

STANDARD INFORMATION

Standard Number: UL 60079-15

Standard Name: Explosive Atmospheres - Part 15: Equipment Protection by Type of Protection 'N'

Standard Edition and Issue Date: 4th Edition Dated February 13, 2013

Date of Revision: February 13, 2013

Date of Previous Revision of Standard: October 21, 2009

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **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/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requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revise requirements.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 equipment protection levels
- Requirements for electrical connections expanded and clarified
- Requirements for luminaire ballasts expanded and clarified
- Requirements for evaluation and testing of motor rotors clarified
- 15 kV limit for equipment protection by type of protection "n" added
- Spacing requirement for voltages above 10 kV modified
- Requirements for restricted breathing enclosures modified
- Modification to requirements for motor rotors and stators

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).

Client Action Required:

Information – To assist our Engineer with review of your Listing Reports, please submit technical information in response to the new/revise paragraphs noted in the attached or explain why these new/revise 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 – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records.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.



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CLAUSE	VERDICT	COMMENT
		<i>Additions to existing requirements are underlined and deletions are shown lined out below.</i>
5	Info	Temperatures
		Maximum surface temperature
5.1		The maximum surface temperature shall be determined in accordance with the determination of maximum temperature requirements of IEC 60079-0. <u>The surface to be considered shall be:</u> <ul style="list-style-type: none"> • for nR equipment and nC equipment: the external surface of the equipment; • for type nA equipment: the surface of any part of the electrical equipment, <u>including the surface of internal parts to which the explosive gas atmosphere might have access</u>
5.2		Small components For evaluation of small components, 5.5 and 5.6 <u>the small component temperature requirements</u> of IEC 60079-0 applies. Temperature relaxations for thin wires and printed circuit tracks contained in IEC 60079-11 may also be used in application of this standard.
6	Info	Requirements for electrical equipment
6.3	Info	Minimum degree of protection
6.3.2	Info	Degree of protection provided by installation
6.3.2DV		DR Modification of Clause 6.3.2 to replace with the following: Replace 'the marking shall include the symbol "X" with "the apparatus is marked in accordance with 29.2 (i) of UL 60079-0" . <u>Where the enclosure is completed by the installation of the equipment and the equipment is marked to indicate this specific condition of use (see the marking requirements of IEC 60079-0) and the manufacturer shall provide relevant information in the documentation in accordance with Clause 25.</u>
6.5	Info	Electric strength
6.5.1	Info	Insulation from earth or frame
6.5.1DV.1	Info	DR Modification of Clause 6.5.1, first paragraph to replace with the following:



CLAUSE	VERDICT	COMMENT
6.5.1DV.1.1		<p><i>New clause added;</i></p> <p>Where the electrical circuits within the equipment are not connected directly to the frame of the equipment or not intended to be connected to the frame in service, the insulation or separation distance used shall withstand without breakdown the voltage specified in the relevant industrial standard for the individual items of electrical equipment where such requirement exists for the following test voltages for (60, +5)s, :</p>
7		<p><i>New section added;</i></p> <p>Connection facilities and terminal compartments</p> <p>General</p> <p>The connection facility and terminal compartment requirements of IEC 60079-0 are supplemented by the following.</p> <p>Electrical connections are sub-divided into those for field-wiring and for factory wiring and into permanent types and re-connectable/re-wirable types for convenience in detailing the appropriate requirements.</p> <p>Each type shall, as applicable:</p> <ul style="list-style-type: none">a) be constructed in such a way that the conductors cannot slip out from their intended location during tightening of a screw or after insertion;b) provide a means to avoid loosening of the connection in service;c) be such that contact is assured without damage to the conductors such that would impair the ability of the conductors to fulfil their function, even if multi-stranded conductors are used in connections intended for direct clamping of a single conductor;d) provide a positive compression force to ensure contact pressure in service;e) be constructed in such a way that the contact they ensure is not appreciably impaired by temperature changes occurring in normal service;f) except when subjected to the earth continuity test of IEC 60079-0, provide contact pressure that does not depend on the structural integrity of insulating materials;g) not be specified to accommodate more than one individual conductor in a clamping point unless specifically designed and assessed for doing so;h) if intended for stranded conductors, employ a means to protect the conductors and distribute the contact pressure evenly. The method of applying contact pressure shall be capable, on installation, of reliably forming the stranded conductor into an effectively solid shape that does not subsequently change in service. Alternatively, the method of applying the contact pressure should be such that it is designed to accommodate any settlement of the strands in service;i) for screw connections, have a torque value specified by the manufacturer;j) for screwless connections intended for class 5 and/or class 6 fine-stranded



