

BS EN 60730-2-9:2010



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Automatic electrical controls for household and similar use

Part 2-9: Particular requirements for temperature sensing controls

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National foreword

This British Standard is the UK implementation of EN 60730-2-9:2010. It is derived from IEC 60730-2-9:2008. It supersedes BS EN 60730-2-9:2002, which will be withdrawn on 1 November 2013.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags **[C]** **[C]**.

The UK participation in its preparation was entrusted to Technical Committee CPL/72, Electrical control devices for household equipment and appliances.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Amendments/corrigenda issued since publication

Date	Text affected
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**Automatic electrical controls for household and similar use -
Part 2-9: Particular requirements for temperature sensing controls
(IEC 60730-2-9:2008, modified)**

Dispositifs de commande électrique
automatiques à usage domestique et
analogue -
Partie 2-9: Règles particulières pour les
dispositifs de commande thermosensibles
(CEI 60730-2-9:2008, modifiée)

Automatische elektrische Regel- und
Steuergeräte für den Hausgebrauch und
ähnliche Anwendungen -
Teil 2-9: Besondere Anforderungen an
temperaturabhängige Regel- und
Steuergeräte
(IEC 60730-2-9:2008, modifiziert)

This European Standard was approved by CENELEC on 2010-11-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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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 60730-2-9:2008, 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.

A draft amendment was prepared by the Technical Committee CENELEC TC 72, Automatic controls for household use. It was submitted to the Unique Acceptance Procedure.

The combined texts were approved by CENELEC as EN 60730-2-9 on 2010-11-01.

This document supersedes EN 60730-2-9:2002 + A1:2003 + A2:2005 + A11:2003 + A12:2004.

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

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2011-11-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2013-11-01

This Part 2-9 is to be used in conjunction with EN 60730-1:2000, *Automatic electrical controls for household and similar use – Part 1: General requirements*, and any subsequent amendments.

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 EC Directive 2004/108/EC. See Annex ZZ.

Annexes ZA and ZZ have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60730-2-9:2008 was approved by CENELEC as a European Standard with agreed common modifications.

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AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD AND SIMILAR USE –

Part 2-9: Particular requirements for temperature sensing controls

1 Scope and normative references

This clause of Part 1 is applicable except as follows:

1.1 *Replacement:*

This part of IEC 60730 applies to automatic electrical temperature sensing controls for use in, on or in association with equipment for household and similar use, including electrical controls for heating, air-conditioning and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof.

1.1.1 *Replace the explanatory matter with the following new explanatory matter:*

Examples of such controls include boiler thermostats, fan controls, temperature limiters and thermal cut-outs.

Throughout this standard, the word "equipment" includes "appliance" and "control system".

1.1.2 *Replacement:*

This standard also applies to the electrical safety of temperature sensing controls with non-electrical outputs such as refrigerant flow and gas controls.

1.1.3 Not applicable.

Additional subclause:

1.1.101 This standard applies to single operation devices as defined in this standard.

1.5 Normative references

Addition:

☐ EN 60216-1, Electrical insulating materials – Properties of thermal endurance – Part 1: Ageing procedures and evaluation of test results (IEC 60216-1) ☐

IEC 60335 (all parts), *Household and similar electrical appliances – Safety*

IEC 60691:2002, *Thermal links – Requirements and application guide*
Amendment 1 (2006)

IEC 60730-2-4, *Automatic electrical controls for household and similar use – Part 2-4: Particular requirements for thermal motor protectors for motor-compressors of hermetic and semi-hermetic type*

2 Definitions

This clause of Part 1 is applicable except as follows:

2.2 Definitions of types of control according to purpose

2.2.19

operating control

Add, to the definition, the following explanatory paragraph:

In general, a thermostat is an operating control.

2.2.20

protective control

Add, to the definition, the following explanatory paragraph:

In general, a thermal cut-out is a protective control.

