**Technical Capability Document**

**No. TCD – IEC 60079 and ISO 80079 Series**

**Edition 9.0**

**Referenced Standards**

**IEC 60079, ISO 80079-36 and 37, and ISO 16852 – Explosive atmospheres**

**Parts included: IEC 60079- 0, 1, 2, 5, 6, 7, 11, 13, 15, 16, 18, 26, 28, 29-1, 29-4, 30-1, 31, 32-2, 33, 35-1, 35-2, 40, 42, 46, 47, 62784 and ISO 80079-36, 37 and ISO 16852, 17268, 19880-3, -5**

**Name of body:**

**Members of the assessment team**

|  |  |
| --- | --- |
| Name | Role |
|  |  |
|  |  |
|  |  |

**Place(s) of assessment:**

|  |  |
| --- | --- |
|  |  |

**Assessment date(s):**

Documentation Control

| Edition | Date | Changes | Prepared by | Approved by |
| --- | --- | --- | --- | --- |
| 9.0 | 2023-09 | * Expansion of IEC TS 60079-46 to include the minimum testing capability for scopes including ‘Gaseous Hydrogen Fuelling Stations’. * Addition of ISO 17268, 19880-3, -5. * Clarified the definition of in-house under 2.3 that any associated laboratories used need to be an ATF. * Updated editions for IEC 60079-5, IEC 60079-11 and IEC 60079-31. * Updates to IEC 60079-13 to correct standard title, add missing clauses and need for smoke generator. * Removed asterisks in IEC 60079-35-1 for Clauses 8.7, 8.8 and 8.9. | ExMCWG2 and ExMCWG19 | ExMC via Ballot ExMC/1966/DV  ExMC/1987/RV |

**Table of Contents**

[1 Purpose 4](#_Toc144726978)

[2 How to complete this TCD 4](#_Toc144726979)

[2.1 Section 1 – Personnel: 4](#_Toc144726980)

[2.2 Section 2 - Procedures 4](#_Toc144726981)

[2.3 Section 3 – Equipment and tests: 5](#_Toc144726982)

[2.4 Completion of TCDs 6](#_Toc144726983)

[3 IEC 60079-0 Explosive atmospheres – Part 0: Equipment – General requirements 7](#_Toc144726984)

[4 IEC 60079-1 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d" 14](#_Toc144726985)

[5 IEC 60079-2 Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p" 18](#_Toc144726986)

[6 IEC 60079-5 Explosive atmospheres - Part 5: Equipment protection by powdered filling "q" 21](#_Toc144726987)

[7 IEC 60079-6 Explosive atmospheres - Part 6: Equipment protection by liquid immersion "o" 23](#_Toc144726988)

[8 IEC 60079-7 Explosive atmospheres - Part 7: Equipment protection by increased safety "e" 26](#_Toc144726989)

[9 IEC 60079-11 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" 31](#_Toc144726990)

[10 IEC 60079-13 Explosive atmospheres - Part 13: Equipment protection by pressurized room "p" and artificially ventilated room “v” 38](#_Toc144726991)

[11 IEC 60079-15 Explosive atmospheres - Part 15: Equipment protection by type of protection "n" 41](#_Toc144726992)

[12 IEC 60079-16 Electrical apparatus for explosive atmospheres - Part 16: Artificial ventilation for analyzer(s) houses 43](#_Toc144726993)

[13 IEC 60079-18 Explosive atmospheres - Part 18: Equipment protection by encapsulation "m" 46](#_Toc144726994)

[14 IEC 60079-26 Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga 49](#_Toc144726995)

[15 IEC 60079-28 Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation 51](#_Toc144726996)

[16 IEC 60079-29-1 Explosive atmospheres – Part 29-1: Gas detectors – Performance requirements of detectors for flammable gases 55](#_Toc144726997)

[17 IEC 60079-29-4 Explosive atmospheres - Part 29.4: Gas detectors—Performance requirements of open path detectors for flammable gases 62](#_Toc144726998)

[18 IEC/IEEE 60079-30-1 Explosive atmospheres - Part 30.1: Electrical resistance trace heating—General and testing requirements 67](#_Toc144726999)

[19 IEC 60079-31 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t" 71](#_Toc144727000)

[20 IEC 60079-32-2 Explosive atmospheres - Part 32-2: Electrostatic hazards – Tests 74](#_Toc144727001)

[21 IEC 60079-33 Explosive atmospheres – Part 33: Equipment protection by special protection “s” 78](#_Toc144727002)

[22 IEC 60079-35-1 Explosive atmospheres - Part 35-1: Caplights for use in mines susceptible to firedamp – General requirements – Construction and testing in relation to the risk of explosion 80](#_Toc144727003)

[23 IEC 60079-35-2 Explosive atmospheres - Part 35-2: Caplights for use in mines susceptible to firedamp – Performance and other safety-related matters 83](#_Toc144727004)

[24 IEC TS 60079-40 Explosive atmospheres - Part 40: Requirements for process sealing between flammable process fluids and electrical systems 85](#_Toc144727005)

[25 IEC TS 60079-42 Explosive atmospheres - Part 42: Electrical Safety Devices for the control of potential ignition sources from Ex-Equipment 88](#_Toc144727006)

[26 IEC TS 60079-46 Explosive atmospheres - Part 46: Equipment assemblies 90](#_Toc144727007)

[26.1 IECEx OD 290 91](#_Toc144727008)

[27 IEC TS 60079-47 Explosive atmospheres - Part 47: Equipment protection by 2-Wire Intrinsically Safe Ethernet concept (2-WISE) 95](#_Toc144727009)

[28 IEC 62990-1 Workplace atmospheres - Part 1: Gas detectors—Performance requirements of detectors for toxic gases 96](#_Toc144727010)

[29 IEC 62784 Vacuum cleaners and dust extractors providing equipment protection level Dc for the collection of combustible dusts - Particular requirements 102](#_Toc144727011)

[30 ISO 80079-36 Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements 104](#_Toc144727012)

[31 ISO 80079-37 Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres – Non electrical type of protection constructional safety ”c” control of ignition source ”b”, liquid immersion ”k” 108](#_Toc144727013)

[32 ISO 16852 Flame arresters — Performance requirements, test methods and limits for use 111](#_Toc144727014)

[33 ISO 17268 Gaseous hydrogen land vehicle refuelling connection devices 116](#_Toc144727015)

[34 ISO 19880-3 Gaseous hydrogen – Fuelling stations – Part 3: Valves 122](#_Toc144727016)

[35 ISO 19880-5 Gaseous hydrogen – Fuelling stations – Part 5: Dispenser hoses and hose assemblies 127](#_Toc144727017)

# Purpose

The purpose of this Technical Capability Document (TCD) is to provide documented evidence that applicant and accepted ExTLs have the capability to assess and test equipment according to their proposed or accepted scope of standards. It may also be used as a tool to assess and document the capability of ExCBs.

Completion of the TCD will be a collaborative process between the assessment team and the body being assessed. This will occur prior to and at the assessment visit. At the 2015 IECEx MC meeting it was agreed that the TCD will be completed fully at the initial application of an IEC ExTL/ExCB.

Unless otherwise stated by the assessment team, it is also assumed that if an ExCB or ExTL meets the requirements of the respective sections of this TCD, the ExCB or ExTL is also capable of meeting the requirements of older editions of standards.

The TCD does not cover all requirements of the IEC 60079 series of Standards but focuses on the most important requirements of the standards in order to establish that the necessary personnel knowledge and expertise, procedures, and the equipment are available. It is expected that the ExCB or ExTL under assessment will have self-assessed to the complete relevant standards as the assessor may explore areas not covered by this TCD.

Sections within the TCD contain duplication of information from previous sections. To simplify the use of the TCD, the user may put information in the first section/s and reference the section that has the full details.

# How to complete this TCD

Each part of IEC 60079 in this TCD is split into 3 sections as follows:

## Section 1 – Personnel:

This section is to identify the knowledge level of the ExCBs or ExTLs employees regarding the requirements and interpretations of the respective parts of the IEC 60079 series contained in this document.

Prior to the assessment, the body being assessed shall complete the first two columns for each standard in its scope to show the personnel deemed competent for that standard.

The rest of this section will normally be completed by the assessment team during the site assessment visit. But the body being assessed might also like to use it as a self-assessment tool.

Where the suggested questions or topics given in the personnel section for each standard require a specific numerical answer from the standard, it is acceptable if the person being questioned can readily find the appropriate answer from a copy of the standard. (that is, they are sufficiently familiar with the standard that they know immediately where to find the specific answer)

## Section 2 - Procedures

This section is to identify the procedures used for carrying out the tasks related to IEC 60079 equipment series (assessment and testing). The knowledge of these procedures may be assessed in Section 1.

If there are any contracted or subcontracted tests, a procedure must be included that meets the subcontracting requirements of ISO/IEC 17025.

This section shall be initially completed by the ExCB/ExTL and submit to the Lead Assessor by the time specified prior to the assessment.

## Section 3 – Equipment and tests:

This section is to identify the relevant tests for the part of the standard. It then looks, for each test, at the availability and adequacy of equipment, maintenance and calibration of the equipment, and capability to perform the test correctly. It also includes provision for comments and photos. It is expected that test laboratories/certification bodies will have minimum testing equipment in-house or **an agreement/contract to borrow or rent testing equipment** along with operating procedures and trained personnel that will be able to fulfil the requirements of the tests.

The minimum testing equipment is denoted with an asterisk **\*** throughout the TCD.

**It is allowed to have an agreement/contract to borrow or rent for tests where the equipment is also available in-house, e.g., to solve capacity issues, or for those tests that are not indicated with an asterisk.** A comment shall be provided in the TCD for those tests that are not performed in-house documenting the ExCB/ExTL’s ability to select suitable contractors or subcontractors.

NOTE: Some examples when borrowing or renting may be used:

* Extremely large equipment that will not fit in an ExTL’s IP5X/6X chamber
* Temperature testing of ‘e’ electrical motors that are beyond the capability of the ExTL’s electrical power supply

The ExTL shall not borrow or rent test equipment for every test in a particular standard.

