

STANDARD INFORMATION

This SUN establishes the Continuing Certification approach to Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures “d”

Standard Number: UL 60079-1

Standard Name: Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures “d”

Standard Edition and Issue Date: 7th Edition Dated September 18, 2015

Date of Revision: September 18, 2015

Date of Previous Revision of Standard: 6th Edition Revised August 9, 2013

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **No action is required for currently certified products to maintain certification.**

This SUN is being presented to assist users of the standard to appreciate the significance of the changes made to the standard that will apply should the product described be modified after October 1, 2020

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requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revise requirements.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:

- Requirements for level of protection “da”
- Requirements for level of protection “dc”
- Cemented Joint evaluation
- Requirements were added for fused glass to metal joints
- Construction for plugs and sockets to remain flameproof during the arc-quenching period
- Welded enclosures that pass a 4x type test can use common industry methods for examining the integrity of the welds
- Batch testing for routine testing
- New Annex G introduces requirements for equipment with an internal source of release of a flammable gas such as a process line for analysis
- New Annex H introduces requirements for inverter fed electrical machines



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:

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 |
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| | | <i>Additions to existing requirements are underlined and deletions are shown lined out below.</i> |
| 4 | Info | Level of protection (equipment protection level, EPL) <i>New clause added;</i> Requirements for level of protection “da” Level of protection “da” is only applicable to catalytic sensors of portable combustible gas detectors. The following are the additional specific requirements for level of protection “da” that modify or supplement the requirements of this standard: – the maximum free internal volume shall not exceed 5 cm ³ ; – the electrical conductors into the sensor shall employ a sealed joint, in accordance with Clause 6, directly in the wall of the enclosure; 4.2 – the breathing device of the sensor shall comply with Clause 10, and shall be bonded to the wall of the enclosure so as to eliminate any gaps (such as cementing per 6.1 or sinter bonding) or shall be press-fitted to the wall of the enclosure with supplemental mechanical means of securing (such as swaging); – supplied by a circuit of Level of Protection “ia”, with a maximum dissipated power limited to 3,3 W for Group I and 1,3 W for Group II; and NOTE Catalytic elements operate normally at a high temperature. If the power dissipation is increased beyond normal operating levels, the element fails to an open circuit. Therefore, the required power limitation provides a limitation of the external surface temperature. – the non-transmission tests of 15.3 or 15.4.4 (if applicable) are modified to increase the number of non-transmission tests as shown in Table 1. |
| 4.4 | | <i>New section added;</i> Requirements for level of protection “dc” General |
| 4.4.1 | | The requirements for level of protection “dc” are applicable to electrical equipment and Ex components with electrical switching contacts and are found in 4.4.2 through 4.4.3. |
| 4.4.2 | | Construction of “dc” devices |



| CLAUSE | VERDICT | COMMENT |
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| | | General |
| 4.4.2.1 | | The requirements of 4.4.2.2 through 4.4.2.5 replace those of Clause 5 through Clause 13. For equipment in level of protection “dc” that is intended for connection to field wiring, Clause 13 applies. |
| | | Free internal volume |
| 4.4.2.2 | | The free internal volume shall not exceed 20 cm3. |
| | | Seal protection |
| 4.4.2.3 | | Enclosures for level of protection “dc” that do not serve as the external equipment enclosure shall be capable of withstanding normal handling and assembly operations without damage to seals. When the enclosure for level of protection “dc” also serves as the external equipment enclosures, the enclosure requirements of IEC 60079-0 apply. |
| | | Continuous operating temperature (COT) requirements |
| 4.4.2.4 | | Poured seals and encapsulating compounds shall have a continuous operating temperature (COT) range that includes a minimum temperature that is below, or equal to, the minimum service temperature and a maximum temperature that is at least 10 K above the maximum service temperature. |
| | | Ratings |
| 4.4.2.5 | | Devices shall be limited to a maximum rating of 690 V a.c., r.m.s. or d.c. and 16 A a.c. r.m.s. or dc. |
| | | Tests for “dc” devices |
| 4.4.3 | | For devices involving level of protection “dc”, components shall be subjected to the type test specified in 15.5. After the test, the device or component shall show no visible signs of damage, no external ignition shall occur, and there shall be no failure to clear the arc when the switch contacts are opened. |
| 6 | Info | Sealed joints |
| 6.1 | Info | Cemented joints |
| | | <i>New clause added;</i> |
| | | Mechanical strength |
| 6.1.2 | | Cemented joints are only intended to ensure the sealing of the flameproof enclosure of which they form a part. Arrangements shall be made in the construction so that the mechanical strength of the assembly does not depend upon the adhesion of the cement alone. Supplemental mechanical means of securing the cemented joint shall not be defeated by the opening of doors or covers that are intended to be opened during installation or maintenance. |



| CLAUSE | VERDICT | COMMENT |
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Cemented joints shall be subjected to the following tests:

a) Two samples representative of production shall be subjected to an overpressure test with water in accordance with 15.2.3.2. The test is considered satisfactory if blotting paper, placed under each sample under test, is free from any trace of leakage.

b) Either the same two samples from a) above, or a separate set of samples, shall be subjected to the tests of enclosures in IEC 60079-0, as applicable. Subsequent to this conditioning, the samples shall be subjected to an overpressure test with water in accordance with 15.2.3.2. The test is considered satisfactory if blotting paper, placed under each sample under test, is free from any trace of leakage.