Additional definitions:

2.2.101

single operation device

SOD

control having a temperature sensing element which is intended to operate only once and then requires complete replacement

2.2.101.1

bimetallic single operation device

single operation device having a bimetallic temperature sensing element

NOTE 1 A bimetallic single operation device does not reset above a declared temperature (see 11.4.103).

NOTE 2 Requirements for thermal links (which are not allowed to reset) are contained in IEC 60691.

[C] 2.2.101.2

non-bimetallic single operation device

single operation device having a temperature sensing element which is part of a combination action control, the operation of which cannot be separated from other functions of the control and having a non-bimetallic thermal element that operates only once and then requires complete or partial replacement

NOTE 1 When such parts can be tested separately, they are considered to be thermal links within the scope of EN 60691.

NOTE 2 The ageing period and thermal response of the device is dependent on the intended use of the device. As a result, the nature of the testing applicable to the device should be representative of the application conditions for which the protective control is intended (see 7.2).

NOTE 3 Non-bimetallic single operation devices provide the equivalent of micro-disconnection. **[C]**

2.2.101.2.1

rated functioning temperature

T_f

temperature of the sensing element of a non-bimetallic SOD which causes it to change the state of conductivity of the control when measured under specified conditions as declared by the manufacturer

[C] definitions deleted **[C]**

2.2.102

room thermostat

independently mounted or incorporated thermostat intended to control the temperature of habitable space

2.2.103

fan control

automatic temperature sensing control intended to control the operation of a fan or blower

2.2.104

boiler thermostat

thermostat intended to control boiler/liquid temperature

2.2.105

modulating thermostat

thermostat which controls the temperature between two limits by continuously controlling the input to the load

2.2.106

voltage maintained thermal cut-out

thermal cut-out which is maintained in its operated condition by the voltage which appears across it in that condition

2.2.107

agricultural thermostat

a thermostat intended for use in agricultural confinement buildings

2.3 Definitions relating to the function of controls

2.3.14 Additional definition:

2.3.14.101

time factor

transient response of temperature sensing controls by defined change of the activating quantity

2.5 Definitions of types of control according to construction

Additional definitions:

2.5.101

push-and-turn actuation

two-step actuation accomplished by first pushing, then rotating the actuating member of the control

2.5.102

pull-and-turn actuation

two-step actuation accomplished by first pulling, then rotating the actuating member of the control

3 General requirements

This clause of Part 1 is applicable.

4 General notes on tests

4.1 Conditions of test

This clause of Part 1 is applicable except as follows:

4.1.7 Not applicable.

Additional subclauses:

4.1.101 For the purposes of the tests of this standard and unless otherwise indicated, ambient temperature excursions beyond $T_{\max}$ during abnormal operation as a precursor to the operation of a manual reset thermal cut-out or a bimetallic SOD are ignored.

 *Note deleted* 

4.1.102 For manual reset thermal cut-outs and bimetallic SODs which have an operating value above $T_{\max}$, the temperature at the sensing element is raised, as necessary, to achieve any cycling required during the tests.

4.2 Samples required

4.2.1 Addition:

Six samples of bimetallic SODs are used for the test of Clause 15  and a further six for the test of Clause 17. 

Additional samples are required for the tests of Clause 17.

5 Rating

This clause of Part 1 is applicable.

6 Classification

This clause of Part 1 is applicable except as follows:

6.4 According to features of automatic action

6.4.3 Additional subclauses:

6.4.3.101 – for sensing actions, no increase in the operating value as a result of any leakage from the sensing element, or from parts connecting the sensing element to the switch head (Type 2.N);

6.4.3.102 – an action which operates after a declared thermal cycling test as specified in 17.101 (Type 2.P);

In general, thermal cut-outs for specific applications, such as pressurized water heating systems, may be classified as having Type 2.P action.