The ExTL and the owner of the borrowed or rented test equipment shall have an Agreement/Contract to establish the responsibilities for the calibration, use and maintenance of the equipment.

The ExTL shall have appropriate provisions to ensure that the transportation of the borrowed/rented test equipment will not affect the correct functioning of the equipment.

The IECEx Assessment Team shall verify the competence of the ExTL staff to properly use such equipment, as well as the compliance of this testing/measurement equipment with the applicable standard’s requirements.

In cases when it is impractical to ship the borrowed or rented equipment to the ExTL facilities, for example, extra size of humidity chamber, it is permitted that the ExTL staff carries out the relevant testing/measurement at the facility of the owner of the borrowed or rented equipment.

Proficiency testing became mandatory for accepted IECEx ExTLs during 2015. When assessing existing ExTLs, assessors should check:

* Participate in relevant program(s);
* Has a copy of the report;
* Understand the report and their results; and
* Undertaken any improvement action from phase 1 and/or phase 2 or as required by the IECEx secretariat.

For initial assessments, assessors may require tests using proficiency testing artefacts to be demonstrated as part of the assessment. The results will be recorded within the TCD and on the respective site assessment report.

This section shall be completed by the ExCB/ExTL. This might include provision of information about the relevant equipment and electronic copies of photos. The assessment team will add information and photos about tests witnessed during the site visit in this section.

Note 1: Information and photos used to be in the site assessment report but are now included in the TCD.

Note 2: To add photos - It is best to use the ‘insert’ function as the photos will automatically fit the width of the cell

Definition of in-house. For the purpose of this document "in-house" means being within the ExTL or associated ATF(s) to which the ExTL has access both in terms of priority (ie. can get tests done when needed) and geography (ie. nearby).

NOTE: IECEx OD 03 contains additional information used to assist in interpretation of these requirements.

## Completion of TCDs

All new applicants are to have a TCD completed as part of the original assessment. The Lead Assessor is to send the TCD to the applicant so it can be partly completed and forwarded to the assessment team with sufficient time for the assessor to review. At the time of the assessment, the respective parts of the TCD are to be completed between the assessment team and the applicant.

When the ExTL is not integral with the ExCB, section 3 shall be completed with comments indicating the ExTL(s).

Note: To make document smaller as a .docx file do the following

- select save as

- click 'tools' bottom middle

- choose 'Compress Pictures'

- click on 'Options'

- select both the top options under 'Compression options'

- selection 'email (96 ppi)' under Target output'

- Then click, 'OK', 'OK' and 'Save'

# IEC 60079-0 Explosive atmospheres – Part 0: Equipment – General requirements

|  |
| --- |
| Edition(s) covered by this TCD |
| 7.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (e.g. initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is explosion protection? * What are the equipment groups? * What are EPLs? * What is meant by ambient temperature? * Temperature Classification * External heating or cooling * What is meant by service temperature? * Can parts exceed the temperature class? * Mechanical strength - materials and impact strength * Stored energy and cooling time * Circulating currents * Retention of gaskets * Various forms of energy - RF, Laser, Ultrasonic etc. * Non-metallic materials - plastics, Elastomers, glass etc. * Electrostatic charge - Group I, Group II and Group III * Metallic parts - light alloys * Fasteners * Special fasteners * Interlocks * Bushings * Cements * Ex Components * Connection facility, including creepage and clearance if necessary * Earthing * Entries into enclosure - entry holes and cable entry devices etc. * Rotating machines * Switchgear * Fuses * Plugs & sockets * Luminaires * Cells & batteries * Documentation - drawings, instructions etc. * Compliance * Understanding of the application of Clause 6.6.4 Laser, Luminaires and other non-divergent continuous wave optical sources and the scope of IEC 60079-28 sufficiently to know if application of IEC 60079-28 is applicable” |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| Standard: IEC 60079-0 General Requirements | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **6.3** | **Opening time test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.3** | **Capacitance discharge timing test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| **17.2.1** | **Ingress Protection – IP Code 1X-2X – Protected Against Solid foreign objects on ventilation openings \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **25** | **Compliance of prototype or sample with documents \*** | |
|  | Availability and adequacy of equipment | Relevant equipment may be needed by the concept standard – e.g. measuring equipment for creepage and clearance in Ex i and Ex e, or measurement of flamepaths in Ex d.  Also can include CTI test equipment when required by the concept standard. |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.4.2** | **Resistance to impact \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.4.3** | **Drop test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.4.5** | **Degree of protection (IP) by enclosures – dust test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2012/003](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/85) |  |
|  | Comments |  |
| Photos |  |  |
| **26.4.5** | **Degree of protection (IP) by enclosures – water test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.5.1** | **Temperature measurement tests \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |
| **26.5.2** | **Thermal shock test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.5.3** | **Small component ignition test (Group I and Group II)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.6** | **Torque test for bushings \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.8** | **Thermal endurance to heat \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2020/003](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/3221) |  |
|  | Comments |  |
| Photos |  |  |
| **26.9** | **Thermal endurance to cold \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.10** | **Resistance to UV light** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.11** | **Resistance to chemical agents for Group I equipment \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.12** | **Earth continuity \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.13** | **Surface resistance test of parts of parts of enclosures of non-metallic materials \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.14** | **Measurement of capacitance \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.15** | **Verification of ratings of ventilating fans** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.16** | **Alternative qualification of elastomeric sealing O-rings** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **26.17** | **Transferred charge test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.3.1** | **Tests of clamping of non-armoured and braided cables \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.3.2** | **Tests of clamping of armoured cables \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

Where none of the concept standards included in the scope of the ExTL requires the capability for any particular test above, the ExTL does not need to have the testing equipment in-house or demonstrate the capability for that test.

# IEC 60079-1 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"

|  |
| --- |
| Edition(s) covered by this TCD |
| 7.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is a flameproof enclosure? * EPLs * Enclosed break devices * Joints - gap and width Groups I, IIA, IIB and IIC * Stationary joints * Moving joints * Sealed (cemented) joints * Breathing and draining devices * Fasteners and materials of construction * Entry devices and the holes for them * Temperature considerations * Testing - mechanical measurements * Testing - reference pressure * Testing - pressure test * Testing - flame transmission test * Testing - breathing and draining devices * Testing - flame erosion * Testing - cable entry devices * Empty flameproof enclosures - testing * Empty flameproof enclosures - utilisation * Cells and batteries * Containment systems |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| Standard: IEC 60079-1 Flameproof enclosure "d" | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **4.2** | **Requirement for level of protection "da"** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5** | **Verification and tests \***  **e.g. Measurement of flamepaths and enclosure dimensions** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| **15.2.2** | **Determination of Reference Pressure \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **15.2.3** | **Overpressure test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **15.3** | **Test for non-transmission of an internal ignition \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **15.4** | **Tests of flameproof enclosures with breathing and draining devices** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **15.5** | **Tests for "dc" devices \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **B.1.2** | **Sintered metal elements - bubble test pore size** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **B.1.3** | **Sintered metal elements - Density** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **B.1.4** | **Sintered metal elements - Open porosity and/or fluid permeability** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **C.3.1** | **Cable glands - Sealing test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **C.3.3.1**  **C.3.4.1** | **Type tests for Ex blanking elements - Torque test \*** | |
| **Availability and adequacy of equipment** |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **C.3.4.2** | **Impact test for thread adapters \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

It is possible for an ExTL to have a scope limitation for ‘da’ only. In this situation, the minimum test equipment is in Clause 15.3.

Test gases should be appropriate for the particular scope of the ExTL.

e.g. for Group II the 85/15 hydrogen /methane mixture should be available or be capable of being generated

# IEC 60079-2 Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p"

|  |
| --- |
| Edition(s) covered by this TCD |
| 6.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What are the principles of type of protection p? * What are the Level of protection of Ex p equipment and the intended use in the Ex-zones? * What is the meaning of containment system? * What is the meaning of dilution? * What are the requirements for special fasteners? Does IEC 60079-2 define separate requirements on that? * What are the requirements on mechanical strength of an enclosure and how to test that? * What is the meaning of static pressurization? * How is the temperature class to be determined? * How has the safety device to be designed for static pressure? * What is the special requirement for group III equipment after opening of the enclosure? * What is the minimum value of overpressure? * What kinds of gases are possible to use as protection gases? * What are the design requirements for containment systems?   Describe the purging and dilution test requirements and process. |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| Standard: IEC 60079-2 Pressurized enclosure "p" | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **16.1** | **Determining the maximum overpressure rating \*** | |
| Availability and adequacy of equipment |  |
| Maintenance and calibration |  |
| Capable of being performed correctly |  |
| Comments |  |
| Photos |  |  |
| **16.2** | **Maximum overpressure test \*** | |
| Availability and adequacy of equipment |  |
| Maintenance and calibration |  |
| Capable of being performed correctly |  |
| Comments |  |
| Photos |  |  |
| **16.3**  **16.3.1**  **16.3.2** | **Leakage test \*** | |
| Availability and adequacy of equipment |  |
| Maintenance and calibration |  |
| Capable of being performed correctly |  |
| Comments |  |
| Photos |  |  |
| **16.4**  **16.4.1**  **16.4.3**  **16.4.4**  **16.4.5** | **Purging test for pressurized enclosures with no internal source of release**  **and filling procedure test for static pressurization \*** | |
| Availability and adequacy of equipment |  |
| Maintenance and calibration |  |
| Capable of being performed correctly |  |
| Comments |  |
| Photos |  |  |
| **16.5**  **16.5.1**  **16.5.2**  **16.5.3**  **16.5.4** | **Pressurized enclosure where the flammable substance is not a liquid,**  **pressurization by continuous flow and the protective gas is air \*** | |
| Availability and adequacy of equipment |  |
| Maintenance and calibration |  |
| Capable of being performed correctly |  |
| Comments |  |
| Photos |  |  |
| **16.6** | **Verification of minimum overpressure \*** | |
| Availability and adequacy of equipment |  |
| Maintenance and calibration |  |
| Capable of being performed correctly |  |
| Comments |  |
| Photos |  |  |
| **16.7**  **16.7.1**  **16.7.2** | **Tests for an infallible containment system \*** | |
| Availability and adequacy of equipment |  |
| Maintenance and calibration |  |
| Capable of being performed correctly |  |
| Comments |  |
| Photos |  |  |
| **16.8** | **Overpressure test for a containment system with a limited release \*** | |
| Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

# IEC 60079-5 Explosive atmospheres - Part 5: Equipment protection by powdered filling "q"

|  |
| --- |
| Edition(s) covered by this TCD |
| 4.1 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the type of protection q? * What are the levels of protection with this type of protection? * Which filling materials might be used? * Are there any distances through the filling material given? * What is a container? * Which different types of container are allowed? * Are there any protective devices allowed to be used to limit the temperature? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-5 Powder filling "q" | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **5.1.1** | **Pressure type test of enclosure** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.1.2** | **Verification of the degree of protection of the enclosure** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.1.3** | **Insulation resistance test of the filling material** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.1.4** | **Maximum temperatures** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

Noting that Ex q certification is rarely required, it is acceptable for the ExTL to demonstrate that they have the capability to source the equipment in the event of these tests being required.

