STANDARDS UPDATE NOTICE (SUN)
ISSUED: February 25, 2019

STANDARD INFORMATION

Standard Number: UL 60730-2-9
Standard Name: Automatic Electrical Controls – Part 2-9: Particular Requirements for Temperature Sensing Controls
Standard Edition and Issue Date: 4th Edition Dated February 14, 2017
Date of Revision: October 13, 2010, August 16, 2013, and February 14, 2017
Date of Previous Revision of Standard: 1st Edition Dated January 17, 2003

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **All products must comply with the 4th edition of UL 60730-2-9 by December 31, 2019**

IMPACT, OVERVIEW, AND ACTION REQUIRED

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revised requirements and which products will require re-evaluation. **NOTE:** Effective immediately, this revised standard will be exclusively used for evaluation of new products unless the Applicant requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revised requirements.

Overview of Changes: Below are changes to the standard that may affect currently listed products.

October 13, 2010:
- Two new classifications were added
- Requirements were added for thermostats used in drip-type coffee makers
- Added requirements for voltage maintained thermal cut-outs
- Endurance tests for DTCM, fan/heat sequencers and SHTPs
- Two new classifications were added

August 16, 2013
- Requirements for non-bimetallic single operation devices

February 14, 2017
- Modification of heating-freezing tests
- Alignment of the EMC requirements in H.26 to those in other part 2 standards
- Addition of requirements in Clause H.27 to cover class B and C control functions of temperature sensing controls

Specific details of new/revised requirements are found in table below.

If the applicable requirements noted in the table are not described in your report(s), these requirements will need to be confirmed as met and added to your report(s) such as markings, instructions, test results, etc. (as required).

Client Action Required:

Information – To assist our Engineer with review of your Listing Reports, please submit technical information in response to the new/revised paragraphs noted in the attached or explain why these new/revised requirements do not apply to your product (s).

Current Listings Not Active? – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.

STANDARD INFORMATION

CLAUSE	VERDICT	COMMENT
		Additions to existing requirements are underlined and deletions are shown lined out below.
		THE FOLLOWING CHANGES REFLECT THE OCTOBER 13, 2010 REVISION
1.1.101DV		The scope was expanded to include specialized applications for temperature sensing devices to reflect current requirements.
2.2.105, 2.2.106, 2.2.107		Adding Modulating thermostat, voltage maintained thermal cut-out and agricultural thermostat
2.2.107ADV – 2.2.107CDV		Nine new definitions were added. Specifically, 2.2.107ADV.1 to 2.2.107ADV.7 relate to characteristics specific to Drip-Type Coffee Makers; 2.2.107BDV and 2.2.107CDV relate to Fan/ Heat Sequencer and Self-heating thermal protectors respectively. These definitions are added to support the requirements in the standard that reflects current practices.
4.2.1DV		Revised the Samples Required section to include self-heating thermal protectors.
6.4.3.105, 6.4.3.106		Features of automatic action
6.7.103ADV.1 and 6.7.103BDV.1		Two new classifications were added. Specifically, 6.7.103ADV.1 and 6.7.103BDV.1 were added to address household drip-type coffee makers and self-heating thermal protectors used in recessed lighting fixtures. These classifications reflect current requirements and practices.
Table 7.2 DV		Requirements were added for thermostats used in drip-type coffee makers, SHTP and fan/heat sequencers based on current practices and requirements.
11.4.106, 11.4.107		Added requirements for voltage maintained thermal cut-outs and Type 1.AM or 2.AM action. Voltage maintained thermal cut-outs are automatic thermostats with a PTC/resistor connected in parallel with the contacts.
14.102ADV		Heating test requirements for SHTP devices. This subsection was added to cover controls classified under 6.7.103BDV.
15.5.6ADV to 15.5.6EDV		Deviation and drift requirements for DTCM, Fan/heat sequencers and SHTP devices.
17.15.2		Requirements for non-bimetallic single operation devices. Strix and Otter controls are examples of manufacturers that have non-bimetallic SODs.
17.16.102ADV – 17.16.102CDV		Endurance tests for DTCM, fan/heat sequencers and SHTPs. These added paragraphs cover the endurance requirements for thermostats for drip-free coffee makers, SHTP and fan/heat sequencers based on current practices and requirements.
17.16.108		Test procedure for Voltage maintained thermal cut-outs