6.4.3.103 – an action which is initiated only after a push-and-turn or pull-and-turn actuation and in which only rotation is required to return the actuating member to the off or rest position (Type 1.X or 2.X);

6.4.3.104 – an action which is initiated only after a push-and-turn or pull-and-turn actuation (Type 1.Z or 2.Z);

6.4.3.105 – an action which cannot be reset under electrically loaded conditions **[C]** and at temperatures above -20 °C or at a lower temperature if so declared **[C]** (Type 1.AK or 2.AK);

6.4.3.106 – an action which operates after declared agricultural environmental exposures (Type 1.AM or 2.AM).

6.7 According to ambient temperature limits of the switch head

Additional subclauses:

6.7.101 Controls for use in or on cooking appliances.

6.7.102 Controls for use in or on ovens of the self-cleaning type.

6.7.103 Controls for use in or on food-handling appliances.

[C] 6.7.104 Non-bimetallic SOD for incorporation into appliances for heating or employing liquids or steam.

NOTE Not suitable for use in instantaneous water heaters. **[C]**

6.8.3 Modification:

Replace the first paragraph by:

For an in-line cord control, a free standing control, an independently mounted control or a control integrated or incorporated in an assembly utilizing a non-electrical energy source:

6.15 According to construction

Additional subclause:

6.15.101 – controls having parts containing liquid metal.

7 Information

This clause of Part 1 is applicable except as follows:

7.2 Methods of providing information

Table 7.2

Addition:

Information		Clause or subclause	Method
101	Maximum sensing element temperature (other than relevant to Item 105) ¹⁰¹⁾	6.7 6.15 14.101	X
102	Time factor with or without sheath ref.	2.3.14.101 11.101 BB.1.2	X
103	SOD reset temperature (either –35 °C or 0 °C)  (17.15.2.2) 	2.2.101 11.4.103  17.15.2.2 	X
104	Number of cycles for bimetallic single-operation devices with 0 °C reset	17.15.1.3.1	X
105	Maximum sensing element temperature for the test of 17.16.107 (T_e)	6.7.102 17.16.107	D
106	Controls having parts containing liquid metal ¹⁰²⁾	6.15.101 11.1.101 18.102	D
107	Tensile yield strength	11.1.101	X
108	Minimum current for the purpose of the test of 23.101 ¹⁰³⁾	23.101	D
109	$T_{max,1}$ is the maximum ambient temperature in which the control may remain continuously in the operated condition so that Table 14.1 temperatures are not exceeded ¹⁰⁵⁾	14.4.3.1	D
110	Time period, t_1 , is the maximum time during which the ambient temperature can be higher than $T_{max,1}$ after the control has operated ¹⁰⁵⁾	14.4.3.1	D
111	Temperature limit above which automatic reset of a manual reset thermal cut-out or a voltage maintained thermal cut-out shall not occur (not higher than –20 °C)	2.2.105 11.4.106 17.16.104.1 17.16.108	X
112	For Type 2.P controls, the method of test	17.101	X
113	The click rate N or switching operations per minute for the purposes of testing to CISPR 14-1	23	X
114	Rated functioning temperature (T_f)	2.2.101.2.1 17.15.2	C
115	 Ageing temperature for non-bimetallic SOD ¹⁰⁶⁾	17.15.2.2.1 17.15.2.2.2	D
116	Rate of rise of temperature for testing non-bimetallic SOD ¹⁰⁷⁾	17.15.2.2.1 17.15.2.2.2 	D
117	Agricultural thermostat	2.2.107 6.4.3.106 11.4.107 11.6.3.101 Annex DD	D
601	 The minimum voltage at which a voltage maintained thermal cut-out will not reset (this shall not be higher than 0,85 times the minimum rated voltage).	11.4.106 	

NOTES

Additional notes

¹⁰¹⁾ This declaration applies only to temperature sensing controls containing liquid metal. For temperature sensing controls used in or on self-cleaning ovens, this declaration is the temperature for the cooking operation.