# IEC 60079-6 Explosive atmospheres - Part 6: Equipment protection by liquid immersion "o"

|  |
| --- |
| Edition(s) covered by this TCD |
| 4.1 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |

**2: Personnel knowledge**

To be completed by assessor

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the type of protection “o”? * What levels of protection are permitted with this type of protection? * When is an overpressure test required? * What is the prospective short-circuit current for switching devices with level of protection “ob”? * When is a breathing devise required? * At 6,000v what is the minimum possible liquid level with an a.c. switching device? * What level of protection is permitted when the rated voltage is 13.8kV? * What is the minimum pressure setting for sealed enclosure pressure-relief devices? * What is the IP rating for sealed enclosure pressure relief device outlet? * What is the minimum temperature difference between the minimum flash point (closed cup) and the temperature of internal components immersed in the liquid? * What is the minimum volume resistivity permitted for the protective liquid? * Are you aware of the requirements of normative Annex D *Supplementary requirements for electrical equipment with Level of Protection “oc” for voltages greater than 15 kV and up to and including 245 kV*?   + What maximum voltage is allowed by the annex?   + Give examples for some the additional requirements specified   + What routine tests may be required, and how can you demonstrate  the competence of your assessors to assess the manufacturer’s capabilities to do those tests?   + What standard is applicable for the above tests?   + At what liquid depth are tests to be carried out?   + Are you aware of the possible application of IEC 60079-33 and the need to consider this at contract review in the event it is not in your scope?   + Are you aware that although this is for EPL “oc”, some requirements for “ob” may apply – can you give examples? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**3: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**4: Equipment and Testing**

| Standard: IEC 60079-6 Liquid immersion "o" | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | | Result – Remark |
| **6.1.1** | **Overpressure test on sealed enclosures** | | |
|  | Availability and adequacy of equipment | |  |
|  | Maintenance and calibration | |  |
|  | Capable of being performed correctly | |  |
|  | Comments | |  |
| Photos |  | |  |
| **6.1.2** | **Reduced pressure test on sealed enclosures** | | |
|  | Availability and adequacy of equipment | |  |
|  | Maintenance and calibration | |  |
|  | Capable of being performed correctly | |  |
|  | Comments | |  |
| Photos |  | |  |
| **6.1.3** | **Overpressure test on unsealed enclosures** | | |
|  | Availability and adequacy of equipment |  | |
|  | Maintenance and calibration |  | |
|  | Capable of being performed correctly |  | |
|  | Comments |  | |
| Photos |  |  | |
| **6.1.4** | **Maximum temperature** | | |
|  | Availability and adequacy of equipment |  | |
|  | Maintenance and calibration |  | |
|  | Capable of being performed correctly |  | |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  | |
|  | Comments |  | |
| Photos |  |  | |
| **6.1.5** | **Switching Tests** | | |
|  | Availability and adequacy of equipment |  | |
|  | Maintenance and calibration |  | |
|  | Capable of being performed correctly |  | |
|  | Comments |  | |
| Photos |  |  | |

**Minimum testing capability**

Noting that Ex o certification is rarely required, it is acceptable for the ExTL to demonstrate that they have the capability to source the equipment in the event of these tests being required

# IEC 60079-7 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

|  |
| --- |
| Edition(s) covered by this TCD |
| 5.1 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the type of protection e? * What is the minimum ingress protection level for an enclosure containing bare conductive live parts? * Give an example of when an “X” suffix has to be added to the certificate number. * What is meant by the value *t*E? * With what level of protection is a current-dependent safety device required for rotating electrical machines? * What methods are permitted to verify the minimum air gap requirement for rotating electrical machines with level of protection “eb”? * For rotating electrical machines what is the maximum ratio of the starting current *I*A/*I*N? * With rotating electrical machines with level of protection “eb” what is the total sum of the risk factors above which tests for possible air gap sparking is required? * Testing- what is the heat preconditioning test temperature (IEC 60079-0 test of enclosures) for equipment with level of protection “eb”? * What is the voltage above which stator winding insulation system tests need to be conducted for stator windings from rotating electrical machines with level of protection ”eb”? * Testing- What is the test voltage and explosive test mixture for a steady state ignition test for equipment group IIB for insulation systems? * Testing- How many voltage impulses of what voltage level and rise time must a level of protection “ec” 3,3kV stator insulation system pass? * What is the maximum capacity for sealed cells? * Testing- What is the accepted condition of the bulb and filament of a lamp following an impact or drop test? * Testing- detail the different methods used for determining the temperature of ballasts for discharge lamps under abnormal operating conditions for levels of protection “eb” & “ec”. * Alternative separation distances for Level of Protection “ec” equipment under controlled environments. |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-7 Increased safety "e" | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **6.1** | **Dielectric strength \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.2**  **6.2.1** | **Rotating electrical machines**  **Determination of starting current ratio IA/ IN and the time tE** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.2.3**  **6.2.3.1** | **Additional tests**  **Stator winding insulation** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.2.3.2** | **Cage rotor** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.2.4** | **Overspeed test of cemented magnets** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.3**  **6.3.2** | **Luminaires**  **Impact and drop tests\*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.3.3** | **Mechanical tests for screw lampholders other than E10** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.3.4** | **Abnormal operation of luminaires** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.3.5** | **Sulphur dioxide test for level of protection "eb" for the connection of bi-pin lamp caps to lampholders** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.3.6** | **Vibration test for level of protection "eb" for luminaires with bi-pin lamps** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.3.7** | **Tests for wiring of luminaires subject to high-voltage impulses from ignitors** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.3.8** | **Tests for electronic starters for tubular fluorescent lamps and for ignitors in level**  **of protection “ec” for discharge lamps** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.3.9** | **Test for starter holders for luminaires in Level of Protection “ec”** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.4** | **Measuring instruments and instrument transformers\*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.5** | **Transformers and other than instrument transformers\*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.6**  **6.6.2** | **Verification and tests for cells and batteries of Level of Protection “eb”**  **Insulation test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.6.3** | **Mechanical shock test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.6.4** | **Test for Level of Protection "eb" ventilation of battery container** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.7** | **Verification and tests for cells and batteries of Level of Protection “ec”** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.8** | **General purpose junction boxes\*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.9** | **Resistance heating devices (not trace heating) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.10** | **Terminal insulating material tests – thermal conditioning then pull test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

# IEC 60079-11 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

|  |
| --- |
| Edition(s) covered by this TCD |
| 7.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is intrinsic safety? * Relevance of faults * Infallibility, including infallible components * Levels of Protection * Temperature assessment of wiring and trackwork * Methods of establishing temperature classification * Spark ignition assessment using reference curves and tables * Separation of conductive parts * Earthing * Encapsulation * Rating of components * Thermal devices * Batteries |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**



| Standard: IEC 60079-11 Intrinsic safety "I" | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **9.1** | **Spark ignition test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.3** | **Temperature tests \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |
| **9.4** | **Mechanical tests \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.5** | **Current carrying capacity of infallible printed circuit board connections** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.6** | **Dielectric strength tests \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.7** | **Qualification of solid insulation and distance through casting compound for**  **application of reduced separations** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.8** | **Type tests for PCB coatings** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.9** | **Differential Leakage current tests for signal isolators** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.10** | **Isolator tests** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.11** | **Tests for intrinsically safe apparatus containing piezoelectric devices \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.12** | **Tests for PTC devices** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.13** | **Determination of parameters of loosely specified components \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.14** | **Tests for cells, batteries and supercapacitors \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.15** | **Determination of storable energy in common mode chokes** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.16** | **Type tests for components protected by time dependent current limitation** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.17** | **Transformer tests \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **Annex D** | **Excess transient energy test** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **Annex F** | **Ignition testing of semiconductor limiting power supply circuits** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

The following are specific requirements related to the spark test apparatus (STA):

* + 3 A STA
  + 10 A STA if testing to higher currents may be necessary.
  + Range of capacitors having low inductance
  + Range of air-cored inductors having low resistance
  + Current probe for measuring transient conditions
  + Ability to test with gas mixture giving factor of safety for Group IIC (oxygen-hydrogen-air mixture or oxygen-hydrogen mixture, according to Table 24).

Where it is necessary to establish the CTI by test, then that may be done through a subcontract arrangement.

ExTLs must have the capability to accurately measure distances on circuit boards to check widths, and creepage and clearance distance. Vernier/digital callipers are not generally appropriate for this purpose.

Competency under this standard is considered to cover IEC 60079-25.

