

**Automatic electrical controls for household and similar use -  
Part 1: General requirements  
(IEC 60730-1:2010, modified)**

Dispositifs de commande électrique  
automatiques à usage domestique et  
analogue -  
Partie 1: Exigences générales  
(CEI 60730-1:2010, modifiée)

Automatische elektrische Regel- und  
Steuergeräte für den Hausgebrauch und  
ähnliche Anwendungen -  
Teil 1: Allgemeine Anforderungen  
(IEC 60730-1:2010, modifiziert)

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## CENELEC

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

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## Foreword

The text of the International Standard IEC 60730-1:2010, prepared by IEC/TC 72, Automatic controls for household use, together with the common modifications prepared by the Technical Committee CENELEC TC 72, Automatic controls for household use, was submitted to the CENELEC Unique Acceptance Procedure and approved by CENELEC as EN 60730-1:2011.

This document supersedes EN 60730-1:2000 + corr. Aug.2007 + A12:2003 + A1:2004 + A13:2004 + A14:2005 + A16:2007 + corr. Mar.2010 + A2:2008.

The main technical modifications of this European Standard since the above previous edition are listed below:

- changes to the low temperature test requirements for in-line cords;
- revision to the pollution degree for the environment surrounding contacts;
- addition to the use of screwless terminals on printed circuit boards and revisions to creepage distances;
- additions of EN 55011 EMC requirements;
- incorporation of EMC test levels from EN 60335 series;
- additional testing for flexible cords;
- revisions to the requirements for resistance to heat, fire and tracking including replacement of Clause 21 and Annexes F and G;
- new requirements in H.27.1 for first and second fault approach to ensure functional safety;
- incorporation of software techniques from EN 61508-3 in H.11.12;
- updates to the references and bibliography;
- the keyword index was deleted as unnecessary due to the availability of search functions for electronic editions of the standard.

Additionally, this European Standard is the editorial result of the combined texts of EN 60730-1:2000 and its amendments, except where CENELEC common modifications have already been incorporated in IEC 60730-1:2010, together with the deletion of additional ‘in some countries’ paragraphs and ‘under consideration’ paragraphs which have been introduced in IEC 60730-1:2010.

The following dates are fixed:

- |                                                                                                                                                                                            |       |            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------|
| <ul style="list-style-type: none"> <li>– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement</li> </ul> | (dop) | 2012-10-24 |
| <ul style="list-style-type: none"> <li>– latest date by which the national standards conflicting with the EN have to be withdrawn</li> </ul>                                               | (dow) | – *        |

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

\* *Justification for no dow:*

*This European Standard replaces EN 60730-1:2000 and its amendments. However, EN 60730-1:2000 remains valid until all the Part 2's which are used in conjunction with it have been withdrawn. No date of withdrawal (dow) has been given pending the updating of all the Part 2's to align with this EN 60730-1:2011. The applicable date of withdrawal is given in each Part 2. It is intended the dow for this Part 1 will be fixed once all the Part 2's have been updated.*

This Part 1 is to be used in conjunction with the appropriate Part 2 for a particular type of control, or for controls for particular applications. This Part 1 may also be applied, so far as reasonable, to controls not mentioned in a Part 2, and to controls designed on new principles, in which case additional requirements may be necessary.

Subclauses which are additional to those in IEC 60730-1:2010 are numbered 601, 602 etc. Annexes which are additional to those in IEC 60730-1:2010 are prefixed "Z".

Where reference is made to other international or harmonized standards, the edition of that standard quoted in Annex ZA (normative) is applicable.

Special national conditions causing a deviation from this European Standard are listed in Annex ZB (normative) which forms part of this standard.

National deviations from this European Standard are listed in Annex ZC (informative).

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EU Directive 2004/108/EC. See Annex ZZ.

NOTE In this standard the following print types are used:

- Requirements proper: in roman type.
- *Test specifications: in italic type.*
- Explanatory matter: in smaller roman type.

## Endorsement notice

The text of the International Standard IEC 60730-1:2010 was approved by CENELEC as a European Standard with the following common modifications.

### COMMON MODIFICATIONS

#### General common modification valid for the entire document

If an explanatory statement does not start with NOTE, **add** in front of this explanatory statement "NOTE" and **number** it if more than one note is given in the same subclause.

#### Contents

Annexes **Add** the following after Annex U:

Annex ZA (normative) Normative references to international publications with their corresponding European publications

Annex ZB (normative) Special national conditions

Annex ZC (informative) A-deviations

Annex ZD (normative) EMC immunity for controls

Annex ZZ (informative) Coverage of Essential Requirements of EC Directives

Figures **Delete** Figures 25 to 30 and Figures H.3 and H.4.

After Figure R.3, **add** "Figure ZD.1 EMC test framework for controls".

Tables **Delete** Table 2.

In the title of Table 14, **delete** "(this table applies in all countries except Canada, and the USA)."

After Table 14, **add** "Table Z1".

**Delete** Tables 15 to 18, Table 25 and Table H.16.

After Table P.1, **add** the following:

Table ZD.1 – Classification and test overview

Table ZD.2 – Compliance criteria

Table ZD.3 – Test levels for voltage surges

Table ZD.4 – Test levels for burst

Table ZD.5 – Test application for electrical fast transient burst test

Table ZD.6 – Test levels for conducted disturbances on mains, I/O lines and DC power lines

Table ZD.7 – Test levels for electrostatic discharge

Table ZD.8 – Test levels for radiated electromagnetic field on enclosure

Table ZD.9 – Test levels for radiated electromagnetic field on enclosure

Table ZD.10 – Voltage dips (50 Hz / 60 Hz)

Table ZD.11 – Voltage interruption (50 Hz/60 Hz)

# 1 Scope

## 1.1.1 Replace the fourth paragraph by the following:

NOTE 1 Throughout this standard the word "equipment" means "appliance and equipment".

## Replace Note 1 and Note 2 by the following:

NOTE 2 These requirements are referred to by IEC 61810-1:2008, Clause 1.

NOTE 3 This standard is intended to be used for the testing of any stand-alone relay which is intended to be used as a control of an appliance according to IEC 60335-1. It is not intended to be used for any other stand-alone relay, or to replace the IEC 61810 series of standards.

## 1.1.3 Add the following note:

NOTE Starting relays are tested as voltage sensing or current sensing controls.

## 1.5 Add the following normative reference after IEC 60695-10-2:

EN 60730 series, *Automatic electrical controls for household and similar use* (IEC 60730 series)

## Add the following normative reference before CISPR 22:2008:

EN 55016-1:2010 + A1:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus* (CISPR 16-1-1:2010 + A1:2010)

## Add the following normative references after IEC 62326

HD 21.5 S3:1994 + A1:1999 + A2:2001, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5: Flexible cables (cords)* (IEC 60227-5:1979, mod.)

HD 22.4 S4:2004, *Cables of rated voltages up to and including 450/750 V and having cross-linked insulation – Part 4: Cords and flexible cables*

# 2 Definitions

## 2.1.5 Delete Note 2.

## 2.1.15 Delete "(conductive) shield (US)".

## 2.1.16 Delete "(electrically) protective shield (US)".

## 2.1.17 Delete "(electrically) protective shielding (US)".

## 2.2.8 Replace the two last paragraphs by:

NOTE 1 A thermal cut-out may be of the automatic, manual reset or non-resettable type.

NOTE 2 Normally a thermal cut-out will provide a type 2 action.

## 2.7.2 Replace the two last paragraphs by:

NOTE 1 See Annex ZB.

NOTE 2 An earthing terminal is only allowed if it is for continuity or functional (as distinct from protective) purposes.

### 2.7.3 **Replace** the two last paragraphs by:

NOTE 1 See Annex ZB.

NOTE 2 An earthing terminal is only allowed if it is for continuity (as distinct from protective) purposes.

### 2.7.5.3 **Replace** the paragraph by:

NOTE 1 The enclosure of an all-insulated class II control may form a part or the whole of the supplementary insulation or of the reinforced insulation. If a control with double insulation and/or reinforced insulation throughout has an earthing terminal or earthing contact, it is deemed to be of class 0I or class I construction.

NOTE 2 See Annex ZB.

### 2.13.9 **Delete** “Explanatory” in front of the four notes.

### 2.14.2 **Delete** the explanatory paragraph.

## 4 **General notes on tests**

### 4.2.1 **Replace** the first sentence by:

*One sample is used for the tests in Clauses 5 to 11 and 18 to 27 including the relevant annexes.*

**Delete** the third explanatory paragraph.

### 4.3.3.1 **Add** “See Annex ZB.” at the end of the paragraph.

### 4.3.3.3 **Add** “See Annex ZB.” at the end of the paragraph.

## 5 **Rating**

### 5.1 **Add** a new requirement paragraph after the 1<sup>st</sup> paragraph:

The rated voltage of controls, having terminals intended to be directly connected to the supply mains single phase, shall cover usage at 230 V and to the supply mains multi-phase, 400 V.