¹⁰²⁾  text deleted  Controls using liquid metal are allowed only with a special marking on the control. Documentation (D) shall contain a clear warning of the actual danger that may occur. The following symbol shall be used for marking the control: 

¹⁰³⁾ When no minimum is declared, the test value is 15 mA.

¹⁰⁵⁾ Consideration should be given to the provision of information by the equipment manufacturer relating to the minimum time that the appliance has to be disconnected from the supply to allow a voltage maintained thermal cut-out to reset.

¹⁰⁶⁾ Determined by the control manufacturer based on the opening temperature of the thermal-cut out.

¹⁰⁷⁾ Determined by the control manufacturer referring to the actual maximum rate of rise probable in the projected end-use equipment. 

8 Protection against electric shock

This clause of Part 1 is applicable.

9 Provision for protective earthing

This clause of Part 1 is applicable.

10 Terminals and terminations

This clause of Part 1 is applicable.

11 Constructional requirements

This clause of Part 1 is applicable except as follows:

11.1 Materials

Additional subclause:

11.1.101 Parts containing liquid metal

For controls declared under Item 106 of Table 7.2, parts that contain mercury (Hg), and parts of any control that contain sodium (Na), potassium (K), or both, shall be constructed of metal that has a tensile yield strength at least four times the circumferential (hoop) or other stress on the parts at a temperature 1,2 times the maximum temperature of the sensing element (T_e).

Compliance is checked by inspection of the manufacturer's declaration and by the test of 18.102.

☐ Insulating material used in non-bimetallic SODs as defined in this standard shall comply with the requirements of EN 60216-1:2001 and be suitable for the application. ☐

11.3 Actuation and operation

11.3.9 Pull-cord actuated control

Addition:

The second explanatory paragraph is not applicable to controls classified as Type 1.X or 2.X or Type 1.Z or 2.Z.

11.4 Actions

11.4.3 Type 2 action

Additional subclauses:

11.4.3.101 Capacitors shall not be connected across the contacts of a thermal cut-out.

☐ Note deleted ☐

11.4.3.102 Constructions requiring a soldering operation to reset thermal cut-outs are not permitted.

11.4.13 *Replacement:*

11.4.13 Type 2.K action

Additional subclauses:

11.4.13.101 A Type 2.K action shall be so designed that in the event of a break in the sensing element, or in any other part between the sensing element and the switch head, the declared disconnection or interruption is provided before the sum of the declared operating value and drift is exceeded.

Compliance is checked by breaking the sensing element. The breaking may be achieved by partly pre-cutting or filing through.

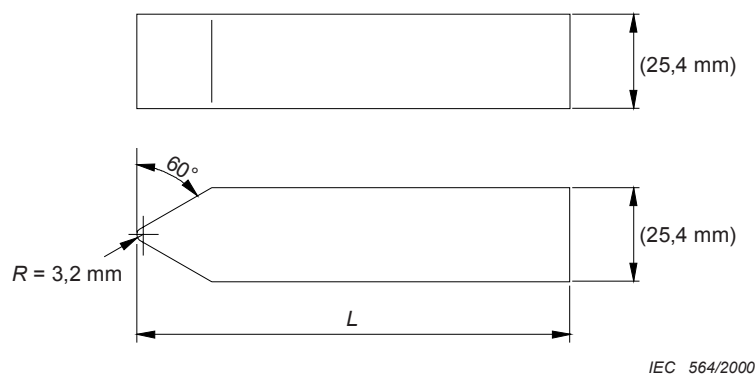
The temperature sensing control is heated to within 10 K of the operating temperature and the temperature then increased at a rate not to exceed 1 K/min. The contacts shall open before the sum of the declared operating value plus drift is exceeded.