CLAUSE	VERDICT	COMMENT
27.101DV – 27.103DV		Abnormal tests for SHTPs. The overvoltage, thermal cycling and short-circuit tests apply to SHTPs
H.6.18.3DV		Software classes for closed water heater controls based on the functionality
H.26 tests		Tests performed when the control is in the declared condition and when it is not. Also, added H.26.14
Table AA1DV		Maximum tolerances for deviation and drift for certain controls/applications
Annex DD		Replaced/reallocated requirements in Annex 9.DVB to Annex DD for agricultural controls
		THE FOLLOWING CHANGES REFLECT THE AUGUST 16, 2013 REVISION
4	Info	**General notes on tests**
4.2	Info	**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.
6	Info	**Classification**
6.7	Info	**According to ambient temperature limits of the switch head**
6.7.104		The non-bimetallic SODs are limited for use in appliances for heating or employing liquids or steam. It is not suitable for instantaneous water heaters and storage water heaters.
7	Info	**Information**
Table 7.2		**Table 1 - Required information and methods of providing information**

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.	2.3.14.101, 11.101, BB.1.2	X
103 SOD reset temperature (either –35 °C or 0 °C)	2.2.101, 11.4.103, 17.15.2.3	X 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 (Te)	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 Tmax.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, t1, is the maximum time during	14.4.3.1	X

CLAUSE	VERDICT	COMMENT

which the ambient temperature can be higher than Tmax.1 after the control has operated [105)]		
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 (Tf)	2.2.101.2.1, 17.15.2	C
115 ~~Holding temperature (Tc)~~ Ageing temperature for non-bimetallic SOD [106)]	~~2.2.101.2.2~~ 17.15.2.2, 17.15.2.3	D
116 ~~Maximum temperature limit (Tm)~~ Rate of rise of temperature for testing non-bimetallic SOD [107)]	~~2.2.101.2.3~~, 17.15.2.2, 17.15.2.3	D
117 Agricultural thermostat	2.2.107, 6.4.3.106, 11.4.107, 11.6.3.101, Annex DD	D

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)] In China, the use of liquid metal in or on cooking or food-handling equipment is not allowed.
In Germany, 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: ⚠
In Canada, the use of mercury is not allowed.
[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-cutout.
[107)] Determined by the control manufacturer referring to the actual maximum rate of rise probable in the projected end-use equipment.

11	Info	**Constructional requirements**
11.1	Info	**Materials**
11.1.102		Material for non-bimetallic SODs Insulating material used in non-bimetallic SODs as defined in this standard shall comply with the requirements of IEC 60216-1:2001 and be suitable for the application.
16		**Environmental stress** This clause of Part 1 is applicable except as follows: All controls except bimetallic SOD shall be environmentally conditioned as per Clause 16 of IEC 60730-1.
17	Info	**Endurance**