## 6 **Classification**

### 6.6.1 **Delete** the explanatory paragraph.

### 6.8.2.1 **Add** “(see Annex ZB)” before the semi column.

### 6.8.2.2 **Add** “(see Annex ZB)” before the semi column.

### 6.8.3.1 **Add** “(see Annex ZB)” before the semi column.

### 6.8.3.2 **Add** “(see Annex ZB)” before the semi column.

## 7 Information

Table 1 In Requirement 7, **replace** the wording by "The type of load and rated current <sup>7)</sup>".

In Requirement 19, **delete** <sup>601)</sup>.

In Requirement 23, **add** to the wording "if more than 20 K above  $T_{\max}$ ".

In Requirement 78, **replace** the second column by:

"Table 20 (19.1 of the previous edition), Note 1"

After requirements 91 and 92, **add** the following new requirements:

|     |                                                                                              |        |   |
|-----|----------------------------------------------------------------------------------------------|--------|---|
| 601 | EMC standard/test method                                                                     | 23.1   | X |
| 602 | Declared voltage and declared current for the purposes of EMC emission tests <sup>601)</sup> | 23.1.1 | D |

In Note <sup>4)</sup>, **replace** the text before the table by:

4)  $\alpha_1$  = minimum rising rate

$\beta_1$  = minimum falling rate

The rate of change ( $\alpha_1$  and  $\beta_1$ ) of the activating quantity are those applicable to normal use.

$\alpha_2$  = maximum rising rate (for Type 2 actions only)

$\beta_2$  = maximum falling rate (for Type 2 actions only)

For test purposes,  $\alpha_1$  and  $\beta_1$  shall be as declared but not lower than the limit(s) indicated in the appropriate Part 2s for Type 1 actions and/or Type 2 actions. The values  $\alpha_2$  and  $\beta_2$  are for test purposes only, and may alternatively be declared as a maximum cycling rate. The rates of change for the purpose of this standard shall be expressed in the units as shown in the following table\*:

**Replace Note <sup>7)</sup> by:**

<sup>7)</sup> For each circuit of the control, the type of load and rated current. For controls with more than one circuit it shall be made clear to which circuit or terminal the information applies. For circuits for resistive and inductive loads, the rated current, or the rated load in VA, at power factors as indicated in Table 14 (17.2.1 of the previous edition).

**Replace the text of note <sup>9)</sup> by 'Void'.**

After Note <sup>21)</sup>, **add** the following new note:

<sup>601)</sup> These declarations are intended to cover normal use.

7.4.3 **Replace** the explanatory paragraph by

NOTE See Annex ZB.

7.4.3.2 **Replace** all four explanatory paragraphs by.

NOTE See Annex ZB.

## 8 Protection against electric shock

8.1.1.1 **Delete** the explanatory paragraph (NOTE).

8.3.2.4 **Replace** the first sentence by:

The voltage shall not exceed 34 V peak.

8.4 **Delete** the two explanatory paragraphs.

## 9 Provision for protective earthing

9.1.1 **Add** "See Annex ZB." after the 1<sup>st</sup> paragraph.

9.1.2 **Add** "See Annex ZB." after the 1<sup>st</sup> paragraph.

9.3.2 **Delete** the two explanatory paragraphs and Table 2 (9.3.2 of the previous edition).

9.3.3 **Format** the text as a proper requirement.

9.3.4 **Delete** the explanatory paragraph.

9.5.2 **Delete** the entire subclause.

## 10 Terminals and terminations

Table 3 **Delete** "1)" in the heading row and replace the text of Note <sup>1)</sup> by 'Void'.

10.1.4.2 **Delete** the entire subclause.

10.1.4.3 **Delete** the entire subclause.

10.1.8.3 **Replace** the last sentence as follows:

*The conductor is inserted into the terminal in the position most likely to assist a wire to escape and then the screw is tightened with a torque equal to two-thirds of the torque specified in Table 20 (19.1 of the previous edition).*

10.1.9.1 **Modify** the first sentence by:

*The terminals are fitted with conductors of the smallest and largest nominal cross-sectional areas used in 10.1.4, fixed or flexible, whichever is appropriate, or the more unfavourable and the terminal screws are tightened, the torque applied being equal to two-thirds of the torque specified in Table 20 (19.1 of the previous edition).*

10.1.14 **Delete** the explanatory paragraph.

10.1.16 **Delete** the entire subclause including 10.1.16.1.

10.2.1 **Add** a new requirement paragraph after the 1<sup>st</sup> paragraph:

A terminal or termination is not required if a conductor is permanently connected to the control by the control manufacturer.

Table 6 **Delete** "1)" in the heading row and replace the text of Note <sup>1)</sup> by 'Void'.

## 11 Constructional requirements

11.2.1.1 **Delete** the explanatory paragraph.

11.3.2 **Delete** in the sixth line the word “or”.

**Add** “(7.2 of the previous edition)” after “Table 1” in two places.

11.5 **Delete** the last explanatory paragraph.

11.8.1 **Replace** “60245 IEC 53” by “H05RR-F of HD 22.4”.

**Replace** “60227 IEC 53” by “H05VV-F of HD 21.5”.

Table 10 **Delete** “<sup>1)</sup>” in the heading row and replace the text of Note <sup>1)</sup> by 'Void'.

11.10.3 **Delete** the explanatory paragraph (NOTE).

11.11.1.2 **Delete** all the explanatory paragraphs.

11.11.1.3 **Replace** text by “Void”.

11.11.1.4 **Replace** text by “Void”.

## 12 Moisture and dust resistance

12.1.6 **Delete** the explanatory paragraph.

12.1.6.2 **Replace** the last sentence by:

*The glands and other sealing means are then tightened with a torque equal to two-thirds of that given in Table 20 (19.1 of the previous edition).*

12.3 **Delete**, including subclauses 12.3.1 to 12.3.7.

## 13 Electric strength and insulation resistance

Table 12 In the row for supplementary insulation, in the second column, **add** “ – ”.

In the row for reinforced insulation, in the second column, **add** “ – ”.

In the row for electronic disconnection, in the second column, **add** “100”.

**Replace** the text of note <sup>4)</sup> by 'Void'.

**Add** “See Annex ZB.” to note <sup>10)</sup>.

**Delete** “<sup>14)</sup>” in the title and **replace** the text of Note <sup>14)</sup> by 'Void'.

13.3 **Delete** including subclauses 13.3.1 to 13.3.4.

## 14 Heating

14.1.1 **Delete** the explanatory paragraph.

14.4 **Replace** text including the explanatory paragraph by:

All circuits and terminals intended to control external loads shall be loaded as declared in Table 1 (7.2 of the previous edition), requirement 3, such that each circuit or terminal carries that current between 0,9 and 1,1 of its declared rating that will prove most arduous. All controls shall be tested at a voltage between 0,9 and 1,1 times rated voltage but controls that are not sensitive to voltage may be tested at a lower voltage provided that 1,1 times rated current is passed. Internal circuits shall be connected as specified by the manufacturer.

14.6.2 **Add** "(7.2 of the previous edition)" after "Table 1".

Table 13 **Delete** the second sentence of note <sup>1)</sup>.

**Delete** the last two sentences of note <sup>7)</sup>.

After Table 13, **add** the following:

**14.Z1** If the maximum permitted temperature of a winding or core lamination exceeds the value specified for the text described in 14.1 six additional samples shall be subjected to the following tests:

*Moving parts, if any, are locked and a current is passed individually through each winding, this current being such that the temperature of the relevant winding is equal to the maximum temperature measured under the conditions specified in 14.1. This temperature is increased by whichever value is chosen from the following table. The total time during which the current is passed is as indicated in Table Z1 for the temperature increase chosen.*

**Table Z1**

| Temperature increase<br>°C (K) | Total time<br>h |
|--------------------------------|-----------------|
| 0 ± 3                          | p <sup>1)</sup> |
| 10 ± 3                         | 0,5 p           |
| 20 ± 3                         | 0,25 p          |
| 30 ± 3                         | 0,125 p         |

<sup>1)</sup> In general, p equals 8 000 for controls for EN 60335-1 applications.

