**Technical Capability Document**

**No. TCD – 60079-19:2019**

**Edition 4.0**

*Document History*

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| --- | --- | --- | --- | --- |
| Edition | Date | Changes | Prepared by | Approved by |
| 1 |  | Initial release (Conversion from TGD documents) | ExMC WG2 | IECEx Secretariat |
| 2 | 2009 09 | Updated | JSA | ExMC Melbourne 2009 |
| 3 | Nov 2017 | Updated | ExMC WG2 & ExSFC | ExMC 2017 Meeting via Decision 2017/60 |
| 4 | May 2021 | Updated to align with IEC 60079-19:2019, Edition 4.0 content |  ExSFC | ExMC following review by ExSFC & ExAG |

**Referenced Standards**

IEC 60079 -19: 2019, Explosive atmospheres - Parts 19: Equipment repair, overhaul and reclamation

**Name of body:**

**Members of the assessment team**

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

**Place(s) of assessment:**

|  |  |
| --- | --- |
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**Assessment date(s):**

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# Purpose

The purpose of this Technical Capability Document (TCD) is to provide documented evidence that applicant ExCB has the capability to assess service facilities according to the service facility’s proposed or accepted scope of capability.

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 ExCB. At the 5 year reassessment, the secretariat will send the TCD that is on file to the ExCB to update in time for the reassessment. For bodies that have not previously completed the TCD, they will be asked by the secretariat to complete it before the next full reassessment. More details are given later.

Unless otherwise stated by the assessment team, it is also assumed that if an ExCB meets the requirements of the respective sections of this TCD, the ExCB 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 to establish that the necessary personnel knowledge and expertise exists within the ExCB to assess service facility procedures, processes, and the equipment available. It is expected that the ExCB 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:

## ExCB Personnel:

This section is to identify the knowledge level of the ExCBs employees regarding the requirements and interpretations of IEC 60079-19 and the respective parts of the IEC 60079 series contained in this document.

Prior to the assessment, the body being assessed shall assess each person nominated by the ExCB as an auditor of Ex Service Facility considering, as a minimum, the requirements of competency detailed in Section 3.

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

This section should be initially completed by the ExCB prior to the assessment.

## ExCB Procedures:

This section is to identify the procedures used for carrying out the assessment of service facilities related to IEC 60079-19 and the IEC 60079 services series as detailed in the following clauses 4 – 15 of IEC 60079-19. This section will include procedures for the assessment of competency of service facility personnel as required in Section 4. If there are any contracted or subcontracted assessments, a procedure must be included that meets the subcontracting requirements of ISO/IEC 17025.

This section should be initially completed by the ExCB prior to the assessment.

### ExCB Procedures

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

|  |  |  |
| --- | --- | --- |
| **Procedure title**  | **No** | **Clause(s) covered** |
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## ExCB assessment of Service Facility Personnel:

This section is to identify the procedures of the ExCB to assess the knowledge level of the service facility employees regarding the requirements and interpretations of the respective parts of the IEC 60079 series contained in this document. The procedures shall include acceptance of service facility employees with a current IECEx Certificate of Personnel Competence for Unit Ex 005.

Prior to the assessment, the service facility being assessed should complete the first columns for its scope to show the personnel deemed competent for that standard.

The remainder of this section will normally be completed by the assessment team during the site assessment visit. Additionally, the service facility being assessed might also like to use it as a self-assessment tool.

## ExCB assessment of Service Facility Procedures:

This section is to identify the procedures of the ExCB to assess the validity and effectiveness of procedures and processes used by a service facility for carrying out the tasks related to IEC 60079 services series capability as detailed in its scope. The knowledge of these procedures may be assessed in Section 3.

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

## ExCB assessment of Service facility equipment and tests:

This section is to identify the procedures of the ExCB to identify together with the service facility the equipment relevant for the service facility scope and test & measurement equipment for the part of the standard.