# IEC 60079-13 Explosive atmospheres - Part 13: Equipment protection by pressurized room "p" and artificially ventilated room “v”

|  |
| --- |
| Edition(s) covered by this TCD |
| 2.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the scope of this standard? * What are the suitable groups and EPL? * What are the different types and level of protection in this standard? * How is the mechanical strength test performed and/or assessed? * What are the requirements for penetrations and seals? * How shall the inlet and outlet of the air be arranged? * What are the minimum requirements in terms of purge volume and flow rate? Is it allowed to go below of that minimum values? What is it compared to the minimum flow rate of artificial ventilation? * What requirements do exist for enclosures within the room? * What methods do exist to prevent the explosive atmosphere from entering an open door of a pressurized room? * What is an airlock and what are the requirements on airlocks? * What are the requirements for safety devices used with pressurized rooms? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-13 Pressurized room "p" and artificially ventilated room “v” | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **6** | **Requirements for pressurized rooms** | |
| **6.4** | **Verification of pressurized rooms** | |
| **6.4.3** | **Overpressure test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.4.4** | **Purging test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.4.5** | **Minimum pressure differential test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.4.6** | **Confirmation of the ratings of the safety devices** | |
|  | Availability and adequacy of equipment | See below. |
|  | Maintenance and calibration | See below. |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos | NA | No test equipment needed. |
| **6.4.7** | **Verification of sequence of operation of the safety devices** | |
|  | Availability and adequacy of equipment | See below. |
|  | Maintenance and calibration | See below. |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos | NA | No test equipment needed. |
| **7** | **Requirements for artificially ventilated rooms** | |
| **7.5** | **Verification for artificially ventilated rooms** | |
| **7.5.3** | **Purging test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.5.4** | **Minimum ventilation flow rate test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.4.6** | **Confirmation of the ratings of the safety devices** | |
|  | Availability and adequacy of equipment | See below. |
|  | Maintenance and calibration | See below. |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos | NA | No test equipment needed. |
| **7.5.6** | **Verification of sequence of operation of the safety device \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.5.7** | **Testing of ventilation system \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

ExTLs having testing capability for IEC 60079-2 are assumed to have capability for the tests in this standard. However, the ExTL will need to be able to generate chemical smoke for two of the above tests, e.g., in 6.4.4.

If IEC 60079-2 is not within the testing capability, then the tests marked with an asterisk are considered to be the minimum testing capability that should be available in-house at an ExTL.

# IEC 60079-15 Explosive atmospheres - Part 15: Equipment protection by type of protection "n"

|  |
| --- |
| Edition(s) covered by this TCD |
| 5.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| What is type "n" – what is its purpose  Surface temperature  Degree of protection  Creepage and clearance  Coatings / compounds / potting / CTI  Wiring and connections – internal and user  Rotating machines – air gap and construction  HV motors – potential sparking(?)  Fuses / plugs and sockets  Luminaires  Cells & batteries  Hermetically sealed devices  Sealed devices  Restricted breathing devices |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-15 Type of protection "n" | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **11.1** | **Tests for non incendive components \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **11.2** | **Tests of sealed devices \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **11.3** | **Type test requirements for restricted-breathing enclosures \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

Most requirements and tests in this standard have now been (or are in the process of being) transferred to other standards.

# IEC 60079-16 Electrical apparatus for explosive atmospheres - Part 16: Artificial ventilation for analyzer(s) houses

|  |
| --- |
| Edition(s) covered by this TCD |
| 1 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is an analyzer house? * What is artificial ventilation? * Possible operating pressure inside an analyzer during ventilating? * What are ventilation types? * What is considered as a ventilation failure? * General safety considerations? * Considerations when incorporating an analyzer house in an existing building? * Impact of handling flammable gases on surroundings of analyzer houses? * What consideration is to be taken regarding ingress of external atmospheres into analyzers? * Type of protection appropriate to all equipment intended to remain in operation during a ventilation failure? * When to incorporate time delay to switch off electrical apparatus not able to operate in explosive atmosphere? * Condition for re-energizing such equipment? * Calculation to be conducted to prevent purging? * Requirements for equipment installed in an analyzer house * Principle applicable to parts (length of piping, number of joints, components containing flammable substances,…) inside the analyzer house? * Expectations for the gas sampling inlet and outlet pipes? * Techniques to limit to a minimal value any escape of flammable substances? * Where to carry operations which involve intentional release of flammable substances? * Appropriate dimension of the building? * When selecting highly insulating materials what hazards have to be avoided? * Design consideration to avoid accumulation of flammable substances * Prevention of air loss? * Requirements for all ventilation systems? * Specific requirements for forced ventilation? * Specific requirements for induced ventilation? * Ventilation failure detection? * Management of not automatically self-closing doors. * Automatic disconnection delay? * Closing of the air inlets? * Condition to restore electricity power? * Expected Verification and test? * Usual Marking? * Usual Warning? * Expected records? * Modifications? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-16 Artificial ventilation for analyzer(s) houses | | |
| --- | --- | --- |
| Clause 7 | Requirement – Test | Result – Remark |
| **3)** | **Airflow and purging test \*** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4)** | **Pressure test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5)** | **Safeguarding system test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6)** | **Flow restrictor test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

ExTLs having testing capability for IEC 60079-2 are assumed to have capability for the tests in this standard. If IEC 60079-2 is not within the testing capability, then the tests marked with an asterisk are considered to be the minimum testing capability that should be available in-house at an ExTL.

# IEC 60079-18 Explosive atmospheres - Part 18: Equipment protection by encapsulation "m"

|  |
| --- |
| Edition(s) covered by this TCD |
| 4.1 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|  |
| --- |
| **Check of competence (typical topics or questions to cover include):** |
| * What is the type of protection m? * What are the different levels of protection? * What we call "Water absorption"? * What is the principle of "Fault examination" for "m" equipment? * What is the free space required when the distance to the surface is less than 1 mm for "ma", "mb" and "mc" equipment? * What is the distance to the surface required when the free space is less than 1 cm3 for "ma", "mb" and "mc" equipment? * Is it possible to have batteries in "m" equipment? * What kind of test has to be performed on "m" equipment with permanently connected cable? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-18 Type of protection "m" | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **8.1.1** | **Water absorption test on compound \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.1.2** | **Dielectric strength tests on compound \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.2** | **Maximum temperature \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.3.1** | **Thermal endurance to heat \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.3.2** | **Thermal endurance to cold \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.4** | **Dielectric strength tests - circuits \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.5** | **Cable pull tests \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.6** | **Pressure tests \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.7** | **Endurance test for resettable thermal protective devices with contacts** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.7** | **Endurance test for resettable thermal protective devices without contacts** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.8** | **Sealing tests for built-in protective devices \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

# IEC 60079-26 Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga

|  |
| --- |
| Edition(s) covered by this TCD |
| 3.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| This standard specifies alternative requirements for construction and test for electrical equipment that provides EPL Ga where standardisation types of protection cannot be applied. Can you give an example of how it does this?  The standard is also applied to equipment mounted across a boundary where different EPLs apply. Can you explain how it achieves this?  Application of two independent Types of Protection providing EPL Gb.  Give an example of two Types of Protection that may be used in combination.  How would they be assessed?  Separation elements  Partition walls  Bushings  Natural ventilation  Moving parts and frictional heating  Process connections |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-26 Equipment with equipment protection level (EPL) Ga | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **5.2** | **Separation elements \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.3** | **Temperature evaluation \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |

# IEC 60079-28 Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation

|  |
| --- |
| Edition(s) covered by this TCD |
| 2.0 |

Regarding possible restriction of scope, the following approach should be followed:

* It is reasonable to exclude the ignition testing from scopes as no one seems to have had to do this.
* Where a scope is restricted to “op is”, the laboratory should be able to perform the tests for measurement of optical power and optical irradiance or have a subcontract arrangement with a body that could do these tests. In this case the subcontracting body will require an assessment by IECEx. It should be noted that not only is the actual test important, but the faults that must be applied are also critical. These may be electrical or mechanical faults depending on what will produce the worst case situation and require a good appreciation of optical radiation.

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Typical topics or questions to cover include: |
| --- |
| **Most likely ignition mechanisms**  **Terms and definitions (see below)**  Absorption  Beam diameter (or beam width)  Beam strength  Fibre optic terminal device  Inherently safe optical radiation  Irradiance  Minimum ignition energy  Optical fibre communication system  Free space optical communication system  Optical (or radiant) power  Optical radiation  Radiant energy  Radiant exposure  **General Requirements -**  What are the equipment protection levels (EPLs) that apply and their relationship to an ignition source?  **Types of protection -**  There are three types of protection that can be applied (see below)  **Inherently safe optical radiation “op is” -**  Summarise the requirements for inherently safe optical radiation covering such areas as:  Continuous wave radiation  Pulsed radiation  Ignition tests  Optical devices incorporating the inherently safe concept  **Protected optical radiation “op pr” -** Summarise the requirements for protected optical radiation, including:  Radiation inside fibre etc.  Radiation inside enclosures  **Optical radiation interlock with optical fibre breakage “op sh” -** Summarise the requirements for optical radiation interlock with optical fibre breakage  **Suitability of types of protection -** Discuss the use of Annex C and the principles of using the types of protection |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-28: 2015 Part 28: Protection of equipment and transmission systems using optical radiation | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **5.2.** | **Requirements for inherently safe optical radiation “op is”** | |
| **5.2.2** | **Continuous wave radiation** | |
| **5.2.2.2** | **Optical power** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.2.2.3** | **Optical irradiance** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.2.3** | **Pulsed radiation** |  |
| **5.2.3.1 to 5.2.3.5** | **“Optical pulses with different durations” and additional requirements** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.2.4 and 6** | **Ignition tests (see comment on ignition tests above)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.2.5** | **Over-power / energy fault protection** |  |
| **5.2.5.1 to**  **5.2.5.3** | **Self-limiting sources / sources requiring power limiting circuitry** | **See and make reference to clauses 5.2.2.2 and 5.2.2.3 of this standard and to methods of (e.g.) IEC 60079-11** |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.3** | **Requirements for protected optical radiation “op pr”** |  |
| **5.3.1 to**  **5.3.3** | **Radiation inside optical fibre or cable / inside enclosures** | **See and make reference to test requirements of other standards, e.g. : IEC 60079-0, IEC 60079-1, IEC 60079-15,  IEC 60079-11 [Those test equipment need to be available, depending on the scope of ExTL]** |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4** | **Optical system with interlock “op sh”** | **Assessment and/or measurement of the ignition delay time and the used methods of functional safety (test result, test report origin)** |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

See the introduction for this standard regarding minimum testing capability.

