

## Test Requirement for Safety Approval

### Verification of electrical characteristics according to IEC60947-7-1

The verification of electrical characteristics includes the following :

- verification of clearances and creepage distances
- dielectric test
- verification of the voltage drop
- temperature-rise test
- short-time withstand current test
- ageing test for screwless-type terminal blocks

#### 8.4.3 Dielectric Test

Each test shall be carried out on five adjacent terminal blocks and then between all terminal blocks connected together and the support to which the terminal blocks are attached.

The test voltage shall be applied first between the adjacent terminal blocks and then between all terminal blocks connected together and the support to which the terminal blocks are attached.

**Table 12A**

**Dielectric test voltage corresponding to the rated insulation voltage**

Rated insulation voltage $U_1$ V	AC test voltage (r.m.s.) V	DC test voltage V
$U_1 \leq 60$	1000	1415
$60 < U_1 \leq 300$	1500	2120
$300 < U_1 \leq 690$	1890	2670
$690 < U_1 \leq 800$	2000	2830
$800 < U_1 \leq 1000$	2200	3110
$1000 < U_1 \leq 1500^{1)}$	-	3820

**Verification of voltage drop**

**The voltage drop shall be verified**

- a) before and after the test of mechanical strength of clamping units
- b) before and after the temperature-rise test
- c) before and after the short-time withstand current test
- d) before, during and after the aging test

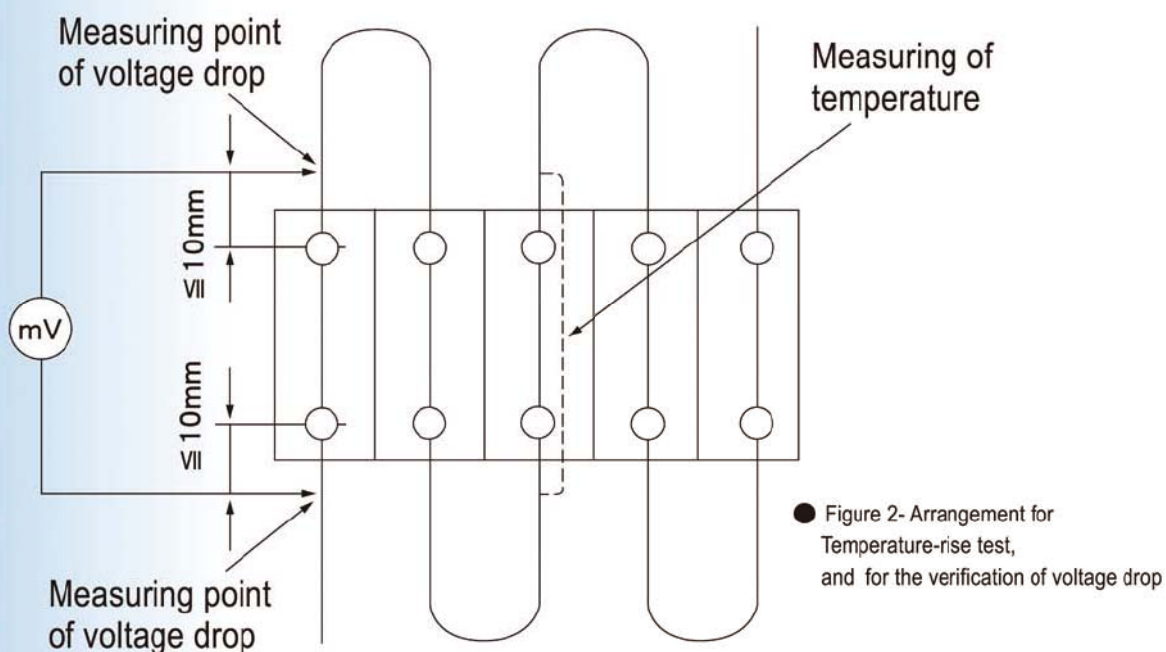
The voltage drop is measured on each terminal block as indicated in figure2. The measurement is made with a direct current of 0.1 times the value given table 4 or table 5.

Before the tests according to a), b), c) and d) above, the voltage drop shall not exceed 3.2mV.

After the tests mentioned above, the voltage drop shall not exceed 150% of the values measured before the test.