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		conductors according to IEC 60228, the fine-stranded wire shall be equipped with a ferrule or the termination shall have a method to open the clamping mechanism so that the conductors are not damaged during the installation of the conductor.
7.2		Field wiring connections
		General
		Terminals for field wiring shall be dimensioned to allow the effective connection of conductors of cross-section equal to at least that corresponding to the rated current of the electrical equipment.
7.2.1		Connections shall be located in a position such that where required to be inspected in service they are reasonably accessible.
		The number and size of conductors that can be safely connected shall be specified in the descriptive documentation according to IEC 60079-0.
		Connections made using terminals complying with IEC 60947-7-1, IEC 60947-7-2, IEC 60999-1, or IEC 60999-2
7.2.2		Such terminals are intended for the connection of copper conductors with the insulation locally removed and without the addition of intermediate parts other than those replicating the form of a bare conductor, such as a ferrule.
		Terminals shall be capable of being fixed in their mountings.
		DR Modification of Clause 7.2.2 title as follows:
7.2.2DV		Connections made using terminals complying with IEC 60947-7-1, IEC 60947-7-2, IEC 60999-1, IEC 60999-2, UL 486E, UL 60947-7-1, or UL 60947-7-2
		Field wiring connection facilities integral to “n” equipment or components
7.2.3		Terminals shall meet the requirements of 7.2.2, where applicable.
		Connections designed to be used with cable lugs and similar devices
7.2.4		Such connections shall be fixed in their mountings. A means of securing the cable to prevent rotation or movement shall be provided to avoid either loosening or compromising creepage and clearance. Alternatively, it shall be demonstrated that such rotation or movement is otherwise restricted.
		Connections using permanent arrangements
7.2.5		These connections are typically tails with crimping or soldering facilities that are intended to be connected during installation using appropriate connection methods. 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. If



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		the method of connection is by soldering, a method of providing mechanical support of the completed connection shall be provided. The security of the joint shall not rely solely on the solder.
7.3		Factory connections
		General
7.3.1		Factory connections shall be either fixed in a specific location or be provided with means of meeting the creepage and clearance requirements of this standard.
		Field wiring connection methods used for factory connections
7.3.2		Any of the connection methods suitable for use as field wiring connections may be used for a factory connection.
		Other factory connections
7.3.3		In addition to the connection methods given in 7.3.2, twist-on connecting devices meeting the requirements of IEC 60998-2-4 may also be used for factory connections.
7.3.3DV		DR Modification of Clause 7.3.3 paragraph as follows: Add "or UL 486A-UL 486B" after "IEC 60998-2-4".
		Permanent connections
		Permanent connections shall only be made by
7.3.4		a) crimping, b) brazing, c) welding, d) soldering, provided that the conductors are not supported by the soldered connection alone.
		Pluggable connections
		These connections are designed to be readily connected or disconnected during assembly, maintenance, or repair.
		Pluggable connections shall provide one of the following:
7.3.5		a) each connection or group of connections shall be secured with a mechanical retaining device which may or may not be an integral part of the connector, but which, excluding internal friction, provides a force resisting separation of at least 15 N; b) for a lightweight connecting component relying on friction to remain in place and not attached in any way outside of the connection points, the separating force in Newtons shall be greater than 100 times the mass of the component



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		(in kg) and a mechanical retaining device is not required. The force shall be applied gradually near the centre of the component;
		If the factory connection may remain energised when separated, it shall be marked in accordance with item b) of Table 14. For small items, adjacent marking can be provided.
7.3.5DV.1	Info	DR Modification of Clause 7.3.5, second paragraph, item a) to replace with the following:
		each connection or group of connections shall be
7.3.5DV.1.1		<ul style="list-style-type: none"> secured with a mechanical retaining device which may or may not be an integral part of the connector and does not rely on friction alone or, able to withstand a separation force of at least 15 N;
		Terminal bridging connections
7.3.6		A terminal bridging connection shall have a separating force in newtons that is greater than 100 times the mass of the component (in kg). The force shall be applied gradually near the centre of the component.
8	Info	Supplementary requirements for non-sparking electrical rotating machines
		Terminal boxes
8.3		Terminal boxes attached to machines operating at voltages up to 1 kV, may be opened to the interior of the machine, only when the IP rating of the machine is IP44 or higher. The external IP protection of the box shall be not less than IP54, as determined in accordance with 33.3.4 <u>IEC 60079-0</u> .
		Conduit stopping boxes, cable sealing and dividing boxes
8.4		If fitted, conduit stopping boxes, cable sealing and dividing boxes shall provide a degree of protection not less than IP54 as determined in accordance with 33.3.4 <u>IEC 60079-0</u> .
		Connection facilities for external conductors
8.5		The connection facilities of rotating machines shall comply with 14.2. In addition, for all forms of cable connection, it shall be possible to remove the machine while ensuring that cable sealing is not disturbed (for example in the case of a sealing compound) or can be replaced without subjecting the cable to stresses liable to damage the cable insulation or the conductors. This subclause does not apply if there is no requirement to disconnect and reconnect the machine during maintenance.
		<u>The connection facilities of rotating machines shall comply with Clause 7.</u>
8.7		To avoid contact between stator and rotor, a radial air gap shall be specified <u>in the documentation prepared in accordance with Clause 25</u> and demonstrated by one of the following means:



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		<p>a) measurement of the radial air gap of the test sample; b) calculation of the minimum radial air gap; c) construction in accordance with the following equation:</p>
8.8	Info	<p>Rotor cages</p> <p>Assessment for possible air gap sparking</p> <p>Rotating electrical machines with a rated output exceeding 100 kW shall be assessed for possible air gap and being other than a duty type S1 or S2, shall be <u>assessed for possible air gap sparking as follows:</u></p> <p>If the total sum of the factors determined by Table 6 is greater than 5 <u>6</u>, <u>one of the following shall be applied:</u></p> <p>a) the machine or a representative sample shall be tested in accordance with 22.13.1; or b) <u>the machine design shall allow special</u> measures to be applied during starting to ensure that its enclosure does not contain an explosive gas atmosphere at the time of starting. In this case, the machine marking shall include the symbol “X”, in accordance with item i) of 29.2 of IEC 60079-0, and the specific conditions of use to be employed shall be specified in the documentation as required by Clause 25; or c) the starting current of the machine is required to be limited to 300 % of rated current, IN. In this case, the machine marking shall be in accordance with 29.2 (i) <u>When external current limiting is required, the machine marking shall include the symbol “X”, in accordance with the marking requirements of IEC 60079-0, and the specific conditions of use shall include that the motor is suitable only for reduced voltage starting which limits the starting current to 300 % of the rated current.</u></p>
8.8.3		
8.8.3DV.2	Info	<p>DR Modification of Clause 8.8.3, second paragraph, item c) to replace with the following:</p>
8.8.3DV.2.1		<p><u>the starting current of the machine is required to be limited to 300 % of rated current, IN. When external current limiting is required, the machine marking indicates this specific condition of use (see the marking requirements of IEC 60079-0), and the specific conditions of use shall include that the motor is suitable only for reduced voltage starting which limits the starting current to 300 % of the rated current.</u></p>



