



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 61810-7-6:2023**  
**01-november-2023**

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**Električni releji - Preskusi in meritve - 7-6. del: Upornost kontaktnega tokokroga (ali napetostni padec)**

Electrical relays - Tests and Measurements - Part 7-6: Contact-circuit resistance (or voltage drop)

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Relais électriques - Essais et mesurages - Partie 7-6: Résistance (ou chute de tension) du circuit de contact

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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.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
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TITLE:

**Electrical relays - Tests and Measurements - Part 7-6: Contact-circuit resistance (or voltage drop)**

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## CONTENTS

1		
2		
3	FOREWORD.....	- 3 -
4	1 Scope.....	- 5 -
5	2 Normative references .....	- 5 -
6	3 Terms and definitions .....	- 5 -
7	4 Test procedure .....	- 5 -
8	4.1 Elementary relays .....	- 5 -
9	4.1.1 Purpose .....	- 5 -
10	4.1.2 Procedure .....	- 6 -
11	4.1.2.1 Measurement details .....	- 6 -
12	4.1.2.2 Test current and voltage .....	- 6 -
13	4.1.2.3 Measuring Cycles .....	- 7 -
14	4.1.2.3.1 Measurement with direct current .....	- 7 -
15	4.1.2.3.2 Measurement with alternating current .....	- 7 -
16	4.1.3 Conditions to be specified.....	- 7 -
17	4.2 Reed relay.....	- 8 -
18	4.2.1 Purpose .....	- 8 -
19	4.2.2 Procedure.....	- 8 -
20	4.2.3 Conditions to be specified .....	- 10 -
21	5 Evaluation .....	- 10 -
22	5.1 Elementary relay .....	- 10 -
23	5.2 Reed relay.....	- 11 -
24	Annex T (informative) Test report .....	- 12 -
25	a) Test standard, edition (test procedure) .....	- 12 -
26	Bibliography .....	- 13 -
27		
28	Figure 1 – Time definitions .....	- 9 -
29	Figure 2 – Sequence of contact-circuit resistance measurement .....	- 10 -
30		
31	Table 1 – Test current and voltage .....	- 7 -
32		
33		
34		
35		

36 INTERNATIONAL ELECTROTECHNICAL COMMISSION

37 **Electrical relays – Tests and Measurements –**

38 **Part 7-6: Contact-circuit resistance (or voltage drop)**

39 **FOREWORD**

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

73 **This document is a CDV based on the observations of CC files on 94\_846e\_CD. The red text has**  
 74 **changed from the document of 94\_846e\_CD.**

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

CD	CC
94/846/CD	94/942/CC

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

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

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

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

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

86 • reconfirmed,

87 • withdrawn,

88 • replaced by a revised edition, or

89 • amended.

90

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## 91 Electrical relays – Tests and Measurements –

### 92 Part 7-6: Contact-circuit resistance (or voltage drop)

93

94

#### 95 1 Scope

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

99 The object of this part is to define a standard test method to measure contact-circuit resistance (or  
100 voltage drop).

#### 101 2 Normative references

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

105 IEC 61810-1: 2015/AMD 1:2019, *Electromechanical elementary relays – Part 1: General and*  
106 *safety requirements*

107 IEC 61810-7-0:202X, *Electromechanical elementary relays – Test and measurement – Part 7-0: General*  
108 *and Guidance*

109 **IEC 62246-1:2015, *Reed switches - Part 1: Generic specification***

110 *Secretary note: All normative references will be checked and updated in a later stage.*

#### 111 3 Terms and definitions

112 For the purposes of this document, the terms and definitions given in IEC 61810-1 and  
113 IEC 61810-7-0 apply.

114 ISO and IEC maintain terminological databases for use in standardization at the following  
115 addresses:

- 116 ● IEC Electropedia: available at <http://www.electropedia.org/>
- 117 ● ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 118 4 Test procedure

##### 119 4.1 Elementary relays

###### 120 4.1.1 Purpose

121 Contact-circuit resistance (or voltage drop) test is to check that the resistance (or voltage drop)  
122 across a closed contact remains within specified limits.

## 123 4.1.2 Procedure

### 124 4.1.2.1 Measurement details

125 The resistance (or voltage drop) shall be measured using a four-terminal bridge, by the  
126 voltmeter-ammeter method, or, particularly for dynamic tests, using automatic monitoring  
127 equipment.

128 The contact-circuit resistance shall be measured with AC voltage or DC voltage. AC voltage is  
129 preferred, unless otherwise specified.

130 For AC measurements, the frequency shall be 0,8 kHz to 2 kHz, or as prescribed. If d.c. is  
131 prescribed, the resistance shall be measured for both polarities except for dynamic  
132 testing. Measurement in the same direction is permitted without changing the polarity, provided  
133 they show equivalent test results.