**Table 4**  
**Values of test current for temperature-rise test, ageing test**  
**and voltage drop verification for metric wire sizes**

<b>Rated cross-section (mm<sup>2</sup>)</b>	<b>0.2</b>	<b>0.34</b>	<b>0.5</b>	<b>0.75</b>	<b>1</b>	<b>1.5</b>	<b>2.5</b>	<b>4</b>	<b>6</b>	<b>10</b>	<b>16</b>
<b>Test Current (A)</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>9</b>	<b>13.5</b>	<b>17.5</b>	<b>24</b>	<b>32</b>	<b>41</b>	<b>57</b>	<b>78</b>
<b>Rated cross-section (mm<sup>2</sup>)</b>	<b>25</b>	<b>35</b>	<b>50</b>	<b>70</b>	<b>95</b>	<b>120</b>	<b>150</b>	<b>185</b>	<b>240</b>	<b>300</b>	
<b>Test Current (A)</b>	<b>101</b>	<b>125</b>	<b>150</b>	<b>192</b>	<b>232</b>	<b>269</b>	<b>300</b>	<b>353</b>	<b>415</b>	<b>520</b>	



**Table 5**  
**Values of test current for temperature-rise test, ageing test and voltage drop verification for AWG or kcmil wire sizes**

<b>Rated cross-section (AWG)</b>	<b>24</b>	<b>22</b>	<b>20</b>	<b>18</b>	<b>15</b>	<b>14</b>	<b>12</b>	<b>10</b>	<b>8</b>	<b>6</b>	<b>4</b>
<b>Test Current (A)</b>	<b>4</b>	<b>5</b>	<b>8</b>	<b>10</b>	<b>16</b>	<b>22</b>	<b>29</b>	<b>38</b>	<b>50</b>	<b>67</b>	<b>90</b>

<b>Rated cross-section (AWG or MCM)</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>00</b>	<b>000</b>	<b>0000</b>	<b>250</b>	<b>300</b>	<b>350</b>	<b>500</b>	<b>600</b>
							<b>MCM</b>	<b>MCM</b>	<b>MCM</b>	<b>MCM</b>	<b>MCM</b>
<b>Test Current (A)</b>	<b>121</b>	<b>139</b>	<b>162</b>	<b>185</b>	<b>217</b>	<b>242</b>	<b>271</b>	<b>309</b>	<b>353</b>	<b>415</b>	<b>520</b>



### Temperature-rise Test

The voltage drop is measured before the temperature-rise test on each terminal block as indicated in figure 2. The measurement is made with a direct current of 0.1 times the value given table 4 or table 5. Five adjacent terminal blocks connected in series by conductors of the rated cross-section, as shown in figure 2. The conductors shall be tightened with a torque according to table 4 of IEC60947-1. A variation of less than 1 K between any two out of three consecutive measurements made at an interval of 5 min is considered as steady temperature and the temperature rise of the terminal block shall not exceed 45k.

Before the temperature-rise test, the voltage drop shall not exceed 3.2mV and after the test mentioned above, the voltage drop shall not exceed 150% of the values measured before the test.

### Short-time withstand current

The purpose of this test is to verify the ability to withstand a thermal shock.

A terminal block shall be capable of withstanding for 1 second the rated short-time withstand current which corresponds to  $120A/mm^2$  of its rated cross-section. The voltage drop shall be verified after the short-time withstand current test.

## Verification of rated cross-section(special test with gauges)

The test shall be carried out on each clamping unit of one terminal block.

Test for insertability of unprepared round copper conductors having max. cross-section

The test shall be carried out using the appropriate form A or form B in Table 7.

The measuring section of the gauge shall be able to penetrate freely into the terminal aperture to the full depth of the terminal (see also note to Table 7).

**Table 7**  
**Maximum conductor cross-section and corresponding gauges**

Conductor cross-section		Gauge(see figure 2)					
Flexible conductors  mm <sup>2</sup>	Rigid conductors (solid or stranded)  mm <sup>2</sup>	Marking	Form A		Form B		Permissible deviation for a and b  mm
			Diameter a mm	Width b mm	Marking	Diameter a mm	
1.5	1.5	A1	2.4	1.5	B1	1.9	0-0.05
2.5	2.5	A2	2.8	2.0	B2	2.4	
2.5	4	A3	2.8	2.4	B3	2.7	
4	6	A4	3.6	3.1	B4	3.5	0-0.06
6	10	A5	4.3	4.0	B5	4.4	
10	16	A6	5.4	5.1	B6	5.3	
16	25	A7	7.1	6.3	B7	6.9	0-0.07
25	35	A8	8.3	7.8	B8	8.2	
35	50	A9	10.2	9.2	B9	10.0	
50	70	A10	12.3	11.0	B10	12.0	0-0.08
70	85	A11	14.2	13.1	B11	14.1	
85	120	A12	16.2	15.1	B12	16.1	
120	150	A13	18.2	17.0	B13	18.0	
150	185	A14	20.2	19.0	B14	20.0	
185	240	A15	22.2	21.0	B15	22.0	0-0.09
240	300	A16	26.5	24.0	B16	26.0	



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	Barrier Type Terminal Block, model No.
	Illuminated Pushbutton Switch, model No.
	Interface Products, model No.
	Din Rail Terminal Block, model No.
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## Switchlab Inc.

8F., No. 66, Chung Cheng Rd., Hsin Chuang City, Taipei Hsien, 24243, Taiwan

Tel: 886-2-29968270 Fax: 886-2-29966947 E-mail: deca@deca.com.tw



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	2				
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