# IEC 60079-29-1 Explosive atmospheres – Part 29-1: Gas detectors – Performance requirements of detectors for flammable gases

|  |
| --- |
| Edition(s) covered by this TCD |
| 2.1 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * Gas properties * Types of instruments * Sensors * Supply of gas to instrument * Signals and alarms * Times * Resolution * Measurement range * Selectable range * Indicating light * Indicator light marking * Alarm or output functions * Continuous duty apparatus * Group I portable apparatus indicating up to 5% v/v * Group II portable apparatus indicating up to 100% LFL * Fault signals * Adjustments * Battery powered apparatus * Stand-alone gas detection apparatus for use with separate control units * Separate control units for use with stand-alone gas detection apparatus * Software controlled apparatus * Conversion errors * Special state indication * Software * Data transmission * Self-test routines * Tests repeat? * Functional concept * Labelling and marking * Instruction manual * General requirements for tests * Samples and sequence of tests * General * Sequence * Stand-alone gas detection apparatus * Standalone control units * Preparation of apparatus before testing * Mask for calibration and tests * Normal conditions for test * Test gas(es) * Standard test gas * Flow rate for test gases * Voltage * Temperature * Pressure * Humidity * Stabilization time * Orientation * Communication options * Gas detection apparatus as part of systems |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| Standard: IEC 60079-29-1 Gas detectors – Performance requirements of detectors for flammable  gases | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **5.4** | **Test Methods** | |
| **5.4.1** | **General** | |
| **5.4.2** | **Unpowered storage \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.3** | **Calibration and adjustment \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4** | **Stability \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.1** | **Battery-powered equipment for stability \*** | |
|  | Availability and adequacy of equipment | |
|  | Maintenance and calibration | |
|  | Capable of being performed correctly | |
|  | Comments | |
| Photos |  | |
| **5.4.4.2** | **Short-term stability \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.3** | **Long-term stability (fixed and transportable equipment –  Group I only) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.4** | **Long-term stability (portable equipment – Group I only) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.5** | **Long-term stability (fixed and transportable equipment –  Group II only) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.6** | **Long-term stability (portable equipment – Group II only) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.5** | **Alarm set point(s) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6** | **Temperature \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.7** | **Pressure \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.8** | **Humidity of test gas \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.9** | **Air velocity (Maybe subcontracted but only to another ExTL)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.10** | **Flow rate for aspired apparatus \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.11** | **Orientation \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.12** | **Vibration** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.13** | **Drop test for portable and transportable equipment \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.14** | **Warm-up time \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.15** | **Time of response \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.16** | **High gas concentration operation above the measuring range \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.17** | **Battery capacity \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.18** | **Power supply variations \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.19** | **Addition of sampling probe** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.20** | **Other gases and poisons \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.21** | **Electromagnetic immunity** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.22** | **Field calibration kit \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.23** | **Software function \*** | |

# IEC 60079-29-4 Explosive atmospheres - Part 29.4: Gas detectors—Performance requirements of open path detectors for flammable gases

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

Regarding testing capabilities, the following approach should be followed.

* It is common for this testing to be done at the manufacturer's premises.
* Because of this, it may not be necessary for the ExTL to have all equipment necessary to do the tests.
* But this approach is only acceptable where the ExTL is demonstrating its expertise through having the capability to test at its own laboratories with its own test equipment for IEC 60079-29-1.

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the scope of this standard? * What is the fundamental difference between the equipment required to meet this standard and equipment required to meet IEC 60079-29-1? * Explain the two types of open path equipment that fall within the scope of this standard * Explain the role of gas cells in testing this equipment * What are some of tests that are unique to open path equipment and why they are needed? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-29-4  Part 29-4: Gas detectors—Performance requirements  of open path detectors for flammable gases | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **5.4** | **Test Methods** | |
| **5.4.1** | **Initial preparation and procedure** | |
| **5.4.2** | **Unpowered storage** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.3** | **Calibration curve** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4** | **Stability** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.1** | **Slow release of gas volume (Equipment with automatic drift compensation only)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.2** | **Long-term stability (continuous-duty a.c. or d.c. powered)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.3** | **Long-term stability (continuous-duty battery powered)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.4** | **Stability (sport-reading equipment only** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.5** | **Alarm reliability** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6** | **Temperature variation** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.7** | **Water vapour interference** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| **5.4.8** | **Vibration** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.9** | **Drop test for portable and transportable equipment** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.10** | **Alignment** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.11** | **Time of response** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.12** | **Minimum time to operate (spot-reading equipment** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.13** | **Battery capacity** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.14** | **Power supply variations (externally powered equipment)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.15** | **Power supply interruptions and transients** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.16** | **Recovery from power supply interruption** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.17** | **Electromagnetic compatibility (EMC)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.18** | **Beam block fault** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.19** | **Partial obscuration** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.20** | **Long term operation** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.21** | **Direct solar radiation (applicable for equipment intended for outdoor use)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

See the introduction for this standard regarding minimum testing capability.

# IEC/IEEE 60079-30-1 Explosive atmospheres - Part 30.1: Electrical resistance trace heating—General and testing requirements

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * Determining maximum sheath temperatures – Understand the concepts of a) product classification method, b) stabilized design method, c) controlled design method, and d) controller/limiter design methods as specified in clauses 4.5.1 through 4.5.3. * Design verification methodology – Understand the concepts specified in Annex C for a) stabilized designs, b) controlled designs, and c) controller/limiter designs. * Controlled design and controller/limiter design – Understand the concepts, their applicability to area classification, and their requirements for documentation as specified in clauses 4.5.3.1 through 4.5.3.3. * IEC 60079-0 requirements – Understand applicability as listed in Table 1. * General requirements – Understand the general requirements, mechanical strength levels, and applicability to integral components as given in clauses 4.1, 4.2, and 4.3 respectively. * Branch circuit protection – Understand the concepts specified in clause 4.4. * Markings and documentation – Understand the requirements specified in clauses 6 and 7 respectively. * Documenting temperature sensor locations – Understand the importance in manufacturer’s literature as specified in clause 4.5.3.1. |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC/IEEE 60079-30-1  Part 30.1: Electrical resistance trace heating—General and testing requirements | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **5.1.2** | **Dielectric Test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.1.3** | **Electrical insulation resistance test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.1.4** | **Flammability test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.1.5** | **Impact tests** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
| Photos |  |  |
| **5.1.6** | **Deformation test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.1.7** | **Cold bend test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.1.8** | **Water resistance test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| 5.1.9 | **Integral components resistance to water test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| 5.1.10 | **Verification of rated output** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| 5.1.11 | **Thermal stability of electrical insulating material** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| 5.1.12 | **Thermal performance test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| 5.1.13 | **Determination of maximum sheath temperature** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |
| 5.1.14 | **Verification of start-up current** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| 5.1.15 | **Verification of the electrical resistance of metallic covering** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| 5.1.16 | **Outdoor exposure test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

The following are acceptable options for this standard

1. The ExTL is capable of performing all tests at its laboratories.
2. The ExTL has a comprehensive procedure covering testing at the manufacturers' premises addressing:
   1. Compliance with OD024; and
   2. Methods of verifying test equipment, such as those used for impact test, deformation test and cold bend test, compliance with the requirements of the standard with appropriate calibrated and traceable instruments being using for that verification.
3. A combination of the above approaches where the ExTL is capable of performing only some of the tests at its laboratories.

# IEC 60079-31 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

|  |
| --- |
| Edition(s) covered by this TCD |
| 3.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is dust ignition protection by enclosure? * What are the three levels of protection? * What EPL relates to each of the three levels of protection respectively? * Describe the relationship between level of protection, group, and ingress protection. * Fault current limitation for “ta” * Protective device requirements for “ta” equipment * Supplementary enclosure requirements for “ta” equipment with normally arcing and sparking parts * Joints * Gaskets and seals * Cable Glands * Entries * Testing – Test of enclosures in accordance with IEC 60079-0 * Testing – Impact test for supplementary enclosures * Testing – Pressure Test * Testing – IP Test * Testing – Thermal Test for “ta” versus “tb” and “tc” |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-31 Equipment dust ignition protection by enclosure "t" | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **6.1.1** | **Type tests for dust exclusion by enclosures** | |
| **6.1.1.1** | **General (includes thermal endurance to heat and cold) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.1.1.2** | **Impact test for supplementary internal enclosures \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.1.1.3** | **Pressure test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.1.1.4** | **IP test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2012/003](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/85) |  |
|  | Comments |  |
| Photos |  |  |
| **6.1.2** | **Tests to determine maximum surface temperature \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

Where the thermal tests including dust layer is required it shall be sufficient for the ExTL to demonstrate that it has a source of dust that complies with IEC 60079-0

# IEC 60079-32-2 Explosive atmospheres - Part 32-2: Electrostatic hazards – Tests

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| What is the scope of this standard**?** |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-32 Explosive atmospheres - Part 32-2: Electrostatic hazards, guidance | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **4.2** | **Surface resistance** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.3** | **Surface resistivity** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| 4.4 | **Volume Resistivity** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.5** | **Leakage resistance** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.6** | **In-use testing of footwear** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.7** | **In-use testing of gloves** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.8** | **Powder resistivity** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.9** | **Liquid conductivity** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.10** | **Capacitance** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.11** | **Transferred charge** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.12** | **Ignition test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.13** | **Measuring of charge decay** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **4.14** | **Breakdown voltage** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

All tests included in the ExTL scope for this standard should be capable of being performed by the ExTL

# IEC 60079-33 Explosive atmospheres – Part 33: Equipment protection by special protection “s”

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the scope of this standard and under what circumstances is it likely to be used? * What is the role of the independent verifiers? * Who do they need to be independent from? * What competencies are the independent verifiers expected to have? * How many independent verifiers are needed for the various EPLs? * What is expected of the manufacturer? * What sort of potential ignition sources would need to be considered? * How is the ignition hazard assessment carried out? * Who prepares the assessment and test specification? * The standard recognises four potential scenarios in 10.2 - discuss each of the scenarios * What other innovative means might be used? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

Nil

**Minimum testing capability**

There are no tests specified by this standard.