NOTE The tests of enclosures in IEC 60079-0 permit the tests to be conducted on either a set of two samples or a set of four samples, with the difference being the number of tests conducted on each sample.

If there is any leakage on the blotting paper as a result of the test on the samples from 6.1.2 b), then the cemented joint for one sample that leaks after being subjected to the tests of enclosures and hydraulic pressure testing shall be subjected to the following tests:

- the flame erosion test in 19.4 but with no modifications to the cemented joints of the test samples, followed by
- the test for non-transmission in 15.3.2.1, or the test for non-transmission in 15.3.3.3 or 15.3.3.4, as applicable for the equipment group, with no further modifications to the cemented joints of the test sample.

The cemented joint is judged satisfactory if this test for non-transmission is satisfactory.

Routine overpressure testing of cemented joints (per Clause 16) shall be performed whenever 1,5 times or 3 times the reference pressure is necessary to comply with 6.1.2.

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| | | <i>New section added;</i> |
| 6.2 | | Fused glass joints |
| 6.2.1 | | General |
| | | DE Modification of Clause 6.2.1 to replace with the following: |
| 6.2.1DV.1 | | Fused glass joints are glass-to-metal joints formed by the application of molten glass into a metal frame that results in either a chemical or physical bond between the glass and the metal frame. |
| | | NOTE 1: Fused glass joints do not have a flamepath and therefore do not need to be subjected to the tests of non-transmission. |



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| | | NOTE 2: Fused ceramic joints also result in a chemical or physical bond between the ceramic and the metal frame and are evaluated in the same manner as a fused glass joint. |
| 6.2.2 | | Width of fused glass joints The path through a fused glass joint from the inside to the outside of a flameproof enclosure shall be ≥ 3 mm. |
| 13 | Info | Entries for flameproof enclosures |
| 13.6 | Info | Plugs and sockets and cable couplers |
| | | <i>New clause added;</i> |
| 13.6.4 | | If not connected to an interlocking switch which ensures a time delay between switching of the load and disconnecting the plug and socket, the plug and socket shall remain flameproof during the arc-quenching period while opening a test circuit of the rated voltage and rated current. For a.c. circuits, the test circuit power factor shall be less than or equal to 0,6, unless the equipment is marked for resistive loads only. |
| 16 | Info | Routine tests |
| | | <i>New clause added;</i> |
| | | Enclosures incorporating a welded construction |
| | | For enclosures or parts of enclosures that incorporate a welded construction, the integrity of the welded construction shall be verified by means of routine overpressure testing. |
| 16.3 | | Alternatively, when routine overpressure testing of a welded construction is impractical (such as due to the construction of the enclosure), and when the enclosure complies with the 4 times overpressure type test, the integrity of the welds may be verified by one of the following inspection methods: <ul style="list-style-type: none"> – radiographic weld inspection; or – ultrasonic weld inspection; or – magnetic particle weld inspection; or – liquid penetrant weld inspection. NOTE ISO standards exist for each of the above weld inspection methods. |
| | | <i>New clause added;</i> |
| 16.6 | | Batch testing Where the routine overpressure testing is replaced by a batch test according to the following criteria based on ISO 2859-1[5]: |



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| | | <ul style="list-style-type: none">– For a production batch up to 100, a sampling of 8 needs to be tested at 1,5 times the reference pressure with no failures.– For a production batch from 101 to 1 000, a sampling of 32 needs to be tested at 1,5 times the reference pressure with no failures.– For a production batch from 1 001 up to 10 000, a sampling of 80 needs to be tested at 1,5 times the reference pressure with no failures.– Batches above 10 000 must be subdivided into smaller batches. <p>If there is any non-compliant test results, 100 % of all remaining samples in the batch shall be tested at 1,5 times the reference pressure. Future batches should be routine tested at 1,5 times the reference pressure until confidence is established to reconsider batch testing.</p> <p>NOTE Upon non-compliant test results, reconsideration of this batch testing approach is at the discretion of the party issuing the involved certificate.</p> |
| Annex G | | <p><i>New annex added;</i></p> <p>Additional requirements for flameproof enclosures with an internal source of release (containment system)</p> <p>This annex contains requirements for equipment with an internal source of release of a flammable gas such as a process line for analysis (see standard for details).</p> |
| Annex H | | <p>Requirements for machines with flameproof “d” enclosures fed from converters</p> <p>This annex contains requirements for inverter fed electric machines (see standard for details).</p> |
| <p>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.</p> | | |