CLAUSE	VERDICT	COMMENT
17.15	Info	**Single operation devices**
17.15.2	Info	Non-bimetallic SODs
17.15.2.1		***New clause added;*** For a non-bimetallic SOD, automatic temperature sensing functions except those for the non-bimetallic part of the control, such as thermostat, temperature limiter and/or the thermal-cutout, shall comply with 17.16.101, 17.16.103 and 17.16.104 respectively. These tests are conducted on separate samples.
17.15.2.2		***New clause added;*** Six untested samples are then to be mounted in a suitable apparatus and the thermal sensing elements are conditioned for an ageing period equal to either 750 h or the result of the specified number of cycles declared by the end product application divided by 4 (calculation value is the number of hours), whichever is greater, at the temperature declared in Table 7.2, item 115, – 5 K. No operation of the SODs shall occur during this ageing period. Operation of the device shall be detected as indicated in 15.5.3.107.
17.15.2.3		***New clause added;*** At the end of the ageing period, the samples are removed from the apparatus. The appropriate tests of Clause 15 shall be repeated on six untested samples and the six samples subjected to the conditioning of 17.15.2.2 and the temperatures measured shall be within the declared deviation limits, with the electrical conditions of the test V Rmax and IRmax. For non-bimetallic SOD's where the sensing element has a declared reset temperature, the SOD's shall be held at the temperature declared in Table 7.2 and the test will continue for 7 h. The device shall not reset during this period as indicated in 15.5.3.109. All samples shall then be subjected to the test of Clause 13, carried out at the temperature limits declared in Table 7.2 requirement 36. NOTE The apparatus used for the tests of 17.15.2.2 and 17.15.2.3 should be constructed so that heat can be applied to the thermal sensing element of the SOD whilst taking care that other parts of the control are protected from exposure to temperatures in excess of their intended use.

CLAUSE	VERDICT	COMMENT
		THE FOLLOWING CHANGES REFELCT THE FEBRUARY 14, 2017 REVISION
1	Info	**Scope**
1.1		Replacement: This standard is applicable to automatic electrical temperature SENSING CONTROLS forming part of a building automation CONTROL SYSTEM within the scope of ISO 16484. This standard also applies to automatic electrical temperature SENSING CONTROLS for equipment that may be used by the public, such as equipment intended to be used in shops, offices, hospitals, farms and commercial and industrial applications. This standard does not apply to automatic electrical temperature SENSING CONTROLS intended exclusively for industrial process applications, unless explicitly mentioned in the relevant equipment standard.
1.1.1		Replacement: This standard applies to the inherent safety, to the OPERATING VALUES, OPERATING TIMES, and OPERATING SEQUENCES where such are associated with equipment safety, and to the testing of automatic electrical temperature SENSING CONTROL devices used in, or in association with, equipment. This standard is also applicable to the functional safety of low complexity safety-related temperature SENSING CONTROLS and SYSTEMS.
1.1.4		Replacement: This standard applies to MANUAL CONTROLS when such are electrically and/or mechanically integral with automatic temperature SENSING CONTROLS.
1.1.5		Replacement: This standard applies to a.c. or d.c. powered temperature SENSING CONTROLS with a rated voltage not exceeding 690 V a.c. or 600 V d.c.
1.1.6		Replacement: This standard does not take into account the RESPONSE VALUE of an AUTOMATIC ACTION of a temperature SENSING CONTROL, if such a RESPONSE VALUE is dependent upon the method of mounting it in the equipment. Where a RESPONSE VALUE is of significant purpose for the protection of the USER, or surroundings, the value defined in the appropriate equipment standard or as determined by the manufacturer shall apply.