# IEC 60079-35-1 Explosive atmospheres - Part 35-1: Caplights for use in mines susceptible to firedamp – General requirements – Construction and testing in relation to the risk of explosion

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What would be required to assess a Caplight as EPL Ma? * Temperature assessment * Spark ignition assessment * Headpiece construction & testing * Battery enclosure construction & testing * Cable requirements * Charging contacts requirements * Creepage & clearance requirements * Over-current protection * Cells & batteries * Marking |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-35-1  Part 35-1: Caplights for use in mines susceptible to firedamp – General requirements – Construction and testing in relation to the risk of explosion | | |
| --- | --- | --- |
| **Clause** | **Requirement – Test** | **Result – Remark** |
| **8.1** | **Impact test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.2** | **Drop tests \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.3** | **Degree of protection (IP) by enclosures \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4** | **Test to verify the non-ignition of a representative electrolytic gas mixture or**  **firedamp by fuse or thermal circuit-breaker \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.5** | **Test to verify the non-ignition of a gas mixture by one strand of the cable**  **between the headpiece and the battery by thermal ignition \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.6** | **Test to verify the resistance of the cable sheath to fatty acids \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.7** | **Test to verify the resistance of the cable sheath to fire** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.8** | **Test to verify the strength of cable entries, anchoring devices and cable** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.9** | **Electrolyte leakage test for cells and batteries** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.10** | **Current-limiting resistor test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

The tests marked with an asterisk are considered to be the minimum testing capability that should be available in-house at an ExTL.

# IEC 60079-35-2 Explosive atmospheres - Part 35-2: Caplights for use in mines susceptible to firedamp – Performance and other safety-related matters

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * Light sources and their holders * Luminous intensity and illuminance * Lamp life and battery life * Caplight useful working period * Durability * Ergonomics * Marking |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

|  |  |  |
| --- | --- | --- |
| Standard: IEC 60079-35-2  Part 35–2: Caplights for use in mines susceptible to firedamp –  Performance and other safety-related matters | | |
| **Clause** | **Requirement – Test** | **Result – Remark** |
| **7** | **Type tests - Illumination throughout the useful working period \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

.

# IEC TS 60079-40 Explosive atmospheres - Part 40: Requirements for process sealing between flammable process fluids and electrical systems

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics to cover include): |
| --- |
| * What is the scope of this document:  1. sealing between a flammable process fluid and an electrical system where a failure could allow the migration of the process fluid directly into the premises wiring system? AND/OR 2. conduit sealing devices, cable glands and other wiring sealing methods addressed in the IEC 60079 series or other standards?  * What is dual process seal equipment? * What is process connected equipment? * What is a process seal? * What is the difference between a primary process seal and a secondary process seal? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Testing**

| Standard: IEC 60079-40 Explosive atmospheres - Part 40: Requirements for process sealing between flammable process fluids and electrical systems | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | Result – Remark | |
| **5.2** | **Single process seal equipment** | | |
| **5.2.2** | **Temperature cycling** | | |
|  | Availability and adequacy of equipment |  | |
|  | Maintenance and calibration |  | |
|  | Capable of being performed correctly |  | |
|  | Comments |  | |
| Photos |  |  | |
| **5.2.3** | **Pressure cycling** | | |
|  | Availability and adequacy of equipment |  | |
|  | Maintenance and calibration |  | |
|  | Capable of being performed correctly |  | |
|  | Comments |  | |
| Photos |  |  | |
| **5.2.4** | **Leakage test \*** | | |
|  | Availability and adequacy of equipment |  | |
|  | Maintenance and calibration |  | |
|  | Capable of being performed correctly |  | |
|  | Comments |  | |
| Photos |  |  | |
| **5.2.5** | **Burst pressure test\*** | | |
|  | Availability and adequacy of equipment |  | |
|  | Maintenance and calibration |  | |
|  | Capable of being performed correctly |  | |
|  | Comments |  | |
| Photos |  |  | |
| **5.3** | **Dual process seal equipment** | | |
| **5.3.1** | **Primary process seal leakage test** | | See 5.2.4 |
| **5.3.2** | **Primary process seal burst pressure test** | | See 5.2.5 |
| **5.3.3** | **Venting pressure determination\*** | | |
|  | Availability and adequacy of equipment |  | |
|  | Maintenance and calibration |  | |
|  | Capable of being performed correctly |  | |
|  | Comments |  | |
| Photos |  |  | |
| **5.3.4** | **Verification of annunciation effectiveness\*** | | |
|  | Availability and adequacy of equipment |  | |
|  | Maintenance and calibration |  | |
|  | Capable of being performed correctly |  | |
|  | Comments |  | |
| Photos |  |  | |
| **5.3.5** | **Secondary process seal leakage test\*** | | |
| **5.3.5.1** | **Equipment incorporating venting** | | |
|  | Utilises equipment from earlier testing |  | |
| **5.3.5.2** | **Equipment not incorporating venting** | | |
|  | Utilises equipment from earlier testing |  | |
| **5.4** | **Verification of limited pressure effectiveness** | | |
|  | Utilises equipment from earlier testing |  | |

**Minimum testing capability**

The tests marked with an asterisk are considered to be the minimum testing capability that should be available in-house at an ExTL.

# IEC TS 60079-42 Explosive atmospheres - Part 42: Electrical Safety Devices for the control of potential ignition sources from Ex-Equipment

|  |
| --- |
| Edition(s) covered by this TCD |
| 1 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * Give examples of electrical safety devices this TS may be applied to. * Give example of equipment/applications this does not apply to. * Explain the purpose or definition of a safety device. * What standards should first be used to protect against potential ignition sources? * What are the safety characteristics of a safety device? * What is a Risk Reduction Factor? * What is the difference between a simple safety device and a complex safety device? * What marking requirements are specified by the TS? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| Standard: IEC 60079-42 Explosive atmospheres -  Part 42: Electrical Safety Devices for the control of potential ignition sources from Ex-Equipment | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **7** | **Testing and verification** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

Note: No specific test equipment specified in this standard. However, if any is commonly used by an ExTL for this type of equipment it can be recorded above.

# IEC TS 60079-46 Explosive atmospheres - Part 46: Equipment assemblies

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * How do you define an assembly? * What is an assembly that would be under the Scope of 60079-46, and what is an assembly that is not? * If an assembly is under the Scope of 60079-46, does that mean that 60079-46 has to be applied? * The following questions assume that 60079-46 is applied…   + What are the minimum IECEx standards that would be listed on the CoC?   + Do both electrical and non-electrical risks of ignition have to be addressed, or is there an option?   + How are the general and explosion protection specifications determined for an assembly?   + How is the classification of the area in which the assembly is to be installed determined?   + How is the classification of the area around a source of release from the assembly determined?   + Do all Specific Conditions of Use for Ex Equipment need to be addressed in the assembly?   + Under what situations, if any, are Ex Components permitted to be used in assemblies?   + Discuss the content of the final documentation package.   + Describe your approach(es) to establishing a T-Code for an assembly. |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

## IECEx OD 290

**IECEx Certified Equipment Scheme -**

**Harmonized procedures for IECEx certification of equipment, components and systems associated with the production, dispensing and use of gaseous hydrogen**

ExCBs and ExTLs requesting ‘Gaseous Hydrogen Fueling Stations’ in their scope shall, in addition, have the following minimum testing capability.

NOTE: All applicable tests in OD290 are considered critical for establishing the compliance of the equipment. For tests that require use of high pressure hydrogen / helium at 70 to 100MPa + 150%, it is the intent that the IECEx TL and IECEx CB shall have the thorough competence in understanding the tests, to be able to critically review the procedures used and the results reported by laboratories accredited to 17025 before accepting such reports as part of the IECEx requirements.

It is not intended that the ExTL would acquire the test equipment themselves or conduct these tests under OD-024. The ExTL must either have the capability to perform the tests or have in place dedicated Procedures that specify as a minimum the following:

* Criteria for accepting Testing from Test Labs outside of IECEx, eg must hold current accreditation for the tests by an accreditation body that is a member of the International Laboratory Accreditation Cooperation (ILAC)
* That the Test reports will be reviewed in detail
* The persons from the ExTL, with competence in this area that will review the test reports

These tests have been marked with a Hash “#” in this Section below.

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for OD | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * Understanding of the requirements described in ExTAG DS 2021/001 and ExTAG DS 2022/004 * Awareness of complying with OD 290 and ISO 19880 series standards for an assembly being as hydrogen dispensers * Understanding of the effects of Gaseous Hydrogen on materials, both metallic and non-metallic * Understanding of the composition and working principle of a hydrogen dispenser |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| IECEx OD 290, Ed. 1.0, Harmonised procedures for IECEx Certification of Equipment, Components and Systems associated with the production, dispensing and use of gaseous Hydrogen | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **A.2.2** | **Leakage Test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2.3** | **Impact Test** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2.4** | **Dispenser Shutdown Test #** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2.5** | **Hose Rupture #** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2.6** | **Hose Breakaway Test #** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2.7** | **Electrostatic Discharge Test \*** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2.8** | **Earth (Ground) Continuity Test \*** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2.9** | **Dielectric Voltage-Withstand Test \*** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2.10** | **Cabinet Test for Dispensers Designed for Outdoor Use (IP Test) \*** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2.11** | **Marking and Label Adhesion and Legibility Test \*** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

# IEC TS 60079-47 Explosive atmospheres - Part 47: Equipment protection by 2-Wire Intrinsically Safe Ethernet concept (2-WISE)

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the 2-WISE concept? * Levels of protection * Typical intrinsic safety parameters * Simple apparatus * Wiring/Cable requirements * Powered/Unpowered system * Descriptive system document * Typical Marking |

|  |  |
| --- | --- |
| **Comments by IECEx Assessor:** |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

| Procedure title | No | Clause(s) covered |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

Nil

**Minimum testing capability**

There are no tests specified by this standard.

# IEC 62990-1 Workplace atmospheres - Part 1: Gas detectors—Performance requirements of detectors for toxic gases

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

NOTE It is possible for the scope of a body to be limited to SM or HM only.