11.4.13.102 Type 2.K action may also be achieved by compliance with a), b) or c).

- a) Two sensing elements operating independently from each other and actuating one switched head.
- b) Bimetallic sensing elements with
 - 1) exposed elements attached with at least double spot welding of the bimetal at both of its ends, or
 - 2) elements so located or installed in a control of such construction that the bimetal is not likely to be physically damaged during installation and use.
- c) If the loss of the fluid fill causes the contacts of the control to remain closed or leakage causes upward shift beyond the declared maximum operating temperature, the bulb and capillary of a temperature sensing control which is actuated by a change in the pressure of a fluid confined in the bulb and capillary shall conform to the following.

There shall be no damage to the bulb or capillary to the extent which will permit escape of any of the fill when an impact tool, as illustrated in Figure 11.4.13.102, is dropped once from a height of 0,60 m so that the tapered end of the tool strikes the bulb or capillary in a perpendicular position. For this test, the capillary or the bulb shall be on a concrete surface.

If the capillary is provided with a separate shroud or sleeve, it is to be left in place during the test described above.



Material: Steel, CRS, Break all corners

L to be sized to obtain total mass of 0,454 kg

Figure 11.4.13.102 – Impact tool

Additional subclauses:

11.4.101 Type 2.N action

A Type 2.N action shall be so designed that in the event of a leak in the sensing element, or in any other part between the sensing element and the switch head, the declared disconnection or interruption is provided before the sum of the declared operating value and drift is exceeded.

Compliance is checked by the following test:

The operating value of a Type 2.N control is measured under the conditions of Clause 15 of Part 1. If the control has means for setting, it is set to the highest value.

After this measurement, a hole is artificially produced in the sensing element and the measurement of the operating value is repeated.

No positive drift is allowed above the declared value.

 Note deleted 

11.4.102 Type 2.P action

A Type 2.P action shall be so designed that it operates in its intended manner after a thermal cycling test.

Compliance is checked by the test of 17.101.

11.4.103 Bimetallic single-operation device

A bimetallic single-operation device shall be so designed that it does not reset above the reset value declared in Table 7.2, Item 103.

Compliance is checked by the test of 17.15.

11.4.104 Type 1.X or 2.X

A Type 1.X or 2.X action shall be so designed that a turn action can only be accomplished after the completion of a push action or a pull action. Only rotation shall be required to return the actuating member of the control to the off or rest position.

Compliance is checked by the tests of 18.101.

11.4.105 Type 1.Z or 2.Z

A Type 1.Z or 2.Z action shall be so designed that a turn action can only be accomplished after the completion of a push action or a pull action.

Compliance is checked by the tests of 18.101.

11.4.106 Voltage maintained thermal cut-out (Type 1.AK or Type 2.AK)

A voltage maintained thermal cut-out shall be so designed that it does not automatically reset at any temperature higher than -20 °C or any lower temperature declared in Table 7.2, Requirement 111.

Compliance is checked by the following test which is carried out as part of 17.14:

The voltage maintained thermal cut-out shall be maintained, in an operated condition, at - 20 °C or at any lower temperature declared by the manufacturer in Table 7.2, Requirement 111.

The voltage maintained thermal cut-out is connected to the voltage value declared in Table 7.2, Requirement 601, in series with a resistance of a value which will limit the current through the control to not more than the maximum rated current together with a suitable means to detect resetting of the thermal cut-out.

The test will continue for 1 h. The device shall not reset during this period. 

11.4.107 Type 1.AM or 2.AM

A Type 1.AM or 2.AM action shall be so designed that it operates in its intended manner after the declared agricultural environmental exposures.

Compliance is checked by the tests of Annex DD.

11.6 Mounting of controls

11.6.3 Mounting of independently mounted controls

Additional subclause:

11.6.3.101 For agricultural thermostats declared in Table 7.2, Item 117, the mounting method shall be such that the integrity of the protection by the enclosure is not compromised.