CLAUSE	VERDICT	COMMENT
1.1.7		Replacement: This standard applies also to temperature SENSING CONTROLS incorporating ELECTRONIC DEVICES, requirements for which are contained in Annex H and to temperature SENSING CONTROLS using NTC THERMISTORS or PTC THERMISTORS, requirements for which are contained in Annex J.
12	Info	**Moisture and dust resistance**
12.101	Info	**Refrigeration controls**
12.101.3		The two samples used for the softening tests and one untested sample (three total) are placed in water maintained ~~at (90 ± 5) °C~~ between Tmax (maximum declared SWITCH HEAD ambient temperature) and either (Tmax +5) °C or 1,05 times Tmax, whichever is greater for 2 h. The three samples are then immediately transferred to water at a temperature of below 5 °C for 2 h and then frozen in a small, flexible container at ~~–35 °C~~ a temperature between Tmin (minimum declared SWITCH HEAD ambient temperature) and (Tmin –5) °C for 2 h. Ten heating-freezing cycles are required.
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 tested samples shall be left in water at room temperature ~~for four~~ overnight ~~periods~~ after each completed heating-freezing cycle.
14	Info	**Heating**
14.4.3.1.101		Where the whole CONTROL has been declared as the SENSING ELEMENT (see Table 1, requirement 47), the heating test, ~~shall be conducted under the conditions of 14.4.3.1~~ at the request of the manufacturer, need not be conducted until the successful completion of the tests in Clause 17.
15	Info	**Manufacturing deviation and drift**
15.5.6DV		D2 Modification of 15.1 of the Part 2: The values of MANUFACTURING DEVIATION and DRIFT shall be in accordance with Annex AADV.1.
17	Info	**Endurance**
17.16	Info	**Test for particular purpose controls**
17.16.101		Thermostats – 17.14 is applicable for all temperature SENSING CONTROLS. In addition to the criteria stated in 17.14, temperature SENSING CONTROLS specified under 14.4.3.1.101 shall comply with the requirements of Clause 14.

CLAUSE	VERDICT	COMMENT
17.16.102.4		***New clause added;*** The test is conducted on one sample, at 120 % of rated voltage and current, making and breaking for 50 cycles. The sample subjected to above test is further tested for 30 000 cycle endurance test, at rated voltage and current as described in Clause 17.
17.16.102.5		***New clause added;*** The test shall successfully complete the required number of cycles as intended without causing any hazard, and comply with dielectric strength in 13.2.
17.16.103		**Temperature limiters** – 17.14 is applicable for all temperature SENSING CONTROLS. In addition to the criteria stated in 17.14, temperature SENSING CONTROLS specified under 14.4.3.1.101 shall comply with the requirements of Clause 14.
17.16.104		**Thermal cut-outs** – 17.14 is applicable for all CONTROLS. In addition to the criteria stated in 17.14, CONTROLS specified under 14.4.3.1.101, shall comply with the requirements of Clause 14.
Annex G		***New annex added;*** **Heat and fire resistance tests** This annex of Part 1 is applicable except as follows:
G.5.1		**Ball pressure test 1** Replace the first line and first dashed item as follows: Where the whole control has been declared as the SENSING ELEMENT, the temperature in the heating oven is the highest of: – 20 K ± 2 K in excess of the MAXIMUM TEMPERATURE measured during the tests of Clause 14, or Clause 17.14, if the heating test of Clause 14 is not conducted,
G.5.2		**Ball pressure test 2** Replace the first line as follows: Where the whole CONTROL has been declared as the SENSING ELEMENT, the ball pressure test is carried out as described in G.5.1 except that the temperature in the heating oven shall be Tb ± 2 °C where Tb is equal to the higher of: Replace the fourth dashed item as follows:

CLAUSE	VERDICT	COMMENT
		– 20 K in excess of the MAXIMUM TEMPERATURE recorded during the heating test of Clause 14, or 17.14, if the heating test of Clause 14 is not conducted,
Annex H		**Requirements for electronic controls**
H.7		Additional requirements to Table 1:

Information	Clause of subclause	Method
58a Addition: See footnote c of Table H.101 109 Additional item: The output condition of THERMAL CUT-OUTS, type 2 THERMOSTATS and type 2 TEMPERATURE LIMITERS after OPERATION[104]	H.26.2.104 H.26.2.103 ~~H.26.2.104, H.26.2.105,~~ H.26.2.106	X X
119 Frequency of the DEFINED STATE test function	H.27.1.2.2.2, H.27.1.2.3.2, H.27.1.2.3.3	X
120 The CONTROL is for PERMANENT OPERATION or NONPERMANENT OPERATION	H.2.101.1, H.2.101.2, H.27.101.2.2.2, H.27.101.2.3.2	X
Additional note: [104] For example, conducting or non-conducting, as applicable.		