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * Difference between Type HM (Health Monitoring) ‘occupational exposure’ equipment and Type SM (Safety Monitoring) ‘general gas detection’ equipment. * Understanding of what constitutes a toxic gas or vapour (including some common examples) * What is an occupational exposure limit value (OELV) – HM equipment? * What is a refence value – HM equipment? * What does TWA stand for? * Uncertainty as applied by this standard |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| Standard: IEC 62990-1 Gas detectors – Performance requirements toxic gases | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **5.4** | **Tests** | |
| **5.4.1** | **General** | |
| **5.4.2** | **Unpowered storage \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.3** | **Measurement of deviations \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4** | **Mechanical tests** | |
| **5.4.4.1** | **Vibration** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.4.2** | **Drop test \*** | |
|  | Availability and adequacy of equipment | |
|  | Maintenance and calibration | |
|  | Capable of being performed correctly | |
|  | Comments | |
| Photos |  | |
| **5.4.5** | **Environmental tests** | |
| **5.4.5.1** | **Temperature \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.5.2** | **Pressure \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.5.3** | **Humidity of test gas \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.5.4** | **Air velocity \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6** | **Performance tests** | |
| **5.4.6.1** | **Alarm set point(s) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.2** | **Time to alarm of alarm reading \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.3** | **Flow rate \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.4** | **Warm-up time \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.5** | **Time of response \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.6** | **Time of recovery \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.7** | **Addition of sampling probe (portable and transportable equipment only) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.8** | **Field calibration kit \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.9** | **Gas concentrations above the upper limit of indication \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.10** | **Extended operation in test gas** | |
| **5.4.6.10.1** | **Portable equipment \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.10.2** | **Fixed and transportable equipment \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.11** | **Orientation tests** | |
| **5.4.6.11.1** | **Portable equipment \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.6.11.2** | **Fixed and transportable equipment \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.7** | **Electrical tests** | |
| **5.4.7.1** | **Battery capacity for battery-powered equipment \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.7.2** | **Power supply variations (excludes battery-powered equipment) \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.7.3** | **Electromagnetic compatibility** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.7.4** | **Time-weighted average (TWA) function \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.8** | **Stability \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.9** | **Fault signal tests \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.10** | **Software controlled equipment \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4.11** | **Protection against water \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

# IEC 62784 Vacuum cleaners and dust extractors providing equipment protection level Dc for the collection of combustible dusts - Particular requirements

|  |
| --- |
| Edition(s) covered by this TCD |
| Edition 1 incorporating amendment 1 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * Typically, what zones would these vacuum cleaners be intended for? * This standard covers electrical mobile motor-operated vacuum cleaners – what are examples of vacuum cleaners not covered? * Does IEC 60079-0 apply? * Does IEC 60079-31 apply? * The standard applies for EPL Dc – hence is Dc acceptable for electrical components located inside of the dust collection containment? * What are examples of where equipment is required to comply with IEC 60079-31 for EPL Dc? * What is the marking requirement for this standard? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| Standard: IEC 62784 Vacuum cleaners and dust extractors providing equipment protection level Dc for the collection of combustible dusts - Particular requirements | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **5** | **Type verification and type tests - End-to-end hose resistance of the hose assembly \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

# ISO 80079-36 Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What are the important aspects to be considered for non-electrical equipment * Ignition hazard assessment * Normal operation * Expected maintenance * Expected malfunctions * Rare malfunctions |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

**With the exception of Annex D these tests use the same methods as in IEC 60079-0**

| Standard: ISO 80079-36 Basic method and Requirements | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **8.2.1** | **Determination of the maximum surface temperature \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Correct application of [ExTAG DS 2015/011A](https://www.iecex.com/publications/extag-decision-sheets/downloaddocument/55) |  |
|  | Comments |  |
| Photos |  |  |
| **8.2.2** | **Hot surface ignition test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.3.1** | **Resistance to impact \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.3.2** | **Drop test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4.1** | **Additional tests of non-metallic parts. Test temperatures** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4.2** | **Additional tests of non-metallic parts. Tests for Group I equipment** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4.3** | **Additional tests of non-metallic parts. Tests for Group II equipment** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4.4** | **Additional tests of non-metallic parts. Thermal endurance to heat \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4.5** | **Additional tests of non-metallic parts. Thermal endurance to cold \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4.6** | **Additional tests of non-metallic parts. Resistance to chemical substances for Group I equipment** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4.7** | **Additional tests of non-metallic parts. Mechanical resistance tests** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4.8** | **Additional tests of non-metallic parts. Surface resistivity test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.4.9** | **Additional tests of non-metallic parts. Thermal shock test \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **Annex D**  **D.4.2.1** | **Determination of the most efficient charging method \***  **Rubbing with pure polyamide cloth** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **Annex D**  **D.4.2.2** | **Determination of the most efficient charging method \***  **Rubbing with cotton cloth** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **Annex D**  **D.4.2.3** | **Determination of the most efficient charging method \***  **Charging with a DC high voltage power supply** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

Where none of the concept standards included in the scope of the ExTL requires the capability for any particular test above, the ExTL does not need to demonstrate the capability for that test.

# ISO 80079-37 Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres – Non electrical type of protection constructional safety ”c” control of ignition source ”b”, liquid immersion ”k”

|  |
| --- |
| Edition(s) covered by this TCD |
| 1.0 |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What are the important aspects to be considered for non-electrical equipment with type of protection constructional safety ”c” with respect to the ignition hazard assessment * What are the important aspects to be considered for non-electrical equipment with type of protection control of ignition source ”b” with respect to the ignition hazard assessment * What are the important aspects to be considered for non-electrical equipment with type of protection liquid immersion ”k” with respect to the ignition hazard assessment |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| Standard: ISO 80079-37 Non-electrical equipment for explosive atmospheres – Non electrical type of protection constructional safety ”c”, control of ignition source ”b”, liquid immersion ”k” | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **8.1** | **Type tests for equipment with type of protection constructional safety ”c”** | |
|  | These tests are covered by ISO 80079-36 and Annex B | |
| **8.2** | **Type tests for equipment with type of protection control of ignition source ”b”** | |
| **8.2.1** | **Determination of control parameters \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| **8.2.2** | **Function and accuracy check of the ignition protection system \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.3** | **Type tests for equipment with type of protection liquid immersion ”k”** | |
| **8.3.2** | **Increased pressure test on enclosed equipment having a sealed enclosure that contains static, or flowing protective liquid \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.3.3** | **Overpressure test on enclosed equipment having a vented enclosure \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **Annex B**  **B.1** | **"Dry run" type test for lubricated sealing arrangements \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **Annex B**  **B.2** | **Type test for determining the maximum engaging time of clutch assembly \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

# ISO 16852 Flame arresters — Performance requirements, test methods and limits for use

|  |
| --- |
| Edition(s) covered by this TCD |
| 2 2016 Second Edition |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * How do flame arresters differ from flameproof enclosures? * Explain the function and differences between deflagration, detonation and unstable detonation arresters. * How do you create the test conditions for stable and unstable detonation arresters? * Why do you also test detonation arresters for deflagrations? |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

| Standard: ISO 16852 Flame arresters — Performance requirements, test methods and limits for use | | | |
| --- | --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **6.5** | **Pressure test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.6** | **Leak test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.7** | **Flow measurement (air)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **6.8** | **Flame transmission test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
|  |  | |
| **7.1** | **Construction** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.3.2.1** | **Deflagration test - End-of-line flame arrester** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.3.2.2** | **Deflagration test - In-line flame arrester** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.3.2.3** | **Deflagration test - Pre-volume flame arrester** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.3.3** | **Detonation test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.3.4, 7.3.5** | **Short time burning test, Endurance burning test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **8.3** | **Specific requirements for liquid product detonation flame arresters- Flame transmission test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.2** | **Specific requirements for dynamic flame arresters (high velocity vent valves) - Flame transmission test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.2.4** | **Specific requirements for dynamic flame arresters (high velocity vent valves) - Endurance burning test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **10.2.2** | **Specific requirements for hydraulic flame arresters - Short time burning test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **10.2.3** | **Specific requirements for hydraulic flame arresters - Deflagration test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **10.2.4** | **Specific requirements for hydraulic flame arresters - Detonation test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **11.2** | **Test flame arrestors installed on or within gas conveying equipment - Flame transmission test** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.2** | **Flow measurement - In-line flame arresters** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.3** | **Flow measurement - End-of-line flame arresters** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **A.4** | **Flow measurement - Undamped oscillation tests of dynamic flame arrester (high velocity vent valves)** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

Where none of the concept standards included in the scope of the ExTL requires the capability for any particular test above, the ExTL does not need to have the testing equipment in-house or demonstrate the capability for that test.

# ISO 17268 Gaseous hydrogen land vehicle refuelling connection devices

|  |
| --- |
| Edition(s) covered by this TCD |
| 2 2020 Third Edition |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the scope of this standard? * Sound Understanding of the general operation of Gaseous Hydrogen dispensing systems, their components, and interdependencies * Understanding of the effects of Gaseous Hydrogen on materials, both metallic and non-metallic * Sound understanding of the safety aspects of ISO/TR 15916 (this would cover all other aspects) * Demonstrated competence in the explosion protection techniques * Understanding of electrostatic generation mechanism and hazard * Understanding of the importance of grounding continuity * Understanding of the requirements on marking |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

**NOTE: All applicable tests in this Standard are considered critical for establishing the compliance of the equipment. For tests that require use of high pressure hydrogen / helium at 70 to 100MPa + 150%, it is the intent that the IECEx TL and IECEx CB shall have the thorough competence in understanding the tests, to be able to critically review the procedures used and the results reported by laboratories accredited to 17025 before accepting such reports as part of the IECEx requirements.**

**It is not intended that the ExTL would acquire the test equipment themselves or conduct these tests under OD-024. The ExTL must either have the capability to perform the tests or have in place dedicated Procedures that specify as a minimum the following:**

* **Criteria for accepting Testing from Test Labs outside of IECEx, eg must hold current accreditation for the tests by an accreditation body that is a member of the International Laboratory Accreditation Cooperation (ILAC)**
* **That the Test reports will be reviewed in detail**
* **The persons from the ExTL, with competence in this area that will review the test reports**

