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Električni releji - Preskusi in meritve - 7-11. del: Zaščita ohišja in stopnja zaščite

Electrical relays - Tests and Measurements - Part 7-11: Enclosure Protection and Degree of Protection

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TITLE:

Electrical relays – Tests and Measurements – Part 7-11: Enclosure Protection and Degree of Protection

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NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Electrical Relays –
Testing and Measurements**
Part 7-11: Enclosure Protection and Degree of Protection

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The International Standards of the IEC 61810 have been prepared by IEC technical committee 94: All-or-nothing electrical relays.

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

CD	CC
94/828/CD	94/918/CC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

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

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

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

- 73 • reconfirmed,
- 74 • withdrawn,
- 75 • replaced by a revised edition, or
- 76 • amended.

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Electrical Relays – Tests and Measurements

Part 7-11: Enclosure Protection and Degree of Protection

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86 **1 Scope**

87 This part of IEC 61810-7 is used for testing along with the appropriate severities and conditions
88 for measurements and tests designed to assess the ability of specimens to perform under
89 expected conditions of transportation, storage and all aspects of operational use.

90 The object of this test is to define standard test methods for appropriate enclosure sealing
91 testing.

92 **2 Normative references**

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

97 IEC 60068-2-17:1994, *Basic environmental testing procedures - Part 2-17: Tests - Test Q:*
98 *Sealing*

99 IEC 60068-2-68:1994, *Environmental testing - Part 2-68: Tests - Test L: Dust and sand*
<https://standards.iteh.ai/catalog/standards/sist/54d2fc3a-9450-45ee-9b37->

100 IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

101 IEC 61810-7-0:202X, *Electrical relays – Tests and Measurements – Part 7-0: Testing general*

102 IEC 61810-7-4:202X, *Electrical relays – Tests and Measurements – Part 7-4: Dielectric strength*
103 *test*

104 IEC 61810-7-7:202X, *Electrical relays – Tests and Measurements – Part 7-7: Functional tests*

105 IEC 61810-7-15:202X, *Electrical relays – Tests and Measurements – Part 7-15: Robustness of*
106 *terminals*

107 **3 Terms and definitions**

108 **3.1**

109 **relay technology category**

110 RT (abbreviation)

111 categories of relays, based upon environmental protection

112 Note – Six categories are in use (RT0 to RTV).

113

114 4 Test procedure

115 4.1 Purpose

116 To determine the effectiveness of the relay enclosure in regard to either sealing or protection
117 against ingress of dust and water.

118 The relay technology categories are described in Annex B.

119 4.2 Dust protection

120 This test applies only for relay according to RTI.

121 4.2.1 Procedure

122 This test shall be carried out in accordance with test La2 of IEC 60068-2-68. The non-operated
123 relay shall be mounted with standard mounting position pin down if not otherwise specified in
124 the test chamber. The air pressure within the relay shall be that of the ambient air pressure in
125 the test chamber (category 2 enclosure). The relay shall be subjected to talc (hydrated
126 magnesium silicate) for 8 h. After a recovery period of 2 h under normal atmospheric conditions
127 and after cleaning (removal of external surface dust) the test samples shall be submitted to
128 visual and functional measurement.

129 4.2.2 Conditions to be specified

130 The conditions to be specified are the following:

- 131 a) pressure reduction inside the relay, if required;
- 132 b) position of the relay, if other than normal operating position;

133 4.3 Sealing

134 4.3.1 Procedure

135 A suitable soldering process in accordance with manufacturer specification shall be chosen out
136 of IEC 61810-7-15 and all test specimens shall go through the selected soldering process.

137 4.3.1.1 Procedure 1 for RTIII relays

138 The sealing test shall be made by immersion in a liquid at a temperature equal to the upper
139 limit of the operating temperature range of the relay (with a tolerance of $-0\text{ K}/+5\text{ K}$) in
140 accordance with test Qc, method 1 or 2 of IEC 60068-2-17. Immersion times shorter than
141 10 min may be specified by the manufacturer. Bubbles shall not exceed the limits given in
142 IEC 60068-2-17.

143 4.3.1.2 Procedure 2 for RT IV and V for relays

144 The helium detection test shall be carried out in accordance with test Qk, method 1 or 2 of
145 IEC 60068-2-17. Where procedure 2 is used and the existence of a gross leak cannot be ruled
146 out, it shall be followed by procedure 1.

