

## Corrigendum to EN 60439-3:1991

English version

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NOTE This corrigendum includes and replaces the corrigenda April 1994 and December 2005.

Add:

### **Annex ZA** (informative)

#### **A-deviations**

**A-deviation:** National deviation due to regulations, the alteration of which is for the time being outside the competence of the CENELEC member.

This European Standard falls under Directive 2006/95/EC.

NOTE (from CEN/CENELEC IR Part 2:2006 , 2.17) Where standards fall under EC Directives, it is the view of the Commission of the European Communities (OJ No C 59, 1982-03-09) that the effect of the decision of the Court of Justice in case 815/79 Cremonini/Vrankovich (European Court Reports 1980, p. 3583) is that compliance with A-deviations is no longer mandatory and that the free movement of products complying with such a standard should not be restricted except under the safeguard procedure provided for in the relevant Directive.

A-deviations in an EFTA-country are valid instead of the relevant provisions of the European Standard in that country until they have been removed.

<u>Clause</u>	<u>Deviation</u>
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	<b>United Kingdom</b>
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	UK Electricity, Safety and Quality Regulations S.I. 2002 No. 2965 require electricity suppliers to state the maximum prospective short circuit current at the supply terminals.
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	This information is given in Electricity Association publication P25. To meet this condition the following requirements are to be incorporated:
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<b>2.1</b>	<b><i>Additional definition:</i></b>
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	<b>2.1.11 <i>Customer distribution board</i></b>
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	An integrated assembly, for the control and distribution of electrical energy, principally in a household or similar premise, incorporating manual means of double-pole isolation on the incoming circuit(s), with polarity observed throughout. They are designed for use exclusively with specific protective devices on the outgoing circuits, and type-tested for use when energized through the specified 100 amp fuse.
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	NOTE Generally known in the UK as a Consumer unit.
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<u>Clause</u>	<u>Deviation</u>
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<b>8.2</b>	<i>Additional test:</i>
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*8.2.3 Verification of the Assembly Capability to withstand a 16 kA fault*

The following test is applied to customer distribution boards as covered by the definition in 2.1.11.

*8.2.3.1 Test arrangements*

The customer distribution board shall be set up as in normal use. It will be sufficient to test a single functional use if the remaining functional units are constructed in the same way and cannot affect the test result.

*8.2.3.2 Short-circuit test procedure*

The following test procedure is intended to verify the performance of the incoming device and its connections, and any other item in the customer distribution board not separately rated in excess of 16 kA, when the complete customer distribution board is protected by a fuse-link complying with BS 1361:1971. This type test shall be deemed to cover the use of any other short-circuit protective device having a Joule integral ( $I^2 t$ ) and cut-off current not exceeding the values given in item b) below, at the rated voltage, prospective current and power factor.

- a) It shall be verified that the representative samples of the final circuit protective devices used for the test comply with Table 101 and Table 102 where applicable
- b) The reference fuse shall be a 100 A fuse-link complying with type II of BS 1361:1971. Details of the fuse-links used for the test, i.e. manufacturer's name, reference, rated current, rated voltage and pre-arcing ( $I^2 t$ ), shall be given in the test report.
- c) The final circuit protective device shall be mounted as in service in the manufacturer's smallest recommended enclosure (metal if offered in the catalogue). The connection on the load side of the protective device under test shall be in accordance with Table 103 and 0,6 m  $\pm$  0,05 m in length.
- d) The test circuit shall be connected as shown in Figure 101. The relative positions of the closing switch, inductive reactor and resistor are not obligatory, but the resistor shall be in series with the master circuit-breaker.
- e) The impedance used for limiting the prospective short-circuit fault current to the required value shall be inserted on the supply side of the circuit.

Resistors shall be connected between line and neutral, after the impedances for adjusting the prospective current, so as to draw current of 10 A per phase at rated voltage from the supply. If an air-cored inductor is used, a resistor taking approximately 1 % of the current through the inductor shall be connected in parallel with it.

A lower value of shunt current may be used with the consent of the manufacturer

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**Table 101 – Requirements for final circuit protective devices:  
Circuit-breakers complying with BS EN 60898  
and RCBOs complying with BS EN 61009**

Circuit-breaker or RCBO type	Time h	Test current in multiples of rated current ( $I_n$ )	Result
B, C, D	1	1,13	No Trip
	1 <sup>a</sup>	1,45	Trip

NOTE Test to be conducted at specified reference ambient temperature.

<sup>a</sup> This test shall commence within 5 seconds of the end of the test at 1,13  $I_n$ .