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
		Stator winding insulation system
		Type tests of the stator winding insulation system shall be conducted in accordance with 22.13.2 for the following constructions:
8.9		<ul style="list-style-type: none"> • Equipment Group IIB or IIC – rated voltage exceeding 1 kV; • Equipment Group IIA – rated voltage exceeding 1 kV for random-wound stators; or • Equipment Group IIA – rated voltage exceeding 6,6 kV for form-wound stators. <p>For all stators with a rated voltage above 1 kV, the machine shall be fitted with anti-condensation heaters.</p>
9	Info	Supplementary requirements for non-sparking fuses and fuse assemblies
9.1	Info	Fuses
		<i>New clause added;</i>
		DR Modification of Clause 9.1 to replace with the following:
9.1DV		<p>Fuses used in circuits that are normally subject to overlapping (such as in motor circuits) shall be deemed non-sparking components if they are non-rewirable, non-indicating, filled, current limiting, cartridge types according to the applicable IEC fuse standards or UL 248-1, operating within their rating.</p> <p>Fuses used in circuits that are not subject to overloading shall be deemed non-sparking components.</p>
		Fuse mounting
9.3		Fuse shall be mounted in non-sparking enclosed holders or non-sparking spring holders or shall be soldered in place. <u>Fuse holder connections shall be in accordance with 7.3.5.</u>
		Fuse enclosures
9.4		Enclosures containing fuses shall be interlocked so that insertion or removal of replacement elements can be carried out only with the supply disconnected <u>the fuses can only be removed or replaced with the supply disconnected.</u> <u>Alternatively,</u> the enclosure shall carry the warning given in item a) of Table 14.
10	Info	Supplementary requirements for non-sparking plugs and sockets
10.1		Plugs and sockets for external connections shall comply with either item a), b) or c) as follows:
		c) All of the following:



CLAUSE	VERDICT	COMMENT
		<ul style="list-style-type: none">– the part which remains energized is a socket outlet;– the plug and socket break the rated current with delayed release to permit the arc to be extinguished before separation;– the plug and socket remain flameproof according to IEC 60079-1 during the arc quenching period;– the contacts remaining energized after separation are protected according to one of the specific types of protection <u>with equipment protection level Ga, Gb or Gc</u>, listed in IEC 60079-0.
10.1DV.1	Info	<p>DR Modification of Clause 10.1, to replace with the following:</p> <p><i>New clause added;</i></p> <p>External plugs and sockets for field wiring connections</p> <p>Plugs and sockets for field wiring connections in potentially incendive circuits either</p> <ul style="list-style-type: none">• between one piece of electrical equipment and another piece of electrical equipment (by means of a cable or cord assembly involving plugs and sockets on both ends of a plug and socket on one end and un-terminated cable or cord on the other), or• between premises wiring and a piece of electrical equipment (by means of a cable or cord assembly involving a socket on the equipment end and un-terminated cable or cord on the premises wiring end). <p>shall comply with either item a), b) or c) as follows:</p> <p>a) they shall be interlocked mechanically or electrically, or otherwise designed so that they cannot be separated when the contacts are energized and the contacts cannot be energized when plug and socket are separated. Switches used for this purpose shall comply with this standard or with one or more types of protection listed in IEC 60079-0;</p> <p>b) they shall be protected against unintentional separation as follows:</p> <ul style="list-style-type: none">• a means shall be provided to mechanically secure the plug or socket that is part of the equipment, to the mating plug or socket that is part of the intended cable assembly that is constructed as follows:<ul style="list-style-type: none">– separation shall be possible only with the aide of a tool.– when not secured, the means shall be captive to the equipment or the cable assembly; and– warning marking as given in item b) of Table 14 shall be provided such that it is readily visible after installation. <p>the equipment installation instructions shall identify the intended cable assembly and repeat the warning given in item b) Table 14; and</p> <ul style="list-style-type: none">• when separated, the part which remains energized shall be a socket