134 The type of measurement shall be as prescribed, and be selected from the following:

135 • static contact resistance measurement denotes that, for each measurement, the contacts  
136 remain closed for an interval sufficient to allow all transients to decay. Three test cycles  
137 shall be made;

138 • dynamic contact resistance measurement denotes that the relay coil is energized by a square  
139 wave, the frequency being as prescribed. A specified number of cycles shall be made, and each  
140 of the cycles shall be monitored. Monitoring shall start after the contact has reached stable  
141 closed condition, or after at least 30 % of the closed part of each cycle has elapsed, whichever is  
142 later. **Any irregularity<sup>1)</sup> in contact-circuit resistance not exceeding a duration of 10 µs shall be  
143 ignored, unless another value is prescribed by the manufacturer, for example 100 µs.**

144 The contact shall not be operated while the measuring voltage is applied, unless otherwise  
145 explicitly stated by the manufacture. The voltage shall be applied after the contacts are closed,  
146 and removed before the contacts are opened.

147 Where the connection points specified in the detail specification are not directly accessible, the  
148 resistance of the cable or wire used shall be subtracted from the measured value. The corrected  
149 value shall be recorded.

150 The coil shall be energized at the rated voltage, unless otherwise specified.

151 There shall be no preconditioning cycle prior to the measurement, unless otherwise explicitly  
152 stated by the manufacture.

153 **During the measurement, any abnormal pressure on the contacts under test and movement of the  
154 test cables shall be avoided.**

155 During an endurance test, checking of contact resistance may be carried out by another method,  
156 for example by checking the voltage drop across the tested contact with the load current flowing  
157 through the contact, **or any other technical equivalent measurement.**

### 158 4.1.2.2 Test current and voltage

159 In order to get the value closer to the actual application, the test current and voltage should  
160 correspond to the actual load conditions.

161 If the test on line can not apply the actual load conditions, the test current and voltage should be  
162 selected according to Table 1.

163 <sup>1)</sup> The non-repetitive transient value considered as irregularity.



164

**Table 1 – Test current and voltage**

Rated contact current A	Maximum test current A	Maximum test voltage V
< 0,01	0,001	0,03
$\geq 0,01 \sim < 0,1$	0,01	0,03
$\geq 0,1 \sim < 1$	0,1	10
$\geq 1 \sim < 30$	1	30
$\geq 30$	20	30

165

**4.1.2.3 Measuring Cycles**

166

**4.1.2.3.1 Measurement with direct current**

167

One measuring cycle consists of:

168

a) application of the voltage;

169

b) measurement with current flowing in one direction;

170

c) measurement with current flowing in the opposite direction (not applicable for measurement in the same direction);

171

172

d) disconnection of the voltage.

173

**4.1.2.3.2 Measurement with alternating current**

174

One measuring cycle consists of:

175

a) application of the voltage;

176

b) making the measurement;

177

c) disconnection of the voltage.

178

Note 1 to entry: Unless otherwise specified, the contact(s) made should not be disturbed between the end of the preceding test and the application of the voltage in this test.

179

180

**4.1.3 Conditions to be specified**

181

The conditions to be specified are the following:

182

a) frequency of the test voltage, if other than 0,8 kHz to 2 kHz;

183

b) type of measurement: steady-state or dynamic operation;

184

c) for dynamic tests, the frequency of the square wave, the number of cycles, and the rated measurement time;

185

186

d) coil voltage value, if other than rated value;

187

e) points of measurement;

188

f) test contact current;

189

g) test contact voltage;

- 190 h) number of **values** for measurement shall be specified in the detailed specification;
- 191 i) evaluation in case of multiple **values**;
- 192 j) maximum contact resistance.

## 193 **4.2 Reed relay**

### 194 **4.2.1 Purpose**

195 The contact-circuit resistance shall not exceed the value prescribed in the detail specification.

### 196 **4.2.2 Procedure**

197 The contact-circuit resistance shall be measured by the 4 point (Kelvin) method at a point 6 mm  
198 from the point of emergence of the termination from the seal, or as prescribed in the detail  
199 specification.

200 The voltage and current applied to the contact circuit shall not exceed 6 V and 1 A AC r.m.s. or  
201 DC unless otherwise prescribed in the detail specification.

202 The frequency of the alternating current shall be in the audio frequency range.

203 The switch shall be saturated magnetically unless otherwise prescribed and the test coil  
204 energization reduced to a value prescribed in the detail specification.

205 The break contact circuit resistance shall be measured without energization of the test coil unless  
206 otherwise specified.

207 The measurement circuit may be connected to the switch at instants 0 or  $t_2$  (see Figure 1) as  
208 prescribed in the detail specification.

209 The measurement circuit shall be disconnected from the switch at the instant  $t_3$  as prescribed in  
210 the detail specification.

211 The measurement of the contact resistance shall be made between instant  $t_2$  and  $t_3$  for the make  
212 contact and between  $t_5$  and  $t_6$  for the break contact, see Figure 2.