IECEx OD 315-5

Edition 1.0 2013-07

IECEx OPERATIONAL DOCUMENT

IEC System for Certification to Standards relating to Equipment for use in Explosive Atmospheres (IECEx System)

IECEx Certified Service Facilities Scheme – Part 5: Repair, overhaul and reclamation of Ex equipment

Additional requirements for IECEx Service Facilities involved in the repair, overhaul and reclamation of Ex equipment

IECEx OD 315-5:2013(E)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE ZZ

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FOREWORD

This IECEx Operational Document is for use by Service Facilities operating in the IECEx Service Facilities Scheme, as described in IECEx OD 013-5.

ExCBs are required to use the requirements of in this document when evaluating Ex Service Facilities, involved in the repair, overhaul and reclamation of Ex equipment.

Document History

Date	Summary
2013-03	This original issue Edition 1 of OD 315-5 supersedes OD 015 Version 2 in part and represents the application of a new numbering system.

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INTRODUCTION

The procedures, techniques, systems and methods of repair as set out in this document are to be followed by Ex Service Facilities involved in the repair, overhaul and reclamation of Ex equipment.

This Operational Document is to be read in conjunction with IEC 60079-19:2010 3rd Edition, and is intended to items not covered by that Standard. Should any conflicts be observed then IEC 60079-19 is to be followed.

Specifications, detailed techniques, and industry practice are reflected in this Operational Document.

Compliance with this Operational Document will require Service Facilities to satisfy the requirements IEC 60079-19:2010 3rd Edition.

To assist with the understanding and use of this Operational Document, the Section and Clause numbering format of IEC 60079-19:2010 3rd Edition has been used, in order to clarify both the stated and additional requirements to the corresponding Clause of IEC 60079-19.

Therefore, it is imperative that this Operational Document be read in conjunction with IEC 60079-19:2010 3rd Edition.

Additional requirements for IECEx Service Facilities involved in the repair, overhaul and reclamation of Ex equipment

1 Scope

This Operational Document OD 315-5 does not in itself introduce technical requirements beyond those contained in IEC 60079-19 however does include additional guidance aimed at ensuring consistency among Ex repair, overhaul and reclamation Service Facilities covered by IECEx certification.

2 Normative references

There is no additional information to the requirements of IEC 60079-19.

3 Definitions and terms

There is no additional information to the requirements of IEC 60079-19.

4 Additional requirements associated with efficiency to maintain T Ratings of rotating machines

When rewinding Ex motors an IECEx Certified Service Facility needs to ensure that their rewind processes do not adversely affect the efficiency of the motor.

Any reduction in efficiency will increase the losses within the machine which will increase surface temperatures and potentially this could exceed the protection concept temperature class.

Guidance on how to rewind motors without adversely affecting their efficiency is freely available from EASA and AEMT.

The document is titled *The Effect of Repair /Rewinding on Motor Efficiency*. This is available from the IECEx website: www.iecex.com.

IECEx Service Facilities rewinding Ex motors should be able to demonstrate to their IECEx CB how they meet the EASA and AEMT guidance on how to maintain efficiency when rewinding Ex motors via their procedures and competency training.

5 Additional requirements: Protection "d" – Flameproof enclosures

For IECEx Service Facilities Scheme, the requirements of IEC 60079-19 apply, plus the following.

5.1 Machining limits for flameproof surfaces

The additional information in B.2 of this document provides general limits for machining.

5.2 Over-pressure test

Where the Service Facility has doubt or questions the validity of documentation or the integrity of the enclosure, the following tests should be considered.

For flameproof protection type "d" enclosures – an over-pressure test in accordance with Annex B.1 to the following:

The pressure to be used for the over-pressure test should be either the value mentioned in the certification documents for such purpose or 1.5 times the explosion pressure (reference pressure).

NOTE Reference pressure information should be obtained from the Ex equipment manufacturer.

If neither the over-pressure test value nor the reference pressure test value are known, the values for the pressure test should be according to IEC 60079-19 Clause 5.2.1.2 "Over-pressure testing".

Where welding repairs may affect the integrity of the Ex "d" enclosure an over-pressure test shall be conducted as a practical method to test the integrity of the welding.

