

STANDARD INFORMATION

Standard Number: UL 60079-7

Standard Name: Explosive Atmospheres - Part 7: Equipment Protection by Increased Safety 'E'

Standard Edition and Issue Date: 5th Edition Dated February 24, 2017

Date of Revision: February 24, 2017

Date of Previous Revision of Standard: 4th Edition Revised May 31, 2013

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **February 24, 2022**

IMPACT, OVERVIEW, AND ACTION REQUIRED

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revise 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requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revise requirements.

Overview of Changes:

- Addition of terminal insulation material tests
- Soldered Connections
- Degrees of protection provided by enclosures
- Added abnormal tests for discharge lamps
- To maintain T4 temperature class, cathode power or ambient temperature reduced
- Ex Component enclosures
- Thermal stability of solid insulating materials
- Addition of end-of-life tests

Specific details of new/revise 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).

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 – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records.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
		<i>Additions to existing requirements are underlined and deletions are shown lined out below.</i>
4	Info	Constructional requirements
4.2	Info	Electrical connections
4.2.2	Info	Field wiring connections
		<i>New clause added;</i>
		DR Modification of Clause 4.2.2.4, fourth paragraph to replace with the following:
4.2.2.4 DV		<p>A means of securing the cable or conductors to prevent rotation or movement shall be provided to avoid either loosening or compromising creepage and clearance. Alternatively, the certificate number shall include the "X" suffix <u>apparatus shall be marked</u> in accordance with the marking requirements of IEC 60079-0 <u>UL 60079-0</u> and the Specific Conditions of Use listed on the certificate shall detail the provisions for securing the cable or conductors to avoid compromising creepage and clearance, and the provisions to avoid loosening of the connections. If the option to use marking instead of the "X" suffix is employed in accordance with IEC 60079-0 <u>UL 60079-0</u>, this marking may appear on either the exterior or the interior of the connection compartment.</p> <p>NOTE Conductors of greater than 35 mm² can provide sufficient rigidity to avoid compromising creepage and clearance.</p>
		Connections using permanent arrangements
4.2.2.5		<p>These connections are typically individual conductors (flying leads) that are intended to be terminated during installation using appropriate connection methods, see 4.2.1. Either a means of fixing the completed connections to a suitable location is to be provided or the completed connections are to be provided with means of reliably insulating them to the requirements of this standard.</p> <p>If the method of connection is by soldering, a method of providing mechanical support of the completed connection, <u>in addition to the solder</u>, shall be provided. The mechanical support of the connection shall not be permitted to rely solely on the solder.</p>
4.2.3	Info	Factory connections



CLAUSE	VERDICT	COMMENT
4.2.3.3		<p>Permanent connections</p> <p>Permanent connections shall only be made by:</p> <ul style="list-style-type: none"> a) crimping; b) brazing; c) welding; d) soldering, with mechanical support of the completed connection, in addition to the solder, provided; or e) <u>In Level of Protection “ec”, printed circuit board mounted components, including surface-mount and through-hole mount components, without additional mechanical support</u> <p><u>NOTE The process commonly referred to as ‘silver soldering’ is considered ‘brazing’.</u></p>
4.2.3.3DV		<p>DR Modification of Clause 4.2.3.3 to add the following paragraph after the NOTE as follows:</p> <p>Terminals with a rated voltage greater than 1 500 V shall be subjected to the applicable examination and tests of UL 1059 and UL 486E. except for the dielectric tests which shall be conducted in accordance with 6.10DV.1.</p>
4.6	Info	<p>Solid electrical insulating materials</p> <p><i>New clause added;</i></p> <p>Specification</p> <p>The specification for insulating material relied upon for compliance with requirements in this standard shall include the following:</p> <ul style="list-style-type: none"> a) the name or registered trademark of the material manufacturer; b) the identification of the material; c) the possible surface treatments, such as varnishes, etc.; d) long-term thermal stability of the material (such as the TI per IEC 60216, RTI per ANSI/UL 746B, or other rating systems establishing long term continuous operating temperature, e.g. 20 000 hour, ratings of the material), e) when applicable, the comparative tracking index (CTI) determined in accordance with IEC 60112 or UL 746A; f) when the insulating material is part of the external enclosure, the temperature index TI, corresponding to the 20 000 h point on the thermal endurance graph without loss of flexural strength exceeding 50 %, determined in accordance with IEC 60216-1 and IEC 60216-2 and based on the flexing property in accordance with ISO 178. If the material does not break in this test before exposure to the heat, the index shall be based on the tensile strength in accordance with ISO 527-2 with test bars of Type 1A or 1B. As an alternative to the TI, the relative thermal index (RTI – mechanical strength or RTI – mechanical impact) may be determined in accordance with ANSI/UL 746B.
4.6.1		