CLAUSE	VERDICT	COMMENT
		<p>outlet.</p> <p>c) All of the following:</p> <ul style="list-style-type: none"> – the part which remains energized is a socket outlet; – the plug and socket break the rated current with delayed release to permit the arc to be extinguished before separation; – the plug and socket remain flameproof according to IEC 60079-1 during the arc quenching period; – the contacts remaining energized after separation are protected according to one of the specific types of protection with equipment protection level Ga, Gb or Gc, listed in IEC 60079-0. <p>The plugs and sockets shall be capable of being connected to one of the following wiring methods:</p> <ul style="list-style-type: none"> • extra-hard usage cord for applications involving circuits operating at 120 volts or less and 3 amperes or less in accordance with Article 400 of the National Electrical Code; • extra-hard usage cord for applications in accordance with the allowance of Flexible Cords in Article 501 of the National Electrical Code; • instrumentation tray cable (Type ITC) for applications involving instrumentation and control circuits operating at 150 volts or less and 5 amperes or less in accordance with Article 727 of the National Electrical Code; or • power-limited tray cable (Type PLTC) for applications involving remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power source in accordance with Article 725 of the National Electrical Code; <p>Cable assemblies and the associated separate plugs and sockets shall be in accordance with UL 2238, “Cable Assemblies and Fittings for Industrial Control and Signal Distribution”, or UL 2237, “Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery”.</p>
		<p><i>New clause added;</i></p>
		<p>Maintaining degree of protection (IP code)</p> <p>Provision shall be made for the fixed part of a plug and socket connector to maintain the degree of protection of the enclosure on which it is mounted, even when the movable part has been removed. If the degree of protection is effectively reduced by accumulation of dust or water, provision shall also be made for maintaining an appropriate degree of ingress protection for the plug and/or socket.</p>
11	Info	Supplementary requirements for non-sparking luminaires
11.2	Info	Construction



CLAUSE	VERDICT	COMMENT
		General
11.2.1		<p>The constructional requirements of the relevant section of IEC 60598-2 and also 5.3.1, 5.3.2 and 5.4 shall apply together with the requirements specified in 21.2.2 to 21.2.12.</p> <p><u>For fluorescent tubes, the distance between the lamp and a protective cover shall be not less than 5 mm unless the protective cover is a concentric cylindrical tube, in which case the minimum distance is 2 mm. For other lamps, the distance between the lamp and the protective cover shall be not less than the value given in Table 7 according to the lamp wattage</u></p>
11.2.3	Info	Lampholders
		Bayonet non-sparking lampholders
11.2.3.2		<p>Bayonet non-sparking lampholders shall comply with the requirements of IEC 61184. They shall incorporate spring contacts so designed that the springs are not the principal means of carrying the current.</p> <p>The connecting wires and their insulation shall not be damaged when the lamp is inserted or removed. The lampholder shall be of a type designed to prevent sparking under conditions of vibration. <u>The spring elements used shall ensure a contact force of at least 10 N between lampcap and lampholder.</u></p>
		Screw non-sparking “nA” lampholders
11.2.3.3		<p>Screw non-sparking lampholders shall comply with the safety and interchangeability requirements of IEC 60238 when mounted in the luminaire. <u>Screw lampholders shall prevent self-loosening of the lamp after insertion. For lamp caps other than E10, this shall be shown by meeting the mechanical test of 22.7. The lampholder shall be of a type designed to prevent sparking under conditions of vibration. The spring elements used shall ensure a contact force of at least 10 N between lampcap and lampholder.</u></p>
		Bi-pin non-sparking lampholders
11.2.3.4		<p>Bi-pin non-sparking lampholders shall comply with the safety and interchangeability requirements of IEC 60400 when mounted in the luminaire. They shall also be designed to make and maintain contact on the barrels of the lamp pins. Contact pressures shall be adequate and the pins of the lamp shall be supported to prevent distortion when they are subject to contact side pressure. <u>The mechanical dimensions and the mounting conditions in the luminaire shall take into account the mechanical values and the tolerances specified for the lamp in IEC 60061-1, IEC 61195 and IEC 60400.</u> The lampholder shall be of a type designed to prevent sparking under conditions of vibration.</p>
11.2.4	Info	Auxiliaries



CLAUSE	VERDICT	COMMENT
11.2.4.1		<p>When mounted in the luminaire, auxiliaries shall comply with the electrical and mechanical safety requirements of IEC 61347-1, IEC 61347-2-1, IEC 61347-2-2, IEC 61347-2-3, IEC 61347-2-4, IEC 61347-2-7, IEC 61347-2-8, IEC 61347-2-9, IEC 61048 and IEC 60155, as applicable, or of other appropriate standards.</p> <p><u>Auxiliaries outside of the scope of the above standards shall be constructed in accordance with this standard or other Ex protection standards. Where required they shall be additionally subject to the tests in this standard.</u></p> <p><u>Auxiliaries within the scope of the above standards are not required to comply with the requirements of IEC 60079-0 for non-metallic materials on which the type of protection depends. Where the manufacture of the auxiliary is not controlled by the luminaire manufacturer the documentation shall define the construction of the auxiliary sufficiently to ensure that requirements of this standard are complied with.</u></p>
11.2.4.1DV.1	Info	<p>DR Modification of Clause 11.2.4.1, first paragraph to replace with the following:</p> <p><i>New clause added;</i></p>
11.2.4.1DV.1.1		<p>When mounted in the luminaire, auxiliaries shall comply with the electrical and mechanical safety requirements of IEC 61347-1, IEC 61347-2-1, IEC 61347-2-2, IEC 61347-2-3, IEC 61347-2-4, IEC 61347-2-7, IEC 61347-2-8, IEC 61347-2-9, IEC 61048, IEC 60155, and UL 1598 as applicable, or of other appropriate standards.</p>
11.2.4.5		<p>Ballasts</p> <p>Ballasts shall be designed so that their life is not unduly shortened when operating under the specified abnormal operating conditions (for example, failure to ignite or rectifier effect of ageing lamps). This may be achieved by the use of a thermal switch (see the specific variation from IEC 60598 1 for windings as given in 21.2.10.3.2).</p> <p><u>The limiting temperature of ballasts, lampholders and lamps shall not be exceeded even in the case of aged lamps. The luminaire shall be subjected to the thermal tests of IEC 60079-0. The stabilized temperature of the ballast, lampholder, and the lamp itself shall be less than the limiting temperature, or a cut-off device shall be used to switch off the power before the limiting temperature is exceeded. Resetting of the cut off device shall only be possible manually (e.g. by switching off the power for resetting).</u></p> <p><u>Ballasts which are used with ignitors that have a working voltage above 1,5 kV shall be of the following construction:</u></p> <ul style="list-style-type: none"> <u>– in accordance with IEC 61347-2-8 and IEC 61347-2-9;</u> <u>– not be of the type which can only be used with ignitors having a timed cut-out.</u>