*The total time is divided into four equal periods, each of them being followed by a period of 48 h during which the control is subjected to a humidity treatment as specified in 12.2. After the final humidity treatment, the insulation shall withstand an electric strength test as specified in Clause 13, the test voltage for the electric strength being, however, reduced to 50 % of the values specified in the table of that clause.*

*Failure of only one of the six samples during the first of the four periods of the test is ignored.*

*If one of the six samples fails during the second, third or fourth period of the test, the remaining five samples are subjected to an additional fifth period of passing current and humidity treatment, followed by an electric strength and insulation resistance test as specified before.*

*Failure of any of the remaining five controls will entail a rejection.*

*The controls are then subjected to the test of 17.8, but only for half the number of cycles specified in that subclause. All controls shall then withstand an electric strength test as specified before.*

NOTE 1 Examples of cases where there may be doubt with regard to the classification of the insulating system of a winding are those cases where well-known insulating materials are used in an unconventional way, where combinations of materials of different temperature classes are used at a temperature higher than that allowed for the lowest class used or where materials are used for which no sufficient experience is available, as may be the case for integral core insulation.

NOTE 2 If it is desired to establish that the insulation system falls within the temperature class claimed by the manufacturer, the winding temperature must be equal to the temperature limit for the class of insulation claimed, increased by the temperature increase chosen from the table.

NOTE 3 The temperature increase chosen from the table should be agreed with the manufacturer.

## 15 Manufacturing deviation and drift

15.1 **Delete** the explanatory paragraph.

## 16 Environmental stress

16.2.1 **Add** "See Annex ZB." at the end of the first dashed paragraph.

**Delete** the explanatory paragraph.

## 17 Endurance

17.1.3 **Add** an explanatory paragraph:

NOTE For the test sequence and conditions of non-resettable thermal cut-outs, see 17.16.

17.1.3.1 **Delete** in the second and fifth dashed paragraphs the text in brackets.

17.2.2 **Replace** the text by:

*The electrical loads to be used are those specified in Table 14 (17.2.1 of the previous edition) at rated voltage  $V_R$ , with this voltage then being increased to  $1,15 V_R$  for the overvoltage test of 17.7 and 17.10.*

17.2.3 **Replace** up to 17.2.3.2 inclusive by "Void".

Table 14 **Delete** the words in brackets at the end of the title.

**Delete** "2)" in the last cell of the last row and **replace** the text of Note 2) by "Void".

**Add** <sup>601)</sup> in the column 'Type of circuit' to the cell for 'Declared specific load' and add the following note to the table:

<sup>601)</sup> For the tests of tungsten filament lamp load the load and test of EN 60669-1:1999, 18.2 and for fluorescent lamp load the load of EN 60669-1:1999, 19.2 shall be used, under the conditions as specified in 17.16 in the relevant Part 2.

Table 15 **Delete.**

Table 16 **Delete.**

17.3.1 **Replace** the last sentence of the third dashed paragraph by:

*If  $T_{min}$  is less than 0 °C, the following additional tests shall be carried out with the switch head maintained between  $T_{min}$  and  $(T_{min} - 5)$  °C:*

*– Controls with Type 1 action – Clauses 16 and 17;*

*– Controls with Type 2 action – Clauses 15, 16 and 17.*

*Three additional samples required.*

17.5.1 **Delete** the explanatory paragraph.

17.6.2 **Delete** the explanatory paragraph.

17.7 **Delete** the words in brackets.

17.7.1 **Delete** the words in brackets.

17.7.3 In the last dash, **add** "(7.2 of the previous edition)" after "Table 1".

17.7.7 **Delete** the explanatory paragraph.

17.8.4.1 **Delete** the explanatory paragraph.

17.10 **Delete** the words in brackets.

17.10.1 **Delete** the words in brackets.

17.10.4 **Delete.**

17.12.5 **Delete.**

17.14 **Delete** the second sentence in the second dashed paragraph.

## **18 Mechanical strength**

18.1.6 **Delete** 18.1.6 to 18.1.6.3 inclusive.

18.2.1 **Delete** “, except as provided in 18.4,”.

18.4 **Replace** by “Void”.

Table 17 **Delete.**

Table 18 **Delete.**

18.4.1 **Delete.**

## 19 Threaded parts and connections

19.1.7 **Replace** “screws” by “threaded parts”.

19.2.4.1 **Delete** the explanatory paragraph.

19.2.5.1 **Delete** the explanatory paragraph.

## 20 Creepage distances, clearances and distances through solid insulation

**Delete** the explanatory paragraph after NOTE 4.

20.1 **Replace** in the fifth line “impulse withstand test” by “impulse voltage test”.

**Replace** in NOTE 2 “impulse test” by “impulse voltage test”.

**Replace** Table 22 except the notes by the following:

| Rated impulse voltage from Table 21 (20.1 of the previous edition) <sup>1)</sup> | Clearances in air up to 2 000 m above sea-level <sup>3)</sup> |      |     |     |                                                 |     |     |     |
|----------------------------------------------------------------------------------|---------------------------------------------------------------|------|-----|-----|-------------------------------------------------|-----|-----|-----|
|                                                                                  | mm                                                            |      |     |     |                                                 |     |     |     |
|                                                                                  | Case A                                                        |      |     |     | Case B<br>(impulse test required – see 20.1.12) |     |     |     |
|                                                                                  | Pollution degree <sup>2)</sup>                                |      |     |     | Pollution degree <sup>2)</sup>                  |     |     |     |
| kV                                                                               | 1                                                             | 2    | 3   | 4   | 1                                               | 2   | 3   | 4   |
| 0,33                                                                             | 0,01                                                          | 0,20 | 0,8 | 1,6 | 0,01                                            | 0,2 | 0,8 | 1,6 |
| 0,50                                                                             | 0,04                                                          |      |     |     | 0,04                                            |     |     |     |
| 0,80                                                                             | 0,10                                                          |      |     |     | 0,1                                             |     |     |     |
| 1,5                                                                              | 0,5                                                           | 0,5  | 0,3 |     | 0,3                                             |     |     |     |
| 2,5                                                                              | 1,5                                                           | 1,5  | 1,5 |     | 0,6                                             | 0,6 |     |     |
| 4,0                                                                              | 3                                                             | 3    | 3   | 3   | 1,2                                             | 1,2 | 1,2 |     |
| 6,0                                                                              | 5,5                                                           | 5,5  | 5,5 | 5,5 | 2                                               | 2   | 2   | 2   |
| 8,0                                                                              | 8                                                             | 8    | 8   | 8   | 3                                               | 3   | 3   | 3   |

20.1.7 **Replace** in the second line “impulse withstand test” by “impulse voltage test”.

**Replace** in the note “impulse test” by “impulse voltage test”.

**21 Resistance to heat, fire and tracking**

21.1 **Delete** the explanatory paragraph.

21.2.7 **Replace** the test specification by:

*Compliance is checked by the tests of Clause G.4 of Annex G, carried out at a voltage corresponding to the PTI value declared for Table 1 (7.2 of the previous edition), requirement 30.*

21.3 **Replace** the existing text by:

The test sequence of 21.2.1 through 21.2.7 applies, preceded by the preconditioning of 21.3.1.

For parts which maintain or retain in position electrical connections the glow-wire test shall be carried-out at a temperature of 850 °C.

21.4 **Delete**, including Table 25.

**23 Electromagnetic compatibility (EMC) requirements - emission**

23.1 **Replace** the first line of the second paragraph by:

*Compliance is checked by one of the following methods as declared by the manufacturer (Table 1 (7.2 of the previous edition), requirement 601) (see also Table H.10 (H.23 of the previous edition)).*

23.1.1 **Add** the following before the first dashed paragraph:

- *the test is conducted at the lowest declared voltage and lowest declared current (Table 1 (7.2 of the previous edition), requirement 602).*

23.1.2 **Replace** the second paragraph by:

*The duration of radio interference is measured by an oscilloscope, or the measuring equipment specified in EN 55016-1-1 but with the capability to measure 20 ms, connected to the control so as to measure the voltage drop across the contacts.*

**24 Components**

24.1.1 In the 1<sup>st</sup> paragraph, **delete** ", 17.2.3.1 and 17.2.3.2".

**27 Abnormal operation**

27.2 **Replace** the title "Burnout test" by "Locked mechanism test".

27.2.1 In the 1<sup>st</sup> paragraph, **delete** ", 17.2.3.1 and 17.2.3.2".

27.2.3.1 **Delete** the explanatory paragraph.

27.5 **Delete** the explanatory paragraph.