CLAUSE	VERDICT	COMMENT
		<p>The specification of the solid insulating material does not apply to interconnecting wiring or printed wiring board mounted components.</p> <hr/> <p><i>New clause added;</i></p> <p>Long-term thermal stability</p> <p>The long-term thermal stability rating of the materials shall be:</p> <p>a) for Level of Protection “eb”, at least 20 K above the maximum service temperature, and at least 80 °C, b) for Level of Protection “ec”, at least the maximum service temperature, or for insulated windings, see 4.8.3 and Table 4.</p>
4.6.2		<p>The long-term thermal stability rating of the materials do not apply to printed wiring board mounted components.</p> <p>Insulating parts made of plastics or laminates, where the original surface is removed during manufacture, shall be coated with an insulating varnish having at least the same grading according to CTI as the original surface. This requirement does not apply to materials where these actions have not affected the grading according to CTI or where the specified creepage distance is provided by other parts not subjected to these actions.</p> <hr/> <p><i>New section added;</i></p>
4.10		<p>Degrees of protection provided by enclosures</p> <hr/> <p>DR Modification of Clause 4.10.1 to replace with the following</p> <p>The degrees of protection as defined in tests of enclosures of UL 60079-0, as applicable, shall be as prescribed in a), b), or c) unless otherwise specified in 4.10.2, 4.10.3, or Clause 5. For Level of Protection “ec”, the tests of enclosures requirements of UL 60079-0 are modified for the thermal endurance to heat preconditioning test to replace the 20 K above the service temperature ($T_s + 20\text{ K}$) with 10 K above the service temperature ($T_s + 10\text{ K}$) and modified to remove the 80 °C minimum test temperature.</p>
4.10.1DV		<p>a) Enclosures containing bare conductive live parts shall provide at least the degree of protection IP54. b) Enclosures containing only insulated conductive live parts as in 4.6 shall provide at least the degree of protection IP44. c) Enclosures for containing only insulated conductive live parts as in 4.6, can provide a reduced degree of protection of IP23 for Group I, or IP20 for Group II, if solid foreign bodies are prevented from falling vertically through any openings into the enclosure. This equipment shall be marked in accordance with the marking requirements of UL 60079-0, and the Specific Conditions of Use listed on the</p>



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		<p>certificate shall detail the degree of protection provided by enclosure and provide guidance on the protection by location that is required. An example of an application where this reduced degree of protection could be suitable is a clean environment.</p> <p>For Level of Protection “ec”, opening of the enclosure for maintenance purposes, is not considered normal operation, and the opening times requirement of UL 60079-0 does not apply.</p> <p>NOTE: The degree of protection requirements from general industrial standards are not applied directly for the evaluation of the explosion protection of Ex Equipment.</p> <p>The bars and rings of rotor cages are not considered to be bare live parts when determining the degree of protection.</p>
6		Type verifications and type tests
6.3		Luminaires
6.3.4		Abnormal operation of luminaires
		<i>New section added;</i>
6.3.4.1		<p>Abnormal operations of ballasts for discharge lamps</p> <p>Level of Protection “eb”, rectification test</p> <p>The ballast is supplied at rated voltage with the lamp replaced by a test circuit consisting of a diode and a resistor, in parallel. By varying the resistance, the test circuit current is adjusted to a value at least equal to twice the normal lamp current. The supply voltage is then increased to not less than 110 % of rating without changing the test circuit. When temperatures have stabilized, the temperatures shall not have exceeded the temperature class.</p>
6.3.4.1.1		<p>With the diode and resistor in circuit, the ballast is then supplied at rated voltage and when temperatures have stabilized, the limiting temperature shall not be exceeded.</p> <p>NOTE 1 A diode rated 600 V / 100 A is typically used. NOTE 2 A variable resistor, 0 to 200 ohms, with a rating at least half the lamp wattage is typically used. NOTE 3 Although such lamps are not permitted to be used in luminaires of Level of Protection “eb” or “ec”, the ballast itself is permitted to be protected by Level of Protection “eb” or “ec”.</p>
6.3.4.1.2		Level of Protection “ec”