Additional subclause:

11.101 Time factor

If a time factor is declared, this shall be checked by one of the applicable determining methods as indicated in Annex BB. The determined value shall not exceed the rated values. See Table BB.1.

 *Note deleted* 

12 Moisture and dust resistance

This clause of Part 1 is applicable except as follows:

Additional subclauses:

12.101 Refrigeration controls

Controls which have the switch head and sensing element mounted in the evaporator of refrigeration or similar equipment, producing conditions of overtemperature and of freezing and melting, shall maintain insulation integrity.

12.101.1 *Compliance is checked by the following tests.*

12.101.2 *Controls which use a potting compound are given a softening test. Two samples are heated in a heating chamber at 15 K above the maximum declared operating temperature for 16 h with the potting surface in the most unfavourable position. The potting material shall not unduly soften or distort, crack or deteriorate.*

12.101.3 *The two samples used for the softening tests and one untested sample (three total) are placed in water maintained at $(90 \pm 5)^\circ\text{C}$ for 2 h. The three samples are then immediately transferred to water at a temperature of below 5°C and then frozen in a small, flexible container at -35°C for 2 h. Ten heating-freezing cycles are required.*

 *Note deleted* 

12.101.4 *Two consecutive heating-freezing cycles are performed in one working day, and then 10 cycles are completed in five consecutive days, with the samples left in water at room temperature for four overnight periods.*

12.101.5 After the last freezing test, the samples are thawed to approximately room temperature in water and the insulation resistance is measured from current-carrying parts to grounded parts and to the surface of potting and/or insulating material; the direct current voltmeter method is used. Insulation resistance shall be at least 50 000 Ω .

12.101.6 While the samples are still moist, a voltage equal to $(2 \times V_R) + 1\,000\text{ V}$ is applied at rated frequency for 1 min between current-carrying parts and grounded parts and the surface of the potting and/or insulating material. No flashover or breakdown of insulation shall occur during the test.

13 Electric strength and insulation resistance

This clause of Part 1 is applicable.

☐ text deleted ☐

14 Heating

This clause of Part 1 is applicable except as follows:

14.4.3.1 The second paragraph is under consideration.

Addition:

For a voltage maintained thermal cut-out, the heating test of 14.4.3.1 is completed, after which the temperature of the sensing element is raised until the contacts open. At this time, the ambient temperature surrounding the sensing element is reduced to $T_{\max,1}$ in time period t_1 , at a uniform rate. The test of 14.5.1 is then completed.

Table 14.1 Note 13) is under consideration.

Additional subclauses:

14.101 The following is applicable to controls classified under 6.7.101 to 6.7.103 inclusive.

14.101.1 As a means of complying with Note 12) of Table 14.1, if the temperature of insulating parts exceeds that permitted in Table 14.1, then the test of 17.16.101 may be conducted after the conditioning of 14.102 and 14.102.1.

14.102 A previously untested sample of the control is conditioned for 1 000 h in an oven maintained at a temperature between $1,02\ T_1 + 20\text{ K}$ and 1,05 times that temperature where T_1 is the maximum measured temperature on the insulating part during the test of Clause 14. The control shall not be energized during this test.

14.102.1 If the elevated temperature is localized, such as at or near a terminal, the 1 000 h conditioning is conducted with the control between $T_{\max}$ and $T_{\max} + 5\%$ for normal conditions, but with the contacts closed and non-cycling. If necessary, the contacts may be forced closed to provide the most arduous temperature conditions. A bimetal heater across the mains is energized at 1,1 times rated voltage. A series bimetal heater shall conduct at 1,1 times rated current.

15 Manufacturing deviation and drift

This clause of Part 1 is applicable except as follows:

15.1 Addition:

The values of manufacturing deviation and drift shall be according to Annex AA unless otherwise declared by the manufacturer.

The explanatory matter is not applicable.

15.4 Addition:

Alternatively, the declared manufacturing deviation and drift may be expressed separately as a tolerance value to the declared operating value.

