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oSIST prEN IEC 61810-7-18:2023
01-september-2023

Električni releji - Preskusi in meritve - 7-18. del: Toplotna upornost tuljave

Electrical relays - Tests and Measurements - Part 7-18: Thermal resistance of the coil

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Ta slovenski standard je istoveten z: prEN IEC 61810-7-18:2023

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COMMITTEE DRAFT FOR VOTE (CDV)

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IEC TC 94 : ELECTRICAL RELAYS	
SECRETARIAT: Austria	SECRETARY: Mr Bernhard Spalt
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 121, SC 121A	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 type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
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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. https://standards.iteh.ai/catalog/standards/sist/085d91d6-22d7-481e-aed4-41c1-61810-7-18-2023 The CENELEC members are invited to vote through the CENELEC online voting system.	

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TITLE:

Electrical relays – Tests and Measurements – Part 7-18: Thermal resistance of the coil

PROPOSED STABILITY DATE: 2026

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Electrical Relays –
Testing and Measurements**
Part 7-18: Thermal resistance of the coil

FOREWORD

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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
94/811/CD	94/872/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 – Testing and Measurements

Part 7-18: Thermal resistance of the coil

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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 determine the thermal resistance of the relay coil.

91 **2 Normative references**

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

96 IEC 60028, *International standard of resistance for copper*

97 IEC 61810-7-0, *Electrical Relays – Tests and measurements - Part 7-0: Testing - General and*
98 *Guidance*

99 **3 Terms and definitions**

100 Clause 3 of IEC 61810-7-0 is applicable.

101 **3.1**

102 **thermal resistance**

103 quotient of the temperature rise of the relay coil by the input power, measured after a period
104 long enough to reach thermal equilibrium

105 The abbreviation for the thermal resistance is R_{th} .

106 [IEV 444-02-17]

107 Note – The thermal resistance usually is given in kelvins per watt.

108

109 4 Test procedure

110 4.1 Thermal resistance of the coil

111 4.1.1 Purpose

112 To determine whether the thermal resistance of the relay coil is within the specified limits.

113 NOTE The Thermal resistance is a heat property and a measurement of a temperature difference by which an
114 object or material resists a heat flow. In conjunction with the heating test this support the understanding of the heat
115 generation of the relay. For any limit the heating test is the only evaluation method.

116 4.1.2 Procedure

117 The relay shall be assembled and mounted according IEC 61810-7-10 Annex A or as specified
118 by the manufacturer. The relay shall be energized successively at four values approximately
119 equally distributed throughout its operative range, and the temperature rise shall be determined
120 for each of them after thermal equilibrium has been reached. All measurements shall be made
121 at a constant ambient temperature and the relay shall be protected from draughts, solar
122 irradiation and the like.

123 The temperature rise shall, for coils made of one or material, be calculated by the formula:

$$124 \Delta t_w = \frac{R_w - R_a}{R_a} \left(t_a + \frac{1}{\alpha_0} \right) [\text{K}]$$

125 where

126 Δt_w is the average temperature rise;

127 R_w is the resistance of the coil in thermal equilibrium;

128 R_a is the resistance of the coil at ambient temperature;

129 t_a is the ambient temperature;

130 α_0 is the temperature coefficient of the resistivity of the conductor material at 0 °C.

131 This formula can be held valid for temperatures between 0 °C and 120 °C.

132 For copper

$$133 \alpha_0 = \frac{1}{234,5} [\text{K}^{-1}]$$

134 NOTE For other wire materials the factor shall chosen accordingly.

135 From the temperature rise, the thermal resistance is calculated by the formula:

$$136 R_{th} = \frac{\Delta t_w}{P_w} [\text{K/W}]$$

137 where

138 R_{th} is the abbreviation for the thermal resistance.

139 P_w is the value of the power supplied to the coil at thermal equilibrium.

140 The value to be compared with the specified value is, unless otherwise prescribed by the
141 manufacturer, the average of the results of the four measurements.

142 **4.1.3 Conditions to be specified**

143 The conditions to be specified are the following:

- 144 a) mounting of the relay;
- 145 b) connection dimensions in line with table 5 of IEC 61810-7-0;
- 146 c) energization values if other than four values equally distributed throughout the operative
147 range;
- 148 d) temperature coefficient of the conductor material, if other than electrolytic copper;
- 149 e) evaluation procedure if other than the average value of four measurements is required;
- 150 f) limits of thermal resistance.

151 **5 Evaluation**

152 The thermal resistance is a design/relay typical number for further use in conjunction with
153 thermal considerations of PCB's, controls and similar.

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155 **Annex T**
156 **(normative)**

157 **Test report**
158

159 The Test report shall consist the following:

- 160 • Description of test specimen;
- 161 • Used sizes of the connection wires;
- 162 • Temperature coefficient of the resistivity of the conductor material;
- 163 • All measurement value
 - 164 ○ Δt_w is the average temperature rise;
 - 165 ○ R_w is the resistance of the coil in thermal equilibrium;
 - 166 ○ R_a is the resistance of the coil at ambient temperature;
 - 167 ○ t_a is the ambient temperature;
- 168 • The thermal resistance result.

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