 • Shock,
- 168 • Acceleration and
- 169 • Vibration.

170 Shock tests may be used to characterize the robustness of the DUT with regard to transportation
171 impacts (e.g. drop events, handling) or whenever the application is subject to rather seldom
172 shock impacts. Shocks create a wide-band excitation of the specimen, not limited to specific
173 frequencies. By that, the shock test also helps to understand the structural integrity of the DUT,
174 if it is tested without packaging.

175 Acceleration tests may be used to characterise the robustness of the DUT with regard to
176 continuous acceleration stress during its service life. Typical applications are aircrafts, rotating
177 machinery as well as the automotive sector. The acceleration tests represent permanent steady
178 forces to the DUT interior, giving insight into its structural integrity.

179 Vibration tests may be used to characterise the robustness of the DUT with regard to expected
180 frequency ranges, by provoking particular resonance frequencies. This may be relevant for
181 automotive applications as well as any kind of transportation stress. Further, environmental
182 conditions like off-shore installations may represent significant vibration throughout life as well
183 as rotating machines or any moving equipment nearby the DUT installation. The vibration tests
184 apply sine-wave forces to the DUT and its interior, creating a particular stress on any joints and
185 connection elements between the structural components.

<https://standards.iteh.ai/catalog/standards/sist/2c1ca731-daf8-43a6-886e-1071d73/osist-pren-iec-61810-7-17-2023>

186 4.1.2 General conditions

187 The DUT under test shall be in a new and clean condition, mounted as in service or specified
188 by the manufacturer. If agreed, the tests may be carried out also on DUTs that are or have been
189 in service. The condition of the DUT is to be defined and stated in the report.

190 The test shall be performed under applicable reference conditions given in Clause 4 of
191 IEC 61810-7-0.

192 The energization of the test coil shall be at the lower limit of the operative range unless
193 otherwise stated by the manufacturer or requested by the procedure below.

194

195 4.2 Shock

196 4.2.1 Purpose

197 To prove the capability of the DUT to function during and/or after non-repetitive shocks
198 encountered in service, during handling or during transportation.

199 4.2.2 Procedure

200 The test shall be conducted in accordance with IEC 60068-2-27, defining test Ea of the basic
201 environmental testing procedures.

202 Preferred severity levels are 3, 100, 500, 1000 or 5000 shocks in each direction, conducted
203 with the half-sine pulse shape. However, other test repetitions and shock profiles may be
204 chosen in accordance with IEC 60068-2-27.

205 NOTE Previous editions of IEC 61810-7 included information on bump testing. This is now removed in accordance
206 with the withdrawal of IEC 60068-2-29. Equivalent stresses can also be covered by definition of shock tests. In
207 addition, specific transportation tests can be specified between manufacturer and customer. For example, in the
208 America region, the ISTA (International Safe Transit Association) specifies several integrity test like 1A, comprising
209 a sequence of vibration and shock (by drop or other means).

210 4.2.2.1 Method 1: Capability to function during shocks

211 During this test, the DUT shall be subjected to one series of shocks while being in its operate
212 condition and one further series while being in its release/reset condition. Both series of tests
213 shall be performed in both directions of each of the three mutually perpendicular axes.

214 The DUTs shall be energized as defined in 4.2.3g) unless otherwise specified.

215 During the test, the contact state shall be electrically monitored in accordance with IEC 61810-
216 7-0.

217 The contact load shall be as specified.

218 4.2.2.2 Method 2: Capability to function after shocks

219 During this test, the DUT shall be subjected to a series of shocks in both directions of each of
220 the three mutually perpendicular axes. The DUT shall not be energized, and the contacts shall
221 not be monitored.

222 4.2.3 Conditions

223 The conditions to be specified in addition to clause 4.1.2 are the following:

- 224 a) method 1 or 2 acc. to subclause 4.2.2.1 or 4.2.2.2.
- 225 b) number of DUTs to be tested;
- 226 c) pulse shape, peak acceleration and duration shall be chosen from Table 1 of
227 IEC 60068-2-27:2008, with a half-sine wave of 11 ms as a preferred pulse shape (see note);
- 228 d) number of shocks, preferred values are 3, 100, 500, 1000 or 5000 shocks;
- 229 e) method of mounting of the DUT to the shaker, as agreed with the manufacturer. Change of
230 DUT orientation between tests of different shock axis shall avoid any impacts to test sample
231 conditions;
- 232 f) permitted duration of opening or closing and details of monitoring device, preferred duration
233 is 10µs (alternative recommended values are 100µs, 1ms and 10ms). The contact action
234 shall be monitored in accordance with IEC 61810-7-0 (e.g. by a Measuring and indicating
235 device as described in IEC 61810-7-0, clause 4.6.5, for open DUTs to detect making contact
236 and for closed DUTs to detect micro-interruptions);
- 237 g) for method 1 acc. to subclause 4.2.2.1
- 238 • energization value, preferably the lower limit of the operative range (for monostable and
239 bistable DUTs),
 - 240 • contact load, if required.

241 NOTE IEC 60068-2-27:2008 Table 1 holds recommendations for degrees of test severity.

242