## Figures

Figure 14 **Replace** note <sup>7)</sup> by:

<sup>7)</sup> Tabs may have an optional detent for latching. Round dimple detents, rectangular dimple detents and hole detents shall be located in the area bounded by dimensions  $b_1$ ,  $l_3$  and  $l_4$  along the centre line of the tab.

Figure 15 **Delete** the reference ' $t_1$ ', and the words "Flatness tolerance" (in two places).

Figure 25 **Delete**.

Figure 26 **Delete**.

Figure 27 **Delete**.

Figure 28 **Delete**.

Figure 29 **Delete**.

Figure 30 **Delete**.

## Annexes

**Annex C** **Replace** the text by 'Void'.

**Annex D** **Replace** the text by 'Void'.

## Annex H

H.7 In requirement 36, **add** H.2.4.6,' after "11.3.2," in the second column.

In requirement 60, **delete** "H.26.10.4" in the second column.

In requirement 70, **add** "<sup>18)</sup>" in the first column.

H.13.2 **Delete** the row "Across electronic disconnection".

**Add** the following new sentence "Note 11, 12, 13, 15 are under consideration."

**Replace** the text of note <sup>14)</sup> by 'Void'.

H.26.1 After the last paragraph, **add** the following:

For EMC immunity of **operating controls** of **Type 1 action** intended to be used as "**free standing controls, independently mounted and/or in-line cord controls**", the tests of Annex ZD apply instead of those of Clause H.26.

H.26.7 **Replace** by "Void".

H.26.10 **Replace** H.26.10 to H.26.10.5 inclusive, Figure H.3, Figure H.4, Table H.16 and the explanatory paragraph by "Void".

H.27.1.1.3 **Delete** the explanatory paragraph.

H.27.1.1.3a) **Replace** the explanatory paragraph by:

The wrapping tissue paper is specified in ISO 4046:1978 as thin, soft, relatively tough paper, generally intended for packing delicate articles, its substance being between 12 g/m<sup>2</sup> and 25 g/m<sup>2</sup>.

Table H.21 **Delete** the last sentence in note 7).

**Annex J**

J.12.2.1 **Replace** “soon” by “sufficiently soon” in the explanatory paragraph.

J.17.17a) **Replace** in the first dashed line “thermal runaway” by “thermal runaway by increased voltage” and in the second dashed line “overcurrent test” by “thermal runaway by increased current”.

J.17.18.5 **Replace** the title of this subclause by “Thermal runaway by increased voltage”.

J.17.18.6 **Replace** the title of this subclause by “Thermal runaway by increased current”.

**Annex K**

Table K.1 In row for 150 V, **delete** “120/208\*\*” in the second column and “\*\*\*” in the fifth column.  
**Delete** note \* and note \*\*.

Table K.2 In row for 150 V, **delete** “120/208\*\*” in the second column.  
**Delete** note \*.

**Annex T**

T.3.2 **Delete** the note relating to Canada and USA.

**Add** Annexes ZA, ZB, ZC, ZD and ZZ as follows.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

NOTE Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u>                           | <u>Year</u>          | <u>Title</u>                                                                                                           | <u>EN/HD</u>            | <u>Year</u> |
|----------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------|
| IEC 60038 (mod)                              | -                    | IEC standard voltages                                                                                                  | EN 60038                | -           |
| IEC 60065 (mod)                              | 2001                 | Audio, video and similar electronic apparatus - Safety requirements                                                    | EN 60065                | 2002        |
| + corr. August                               | 2002                 |                                                                                                                        | + corr. August          | 2007        |
| + A1 (mod)                                   | 2005                 |                                                                                                                        | + A1                    | 2006        |
| -                                            | -                    |                                                                                                                        | + A11                   | 2008        |
| -                                            | -                    |                                                                                                                        | + A12                   | 2011        |
| IEC 60068-2-75                               | -                    | Environmental testing<br>Part 2-75: Tests - Test Eh: Hammer tests                                                      | EN 60068-2-75           | -           |
| IEC 60085                                    | 2007                 | Electrical insulation - Thermal evaluation and designation                                                             | EN 60085                | 2008        |
| IEC 60099-1                                  | -                    | Surge arresters<br>Part 1: Non-linear resistor type gapped surge arresters for a.c. systems                            | EN 60099-1              | -           |
| IEC 60112<br>+ corr. June<br>+ corr. October | 2003<br>2003<br>2003 | Method for the determination of the proof and the comparative tracking indices of solid insulating materials           | EN 60112                | 2003        |
| IEC 60127-1                                  | 2006                 | Miniature fuses<br>Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links           | EN 60127-1              | 2006        |
| IEC 60227-1                                  | -                    | Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V<br>Part 1: General requirements    | -                       | -           |
| IEC 60227-5 (mod)                            | 1979                 | Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V<br>Part 5: Flexible cables (cords) | HD 21.5 S3 <sup>1</sup> | 1994        |
| -                                            | -                    |                                                                                                                        | + A1                    | 1999        |
| -                                            | -                    |                                                                                                                        | + A2 <sup>2</sup>       | 2001        |
| IEC 60245-1                                  | -                    | Rubber insulated cables - Rated voltages up to and including 450/750 V<br>Part 1: General requirements                 | -                       | -           |

<sup>1</sup> Superseded by EN 50525-2-11 and EN 50525-2-71

<sup>2</sup> HD 21.5 S3 includes A2 to IEC 60227-5.

|                                       |              |                                                                                                                                                                                         |                  |           |
|---------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------|
| IEC 60269-1                           | -            | Low-voltage fuses<br>Part 1: General requirements                                                                                                                                       | EN 60269-1       | -         |
| IEC 60335-1 (mod)<br>+ corr. December | 2001<br>2005 | Household and similar electrical appliances<br>- Safety<br>Part 1: General requirements                                                                                                 | EN 60335-1<br>-  | 2002<br>- |
| -                                     | -            |                                                                                                                                                                                         | + corr. July     | 2009      |
| -                                     | -            |                                                                                                                                                                                         | + corr. May      | 2010      |
| -                                     | -            |                                                                                                                                                                                         | + A11            | 2004      |
| + A1                                  | 2004         |                                                                                                                                                                                         | + A1             | 2004      |
| -                                     | -            |                                                                                                                                                                                         | + corr. January  | 2007      |
| -                                     | -            |                                                                                                                                                                                         | + A12            | 2006      |
| -                                     | -            |                                                                                                                                                                                         | + corr. February | 2007      |
| + A2                                  | 2006         |                                                                                                                                                                                         | + A2             | 2006      |
| + corr. August                        | 2006         |                                                                                                                                                                                         | -                | -         |
| -                                     | -            |                                                                                                                                                                                         | + A13            | 2008      |
| -                                     | -            |                                                                                                                                                                                         | + A14            | 2010      |
| IEC 60364                             | series       | Low-voltage electrical installations                                                                                                                                                    | HD 60364         | series    |
| IEC 60384-14                          | -            | Fixed capacitors for use in electronic equipment<br>Part 14: Sectional specification - Fixed capacitors for electromagnetic interference suppression and connection to the supply mains | EN 60384-14      | -         |
| IEC 60384-16                          | -            | Fixed capacitors for use in electronic equipment<br>Part 16: Sectional specification: Fixed metallized polypropylene film dielectric d.c. capacitors                                    | EN 60384-16      | -         |
| IEC 60384-17                          | -            | Fixed capacitors for use in electronic equipment<br>Part 17: Sectional specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors                          | EN 60384-17      | -         |
| IEC 60417                             | series       | Graphical symbols for use on equipment                                                                                                                                                  | -                | -         |
| IEC 60423                             | -            | Conduit systems for cable management - Outside diameters of conduits for electrical installations and threads for conduits and fittings                                                 | EN 60423         | -         |
| IEC 60529                             | 1989         | Degrees of protection provided by enclosures (IP Code)                                                                                                                                  | EN 60529         | 1991      |
| -                                     | -            |                                                                                                                                                                                         | + corr. May      | 1993      |
| + A1                                  | 1999         |                                                                                                                                                                                         | + A1             | 2000      |
| IEC 60539                             | series       | Directly heated negative temperature coefficient thermistors                                                                                                                            | EN 60539         | series    |
| IEC 60664-1                           | 2007         | Insulation coordination for equipment within low-voltage systems<br>Part 1: Principles, requirements and tests                                                                          | EN 60664-1       | 2007      |
| IEC 60664-3                           | 2003         | Insulation coordination for equipment within low-voltage systems<br>Part 3: Use of coating, potting or moulding for protection against pollution                                        | EN 60664-3       | 2003      |