6 Knowledge, skills and competencies of Responsible Persons and Operatives in accordance with IEC 60079-19 Annex B

The ExCB shall obtain a demonstration of competency for each Responsible Person and Operative in accordance with IEC 60079-19 Annex B, and Unit of Competency Ex 005 (overhaul and repair of explosion-protected equipment), set forth in IECEx OD 504 (Specification for Units of Competency Assessment Outcomes), except where such competent persons hold current IECEx CoPC Unit of Competency Ex 005.

NOTE Annex A.14 of this Operational Document provides a basic framework to develop an assessment of knowledge that needs to be expanded and tailored to suit each situation.

Annex A
(informative)

Recommended report forms

This Annex contains a collection of standardized report forms that may be used by Service Facilities involved in the repair, overhaul or reclamation of Ex equipment.

While Ex Service Facilities are free to use their own report formats, those used by the Service Facility should contain the same level of information as that detailed in these sample forms.

ExCBs shall use this Annex as a guide when determining the suitability of such forms used by Service Facilities in the IECEx Service Facilities Scheme.

A.1 Report for motors – Type of protection "d" (Flameproof)

Report no.: ..... Certificate no.:	Flameproof Motors:
Name of Service Facility	Shaft flameproof Gland diametral clearance
Service facility recognition no.:	– D.E.: .....mm
Location:	N.D.E.: .....mm
Country:	Endplate spigot diametral clearance
Motor description:	– D.E.: mm
Serial no.: .....Owner:	N.D.E.: .....mm
Order no.: ..... Date received:	Cable gland and gland spigot diametral clearance: .....mm
Motor condition when dismantled:	Screwed cable gland no. of threads engaged: .....
Drive End D.E; Non Drive End N.D.E	Screwed hand hole covers no. of threads engaged .....
Bearings and seals – D.E.:... N.D.E:	Condition of bolt holes: .....
Bearing journals – D.E.: .... N.D.E:	Terminal box:
Seals journals – D.E.: .. N.D.E:	Deviation of flanged joint surfaces (max): mm
Bearings housings – D.E.: ... N.D.E:	Flamepath gap after assembly: .....mm
Stator and windings:	Water jacket:
.....	Jacket volume test before descaling: .....litres
.....	Jacket thickness: .....mm
Rotor/armature and windings:	Jacket pressure test: ..... kPa at: .....°C
.....	Pass: ..... Fail: .....
.....	Jacket descaled by using: .....
Items missing on receipt of motor:	Volume test after descaling: .....litres
.....	Flow test: ..... litres/min
.....	Static pressure test:
General motor condition:	Terminal boxes: ..... kPa
.....	Motor enclosures: ..... kPa
.....	Tests:
Details of motor repair:	Insulation test to frame: .....Volt megger
.....	Stator/fields: ..... Rotor/Armature: .....
.....	Test run for 1 hour – phase Currents –
Bearing make and no. – D.E.:....N.D.E.:	A:.....
Seal make and no. – D.E.:..... N.D.E.:	B:.....
Replacement shaft manufacturer:	C: .....
	Core test – stator: Rotor: .....
	Previous core test – Stator: Rotor: .....

Certification drawing no(s).: .....

Certification marking: .....

I, ...confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES / NO / NA**

Mark which applies to released product.

Name of Responsible Person: ..... Signature: .....

Service Facility Record number: .....Date: . . ./ . . ./ . . .

A.2 Report for enclosures – Type of protection type "d" (Flameproof)

Report no.: .....

Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no.:..... Fax no.: .....

Enclosure description: .....

Serial no.: ..... Owner: .....

Order no.: ..... Date received: . . . ./. . . ./. . . .

Item	Description of check	Remarks
(a)	Check of external and internal damage	
(b)	Dimensional check	
(c)	Corrosion on flamepaths	
(d)	Result of static pressure test	
(e)	Check of flanged joint surfaces	
(f)	Check of all threaded holes	
(g)	Check of all windows and lenses	
(h)	Check of breathers	
(i)	Check of all bolt holes, studs, screws, etc.	
(j)	Check of all gland entries and fixing holes	
(k)	Check of all cables glands	
(l)	Check of all handhole and inspection covers	
(m)	Check of all mechanical interlocks	
(n)	Check of all flamepath gaps	

Main control panel

1 Max. out of plane of box flanges: .....

2 Max. out of plane of cover: .....

3 Max. flameproof gap when bolted up: .....

4 Max. diametral clearance of spindles: .....

5 Max. diametral clearance of gland to gland apertures: .....

6 Static pressure test – pressure: .....

7 Water jacket – pressure test: ..... Capacity: .....

Certification drawing no(s).: .....