15.5.3 Additional subclauses:

15.5.3.101 *Controls intended for setting by the user shall be set at the maximum operating temperature unless otherwise declared by the manufacturer.*

15.5.3.102 *Controls utilizing a bimetallic or similar sensing mechanism or that portion of a control intended to be exposed to a controlled ambient shall be placed in a circulating air oven to determine the operating value.*

15.5.3.103 *For bimetallic and similar type controls, the temperature shall be determined by mounting a 0,25 mm thermocouple wire to the sensing portion of an identical control not electrically connected and mounted adjacent to the control under test in a circulating air oven.*

15.5.3.104 *For fluid expansion type controls, a maximum 0,25 mm thermocouple shall be attached to the sensing portion, using a suitable adhesive.*

15.5.3.105 *For fluid expansion or contraction type controls, the complete control or, if so intended in use, the bulb portion, or that length of a sensing portion of a control declared by the manufacturer as being a minimum sensing dimension shall be placed in either a circulating air oven or a liquid bath.*

15.5.3.106 *The temperature of the oven or bath may be rapidly increased to 10 K below or decreased to 10 K above the expected operating temperature of the control until conditions of equilibrium have been achieved. The rate of temperature change shall then be reduced to a maximum of 0,5 K/min or to the declared rate of change, whichever is the lowest.*

15.5.3.107 *The operation of the control shall be sensed by a suitable device with a sensing current not exceeding 0,05 A.*

The circuit voltage may be any convenient value that will give reliable indication of the function being monitored.

15.5.3.108 *The operating value of the control shall be recorded.*

15.5.3.109  *For SODs, after the contacts have operated, satisfactory disconnection is determined by subjecting each SOD device to the voltage specified in Table 13.2, with no prior humidity treatment.* 

15.5.4 and 15.5.5 Not applicable.

15.5.6 Addition:

Alternatively, the manufacturing deviation shall be according to Annex AA.

16 Environmental stress

This clause of Part 1 is applicable except as follows:

Addition:

⌈C⌋ All controls except bimetallic SODs shall be environmentally conditioned as per Clause 16 of EN 60730-1.⌋C⌋

17 Endurance

This clause of Part 1 is applicable except as follows:

17.3.1 Addition:

- for controls in which the whole control is declared as the sensing element and for which the minimum operating temperature declared in Table 7.2, Item 48, is less than 0 °C, the test of Subclause 17.8 is carried out on a further set of three samples at the minimum declared operating temperature with a tolerance of +5 K, –0 K, the number of cycles being 5 % of the number declared in Table 7.2, Item 27.

17.8.4 Additional subclause:

17.8.4.101 *The number of automatic and manual cycles for independently mounted and in-line cord controls shall be as indicated in Clause CC.1, unless a higher number is declared by the manufacturer.*

⌈C⌋ Note deleted ⌋C⌋

17.15 *This subclause of Part 1 is replaced as follows:*

17.15 Single operation devices

17.15.1 Bimetallic single operation devices

Bimetallic single operation devices shall be subjected to the following tests:

17.15.1.1 *After the appropriate tests of Clause 15, the same six samples shall be maintained at –35 °C or 0 °C as declared in Table 7.2, Item 103, for 7 h. The devices shall not reset during this period, which is determined by the test of 15.5.3.109.*

17.15.1.2 *Six untested bimetallic single operation devices are conditioned for 720 h at a temperature which is the lower of either:*

- 90 % of the declared operating value ± 1 K,
- or (7 ± 1) K below the declared operating value.

17.15.1.2.1 *During this conditioning, the bimetallic single operation device shall not operate. Operation of the bimetallic single operation device shall be detected as indicated in 15.5.3.107.*

17.15.1.2.2 *The appropriate tests of Clause 15 shall be repeated on the six samples subjected to the conditioning of 17.15.1.2 and the temperature measured shall be within the declared deviation limits.*