|                                         |                      |                                                                                                                                                                                                                                                             |                              |                      |
|-----------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------|
| IEC 60695-2-10                          | -                    | Fire hazard testing<br>Part 2-10: Glowing/hot-wire based test methods - Glow-wire apparatus and common test procedure                                                                                                                                       | EN 60695-2-10                | -                    |
| IEC 60695-2-11<br>+ corr. January       | 2000<br>2001         | Fire hazard testing<br>Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products                                                                                                                                 | EN 60695-2-11                | 2001                 |
| IEC 60695-10-2                          | -                    | Fire hazard testing<br>Part 10-2: Abnormal heat - Ball pressure test                                                                                                                                                                                        | EN 60695-10-2                | -                    |
| IEC 60730                               | series               | Automatic electrical controls for household and similar use                                                                                                                                                                                                 | EN 60730                     | series               |
| IEC 60738-1                             | -                    | Thermistors - Directly heated positive temperature coefficient<br>Part 1: Generic specification                                                                                                                                                             | EN 60738-1                   | -                    |
| IEC 60738-1-1                           | -                    | Thermistors - Directly heated positive step-function temperature coefficient<br>Part 1-1: Blank detail specification - Current limiting application - Assessment level EZ                                                                                   | EN 60738-1-1                 | -                    |
| IEC 60947-1                             | 2007                 | Low-voltage switchgear and controlgear<br>Part 1: General rules                                                                                                                                                                                             | EN 60947-1                   | 2007                 |
| IEC 60998-2-2 (mod)                     | -                    | Connecting devices for low-voltage circuits for household and similar purposes<br>Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units                                                          | EN 60998-2-2                 | -                    |
| IEC 60998-2-3 (mod)<br>+ corr. November | 2002<br>2006         | Connecting devices for low-voltage circuits for household and similar purposes<br>Part 2-3: Particular requirements for connecting devices as separate entities with insulation-piercing clamping units                                                     | EN 60998-2-3                 | 2004                 |
| IEC(/TR) 61000                          | series               | Electromagnetic compatibility (EMC)                                                                                                                                                                                                                         | EN 61000                     | series               |
| IEC 61000-3-2<br>+ A1<br>+ A2           | 2005<br>2008<br>2009 | Electromagnetic compatibility (EMC)<br>Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)                                                                                                                  | EN 61000-3-2<br>+ A1<br>+ A2 | 2006<br>2009<br>2009 |
| IEC 61000-3-3                           | 2008                 | Electromagnetic compatibility (EMC)<br>Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection | EN 61000-3-3                 | 2008                 |
| IEC 61000-4-2                           | 2008                 | Electromagnetic compatibility (EMC)<br>Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test                                                                                                                                 | EN 61000-4-2                 | 2009                 |

|                                  |                      |                                                                                                                                                                                                           |                                   |                      |
|----------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------|
| IEC 61000-4-3<br>+ A1            | 2006<br>2007         | Electromagnetic compatibility (EMC)<br>Part 4-3: Testing and measurement<br>techniques - Radiated, radio-frequency,<br>electromagnetic field immunity test                                                | EN 61000-4-3<br>+ A1              | 2006<br>2008         |
| IEC 61000-4-4<br>+ corr. June    | 2004<br>2007         | Electromagnetic compatibility (EMC)<br>Part 4-4: Testing and measurement<br>techniques - Electrical fast transient/burst<br>immunity test                                                                 | EN 61000-4-4                      | 2004                 |
| IEC 61000-4-5<br>+ corr. October | 2005<br>2009         | Electromagnetic compatibility (EMC)<br>Part 4-5: Testing and measurement<br>techniques - Surge immunity test                                                                                              | EN 61000-4-5                      | 2006                 |
| IEC 61000-4-6                    | 2008                 | Electromagnetic compatibility (EMC)<br>Part 4-6: Testing and measurement<br>techniques - Immunity to conducted<br>disturbances, induced by radio-frequency<br>fields                                      | EN 61000-4-6                      | 2009                 |
| IEC 61000-4-8<br>+ A1            | 1993<br>2000         | Electromagnetic compatibility (EMC)<br>Part 4-8: Testing and measurement<br>techniques - Power frequency magnetic<br>field immunity test                                                                  | EN 61000-4-8<br>+ A1 <sup>3</sup> | 1993<br>2001         |
| IEC 61000-4-11                   | 2004                 | Electromagnetic compatibility (EMC)<br>Part 4-11: Testing and measurement<br>techniques - Voltage dips, short<br>interruptions and voltage variations<br>immunity tests                                   | EN 61000-4-11                     | 2004                 |
| IEC 61000-4-13<br>+ A1           | 2002<br>2009         | Electromagnetic compatibility (EMC)<br>Part 4-13: Testing and measurement<br>techniques - Harmonics and interharmonics<br>including mains signalling at a.c. power<br>port, low frequency immunity tests  | EN 61000-4-13<br>+ A1             | 2002<br>2009         |
| IEC 61000-4-28<br>+ A1<br>+ A2   | 1999<br>2001<br>2009 | Electromagnetic compatibility (EMC)<br>Part 4-28: Testing and measurement<br>techniques - Variation of power frequency,<br>immunity test for equipment with input<br>current not exceeding 16 A per phase | EN 61000-4-28<br>+ A1<br>+ A2     | 2000<br>2004<br>2009 |
| IEC 61058-1 (mod)                | -                    | Switches for appliances<br>Part 1: General requirements                                                                                                                                                   | EN 61058-1                        | -                    |
| IEC 61210 (mod)                  | -                    | Connecting devices - Flat quick-connect<br>terminations for electrical copper<br>conductors - Safety requirements                                                                                         | EN 61210                          | -                    |
| IEC 61249                        | series               | Materials for printed boards and other<br>interconnecting structures                                                                                                                                      | EN 61249                          | series               |

<sup>3</sup> EN 61000-4-8 is superseded by EN 61000-4-8:2010, which is based on IEC 61000-4-8:2009.

|                                         |                      |                                                                                                                                                                                                                                                                 |                         |              |
|-----------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------|
| IEC 61558-2-6                           | -                    | Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V<br>Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers | EN 61558-2-6            | -            |
| IEC 61558-2-16                          | -                    | Safety of transformers, reactors, power supply units and similar products for voltages up to 1 100 V<br>Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units                     | EN 61558-2-16           | -            |
| IEC 62326                               | series               | Printed boards                                                                                                                                                                                                                                                  | EN 62326                | series       |
| CISPR 11 (mod)                          | 2009                 | Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement                                                                                                                                  | EN 55011                | 2009         |
| CISPR 14-1<br>+ corr. January<br>+ A1   | 2005<br>2009<br>2008 | Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus<br>Part 1: Emission                                                                                                                                 | EN 55014-1<br>+ A1      | 2006<br>2009 |
| CISPR 16-1-1<br>+ corr. October<br>+ A1 | 2010<br>2010<br>2010 | Specification for radio disturbance and immunity measuring apparatus and methods<br>Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus                                                                                          | EN 55016-1-1<br>+ A1    | 2010<br>2010 |
| CISPR 22 (mod)                          | 2008                 | Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement                                                                                                                                                        | EN 55022                | 2010         |
| ISO 16484-2                             | -                    | Building automation and control systems (BACS)<br>Part 2: Hardware                                                                                                                                                                                              | -                       | -            |
| -                                       | -                    | Cables of rated voltages up to and including 450/750 V and having cross-linked insulation<br>Part 4: Cords and flexible cables                                                                                                                                  | HD 22.4 S4 <sup>4</sup> | 2004         |

<sup>4</sup> Superseded by EN 50525-2-21:2011.

## Annex ZB (normative)

### Special national conditions

**Special national condition:** National characteristic or practice that cannot be changed even over a long period, e.g. climatic conditions, electrical earthing conditions.

NOTE If it affects harmonization, it forms part of the European Standard.

For the countries in which the relevant special national conditions apply these provisions are normative, for other countries they are informative.

| <u>Clause</u> | <u>Special national condition</u>                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.7.2         | <b>Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom</b><br>Class 0 controls are not allowed.                                   |
| 2.7.3         | <b>Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom</b><br>Class 01 controls are not allowed.                                  |
| 2.7.5.3       | <b>Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom</b><br>Class 01 controls are not allowed.                                  |
| 4.3.3.1       | <b>Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom</b><br>Class 0 and Class 01 controls are not allowed.                      |
| 4.3.3.3       | <b>Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom</b><br>Class 0 and Class 01 controls are not allowed.                      |
| 6.8.2.1       | <b>Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom</b><br>Class 0 controls are not allowed.                                   |
| 6.8.2.2       | <b>Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom</b><br>Class 01 controls are not allowed.                                  |
| 6.8.3.1       | <b>Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom</b><br>Class 0 controls are not allowed.                                   |
| 6.8.3.2       | <b>Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom</b><br>Class 01 controls are not allowed.                                  |
| 7.4.3         | <b>United Kingdom</b><br>Add to the requirement:<br><br>Terminals intended exclusively for a live external conductor shall be indicated by the letter 'L'. |

7.4.3.2 **United Kingdom**

Add to the requirement:

The letter 'L' shall not be used except as indicated above.

