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IEC TC 94 : ELECTRICAL RELAYS	
SECRETARIAT: Austria	SECRETARY: Mr Bernhard Spalt
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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TITLE:

Electrical relays – Tests and Measurements – Part 7-12: Internal Moisture

PROPOSED STABILITY DATE: 2025

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL RELAYS – TESTS AND MEASUREMENTS

Part 7-12: Internal Moisture

FOREWORD

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- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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
94/815/CD	94/915/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

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

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

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

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

- 81 • reconfirmed,
- 82 • withdrawn,
- 83 • replaced by a revised edition, or
- 84 • amended.

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ELECTRICAL RELAYS – TESTS AND MEASUREMENTS

Part 7-12: Internal Moisture

1 Scope

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

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

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

It is used to determine whether internal moisture has an adverse effect on certain properties of the DUT. This test is only applicable to RT III, RT IV and RT V products, i.e. wash tight, sealed and hermetically sealed DUTs.

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2 Normative references (standards.iteh.ai)

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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. <https://standards.iteh.ai/iec143b24c1f/osist-pren-iec-61810-7-12-2023>

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

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

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

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

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

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

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

124 **3 Terms and definitions**

125 For the purposes of this document, the terms and definitions given in Clause 3 of IEC 61810-7-
126 0 apply.

127 ISO and IEC maintain terminological databases for use in standardization at the following
128 addresses:

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

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133 4 Test procedure

134 4.1 Purpose

135 To determine whether internal moisture has an adverse effect on certain properties of the DUT.

136 *[Editorial Note: 2 methods = those will yield different results, consider to add a general*
137 *information under "Purpose" to provide more clarity for handling of the standard that different*
138 *methods will be not comparable]*

139

140 4.2 Procedure

141 4.2.1 General

142 The DUT shall be in a new and clean condition, mounted as in service or specified by the
143 manufacturer. Unless otherwise stated in this document, the test shall be performed under
144 applicable reference conditions given in Clause 4 of IEC 61810-7-0.

145 The energization of the test coil shall be at rated operate value unless otherwise stated by the
146 manufacturer or requested by the procedure below.

147 A minimum of five DUTs shall be tested, preferred number of DUT is 10.

148 NOTE: Internal moisture may create statistical effects due to the variety of possible moisture distribution pattern.
149 Therefore a larger number DUTs than 5 pieces is recommended.

150 4.2.2 Method 1: External temperature impact

151 The DUT coil shall be energized as specified in 4.3 c) while the DUT is under its maximum rated
152 operating temperature for one hour, and then under the minimum rated operating temperature
153 for one additional hour. Unless otherwise specified, the temperature change shall be done at a
154 rate of (5 ± 1) K/min.

155 During the test procedure, measure and monitor the insulation resistance between all contacts
156 and the DUT enclosure at 20 min intervals acc. to IEC 61810-7-5.

157 At the end of the low temperature exposure, the coil shall be de-energized or, for bistable DUTs,
158 the rated reset voltage shall be momentarily applied. The corresponding function of the DUT
159 shall be monitored and a final insulation resistance measurement between all contacts and the
160 DUT shall be done acc. to IEC 61810-7-5.

161 NOTE 1: Other preferred values for temperature change rates are given in IEC 60068-2-14.

162 NOTE 2: The function may be monitored via the contact state according to IEC 61810-7-0 or other suitable
163 measurements on the terminals or coils.

164 4.2.3 Method 2: Over-Energization at room temperature

165 The DUT coil shall be energized at room temperature at 140 % of its rated energization value
166 for 2.5 min. Measure and monitor the insulation resistance between all contacts and the DUT
167 enclosure at 30 s intervals acc. to IEC 61810-7-5. The maximum coil heating due to the allowed
168 duty cycle must be considered.

169

170 4.3 Conditions

171 The conditions to be specified are the following:

- 172 a) method 1 or 2, or both, acc. to 4.2.2 or 4.2.3, respectively. If both methods are specified to
173 be done, the methods shall not be done on the same DUT. Each method shall be considered
174 as an independent test on a new set of DUTs acc. to 4.2.1.
- 175 b) number of DUTs used for the test (new DUTs to be used for method 1 and method 2)
- 176 c) Rated energization quantity (if not specified different);
- 177 d) for method 1 only: maximum and minimum rated operating temperature, temperature change
178 rate, monitoring procedure, functional testing parameters as specified in IEC 61810-7-7.
- 179 e) for methods 1 and 2: test conditions, measurement setup, measurement time and limit value
180 of insulation resistance, as required by IEC 61810-7-5. Unless otherwise specified,
181 recommended values are:
- 182 • measurement time: 60 sec for method 1 and 5 sec for method 2
 - 183 • insulation resistance: $\geq 1\text{M}\Omega$ for basic insulation, $\geq 2\text{M}\Omega$ for reinforced insulation.
- 184
- 185

186 5 Evaluation

187 5.1 Method 1: External temperature impact

188 After the test, the DUTs shall be in good condition and it shall be verified that the contact(s)
189 has (have) changed their state. None of the insulation resistance readings as specified in IEC
190 61810-7-5 during the 20 min intervals shall be lower than the value as specified in 4.3 e).

191 The following tests shall be carried out at room temperature within 30 min after the test
192 procedure

- 193 a) Visual inspection as specified in IEC 61810-7-1. The DUTs shall not show any signs of
194 damage or corrosion. Dimensional checks are not required.
- 195 b) functional test as specified in IEC 61810-7-7. The DUTs shall respond to each functional
196 test step with its intended contact state for each defined voltage step.
- 197 c) insulation resistance measurement between all contacts and the DUT shall be done acc. to
198 IEC 61810-7-5 with measurement time of 60 sec.

199 In addition, the measurement of the contact resistance acc. to IEC 61810-7-6 before and after
200 the test may give indications on internal moisture content due to condensation. However, as
201 the condensation distribution is not known, the measurement shall be done on a larger number
202 of specimen, preferably at least 10 pieces, to achieve a statistical evidence. If such an
203 evaluation is carried out, the DUT terminals shall be powered with low current load to avoid self
204 heating, refer to IEC 61810-7-6 maximum values for the applicable contact load category.

205

206 5.2 Method 2: Over-Energization at room temperature

207 None of the insulation resistance readings as specified in IEC 61810-7-5 during the 30 s
208 intervals shall be lower than the value as specified in 4.3 e).

209

210