Certification marking: .....

I, ...confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/NO/NA**

Mark which applies to released product.

Name of Responsible Person: ..... Signature: .....

Service Facility Record number:..... Date: . . ./ . . ./ . . .

A.3 Report for equipment installed within enclosures – Type of protection type "d" (Flameproof)

Report no.: .....

Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no.: ..... Fax no.: .....

Description of unit: .....

Owner: ..... Order no.: .....

Serial no of enclosure this test certificate applies to.: .....

Enclosure test certificate no.:..... Date received: . ./. . . ./. . . .

Item	Description of check	No work required	Overhauled	Repaired	Replaced (R) Modified (M)
(a)	Isolator mechanism and switch operation				
(b)	Earthing device and operation				
(c)	All auxiliary mechanisms, trip bars, latching arrangements, etc.				
(d)	All locking devices, function and operation				
(e)	All parts for mechanical condition				
(f)	All insulation checked – no heat, cracks, etc.				
(g)	Phase barriers fitted correctly and functional				
(h)	Oil levels and/or gas pressure				
(i)	Gas pressure-sensing devices				
(j)	All wiring and terminations				
(k)	Earth continuity; phase/earth fault lock units				
(l)	Overcurrent, overload and earth-fault devices				
(m)	Earth-fault trip devices				
(n)	Timing devices				
(o)	Temperature-sensing devices				
(p)	Transformer connections, bolts, tapes, bracing, insulators and fittings etc.				
(q)	Installation				
(r)	Machine cables and glands				

Details of overhaul, repair or modification (attach extra pages if required):

Results of insulation resistance tests on transformers:

Transformer ratio: ..... Capacity: ..... Serial no: .....

Manufacturer: ..... Type of cooling: .....

Tested with: ..... V (Megohmmeter)

Primary winding to secondary winding: ..... MΩ

Primary winding to earth: ..... MΩ

Secondary winding to earth: ..... MΩ

Earth continuity of earth screen to core: .....

Assembled unit tested for insulation resistance with:V megohmmeter, and power frequency tested on the following circuits:

Circuit description	Insulation resistance MΩ	Test voltage kV	Test frequency Hz	Result

Certification drawing no(s).: .....

Certification marking: .....

I,.....confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person:..... Signature:.....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.4 Report for equipment – Type of protection "i" (Intrinsic safety)

Report no.: ..... Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no.: ..... Fax no.: .....

Equipment description: .....

Owner: ..... Order no.: .....

Serial no.: ..... Date received: . . . ./. . . ./. . .

Condition upon receipt:..... Old repair label details:.....
Cert no.:.....

Reported fault (if any):.....

Repair action:.....
Parts replaced:.....

Tests performed: .....
Results:.....

Certification drawing no(s).: .....

Certification marking: .....

I,.....confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person:..... Signature:.....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.5 Report for enclosures and transformers – Type of protection "p" (Pressurized)

Report no.: ..... Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no.: ..... Fax no.: .....

Equipment description: .....

Owner: ..... Order no.: .....

Serial no: ..... Date received: . . . ./. . . ./. . . .

Condition upon receipt: Old repair label details:.....
Cert no.:.....

Reported fault (if any):.....

Repair action:.....
Parts replaced:.....

Tests performed: .....
Results:.....

Certification drawing no(s).: .....

Certification marking: .....

I,.....confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person:..... Signature:.....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.6 Report for motors – Type of protection "e" (Increased safety)

Report no.: ..... Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no: ..... Fax no.: .....

Motor description: .....

Owner: ..... Order no.: .....

Serial no: ..... Date received: . . . ./. . . ./. . .

Motor condition when received: Old repair label no.: .....

External surfaces cleaned for inspection –

Fan cowls and fans:.....

Stator case and cooling fins:..... Corrosion: .....

Endshields and fasteners:..... Bearing caps: .....

Ducts and piping: ..... Grease relief: .....

Terminal box cover and gaskets:.....

Gland entries:..... Glands: .....