9.1.1 **Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom**

Class 01 controls are not allowed.

9.1.2 **Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom**

Class 01 controls are not allowed.

Table 12 **Austria, Belgium, Denmark, France, Germany, Italy, Norway and United Kingdom**

Note 10) Class 01 controls are not allowed.

16.2.1 **Finland, Norway and Sweden**

In the first dashed paragraph replace " $(-10 \pm 2) ^\circ\text{C}$ " by " $(-25 \pm 2) ^\circ\text{C}$ ".

## Annex ZC (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 national member.

This European Standard falls under Directives LVD (2006/95/EC), RTTED (1999/5/EC) and EMC (2004/108/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> |
|---------------|------------------|
|---------------|------------------|

|        |                                     |
|--------|-------------------------------------|
| 11.1.2 | <b>Sweden</b> (Ordinance 1991:1290) |
|--------|-------------------------------------|

|  |                                                                                                  |
|--|--------------------------------------------------------------------------------------------------|
|  | Mercury is not allowed in switches and controls, such as level switches, thermostats and relays. |
|--|--------------------------------------------------------------------------------------------------|

|        |                                                        |
|--------|--------------------------------------------------------|
| 11.1.3 | <b>United Kingdom</b> (Statutory Instrument 1768:1994) |
|--------|--------------------------------------------------------|

|  |                         |
|--|-------------------------|
|  | Add to the requirement: |
|--|-------------------------|

|  |                                                                                                                                                    |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------|
|  | These regulations apply to all plugs for domestic use at a voltage of not less than 200 V and in general allow only plugs to BS 1363 to be fitted. |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------|

## Annex ZD (normative)

### EMC immunity for controls

#### ZD.1 Electromagnetic compatibility (EMC) requirements – Immunity

The tests of Annex ZD apply to **operating controls of Type 1 action** intended to be used as “**free standing controls, independently mounted and/or in-line cord controls**” for EMC immunity instead of Clause H.26. See Figure ZD.1.

NOTE 1 Annex ZD may be made applicable to incorporated and/or integrated controls if so requested by their manufacturer.

NOTE 2 For EMC emission, Clause H.23 applies.

EMC test framework for controls

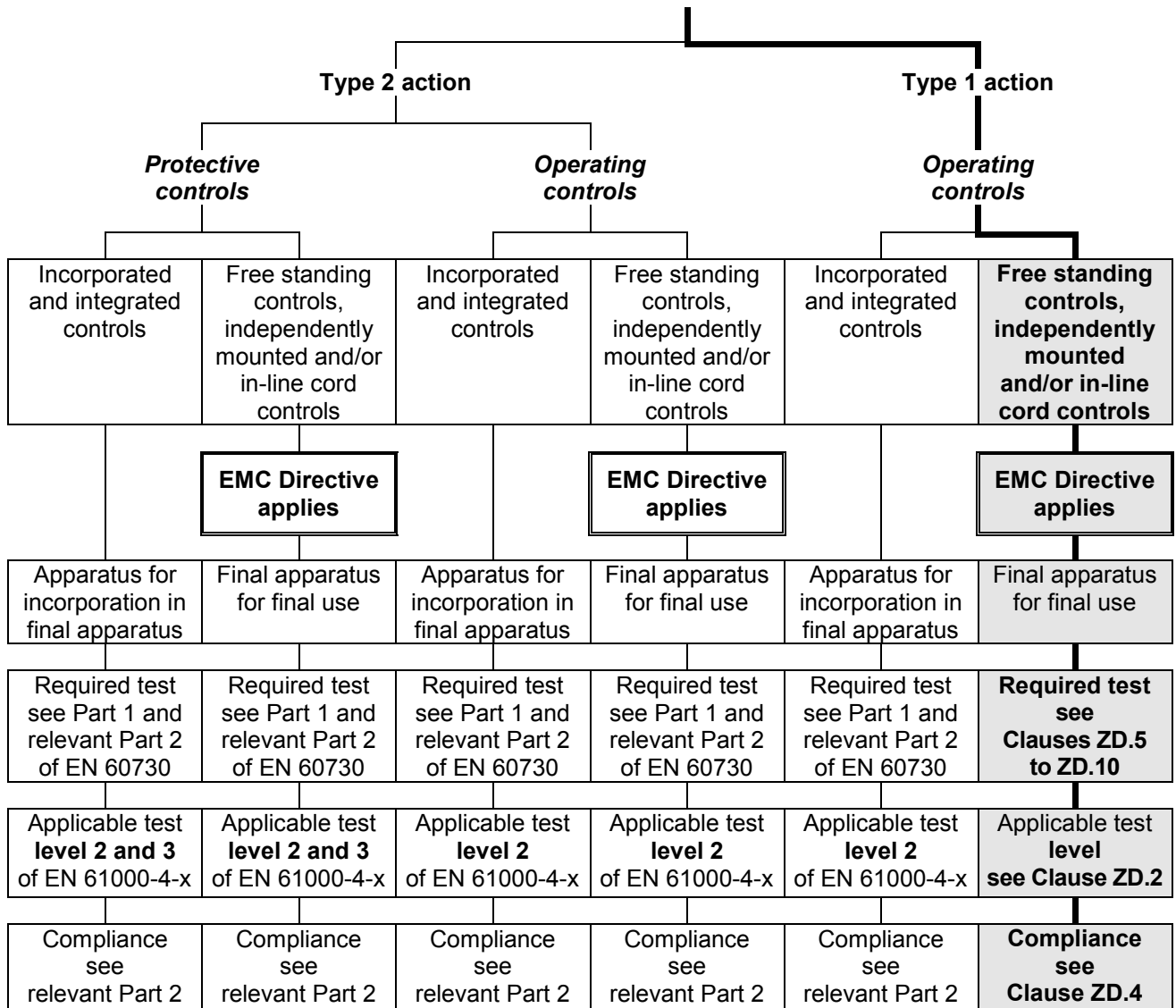


Figure ZD.1 – EMC test framework for controls

## ZD.2 Classification of the control

Table ZD.1 – Classification and test overview

| Control declaration                                                                                                                            | Installation and environmental condition |                |                                                  |                     |                     |                                   |                                                 |                                   |                                   |                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|----------------|--------------------------------------------------|---------------------|---------------------|-----------------------------------|-------------------------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
|                                                                                                                                                | ESD                                      |                | Radiated EMF field                               |                     |                     | Burst                             | Surge                                           | Conducted disturbance             | Power magnetic field              | Voltage dips & interruption        |
|                                                                                                                                                | Environmental class<br>EN 61000-4-2      |                | Environmental class<br>EN 61000-4-3 <sup>d</sup> |                     |                     | Environment class<br>EN 61000-4-4 | Installation class <sup>c</sup><br>EN 61000-4-5 | Environment class<br>EN 61000-4-6 | Environment class<br>EN 61000-4-8 | Environment class<br>EN 61000-4-11 |
| EMC level                                                                                                                                      | Level 2                                  | Level 3        | Level 2                                          | Level 2             | Level 1             | Level 2                           | Class 2                                         | Level 2                           | Level 2                           | Class 2                            |
| Residential <sup>a</sup>                                                                                                                       | Contact dis-charge                       | Air dis-charge | < 1,0 GHz                                        | 1,4 GHz ... 2,0 GHz | 2,0 GHz ... 2,7 GHz | Protected                         | Power and signal cables are well separated      |                                   | Well protected                    |                                    |
| EMC level                                                                                                                                      | Level 2                                  | Level 3        | Level 3                                          | Level 2             | Level 1             | Level 3                           | Class 3                                         | Level 3                           | Level 4                           | Class 3                            |
| Industrial <sup>b</sup>                                                                                                                        | Contact dis-charge                       | Air dis-charge | <1,0 GHz                                         | 1,4 GHz ... 2,0 GHz | 2,0 GHz ... 2,7 GHz | Typical industrial                | Power and signal cables run in parallel         |                                   | Typical industrial                |                                    |
| <sup>a</sup> Residential: Controls are restricted for the use only in residential, commercial and light industrial environment (EN 61000-6-1). |                                          |                |                                                  |                     |                     |                                   |                                                 |                                   |                                   |                                    |
| <sup>b</sup> Industrial: In addition to residential controls are also suitable for industrial environment (EN 61000-6-2).                      |                                          |                |                                                  |                     |                     |                                   |                                                 |                                   |                                   |                                    |
| <sup>c</sup> Installation classes: see Annex R.                                                                                                |                                          |                |                                                  |                     |                     |                                   |                                                 |                                   |                                   |                                    |
| <sup>d</sup> EN 61000-4-20 may be used for small EUT's as defined in EN 61000-4-20:2010, 6.1.                                                  |                                          |                |                                                  |                     |                     |                                   |                                                 |                                   |                                   |                                    |