It then considers, for each test, the availability and adequacy of equipment, maintenance and calibration of the equipment, and capability to perform the test correctly.

It is expected that the ExCB will understand the minimum test and measurement equipment required by the service facility to meet the service facility scope.

## Completion of TCDs

All new applicants ExCB’s shall have a TCD completed as part of the original assessment. The Secretariat shall 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 shall be completed between the assessment team and the applicant.

# IEC 60079-19 Equipment repair, overhaul and reclamation

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| --- |
| Edition(s) covered by this TCD |
| IEC 60079 Series & IEC 60079-19:2019, Edition 4.0 |

**3.1** Personnel

|  |  |  |
| --- | --- | --- |
| Names of personnel deemed competent by the IECEx CB to assess- an Ex Service Facility for this standard | Abbreviation (eg initials) used below (if needed) | Interviewed (Y/N) |
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|  |
| IEC 60079 Series |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * What is a hazardous area
* What are the equipment groups?
* What is explosion protection?
* What are specific Types of Protection design features for ensuring safe operation?
* What are EPLs?
* What is meant by ambient temperature?
* Temperature Classification
* What is relevant surface temperature for each ToP?
* External heating or cooling
* What is meant by service temperature?
* Circulating currents
* Retention of gaskets
* Fasteners
* Special fasteners
* Ex Components
* Entries into enclosure - entry holes and cable entry devices etc.
* Rotating machines
* Switchgear
 |  |
| **IEC 60079-19 – 4 General** |
| Check of competence (typical topics to cover include): | **Comments by IECEx Assessor** |
| * Service facility plant & equipment 4.3.2.1 j)
* Measuring instruments 4.3.2.1 d)
* Competency assessment of Responsible Person, Annex B, Responsibility & authority of Responsible Person 4.3.2.1 a)
* Quality process plan 4.3.2.1 b)
* Work instructions 4.3.2.1 c)
* Effectiveness internal audit 4.3.2.1 h)
* Process integrity verification 4.3.2.1 i)
* Initial assessment of Ex Equipment 4.3.2.1 m) o)
* Certification status agreement with user 4.3.2.1 m)
* Traceability of measurements 4.3.2.1 f)
* Calibration procedures 4.3.2.1 e)
* Omission of tests 4.3.2.1 n)
* Specific Conditions of Use “X” 4.3.2.1 n)
* Documentation – schedule, previous repairs, drawings, instructions etc. 4.3.2.4.1
* Service facility records 4.3.2.4.3
* Training records 4.3.2.4.3. 2) c)
* Job report for the user 4.3.2.4.2
* Attestation of status after repair 4.3.2.4.2
* As found & as left measurement records 4.3.2.1.g)
* Reclaimed component record 4.3.2.4.3 4)
* Competency of operatives 4.3.2.2 & Annex B
* Purchase control procedures 4.3.2.4.3 2) d)
* Spare part validation 4.3.2.5 & 4.3.2.4.3 3) b) e)
* Reclamation methods 4.3.3.4.1
	+ Metal spray 4.3.3.4.2
	+ Electroplating 4.3.3.4.3
	+ Sleeving 4.3.3.4.4
	+ Brazing and Welding 4.3.3.4.5
	+ Metal stitching 4.3.3.4.6
	+ Threaded holes for fasteners 4.3.3.4.7
	+ Re-machining 4.3.3.4.8
* Reclamation verification 4.3.3.4.1
* Reclamation operative competency 4.3.3.3.1
* Alterations & Modifications 4.3.4
	+ IEC 60034-23 requirements 4.3.6.1Shaft runout
	+ Shaft keyway condition
	+ Foot flatness
	+ Core inspection
	+ Rotor inspection
	+ Impregnation system controls
	+ Inspections and tests
* Winding removal 4.3.6.2
* Rotating machine testing 4.3.6.3
	+ IR 4.3.6.3.1 c) – d)
	+ Stator winding resistance 4.3.6.3.1 a)
	+ No Load run 4.3.6.3.2 a)
	+ Locked rotor 4.3.6.3.2 b)
* Alternative tests when Locked Rotor test omitted 4.3.6.3.2 c)
* Core reclamation verification 4.3.6.2
* Core flux test methods IEC 60034-23 & 4.3.6.2 50 hz 1.7T, 60Hz 1.32T.
* Proprietary core flux testers EASA Rewind study
* Ring flux testing EASA Rewind Study
* Equipment marking 4.3.2.6 & Annex A
 |  |
| **IEC 60079-19 – 5 Ex “d”** |
| Check of competence (typical topics to cover include): | **Comments by IECEx Assessor** |
| * Flameproof joint surface finish 5.2.1.1
* Flameproof joint gap 5.2.1.1
* Reduced gaps 5.2.1.1 & Annex C
* Flameproof joint reclamation 5.3.2.2
* Threaded holes for fasteners inspection & reclamation 5.3.2.3
* Overpressure testing 5.2.1.2
* Stator & rotor winding reclamation 5.3.6
* Cable & conduit entries 5.2.3
* Component reclamation methods 5.3.2.1
* Metal spray bond strength 5.3.2.2
 |  |
| **IEC 60079-19 – 6 Ex “i”** |
| Check of competence (typical topics to cover include): | **Comments by IECEx Assessor** |
| * Schedule drawings 6.1
* Multilayer boards 6.1
* Surface mounted components 6.1
* Selection of replacement electrical components 6.1 & 6.2.10
* Printed circuit boards 6.2.8
* Soldered connections 6.2.4
* Conformal coatings 6.2.4 d)
* Shunt diode safety barrier & galvanic isolators 6.2.7
* Optocouplers & piezoelectric components 6.2.9
* Fuses 6.2.5
* Relays 6.2.6
* Batteries 6.2.11
* Testing 6.2.16
 |  |
| **IEC 60079-19 – 7 Ex “p” & “pD”** |
| Check of competence (typical topics to cover include): | **Comments by IECEx Assessor** |
| * Enclosures 7.2.1 & 7.3.2
* Leakage rates 7.2.6.3
* Ingress protection 7.2.2
* Gaskets 7.2.1
* Stator rewinding 7.2.6
* Purging ducts 7.2.1 c) & 7.2.6.3
* Pressure sensors 7.2.6.3 & 7.5
* Flow sensors 7.2.6.3 & 7.5
* Rotors & stators 7.3.5