H.27	Info	**Abnormal operation**
H.27.1.1.3		This clause of Part 1 is applicable except item c).
H.27.1.2.2		Class B control function This clause of Part 1 is applicable except as follows:
H.27.1.2.2.2		First fault Replace item b) as follows: b) the CONTROL shall react within the FAULT REACTION TIME (see Table 1, requirement 91) by proceeding to the DEFINED STATE provided that a subsequent restart under the same FAULT conditions results in the SYSTEM returning to the same DEFINED STATE condition; Replace item c) as follows: c) for SYSTEMS with NON-PERMANENT OPERATION, the CONTROL shall continue to operate as intended, the FAULT shall be detected during the next start-up sequence. The compliance criteria shall be a) or b); NOTE Requirements for SYSTEMS with PERMANENT OPERATION are under consideration. Replace item d) as follows:

CLAUSE	VERDICT	COMMENT
		d) the CONTROL shall continue to operate as intended. Replace the last two paragraphs as follows: The FAULT REACTION TIME shall be declared by the manufacturer (see Table 1, requirement 91). For PERMANENT OPERATION as declared by the manufacturer (see Table 1, requirement 120), item c) is under consideration. For the CONTROL function where a mechanical actuator is part of the DEFINED STATE a test up to but not including the switching contacts is sufficient. If the test of the DEFINED STATE fails, the CONTROL shall initiate the SAFETY SHUT-DOWN. Frequency of test is as declared by the manufacturer (see Table 1, requirement 119). Internal FAULTS of the components of the checking circuits are not considered.
H.27.1.2.3		Class C control function This clause of Part 1 is applicable except as follows:
H.27.1.2.3.2		First fault Replace item b) as follows: b) the CONTROL reacting within the FAULT REACTION TIME (see Table 1, requirement 91) by proceeding to DEFINED STATE provided that subsequent reset from the lock-out condition under the same FAULT condition results in the system returning to the DEFINED STATE condition; Replace item c) as follows: c) for SYSTEMS with NON-PERMANENT OPERATION, the CONTROL shall continue to operate as intended, the FAULT shall be detected during the next start-up sequence. The compliance criteria shall be a) or b). NOTE 101 Requirements for SYSTEMS with PERMANENT OPERATION are under consideration. Replace item d) as follows: d) The CONTROL shall continue to operate as intended. Replace the last sentence with the following: The FAULT REACTION TIME shall be declared by the manufacturer (see Table 1, requirement 91).

CLAUSE	VERDICT	COMMENT
		For PERMANENT OPERATION as declared by the manufacturer (see Table 1, requirement 120), item c) is under consideration. For the CONTROL function where a mechanical actuator is part of the DEFINED STATE a test up to but not including the switching contacts is sufficient. If the test of the DEFINED STATE fails, the CONTROL shall initiate the SAFETY SHUT-DOWN. Frequency of test is as declared by the manufacturer (see Table 1, requirement 119). Internal FAULTS of the components of the checking circuits are not considered.
H.27.1.2.3.3		Second fault Replace second sentence and items a) and b) with the following: During assessment, for SYSTEMS with NON-PERMANENT OPERATION, the second FAULT shall only be considered to occur when a start-up sequence has been performed after the first FAULT. For SYSTEMS with PERMANENT OPERATION, the second FAULT occurs 24 h after the first FAULT. Replace the last two sentences with the following: The FAULT REACTION TIME, as well as the applicability of H.27.1.2.3.2 c), shall be as declared by the manufacturer. For the CONTROL function where a mechanical actuator is part of the DEFINED STATE a test up to but not including the switching contacts is sufficient. If the test of the DEFINED STATE fails, the CONTROL shall initiate the SAFETY SHUT-DOWN. Frequency of test is as declared by the manufacturer (see Table 1, requirement 119). Internal FAULTS of the components of the checking circuits are not considered.
		CUSTOMERS PLEASE NOTE: This Table and column “Verdict” can be used in determining how your current or future production is or will be in compliance with new/revised requirements.