**These tests have been marked with a Hash “#” in this Section below.**

| Standard: ISO 17268 Gaseous hydrogen land vehicle refuelling connection devices | | | | | |
| --- | --- | --- | --- | --- | --- |
| Clause | | Requirement – Test | | Result – Remark | |
| **7.5** | | **User – Machine interface #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.6** | | **Dropping #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.7** | | **Leakage at room temperature #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.8** | | **Valve operating handle #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.9** | | **Receptacle vibration resistance # (Note this test applies to receptacles only)** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.10** | | **Abnormal loads #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.11.3** | | **Leakage tests #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.11.4** | | **Operations tests #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.12.2** | | **Nozzle durability test #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.12.3** | | **Receptacle check valve durability test #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.12.4** | | **Receptacle durability test #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.12.5** | | **Connected nozzle and receptacle durability test #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.13** | | **Sealing material aging test #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.14** | | **Non-metallic material hydrogen resistance test #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.15** | | **Electrical resistance \*** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.16** | | **Hydrostatic strength #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.17** | | **Corrosion resistance #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.18** | | **Deformation #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.19** | | **Contamination test #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.20** | | **Thermal cycle test #** | | | |
|  | | Availability and adequacy of equipment | |  | |
|  | | Maintenance and calibration | |  | |
|  | | Capable of being performed correctly | |  | |
|  | | Comments | |  | |
| Photos | |  | |  | |
| **7.21** | **Pre-cooled hydrogen exposure test #** | | | | |
|  | Availability and adequacy of equipment | |  | | |
|  | Maintenance and calibration | |  | | |
|  | Capable of being performed correctly | |  | | |
|  | Comments | |  | | |
| Photos |  | |  | | |
| **7.22** | **Misconnected nozzle test #** | | | |
|  | Availability and adequacy of equipment | |  | |
|  | Maintenance and calibration | |  | |
|  | Capable of being performed correctly | |  | |
|  | Comments | |  | |
| Photos |  | |  | |
| **7.23** | **Upward/downward nozzle compatibility test #** | | | |
|  | Availability and adequacy of equipment | |  | |
|  | Maintenance and calibration | |  | |
|  | Capable of being performed correctly | |  | |
|  | Comments | |  | |
| Photos |  | |  | |
| **7.24** | **Washout test #** | | | |
|  | Availability and adequacy of equipment | |  | |
|  | Maintenance and calibration | |  | |
|  | Capable of being performed correctly | |  | |
|  | Comments | |  | |
| Photos |  | |  | |
| **7.25** | **User abuse test #** | | | |
|  | Availability and adequacy of equipment | |  | |
|  | Maintenance and calibration | |  | |
|  | Capable of being performed correctly | |  | |
|  | Comments | |  | |
| Photos |  | |  | |
| **7.26** | **Freezing test #** | | | |
|  | Availability and adequacy of equipment | |  | |
|  | Maintenance and calibration | |  | |
|  | Capable of being performed correctly | |  | |
|  | Comments | |  | |
| Photos |  | |  | |
| **7.27** | **Rocking test #** | | | |
|  | Availability and adequacy of equipment | |  | |
|  | Maintenance and calibration | |  | |
|  | Capable of being performed correctly | |  | |
|  | Comments | |  | |
| Photos |  | |  | |
| **7.28** | **Communication test #** | | | |
|  | Availability and adequacy of equipment | |  | |
|  | Maintenance and calibration | |  | |
|  | Capable of being performed correctly | |  | |
|  | Comments | |  | |
| Photos |  | |  | |

# ISO 19880-3 Gaseous hydrogen – Fuelling stations – Part 3: Valves

|  |
| --- |
| Edition(s) covered by this TCD |
| 6 2018 First Edition |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the scope of this standard? * The main types of valves for hydrogen fuelling systems and their functions * The use of hose breakaway valves for vehicle drive-offs * The use of additional safety valves * What factors need to be considered in selection of valve materials for hydrogen applications * What is the maximum allowable working pressure (MAWP) * What is the maximum operating pressure (MOP) * Understanding of the value’s pressure rating for pressure test * Awareness that the electrical parts integrated with the value should comply with IEC 60079-0 * Understanding of the requirements on marking * Potential ignition sources including electrical parts |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

NOTE: All applicable tests in this Standard are considered critical for establishing the compliance of the equipment. For tests that require use of high pressure hydrogen / helium at 70 to 100MPa + 150%, it is the intent that the IECEx TL and IECEx CB shall have the thorough competence in understanding the tests, to be able to critically review the procedures used and the results reported by laboratories accredited to 17025 before accepting such reports as part of the IECEx requirements.

It is not intended that the ExTL would acquire the test equipment themselves or conduct these tests under OD-024. The ExTL must either have the capability to perform the tests or have in place dedicated Procedures that specify as a minimum the following:

* Criteria for accepting Testing from Test Labs outside of IECEx, eg must hold current accreditation for the tests by an accreditation body that is a member of the International Laboratory Accreditation Cooperation (ILAC)
* That the Test reports will be reviewed in detail
* The persons from the ExTL, with competence in this area that will review the test reports

These tests have been marked with a Hash “#” in this Section below.

| Standard: ISO 19880-3 Gaseous hydrogen – Fuelling stations – Part 3: Valves | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **5.3, 6.2, 7.2.3, 8.2.2, 9.2.2, 10.2.2, 11.2, 12.3.2** | **Hydrogen gas pressure cycle test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.4, 6.3, 6.4, 7.2.4, 7.2.5, 8.2.3, 9.2.3, 10.2.3, 10.2.4, 11.3, 12.3.3, 12.3.4** | **Leakage #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.5, 6.5, 7.2.6, 8.2.4, 9.2.4, 10.2.5, 11.4, 12.3.5** | **Worst case fault pressure cycle test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.6, 6.6, 7.2.7, 8.2.5, 9.2.5, 10.2.6, 11.5, 12.3.6** | **Proof pressure test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.7, 6.7, 7.2.8, 8.2.6, 9.2.6, 10.2.7, 11.6, 12.3.7** | **Hydrostatic strength test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.8, 6.8, 7.2.9, 8.2.7, 9.2.7, 10.2.8, 11.7, 12.3.8** | **Excess torque resistance test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.9, 6.9, 7.2.10, 8.2.8, 9.2.8, 10.2.9, 11.8, 12.3.9** | **Bending moment test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.10, 6.10, 7.2.11, 8.2.9, 9.2.9, 10.2.10, 11.9, 12.3.10** | **Non-metallic materials test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **5.11, 9.2.14, 12.3.13** | **Cold gas in warm valve test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.2.12** | **Operation cycle test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.2.13, 8.2.10, 10.2.12, 10.2.13, 11.10, 12.3.11** | **Operation test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.2.14** | **Pressure impulse test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.1.2** | **Electrical Conductivity test \*** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.2.10** | **Separation test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.2.11** | **Impact test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.2.12** | **Drop test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **9.2.13** | **Twisting test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **10.2.11,**  **12.3.12** | **Maximum flow shut-off test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **10.2.13** | **Excess torque operation test #** |  |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

# ISO 19880-5 Gaseous hydrogen – Fuelling stations – Part 5: Dispenser hoses and hose assemblies

|  |
| --- |
| Edition(s) covered by this TCD |
| 11 2019 First Edition |

**1. Personnel**

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx body being assessed for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Check of competence (typical topics or questions to cover include): |
| --- |
| * What is the scope of this standard? * Understanding of the operating temperature and pressure range for which the hose is suitable * How to ensure the possible static electricity on hoses be dissipated * What is the proof pressure of a hose * Understanding of the difference between dispenser hoses and the delivering hoses addressed in ISO 16964 * Understanding of the meaning of production acceptance tests * Understanding of the requirements on marking |

|  |  |
| --- | --- |
| Comments by IECEx Assessor: |  |

**2: Procedures**

Relevant procedures (to be listed by body under assessment):

|  |  |  |
| --- | --- | --- |
| Procedure title | No | Clause(s) covered |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3: Equipment and Tests**

NOTE: All applicable tests in this Standard are considered critical for establishing the compliance of the equipment. For tests that require use of high pressure hydrogen / helium at 70 to 100MPa + 150%, it is the intent that the IECEx TL and IECEx CB shall have the thorough competence in understanding the tests, to be able to critically review the procedures used and the results reported by laboratories accredited to 17025 before accepting such reports as part of the IECEx requirements.

It is not intended that the ExTL would acquire the test equipment themselves or conduct these tests under OD-024. The ExTL must either have the capability to perform the tests or have in place dedicated Procedures that specify as a minimum the following:

* Criteria for accepting Testing from Test Labs outside of IECEx, eg must hold current accreditation for the tests by an accreditation body that is a member of the International Laboratory Accreditation Cooperation (ILAC)
* That the Test reports will be reviewed in detail
* The persons from the ExTL, with competence in this area that will review the test reports

These tests have been marked with a Hash “#” in this Section below.

| Standard: ISO 19880-5 Gaseous hydrogen – Fuelling stations – 5: Dispenser hoses and hose assemblies | | |
| --- | --- | --- |
| Clause | Requirement – Test | Result – Remark |
| **7.2** | **Leakage test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.3** | **Hydrostatic strength #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.4** | **Electrical conductivity \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.5** | **Tensile test of hose assembly #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.6** | **Vertical load strength #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.7** | **Torsion strength #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.8** | **Pressure cycle test (Hydraulic-pressure impulse test) #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.9** | **Hydrogen impulse test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.10** | **Corrosion test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.11** | **Minimum bend radius #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.12** | **Hose permeation #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.13** | **Ozone resistance #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.14** | **Ultraviolet light and water exposure test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.15** | **Crush test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.16** | **Abrasion resistance test #** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.17** | **Marking material legibility** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |
| **7.18** | **Electrical properties of lining material \*** | |
|  | Availability and adequacy of equipment |  |
|  | Maintenance and calibration |  |
|  | Capable of being performed correctly |  |
|  | Comments |  |
| Photos |  |  |

**Minimum testing capability**

The tests marked with an asterisk are considered to be the minimum testing capability that should be available in-house at an ExTL.