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		<p><u>Ballasts subjected to only the 30 day voltage impulse type test shall only be used with timed cut-out ignitors.</u></p> <p><u>If ignitors without timed cut-out are used, the voltage impulse test in IEC 61347-2-8 and IEC 61347-2-9 shall be run for 60 days.</u></p> <p><u>Electronic ballasts according to IEC 61347-2-3, IEC 61347-2-4, IEC 61347-2-7, shall not produce temperatures in excess of the temperature class when subjected to the abnormal conditions given in those standards.</u></p> <p><u>If the ballast is not protected by an internal over current device on the printed circuit boards of electronic ballasts, the requirements for creepage and clearance distances in Table 3 of IEC 61347-1 apply without the exemptions permitted in that standard. If such an over current device is used the creepage and clearance distances on the supply side of the over current device shall be in line with Table 2. The over current device, if employed, shall have a rated voltage not less than that of the circuit and shall have a breaking capacity not less than the fault current of the circuit.</u></p>
11.3		<p><i>New clause added;</i></p> <p>Luminaires for tubular fluorescent bi-pin lamps</p>
11.3.1		<p><i>New clause added;</i></p> <p>General</p> <p>Luminaires for tubular fluorescent bi-pin lamps shall additionally comply with the following requirements.</p>
11.3.2		<p><i>New clause added;</i></p> <p>Maximum ambient temperature</p> <p>The maximum ambient temperature for a luminaire with tubular fluorescent bi-pin lamps employing an electronic ballast shall not exceed 60 °C.</p>
11.3.3		<p><i>New clause added;</i></p> <p>Temperature class</p> <p>As the limiting temperature of a luminaire with tubular fluorescent bi-pin lamps employing an electronic ballast can exceed the temperatures appropriate for temperature classes T5 and T6, those temperature classes shall not be permitted.</p>
11.3.4	Info	Endurance tests and thermal tests
11.3.4.3	Info	Thermal test (abnormal conditions)



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		<i>New clause added;</i>
		Tests for luminaires containing electronic ballasts
11.3.4.3.3		The requirements of the relevant subclause of IEC 61347-2-3 shall apply together with following modifications: – the asymmetric pulse test and the asymmetric power dissipation test shall be conducted; – for T8, T10, and T12 lamps, the maximum cathode power observed during the tests shall not exceed 10 W, for T4 lamps, the power shall not exceed 3 W and for T5 lamps, shall not exceed 5 W.
11.3.4.4	Info	Surface temperatures
		Luminaires
		Under both normal and specified regular expected conditions, the surface temperature of any internal part of the luminaire, or the external surface of the luminaire, shall not exceed either the temperature class or the maximum specified surface temperature.
11.3.4.4.1		<u>The maximum surface temperature prescribed by IEC 60079-0 may be exceeded at the lamp when the highest surface temperature of the lamp inside the luminaire is at least 50 K below the lowest temperature of ignition inside the luminaire of the explosive atmosphere for which the luminaire is intended, as determined by tests made in an explosive gas atmosphere under the most unfavourable conditions of use. No ignition of the surrounding atmosphere shall occur. This dispensation is only valid for the explosive gas atmospheres indicated on the certificate, these being those for which the tests have given satisfactory results.</u>
11.3.4.4.1DV.1	Info	DR Modification of Clause 11.3.4.4.1 NOTE as follows:
		<i>New clause added;</i>
11.3.4.4.1DV.1.1		Replace “IEC 60079-4” with “IEC 60079-20-1”.
12	Info	Supplementary requirements for equipment incorporating non-sparking cells and batteries
12.5	Info	Requirements for type 3 secondary batteries
12.5.2	Info	Battery containers