147 For a detailed description of the Helium sniffer test see Annex A

148 NOTE The helium leak rate is not equal to the leak rate of the gases normally used within sealed relays.

149 If the time interval between sealing and testing has been more than 48 h, the relay shall be
150 exposed to an atmosphere of helium at high pressure.

151 The difference pressure and the duration of exposure shall be as prescribed by the
152 manufacturer.

153 After the exposure, the absorbed helium shall be cleaned from the surface as prescribed by the
154 manufacturer.

155 **4.3.1.3 Procedure 3 – sealing test method QI**

156 This test applies for reed switches and high voltage vacuum reed switches as an alternative to
157 Qk test.

158 The sealing test shall be in accordance with test QI of IEC 60068-2-17. It is applicable only to
159 specimen that are able to withstand external overpressure Annex F of IEC 60017-2-17 shall
160 be considered.

161 **4.3.1.4 Procedure 4 – arc time duration test**

162 This test applies for heavy duty reed switches only.

163 The test shall be performed:

- 164 a) Arcing time less than
 - 165 i) 60ms for 3A types
 - 166 ii) 100ms for 5A types
- 167 b) Coil voltage: 150% of must operate voltage
- 168 c) Load voltage: 100V DC to 110V DC
- 169 d) Load current: 0,5A to 0,55 A
- 170 e) Total number of operations: 3

171 The test setup shall be in accordance to IEC 61810-7-19 and carried out at ambient
172 environmental.

173 **4.3.2 Conditions to be prescribed**

174 The conditions to be prescribed are the following:

- 175 a) procedure or sequence of procedures, and methods in them;
- 176 b) procedure 1: immersion time if different from 10 min;
- 177 c) procedure 2:
 - 178 a. severity if different from 1 000 h;
 - 179 b. absolute immersion pressure, if required;
 - 180 c. free internal volume V (cm³);
 - 181 d. maximum leak rate, or time constant.

182 **4.4 Degree of Protection (IP code)**

183 For relays the first digit: Solid particle protection defined in IEC 60529 may apply and could be
184 tested as the component has to be used in the final application.

185 Anyway – there is no direct linkage between the Relay Technology Category and the Degree of
186 Protection (IP code) given as the RT categories are linked to the function and handling process
187 compared to the IP code which is linked to the avoiding of electrical shock.

188 The first digit indicates the level of protection that the enclosure provides against access
189 to hazardous parts (e.g., electrical conductors, moving parts) and the ingress of solid
190 foreign objects.

191
192**Table 1 Degree of Protection against access to hazardous parts indicated by the first characteristic numeral**

Level sized	Effective against	Description
X	—	X means there is no data available to specify a protection rating with regard to this criterion.
0	Non-protected	No protection against contact and ingress of objects
1	>50 mm 2.0 in	Any large surface of the body, such as the back of a hand, but no protection against deliberate contact with a body part
2	>12.5 mm 0.49 in	Fingers or similar objects
3	>2.5 mm 0.098 in	Tools, thick wires, etc.
4	>1 mm 0.039 in	Most wires, slender screws, large ants etc.
5	Dust protected	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment.
6	Dust-tight	No ingress of dust; complete protection against contact (dust-tight). A vacuum must be applied. Test duration of up to 8 hours based on airflow.

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The second characteristic numeral indicates the degree of protection provided by enclosures with respect to harmful effects on the equipment due to the ingress of water.

Table 2 Degree of Protection against access to hazardous parts indicated by the first characteristic numeral

Second characteristic numeral	Effective against	Description
X	—	X means there is no data available to specify a protection rating with regard to this criterion.
0	Non-protected	No protection against contact and ingress of objects
1	Protected against vertically falling water drops	Vertically falling drops shall have no harmful effects
2	Protected against vertically falling water drops when enclosure tilted up to 150	Vertically falling drops shall have no harmful effects when the enclosure is tilted at any angle up to 150 on either side of the vertical
3	Protected against spraying water	Water sprayed at an angle up to 600 on either side of the vertical shall have no harmful effects
4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effects
5	Protected against water jets	Water projected in jets against the enclosure from any direction shall have no harmful effects
6	Protected against powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects
7	Protected against the effects of temporary immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time
8	Protected against the effects of continuous immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user but which are more severe than for numeral 7.
9	Protected against high pressure and	Protected against high pressure and temperature water jets