General external condition:.....

Missing parts:.....

Motor dismantled:..... Degree of protection: IP.....

Internal condition – Evidence of dust or liquids:...

Drive End D.E; Non Drive End N.D.E

Bearings and seal –	D.E.:.....	Bearing journals –	D.E.: .....
	N.D.E.:		NDE.: .....
Seals journals –	D.E.:.....	Bearing housings –	D.E.: .....
	N.D.E.:		N.D.E.: .....

Stator windings and iron circuit:.....

Rotor cage and iron circuit:.....

Internal fan clearance:.....

Details of motor repair:.....

.....

Ex ‘e’ motor

Cover and fasteners:	Condition of fastener holes: .....
Gasket:	Gland entries:.....
Terminals type:.....	Certificate no.:.....
Cable lugs type:	Sleeving fitted .....
Stator – Diameter:	
Winding to original certification:	or modified: .....
Rotor – Diameter:	
Radial gap:.....	
Replaced – Radial gap:	Overload type:.....
Tests:	
Resistance cold (ohms) – Ambient Temp. C	Phases – A..... B ..... C.....
Core test – Previous stator:	Rotor: .....
– Present stator:.....	Rotor: .....
Insulation test to frame:	Phase/Phase: A..... B ..... D.....
H.V. test to IEC 60079-7.....	kV for 1 min
No load running – Vibration:	Noise: ..... Bearing heat:.....
Phase balance – Reduced voltage:	A..... B..... C .....
(at full load amps) (Locked rotor)	
OR Rated full load:	A..... B..... C .....
Temperature increase test – Full load:	K Temperature class: T .....
Locked rotor:.....	I_A / I_N tE .....s.

Certification drawing no(s).: .....

.....

Remarks: .....

Certification drawing no(s).: .....

Certification marking: .....

I, ...confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person:..... Signature:.....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.7 Report for enclosures – Type of protection "e" (Increased safety)

Report no.: ..... Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no: ..... Fax no.: .....

Enclosure description: .....

Owner: ..... Order no.: .....

Serial no: ..... Date received: . . . ./. . . ./. . .

Enclosure condition when received: Old repair label no.: .....

External surfaces cleaned for inspection –

Covers and fasteners: ..... Base of enclosure: .....

Threaded holes: ..... External corrosion: .....

Surface coating: ..... Gland entries and glands: .....

General external condition: .....

Enclosure dismantled: ..... Degree of protection: IP.....

Internal condition – Dust: ..... Corrosion: .....

or, evidence of liquids: ..... Heat: .....

Missing parts: .....

Cables and terminations: ..... Terminal blocks: .....

Earth terminals: ..... General insulation: .....

Windows and seals: ..... Actuators and seals: .....

Ex 'de' parts: ..... Meters: .....

Lamps: ..... Transformers: .....

Switches: ..... Other: .....

Relays: ..... Interlocks: .....

Luminaire: ..... Lamp type and power (W): .....

Transparent part: ..... Lampholders: .....

Ballasts: ..... Capacitors: ..... Batteries: .....

Certification drawing no(s).: .....

Certification marking: .....

I, ...confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person: ..... Signature: .....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.8 Report for equipment within enclosures – Type of protection "e" (Increased safety)

Report no.: .....

Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no.: ..... Fax no.: .....

Description of unit: .....

Owner: ..... Order no.: .....

Serial no of enclosure this test certificate applies to.: .....

Enclosure test certificate no.:..... Date received: . ./. . ./. . . .

Item	Description of check	No work required	Overhauled	Repaired	Replaced (R) Modified (M)
(a)	Ex 'e' lamp				
(b)	Ex 'e' switch				
(c)	Ex 'e' meter – calibrate				
(d)	Switch actuator – check all seals and action				
(e)	Terminal blocks – check for heat and insulation cracks				
(f)	Bushings and insulation condition				
(g)	Cables – insulation, lugs and sleeving				
(h)	Transformer connections, tapes, bracing insulators, terminal				
(i)	Temperature sensing devices				
(j)	Mechanical interlocks				
(k)	All insulation checked – no heat				
(l)	Heaters – check condition				

Certification drawing no(s).: .....

Certification marking: .....