CLAUSE	VERDICT	COMMENT
		Creepage distances
12.5.2.3		The creepage distance between the poles of adjacent cells and between these poles and the battery container <u>if metallic and conducting shall be at least 35 mm. For non-metallic enclosure, the creepage distances shall comply with Table 2.</u> Where nominal voltages between adjacent cells of the battery exceed 24 V, these creepage distances shall be increased by at least 1 mm for every 2 V in excess of 24 V.
		Supplementary requirements for non-sparking low power equipment
13		Electronic and allied low power equipment, assemblies and sub-assemblies <u>with a rated voltage up to 275 V a.c. or 390 V d.c. used for example, for measurement, control or communication purposes, used in an area of not more than pollution degree 2, as defined in IEC 60664-1, and which do not comply with 6.4 and 6.5.2 shall comply with the following.</u> c) Provision shall be made, either in the equipment or external to the equipment, to provide the transient protection device to be set at a level not exceeding 40 <u>140</u> % of the peak rated voltage <u>value of 85 V or of the peak rated voltage values at the power supply terminals of the equipment given in Table 10.</u> The transient protection shall limit transients up to a maximum of <u>140 % of the peak voltage values for the steps given in Table 10 that the equipment falls into, determined by the maximum input voltage of the equipment in normal operation.</u> Where the equipment is intended to be afforded an equivalent degree of protection by location or where transient protection is to be provided externally, the equipment shall be marked with the symbol "X" (see the marking requirements of IEC 60079-0) and the information shall be given in the documentation (see Clause 25).
16	Info	General supplementary requirements for equipment producing arcs, sparks or hot surfaces
		<i>New clause added;</i>
16DV.1		DR Modification of Clause 16, first paragraph, items a) – d) to replace with the following: 16.DV.1.1 a) enclosed-break equipment (see Clause 17); b) non-incendive component (see Clause 17); c) hermetically sealed apparatus (see Clause 18); d) sealed component (see Clause 19); e) restricted-breathing enclosure (see Clause 20).
19	Info	Non-metallic materials
19.1		Where encapsulation forms part of the external enclosure of apparatus it shall comply with the requirements of 7.2. Where a sealed device has a non-metallic enclosure the enclosure shall comply with the requirements of 7.2. Seals are tested using 33.5.



CLAUSE	VERDICT	COMMENT
		<u>Seals are tested using 22.5 unless the non-metallic material forms all or part of the outer enclosure of the equipment. In this case the requirements of 22.3.1.1 apply</u>
19.1DV		New clause added; DR Modification of Clause 19.1 to replace with the following: Seals are tested using 22.5 unless the non-metallic material forms all or part of the outer enclosure of the equipment. In this case the requirements of 22.3.1.1 replace the conditioning requirements of 22.5.1.
20	Info	Supplementary requirements for restricted-breathing enclosures protecting equipment producing arcs, sparks or hot surfaces
		General
		New clause added;
20.1		Restricted breathing equipment shall be limited in dissipated power such that the temperature measured on the outside does not exceed the maximum surface temperature requirements of IEC 60079-0. Restricted breathing enclosures shall only be assessed as complete equipment including all options and accessories.
20.2	Info	Constructional requirements
20.2.1	Info	Type of equipment
		New clause added;
		Equipment containing normally sparking devices
20.2.1.1		Restricted breathing equipment containing normally arcing or sparking devices, or equipment with hot surfaces designed to have frequent temperature cycles, shall be limited in dissipated power such that the temperature measured on the outside of the enclosure does not exceed the external ambient temperature by more than 20 K. The requirements of 6.4, 6.5 and Clause 7 need not be applied to components inside the restricted breathing enclosure.
		Equipment not containing normally sparking devices
20.2.1.2		Restricted breathing equipment with no normally arcing or sparking devices, but containing hot surfaces in normal operation, shall be limited in dissipated power such that the temperature measured on the outside does not exceed the marked temperature class.



CLAUSE	VERDICT	COMMENT
		Switching devices not used in normal operation, such as an emergency stop switch, shall not be considered to be a normally arcing or sparking device.
		The creepage and clearance distances for terminations on internal components shall be in compliance with Table 2.
20.2.2	Info	Cable glands and conduit entries
		Cable glands
		Cable glands, whether integral or separate, shall meet the requirements of IEC 60079-0.
20.2.2.1		Where cable glands are integral with the enclosure or specific to the enclosure they shall be tested as part of the enclosure.
		Where cable glands are separate: <ul style="list-style-type: none">• threaded Ex cable glands can be evaluated as 'nR' equipment;• other cable glands can be evaluated only as an Ex 'nR' components.
20.2.2.1DV		New clause added; DR Modification of Clause 20.2.2.1 to replace with the following: Cable glands, whether integral or separate, shall meet the flameproof "d" requirements of IEC 60079-0.
		New clause added;
		Conduit entries
20.2.2.2		Conduit entries with tapered threads are considered to meet the requirements for "nR" equipment. Conduit entries with parallel threads shall only be used if the conduit sealing device is tested together with the enclosure. All conduit entries shall be sealed. All unused conduit entries shall be sealed with a blanking plug that meets the "nR" requirements.
		New clause added;
20.2.2.2DV		Modification of Clause 20.2.2.2 paragraph to replace with the following: Conduit entries with tapered threads are considered to meet the requirements for "nR" equipment. Conduit entries with parallel threads shall only be used if the conduit sealing device is tested together with the enclosure. The installation instructions shall specify that All conduit entries used for field wiring connections shall be sealed with explosionproof or flameproof conduit seals at the time of installation. All unused conduit entries shall be closed with a blanking element that meets the "nR" requirements.