## ZD.3 Information

Additional items to Table 1 (7.2 of the previous edition):

| Information                                                                                                   | Clause or subclause | Method |
|---------------------------------------------------------------------------------------------------------------|---------------------|--------|
| 603 According to the electromagnetic environment of one of the two EMC levels                                 | ZD.2                | X      |
| 604 EUT to be tested without primary protection, Table ZD.3, note <sup>a</sup> )                              | ZD.5                | X      |
| 605 Cable length up to or equal to 30 m, Table ZD.3, note <sup>b</sup> )                                      | ZD.5                | X      |
| 606 Data line length < 10 m, Table ZD.3, note <sup>c</sup> )                                                  | ZD.5                | X      |
| 607 Test level (= protection level when upstream protection is not in place), Table ZD.3, note <sup>d</sup> ) | ZD.5                | X      |
| 608 Data line length up to and including 3 m, Table ZD.5                                                      | ZD.5                | X      |
| 609 Applicable of test and frequency, Table ZD.9                                                              | ZD.9                | X      |

## ZD.4 Evaluation of compliance

The compliance criteria are given in Table ZD.2 and are based on the operating conditions and the functional specification of the control during and after the test.

Number of test samples: minimum one sample

After the test, the control shall meet the requirements of Clause 8, 17.5 and Clause 20. If, as a result of the application of the tests defined in Annex ZD, the control becomes dangerous or unsafe, the control shall be deemed to have failed the test.

**Table ZD.2 – Compliance criteria**

| Operating conditions                                                                                                                                      | Compliance criteria                                                                                                 |                                                                                                       |                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                           | A                                                                                                                   | B                                                                                                     | C                                                                                                                                                                                                                      |
| Digital inputs/outputs                                                                                                                                    | No deviation on input readings<br>No deviation on output settings<br>(no change of state)                           | No deviation on input readings<br>No deviation on output settings<br>(no change of state)             | Any error, such as a change of state, destruction of data, and loss of a connection is permitted, provided the initial state is restored automatically after the test - Automatic recovery after the test <sup>b</sup> |
| Analogue inputs/outputs                                                                                                                                   | Deviation as declared in the final product specification is permitted <sup>a</sup> .                                | Deviation is permitted during test.                                                                   |                                                                                                                                                                                                                        |
| Display, Monitor                                                                                                                                          | Operation must be possible at reasonable comfort.                                                                   | Deviation is permitted (e.g. display fault, such as flickering)                                       |                                                                                                                                                                                                                        |
| Local operator override / switching                                                                                                                       | No deviation                                                                                                        | Deviation is permitted for analogue values.<br>No change of state for digital values                  |                                                                                                                                                                                                                        |
| Communication ports                                                                                                                                       | No deviation detectable by the user<br>The reduced data transfer rate must be reasonable for the control operation. | Deviation is permitted.<br>Loss of communication during the test<br>Automatic recovery after the test |                                                                                                                                                                                                                        |
| <sup>a</sup> The permissible deviation is with respect to the value without electromagnetic interference. This means that any basic deviation is ignored. |                                                                                                                     |                                                                                                       |                                                                                                                                                                                                                        |
| <sup>b</sup> This compliance criterion is based on the fact that the control operation in the end user application will be unsupervised.                  |                                                                                                                     |                                                                                                       |                                                                                                                                                                                                                        |

## ZD.5 Surge immunity test

The control is mounted as specified in 4.1.1, supplied at rated voltage and operated at representative operating conditions. It is tested in accordance with EN 61000-4-5.

The severity levels for the declared installation class are specified in Table ZD.3.

Repetition rate: maximum 1/min

Polarity: positive (+) and negative (-)

Number of pulses: at least five pulses for each polarity are applied at selected points

Phase angle: 0°, 90°, 180° and 270° versus the phase angle of the ac line voltage to the equipment under test, with a tolerance of  $\pm 10^\circ$

NOTE Most protectors in common use have low average power capabilities, even though their peak power or peak energy handling can deal with high currents. Therefore, the maximum repetition rate (the time between two surges and the recovery time) depends on the built-in protection devices of the EUT.

**Table ZD.3 – Test levels for voltage surges**

| Control declaration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Test levels                                                    |               |                                                                    |                    |                                                       |                  |                                                    |                    |                                                  |                    |                                               |                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------|--------------------------------------------------------------------|--------------------|-------------------------------------------------------|------------------|----------------------------------------------------|--------------------|--------------------------------------------------|--------------------|-----------------------------------------------|------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | kV                                                             |               |                                                                    |                    |                                                       |                  |                                                    |                    |                                                  |                    |                                               |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | AC power supply and AC I/O directly connected to mains network |               | AC power supply and AC I/O not directly connected to mains network |                    | DC power supply and DC I/O directly connected thereto |                  | Unsymmetrical operated circuits/lines <sup>c</sup> |                    | Symmetrical operated circuits/lines <sup>c</sup> |                    | Shielded I/O and shielded communication lines |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Coupling mode                                                  |               | Coupling mode                                                      |                    | Coupling mode                                         |                  | Coupling mode                                      |                    | Coupling mode                                    |                    | Coupling mode                                 |                  |
| EMC Level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | line to line                                                   | line to earth | line to line                                                       | line to earth      | line to line                                          | line to earth    | line to line                                       | line to earth      | line to line                                     | line to earth      | line to line                                  | line to earth    |
| Residential                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0,5                                                            | 1,0           | NA                                                                 | NA                 | NA                                                    | NA               | 0,5                                                | 1,0                | NA                                               | 1,0                | NA                                            | 0,5              |
| Industrial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1,0                                                            | 2,0           | 1,0 <sup>d</sup>                                                   | 2,0 <sup>a d</sup> | 0,5 <sup>e</sup>                                      | 0,5 <sup>e</sup> | 1,0 <sup>b</sup>                                   | 2,0 <sup>a b</sup> | NA                                               | 2,0 <sup>a b</sup> | NA                                            | 2,0 <sup>b</sup> |
| <sup>a</sup> Normally tested with primary protection unless declared otherwise by the manufacturer (Clause ZD.3, requirement 604).<br><sup>b</sup> The test level shall be lowered to the next lower one if the cable length is shorter or equal to 30 m (Clause ZD.3, requirement 605).<br><sup>c</sup> This test is not applicable to interconnection cables used as data lines and a length of up to 10 m (Clause ZD.3, requirement 606).<br><sup>d</sup> If protection is specified upstream from the EUT, the test level should correspond to the protection level when the protection is not in place (Clause ZD.3, requirement 607).<br><sup>e</sup> Not applicable to input ports intended for connection to a battery or a rechargeable battery which must be removed or disconnected from the apparatus for recharging. Apparatus with a DC power input port intended for use with an AC–DC power adaptor shall be tested on the AC power input of the AC–DC power adaptor specified by the manufacturer or, where none is so specified, using a typical AC–DC power adaptor. DC ports, which are not intended to be connected to a DC distribution network are treated as signal ports. |                                                                |               |                                                                    |                    |                                                       |                  |                                                    |                    |                                                  |                    |                                               |                  |

**Compliance criteria:** B (see Table ZD.2)

## ZD.6 Electrical fast transient/burst immunity test

The control is mounted as specified in 4.1.1, supplied at rated voltage and operated at representative operating conditions. It is tested in accordance with EN 61000-4-4.

The severity levels for the declared EMC level are specified in Table ZD.4.