Purging & pressurisation system verification 7.5 |  |
| **IEC 60079-19 – 8 Ex “e”** |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * Copy rewind requirements 8.2.6.1.2 1) - 20)
* Core reclamation verification 8.2.6.1.2 10)
* Air-gap verification 8.2.1 & IEC 60079-7
* EASA/AEMT Rewind study Best Practice guidance 8.2.6.1.2 Note:
* Terminal block replacement 8.2.3 & 8.4.3
* Defective imbedded temperature detectors8.2.6.3
* Plastic fan material resistance IEC 60079-7
* Fan clearances 8.2.1 & IEC 60079-7
* HV winding incendivity testing 8.2.6.1.3
 |  |
| **IEC 60079-19 – 9 Ex “n”** |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * Copy rewind requirements 9.2.6.1.5
* Core reclamation verification 9.2.6.1.5 k)
* Air-gap verification 9.2.1 & IEC 60079-15
* Terminal block replacement 9.2.3 & 9.4.3
* Defective imbedded temperature detectors 9.2.6.3
* Plastic fan material resistance IEC 60079-15
* Fan clearances 9.2.1 & IEC 60079-15
* HV winding incendivity testing 9.2.6.1.4
 |  |
| **IEC 60079-19 – 10 IEC 60079-26** |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * Requirement for manufacturer’s information 10
* Schedule drawings 10
 |  |
| **IEC 60079-19 – 11 Ex “t”** |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * Ingress protection 11.2.1
* Copy rewind requirements 11.2.6.1
* Core reclamation verification 11.3.6
* Shaft seals 11.2.1
* Defective imbedded temperature detectors 11.2.6.3
* Plastic fan material resistance 11.2.1
 |  |
| **IEC 60079-19 – 12 Ex “o”** |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * Associated types of protection 12.2.1
* Protective liquid removal 12.2.2
* Replacement of components 12.2.3
* Protective liquid 12.5
* Container closure 12.6
* Container reclamation12.3
* Protective liquid replacement 12.2.4
 |  |
| **IEC 60079-19 – 13 Ex “q”** |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * Associated types of protection 13.2.1
* Protective material removal 13.2.2
* Replacement of components 13.2.3
* Container closure 13.2.6
* Container reclamation
* Protective materials13.2.5
 |  |
| **IEC 60079-19 – 14 Ex “s”** |
| Check of competence (typical topics to cover include): | **Comments by IECEx Assessor** |
| * Schedule drawings 14
* Multiple Type of Protection standards 14
 |  |
| **IEC 60079-19 – 15 Electric Resistance Trace Heating** |
| **Check of competence (typical topics to cover include):** | **Comments by IECEx Assessor** |
| * Repair to IEC/IEEE 60079-30-2
* Test to IEC/IEEE 60079-30-1 & -2
 |  |
| **IEC 60079-19 – Annex A** (Normative) |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * Identification of repaired equipment A.1
* Certification status R in square A.2.1
* Certification status R in inverted triangle A.2.2
* Modified equipment marking A.2.3
 |  |
| **IEC 60079-19 – Annex B** (Normative) |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * Method of assessing competency of RP B.3.2
* Method of assessing competency of Operative B.3.3
* Assessment B.4
* Qualification of reclamation operatives B.5
 |  |
| **IEC 60079-19 – Annex C** (Normative) |
| Check of competence (typical topics to cover include): | Comments by IECEx Assessor |
| * Flameproof joint gap Annex C text
* Specific Conditions of Use “X” Annex C text
* Table C-1 Explain
* Figure C-1 Explain
* Group IIC limitation Table C1 6 Other conditions d