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
		Operating rods, spindles and shafts
20.2.3		Openings in enclosures for rods, spindles or shafts shall have means to ensure the type of protection “nR”, and shall not rely on grease or compound as a sole means to maintain sealing integrity, both when the spindles, rods or shafts are in motion and when they are at rest.
		<i>New section added;</i>
20.2.4		Windows
		Cemented windows
20.2.4.1		A window design employing a cemented joint shall be such that it is cemented either directly into the wall of the enclosure so as to form with the latter an inseparable assembly, or into a frame such that the assembly can be replaced as a unit.
		Gasketed windows
20.2.4.2		A window design employing a gasket to ensure type of protection “nR” shall be such that it is mounted directly in the wall or cover of the enclosure.
20.2.5	Info	Gasket and seal requirements
		<i>New clause added;</i>
		DR Modification of Clause 20.2.5 paragraph to replace with the following:
20.2.5DV		Resilient gasket seals shall comply with the gasket retention requirements of IEC 60079-0 and shall be positioned so that they are not subject to mechanical damage under normal operating conditions and they shall retain their sealing properties over the expected life of the equipment. Alternatively, the manufacturers shall specify a recommended replacement frequency and this shall be included in the instructions as specified in Clause 25.
		<i>New section added;</i>
20.2.7		Test port
		General
20.2.7.1		Equipment shall normally be provided with a test port to enable testing of the restricted breathing properties to be carried out after installation, during initial inspection and during maintenance.
		Equipment where the nominal volume of the enclosure changes due to pressure during type testing shall always be equipped with a test port.
20.2.7.2		Test port exemptions



CLAUSE	VERDICT	COMMENT
		Luminaires
		<p>Gaskets and seals shall be fixed in position and shall be designed so that they can be readily replaced.</p> <p>Hard setting adhesives shall not be used.</p> <p>Luminaires may be exempted from the fitting of test port provided the following conditions are met:</p>
20.2.7.2.1		<p>a) there are no normally arcing or sparking devices present in the restricted breathing enclosure, see also 20.2.1.2, and</p> <p>b) resilient gasket seals are mechanically protected so that they are not subject to mechanical damage during field installation or replacement, and</p> <p>c) the gaskets or seals exposed during re-lamping are of a type that can be readily replaced during the re-lamping process.</p> <p>For equipment that does not have a test port fitted, the marking shall include the symbol “X”, in accordance with of IEC 60079-0, and the specific conditions of use to be employed shall be specified in the documentation.</p>
		<hr/> <p>DR Modification of Clause 20.2.7.2.1 to replace with the following:</p> <p>Luminaires may be exempted from the fitting of test port provided the following conditions are met:</p>
20.2.7.2.1DV.1		<p>a) there are no normally arcing or sparking components present in the restricted breathing enclosure, see also 20.2.1.2, and</p> <p>b) resilient gasket seals are mechanically protected so that they are not subject to mechanical damage during field installation or replacement, and</p> <p>c) the gaskets or seals exposed during re-lamping are of a type that can be readily replaced during the re-lamping process.</p> <p>For equipment that does not have a test port fitted, the marking shall include this specific condition of use in accordance with IEC 60079-0, and the need to inspect for mechanical damage to the gasket or seals after field installation or replacement and other specific conditions of use to be employed shall be specified in the documentation.</p>
		<hr/> Other restricted breathing equipment
20.2.7.2.2		<p>Where opening of the equipment is not foreseen when installed, it may also be exempted from the fitting of the test port. The warning label given in item f) of Table 14 shall be affixed to the equipment.</p> <p>Equipment with no test port fitted shall include the symbol $^2X^2$, in accordance with the marking requirements of IEC 60079-0, and instructions for conducting the restricted breathing test shall be given in the documentation along with any other specific conditions of use.</p>



CLAUSE	VERDICT	COMMENT
20.2.7.2.2DV.1		DR Modification of Clause 20.2.7.2.2, second paragraph as follows: Replace “the symbol of “X” “ with “this specific condition of use”.
20.2.7.2.3		Gasket and sealing replacement The instructions shall contain information regarding the required replacement of the gasket or seal after any activity that requires the enclosure to be opened e.g. re-lamping of a luminaire.
20.2.7.2.4		Testing procedure Restricted breathing equipment exempted from the fitting of a test point shall be typed tested in accordance with 22.6.2.3 and in addition routine tested in accordance with 23.2.3.2.1.2.
20.2.9		New section added; Routine test exemptions Equipment containing normally sparking devices shall always be routine tested. Equipment not containing normally sparking devices but fitted with a test-port may be designed to be only type tested at a higher level as defined in 22.6.2.2.1 and in this case the routine test may be omitted.
20.3		New section added; Temperature limitation General If equipment is designed for different but fixed internal configurations, the worst case combination shall be used for determination the maximum surface temperature during the type test.
20.3.1		If equipment may be equipped with a variable combination of internal components, the surface temperature rise during type test may be measured with dummy loads. For this equipment, a routine test for determining the temperature class is required. The temperature rise of equipment under test may alternatively be calculated under the limitations given in 20.3.2.
20.3.2		Temperature calculation The temperature rise of equipment as part of the routine test may be calculated adding the power dissipations of the single internal components. The sum of the calculated power dissipations shall be £ 80 % of the maximum power dissipation measured according to 20.3.1. The single power dissipation of the individual internal components shall be £ 10 % of the possible total power dissipation. If the power-loss of an internal component is > 10 % of the total possible power dissipation a temperature measurement shall be made as