**Table 102 – Requirements for final circuit protective devices:  
Semi-enclosed fuses complying with BS 3036 and cartridge fuses  
complying with BS 1361, type 1**

Fuse rating A	Time h	Test current in multiples of rated current ( $I_n$ )	Result
5(6)	0,75	1,0	Fuse intact
15(16)	1,0		
20	1,0		
30(32)	1,25		
45	1,5		
5(6)	0,75	2,0	Fuse melted
15(16)	1,0		
20	1,0		
30(32)	1,25		
45	1,5		

**Table 103 – Cross sections of copper conductors on load side of  
protective device under test**

Device rating A	Conductor mm <sup>2</sup>
< 6	1,0
> 6 < 10	1,5
> 10 < 20	2,5
> 20 < 32	6,0
> 32 < 40	10,0

<u>Clause</u>	<u>Deviation</u>
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### 8.2.3.3 *Circuit conditions*

The applied voltage shall be not less than 100 % and not more than 110 % of the rated single phase voltage of the final circuit protective device. The recovery voltage measured two cycles after operation shall be not less than 95 % nor more than 105 % of the rated single phase voltage of the final circuit protective device, and shall be maintained for at least 30 s after the interruption of the short-circuit current. The higher limit of 105 % may be exceeded with the consent of the manufacturer.

The value of the prospective short-circuit current shall be  $16 \text{ kA} \pm 0 \%$  at a power factor of  $0,6 \pm 0,05$  determined from a calibration oscillogram taken with a link of negligible impedance positioned as shown in Figure 101. All parts of the equipment normally earthed in service, including its enclosure, shall be insulated from earth, but shall be connected to the neutral of the supply or to a substantially inductive artificial neutral, permitting a prospective fault current of at least 100 A.

This connection shall include a reliable device, such as a fuse consisting of a copper wire of 0,1 mm diameter and not less than 50 mm in length for the detection of the fault current and, if necessary, a resistor to limit the value of the prospective fault current to approximately 100 A.

### 8.2.3.4 *Test sequence*

The customer distribution board shall be subject to the following two tests A and B with the outgoing way fitted with a final circuit protective device of the maximum thermal current rating.

If the final circuit protective devices have a short-circuit rating less than 16 kA, two further tests A and B shall be carried out with a device of the minimum thermal rating fitted. In addition, if the customer distribution board is designed to accept different types or ranges of outgoing devices, each type shall be further tested separately.

The two tests are as follows:

- a) Test A. With the circuit connected as described above, with all fuses in place and all circuit-breakers closed, the test voltage is applied with the point-on-wave controlled to provide initiation of the fault at between  $0^\circ$  and  $20^\circ$  (electrical) on the rising voltage.
- b) Test B. A further short-circuit operation shall be applied after suitable preparation as indicated in Table 104 dependent on which of the alternative results of test A is achieved. If circuit-breakers are included in the customer distribution board, the test shall be applied by reclosing a circuit-breaker with the test circuit energized. If fuses are used, the test shall be as in Test A.

During the tests cheesecloth shall be placed on the outside of the enclosure at all openings, e.g. arc vents and handles. There shall be no ignition of the cheesecloth.

The cheesecloth shall be clean and dry bleached plain cotton of approximately 30 g to 40 g per square metre. When placed into position the cheesecloth shall be folded loosely in such a manner that cut and torn edges will not be exposed directly to the arc or flash. Ignition of the cheesecloth is considered to have occurred when a flame is visible. Smouldering is not considered to be evidence of ignition. The cheesecloth may be changed following each test B. Details of the  $I^2 t$  let through by the combination of devices during the test shall be given in the test report. A new customer distribution board of the same design may be used for each of the two test sequences.

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**Table 104 – Preparation for test B**

		Result of test A		
Reference fuse complying with BS 1361		Intact	Blown	
Protective device		Operated		Not operated
Final circuit preparation for test B	Circuit-breaker complying with BS EN 60898 or RCBO complying with BS EN 61009	No action	Replace reference fuse	Replace reference fuse, open circuit-breaker or RCBO
	Fuse complying with BS 3036	Rewire test fuse	Replace reference fuse. Rewire test fuse	Replace reference fuse
	Fuse complying with BS 1361	Replace test fuse	No action	No action

#### 8.2.3.5 Conditions after test

Where the incoming switch is a protective device, the test report shall state which of the protective devices operated during the test, i.e. the incoming and/or outgoing devices.

The earth fault indicating device shall be intact and the degree of protection of the enclosure shall not be impaired. The insulation resistance a) shall be measured within 3 min of the conclusion of the series of tests. The insulation resistance for b) and c) shall be measured as soon as practical after measurement of a), the times of measurement of b) and c) being recorded in the test report. The values shall be measured at 500 V d.c. and shall not be less than the following:

- 0,10 MΩ between the final circuit protective device incoming terminal and the corresponding outgoing terminal, with the isolating device open and with the blown fuse in position or the circuit-breaker or RCBO opened, whichever is applicable.
- 0,25 MΩ between the final circuit protective device terminals and earth, with the final circuit fuse rewired, the final circuit cartridge fuse replaced, or the circuit-breaker or RCBO reclosed, whichever is applicable, and with the incoming isolating device open.
- 0,25 MΩ between the final circuit protective device incoming terminals and any other metal parts which are unearthed and exposed in service.

The condition of the incoming isolating device shall comply with its product specification with regard to isolating properties. The conductors shall not be deformed such that the clearance and creepage distances specified in 7.1.2 are impaired. There shall be no loosening of parts used for the connection of the conductors.

Where an RCD is included in the customer distribution board its operation shall be checked. With the RCD fully closed and connected to a supply at 0,85 times rated voltage  $\pm 5\%$  the test device shall be operated. The RCD shall open.