CLAUSE	VERDICT	COMMENT
6.3.4.1.2DV		<p>Modification of Clause 6.3.4.1.2 to replace with the following:</p> <p>The temperatures determined during the tests shall not exceed the limiting temperature. The temperatures shall not exceed the values given in the thermal test (abnormal operation) of IEC 60598-1 or UL 1598 or UL 8750 under conditions representing abnormal service conditions (where applicable but not representing a defect in the luminaire or misuse) using a test voltage as specified in UL 60079-0.</p> <p>For windings, the maximum winding temperatures permitted by IEC 60598-1 or UL 1598 or UL 8750 shall be reduced by 20 K.</p> <p>The temperature of windings containing thermal protective devices may exceed these temperatures by up to 15 K for 15 min, prior to operation of the protective device.</p>
6.3.4.3	Info	<p>Power dissipation of cathodes of lamps supplied by electronic ballasts</p> <p>Luminaires in Level of Protection “eb”</p>
6.3.4.3.1		<p>The asymmetric pulse test and the asymmetric power dissipation test in accordance with Annex G shall be conducted. For T8, T10, and T12 lamps, the maximum cathode power observed during the tests shall not exceed 10 W. The <u>maximum cathode power observed during the test shall not exceed the values given in Table 16.</u></p>
		<p><i>New clause added;</i></p> <p>Luminaires in Level of Protection “ec”</p>
6.3.4.3.2		<p>The asymmetric pulse test and the asymmetric power dissipation test shall be conducted in accordance with IEC 61347-2-3.</p> <p>The maximum cathode power observed during the test shall not exceed the values given in Table 16.</p> <p>The tests shall be conducted at the minimum and maximum ambient temperature of the luminaire.</p> <p>NOTE The relevant industrial standard for electronic ballasts is IEC 61347-2-3.</p>



CLAUSE	VERDICT	COMMENT
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New table added;

Power dissipation of cathodes of lamps supplied by electronic ballasts

Table 16

Lamp type	Level of protection		Ambient temperature for the luminaire °C	Temperature class	Maximum cathode power W
	“eb”	“ec”			
T8 /T10/T12	Permitted	Permitted	≤ 40	T4	10
T8 /T10/T12	Permitted	Permitted	≤ 60	T4	8
T8/T10/T12	Permitted	Permitted	≤ 60	T3	10
T5 (8 W)	Permitted	Permitted	≤ 40	T4	4
T5 (8 W)	Permitted	Permitted	≤ 60	T3	4
T5-HE (8 W to 35 W)	Excluded	Permitted	≤ 60	T4	5

9	Info	Marking and instructions
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New clause added;

DV.1 DR Modification of Clause 9.2, first paragraph and NOTE to replace with the following:

The enclosure shall be marked in accordance with the requirements for marking of Ex Components given in IEC 60079-0UL 60079-0, but the marking shall be internal and need not be permanent. The Ex marking string shall not be marked externally.

9.2

NOTE A typical Ex marking string for an Ex Component enclosure is Class I, Zone 1 AEx eb IIC Gb.

Only manufacturer’s name and enclosure identifier information (such as type or serial number) may be marked external to the enclosure. This marking need not be permanent.

These markings may be omitted if the Ex Component enclosure manufacturer is also intended to be the holder of the equipment certificate and indicated as such in the Ex Component certificate Schedule of Limitations.