CLAUSE	VERDICT	COMMENT
		part of the routine test with the equipment under test fitted with all foreseen components and the temperature measurement procedure shall be in accordance with the requirements of IEC 60079-0.
20.4		<i>New section added;</i> Additional requirements for restricted breathing luminaires Mounting arrangement
20.4.1		The mounting arrangement for restricted-breathing luminaires shall be so designed that the luminaire can pass the test for restricted-breathing whether or not it is mounted and any gaskets and/or special components necessary for this purpose shall be supplied with the luminaire.
		Reflectors
20.4.2		Where provision has been made on the luminaire for the attachment of reflectors, the means of attachment shall not impair the restricted breathing properties of such luminaires.
		Surface temperatures of restricted breathing luminaires
20.4.3		For restricted breathing luminaires under both normal and specified abnormal conditions only the temperature of any part of the external surface of a restricted-breathing luminaire shall not exceed that of the declared temperature class or the declared maximum surface temperature.
22	Info	Type tests
		Representative samples
22.1		Representative samples <u>containing all windows, actuators gaskets and seals</u> shall be tested in accordance with the requirements for type tests of this standard. <u>The number of samples used shall be sufficient to perform the necessary tests specified in IEC 60079-0, plus any others required for testing specified in this standard.</u>
22.5	Info	Tests for sealed devices
		DR Modification of Clause 22.5.1 to replace with the following: Three samples of the component shall be conditioned, in an air oven for 168 +30 h at a temperature at least 10 K higher than the maximum service temperature but not less than 80 °C. This conditioning is followed by at least 24 +2 h at least 10 K lower than the minimum service temperature. <u>Following the conditioning, the three samples of the seated component shall be subjected to the voltage testing, followed by the leakage testing, followed by the dielectric withstand testing as noted below.</u>
22.5.1DV		
22.6	Info	Type test requirements for restricted-breathing enclosures



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
		General
22.6.1		Type nR restricted breathing equipment shall be subjected to all applicable tests of IEC 60079-0 prior to the specific required type tests for restricted breathing. If the design of the enclosure is such that the rate of breathing is independent of the direction of the pressure, or the application of a positive pressure results in a more onerous condition, the test may alternatively be performed with a positive pressure within the enclosure.
22.6.2	Info	Test procedures
22.6.2.2	Info	Equipment with test port
		<i>New clause added;</i>
		Type test only without additional routine test
22.6.2.2.1		Under constant temperature conditions, the time interval for an internal pressure of at least 0,3 kPa (30 mm water gauge) below atmospheric to change to half the initial value shall be not less than 360 s.
		<i>New clause added;</i>
		Type test with additional routine test
22.6.2.2.2		Under constant temperature conditions, the time interval for an internal pressure of at least 0,3 kPa (30 mm water gauge) below atmospheric to change to half the initial value shall be not less than 90 s.
		<i>New clause added;</i>
		Type test for equipment without test port
22.6.2.2.3		Under constant temperature conditions, the time interval for an internal pressure of at least 0,3 kPa (30 mm water gauge) below atmospheric to change to half the initial value shall be not less than 180 s.
23	Info	Routine verifications and tests
23.2	Info	Specific routine tests
		<i>New section added;</i>
23.2.3		Routine test requirements for restricted-breathing enclosures



CLAUSE	VERDICT	COMMENT
		General
23.2.3.1		If the equipment is equipped with a test port, the test port may be used for the routine test. Cable glands may be replaced by blanking plugs for the routine test. If the equipment is not equipped with a test port, the equipment may be tested using the cable glands or conduit entry devices.
23.2.3.2		Test procedure
23.2.3.2.1		Equipment where the nominal volume of the enclosure will be unchanged due to pressure
		Equipment with test port
		Under constant temperature conditions, the time interval required for an internal pressure of at least 0,3 kPa (30 mm water gauge) below atmospheric to half the initial value shall be not less than 90 s.
23.2.3.2.1.1		Alternatively following test procedures may be used: <ul style="list-style-type: none">• Under constant temperature conditions, the time interval required for an internal pressure of 3,0 kPa (300 mm water gauge) below atmospheric to change to 2,7 kPa (270 mm water gauge) below atmospheric shall be not less than 14 s.• Under constant temperature conditions, the time interval required for an internal pressure of 0,3 kPa (30 mm water gauge) below atmospheric to change to 0,27 kPa (27 mm water gauge) below atmospheric shall be not less than 14 s.
		Equipment without test port
		Under constant temperature conditions, the time interval required for an internal pressure of at least 0,3 Pa (30 mm water gauge) below atmospheric to change to half the initial value shall be not less than 180 s.
23.2.3.2.1.2		Alternatively following test procedures may be used: <ul style="list-style-type: none">• Under constant temperature conditions, the time interval required for an internal pressure of 3,0 kPa (300 mm water gauge) below atmospheric to change to 2,7 kPa (270 mm water gauge) below atmospheric shall be not less than 27 s.• Under constant temperature conditions, the time interval required for an internal pressure of 0,3 kPa (30 mm water gauge) below atmospheric to change to 0,27 kPa (27 mm water gauge) below atmospheric shall be not less than 27 s.
		Equipment where the nominal volume of the enclosure changes due to pressure
23.2.3.2.2		The enclosure shall be pressurized with air maintained at an overpressure of 0.4 kPa. The rate of supply of air in litres per hour (l/h) necessary to maintain this overpressure shall be measured. The value divided by the net enclosure volume in litres (l) shall not exceed 0,125.



CLAUSE	VERDICT	COMMENT
24	Info	Marking General Where it is necessary to include marking from one of the other methods of protection listed in IEC 60079-0, the marking required by this standard shall occur first. <u>Where multiple methods of protection are used within a piece of type n equipment, they shall all be identified in the marking in alphabetical order.</u> <u>Where IP marking is required equipment shall be marked in accordance with 6.3.</u>
25		Documentation Documentation in addition to that which is required in the documentation and instructions of IEC 60079-0 shall be provided when specified in this standard. Additional documentation required includes: <u>– information on COT of materials where necessary.</u> <u>– information concerning the necessity of replacing gaskets in luminaires during re-lamping</u>
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.		