Polarity: positive (+) and negative (-)

Duration: one minute for each polarity

**Table ZD.4 – Test levels for burst**

| Control declaration | Open circuit output test voltage and repetition rate of the impulses |                        |                                                      |                        |
|---------------------|----------------------------------------------------------------------|------------------------|------------------------------------------------------|------------------------|
| EMC level           | On power port, PE                                                    |                        | On I/O (input/output) signal, data and control ports |                        |
|                     | Voltage peak<br>kV                                                   | Repetition rate<br>kHz | Voltage peak<br>kV                                   | Repetition rate<br>kHz |
| Residential         | 1                                                                    | 5                      | 0,5                                                  | 5                      |
| Industrial          | 2                                                                    | 5                      | 1                                                    | 5                      |

**Table ZD.5 – Test application for electrical fast transient burst test**

| AC power supply and control output for direct connection to the supply                                                             |                                                                        | DC power supply and control outputs for direct connection to the supply | Data lines <sup>a</sup> |
|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------|
| Direct application via CDN according to EN 61000-4-4 between the reference ground plane and ...                                    | each power supply line, individually                                   | Capacitive clamp <sup>b</sup>                                           | Capacitive clamp        |
|                                                                                                                                    | the nearest protective earth terminal                                  |                                                                         |                         |
|                                                                                                                                    | to all multiple combinations of power supply lines and also earth line |                                                                         |                         |
| <sup>a</sup> Applicable only to lines longer than 3 m, according to the manufacturer's declaration (Clause ZD.3, requirement 608). |                                                                        |                                                                         |                         |
| <sup>b</sup> Not applicable to lines connected to dedicated non-rechargeable power supplies.                                       |                                                                        |                                                                         |                         |

**Compliance criteria B:** (see Table ZD.2)

## ZD.7 Radio-frequency electromagnetic field immunity

### ZD.7.1 Immunity to conducted disturbances

The control is mounted as specified in 4.1.1, supplied at rated voltage and operated at representative operating conditions. It is tested in accordance with EN 61000-4-6. The complete frequency range being swept at least once.

The severity levels for the declared EMC level are specified in Table ZD.6.

**Table ZD.6 – Test levels for conducted disturbances on mains, I/O lines and DC power lines**

| Control declaration<br><br>EMC level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Frequency ranges: 150 kHz – 80 MHz |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Voltage level (EMF)                |                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | $U_0$<br>dB $\mu$ V                | $U_0$<br>V          |
| Residential                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 130 <sup>a c d</sup>               | 3 <sup>a c d</sup>  |
| Industrial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 140 <sup>a b c</sup>               | 10 <sup>a b c</sup> |
| <sup>a</sup> The test level can also be defined as the equivalent current into a 150 $\Omega$ load.<br><sup>b</sup> Except for the ITU broadcast frequency band 47 MHz to 68 MHz, where the level shall be 3 V.<br><sup>c</sup> For I/O lines only applicable if the total cable length according to the manufacturer's functional specification may exceed 3 m.<br><sup>d</sup> For input and output DC power port lines only applicable if the total cable length according to the manufacturer's functional specification may exceed 3 m. |                                    |                     |

**Compliance criteria A:** (see Table ZD.2)

### ZD.7.2 Electrostatic discharge

The control is mounted as specified in 4.1.1, supplied at rated voltage and operated at representative operating conditions. It is tested in accordance with EN 61000-4-2.

The severity levels for the declared EMC level are specified in Table ZD.7.

Number of discharges for direct: at least 5 discharges in each polarity (+/-)

Number of discharges for indirect horizontal: at least 5 discharges in each polarity (+/-)  
(Horizontal coupling plane) for each position opposite the centre point of the horizontal coupling plane

Number of discharges for indirect vertical: at least 5 discharges in each polarity (+/-)  
(Vertical coupling plane)

**Table ZD.7 – Test levels for electrostatic discharge**

| Control declaration<br><br>EMC level |          | Contact discharge  | Air discharge      |
|--------------------------------------|----------|--------------------|--------------------|
|                                      |          | Test voltage<br>kV | Test voltage<br>kV |
| Residential and Industrial           | Direct   | 4                  | 8                  |
|                                      | Indirect | 4                  | Not applicable     |

**Compliance criteria B:** (see Table ZD.2)

## ZD.8 Immunity to radiated electromagnetic fields

The control is mounted as specified in 4.1.1, supplied at rated voltage and operated at representative operating conditions. It is tested in accordance with EN 61000-4-3. The complete frequency range being swept at least once.

The severity levels for the declared EMC level are specified in Table ZD.8.

**Table ZD.8 – Test levels for radiated electromagnetic field on enclosure**

| Control declaration<br>EMC level | Frequency ranges      |                       |                       |
|----------------------------------|-----------------------|-----------------------|-----------------------|
|                                  | 80 MHz to 1 GHz       | 1,4 GHz to 2 GHz      | 2,0 GHz to 2,7 GHz    |
|                                  | Field strength<br>V/m | Field strength<br>V/m | Field strength<br>V/m |
| Residential                      | 3                     | 3 <sup>a</sup>        | 1 <sup>a</sup>        |
| Industrial                       | 10 <sup>b</sup>       | 3 <sup>a</sup>        | 1 <sup>a</sup>        |

<sup>a</sup> The frequency range has been selected to cover the frequencies with the highest potential risk of a disturbance.

<sup>b</sup> Except for the ITU broadcast frequency bands 87 MHz to 108 MHz, 174 MHz to 230 MHz, and 470 MHz to 790 MHz, where the level shall be 3 V/m.

**Compliance criteria A:** (see Table ZD.2)

## ZD.9 Immunity to power-frequency magnetic fields

This test is only applicable to controls containing devices susceptible to magnetic fields. (e.g. hall-effect devices) and if declared by the manufacturer (Clause ZD.3, requirement 609).

Such a control is supplied at rated voltage and operated at representative operating conditions. It is tested in accordance with EN 61000-4-8.

The severity levels for the declared EMC level are specified in Table ZD.9.

**Table ZD.9 – Test levels for radiated electromagnetic field on enclosure**

| Control declaration<br>EMC level | Power<br>A/m | Frequency<br>Hz      |
|----------------------------------|--------------|----------------------|
| Residential                      | 3            | 50 / 60 <sup>a</sup> |
| Industrial                       | 30           | 50 / 60 <sup>a</sup> |

<sup>a</sup> The test shall be carried out at the frequencies appropriate to the power supply frequency. Equipment intended for use in areas supplied only at one of these frequencies need only be tested at that frequency (Clause ZD.3, requirement 609).

**Compliance criteria A:** (see Table ZD.2)

## ZD.10 Test of the influence of voltage dips and voltage interruption in the power supply network

During the test, the control shall be initially operated at its rated voltage. The control is operated at representative operating conditions.

It is tested in accordance with EN 61000-4-11. The test is only applicable to AC power input ports. The test levels for the declared EMC level are specified in Tables ZD.10 and ZD.11.

**Table ZD.10 – Voltage dips (50 Hz / 60 Hz)**

| Control declaration<br>EMC level | Voltage<br>$\Delta U$ reduction | Duration in periods<br>50 Hz/60 Hz | Compliance criteria<br>(see Table ZD.2) |
|----------------------------------|---------------------------------|------------------------------------|-----------------------------------------|
| Residential and industrial       | 30 %                            | 25/30                              | C                                       |
| Industrial                       | 60 %                            | 10/12                              | C                                       |

NOTE Voltage shift at zero crossing.

**Table ZD.11 – Voltage interruption (50 Hz/60 Hz)**

| Control declaration<br>EMC level | Voltage<br>$\Delta U$ reduction | Duration in periods | Compliance criteria<br>(see Table ZD.2) |
|----------------------------------|---------------------------------|---------------------|-----------------------------------------|
| Residential                      | 100 %                           | 0,5                 | B                                       |
| Residential and industrial       | 100 %                           | 1                   | B                                       |
| Residential and industrial       | 100 %                           | 250/300             | C                                       |

## **Annex ZZ** (informative)

### **Coverage of Essential Requirements of EU Directives**

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers all relevant essential requirements as given in Article 1 of Annex I of the EU Directive 2004/108/EC.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directives concerned.

**WARNING** - Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

## Bibliography

**Replace** reference to IEC 60669-1:2007 by

EN 60669-1:1999 + A1:2002 + A2:2008, *Switches for household and similar fixed-electrical installations – Part 1: General requirements* (IEC 60669-1:1998, mod. + A1:1999, mod. + A2:2006, mod.)

**Add** the following after IEC 60950-1:2005:

EN 61000-4-20:2010, *Electromagnetic compatibility (EMC) – Part 4-20: Testing and measurement techniques – Emission and immunity testing in transverse electromagnetic (TEM) waveguides* (IEC 61000-4-20:2010)

EN 61000-6-1, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments* (IEC 61000-6-1)

EN 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments* (IEC 61000-6-2)

**Add** the following after ISO 527-1:1993:

ISO 4046:1978, *Paper, board, pulp and related terms – Vocabulary*