Figure C.1 Question 8  |  |
| **IEC 60079-19 – Annex D** (Informative)**Evaluation of best practice during rewinding and repair** |
| **Check of competence (typical topics to cover include):** | **Comments by IECEx Assessor** |
| * Effect of Repair/Rewind on Motor Efficiency OD 301
	+ No change in winding type, turns or pitch
	+ Control of core losses stripping & cleaning max 10% increase in core losses
	+ Core flux test before and after stripping & cleaning
	+ No increase in mean length turn reduce
	+ No reduction in conductor cross-section area
	+ Do not over lubricate bearings
 |  |
| **IEC 60079-19 – Annex E** (Informative)**Additional requirements relating to Ex control equipment** |
| **Check of competence (typical topics to cover include):** | **Comments by IECEx Assessor** |
| * General E.1
* Common items E.2
* Isolators and Circuit interrupters E.3
* Interlocks and mechanical linkages E.4
* Earth fault devices E.5
* Other devices E.6
* Transformers E.7
 |  |

**4: General requirements**

## Ex Service Facility Minimum testing capability

Internal & external micrometres, vernier calipers, straight edges, feeler gauges, GO, NO-GO thread gauges, surface table, surface roughness gauge/comparator, torque wrenches, insulation resistance meters, resistance meters, voltage, current & watt meters, rpm meter, air flow meter.

## Ex Service Facility Minimum Equipment capability

Stator winding removal equipment, controlled pyrolysis burn-out oven, core test, coil winding, curing oven, copper storage, insulation storage, varnish/resin impregnation system, bearing storage, reclamation machinery, lathes, milling, boring, welding, metal spray.