I, ...confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person: ..... Signature: .....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.9 Report for motors – Type of protection "n" (Non-sparking)

Report no.: ..... Certificate no.: .....
Name of overhaul service facility: .....
Service facility recognition no.: .....
Address: .....
Postcode: ..... Telephone no.: ..... Fax no.: .....
Motor description: .....
Owner: ..... Order no.: .....
Serial no: ..... Date received: . . . ./. . . ./. . .

Motor condition when received: Old repair label no.: .....
External surfaces cleaned for inspection –
Fan cowls and fans:.....
Stator case and cooling fins:..... Corrosion: .....
Endshields and fasteners:..... Bearing caps: .....
Ducts and piping: ..... Grease relief: .....
Terminal box cover and gaskets: .....
Gland entries:..... Glands: .....
General external condition:.....
Missing parts:.....
Motor dismantled:..... Degree of protection: IP.....
Internal condition – Dust:.....
or, evidence of liquids:.....

Drive End D.E; Non Drive End N.D.E

Bearings and seal – D.E.:.....		Bearing journals – D.E.:	
	N.D.E.:		NDE.: .....
Seals journals – D.E.:.....		Bearing housings – D.E.:	
	N.D.E.:		N.D.E.: .....

Stator windings and iron circuit:.....
Rotor cage and iron circuit:.....
Internal fan clearance:.....

Details of motor repair: .....

.....

Ex ‘n’ motor

Cover and fasteners: ..... Condition of fastener holes: .....

Gasket: ..... Gland entries: .....

Terminals type: ..... Certificate no.:.....

Cable lugs type: ..... Sleeving fitted: .....

Stator – Diameter: .....

Winding to original certification: ..... or modified: .....

Rotor – Diameter: .....

Radial gap:.....

Replaced – Radial gap: ..... Overload type:.....

Tests:

Resistance cold (ohms) – Ambient Temp .....C Phases – A..... B ..... C .....

Core test – Previous stator: ..... Rotor: .....

– Present stator:..... Rotor: .....

Insulation test to frame: ..... Phase/Phase: A..... B ..... D .....

H.V. test to IEC 60079-15: ..... kV for 1 minute.

No load running – Vibration: ..... Noise: ..... Bearing heat:.....

Phase balance – Reduced voltage: A..... B..... C .....

(at full load amps) (Locked rotor)

OR Rated full load: A..... B..... C .....

Temperature increase test – Full load: ..... K Temperature class: T .....

Certification drawing no(s).: .....

Certification marking: .....

I,.....confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person:..... Signature:.....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.10 Report for enclosures – Type of protection "n" (Non-sparking)

Report no.: ..... Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no.: ..... Fax no.: .....

Enclosure description: .....

Owner: ..... Order no.: .....

Serial no: ..... Date received: . . . ./. . . ./. . .

Enclosure condition when received: Old repair label no.: .....

External surfaces cleaned for inspection –

Covers and fasteners: ..... Base of enclosure: .....

Threaded holes: ..... External corrosion: .....

Surface coating: ..... Gland entries and glands: .....

General external condition: .....

Enclosure dismantled: ..... Degree of protection: IP.....

Internal condition – Dust: ..... Corrosion: .....

or, evidence of liquids: ..... Heat: .....

Missing parts: .....

Cables and terminations: ..... Terminal blocks: .....

Earth terminals: ..... General insulation: .....

Windows and seals: ..... Actuators and seals: .....

Ex 'n' parts: ..... Meters: .....

Lamps: ..... Transformers: .....

Switches: ..... Other: .....

Relays: ..... Interlocks: .....

Luminaire: ..... Lamp type and power (W): .....

Transparent part: ..... Lampholders: .....

Ballasts: ..... Capacitors: ..... Batteries: .....

Enclosure assembled:

Restricted breathing test: ..... Type of test: .....

Certification drawing no(s).: .....

Certification marking: .....

I, ...confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person: ..... Signature: .....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.11 Report for motors – Type of protection "t" (Protection by enclosure)

Report no.: ..... Certificate no.: .....
Name of overhaul service facility: .....
Service facility recognition no.: .....
Address: .....
Postcode: ..... Telephone no.: ..... Fax no.: .....
Motor description: .....
Owner: ..... Order no.: .....
Serial no: ..... Date received: . . . ./. . . ./. . .

Motor condition when received: Old repair label no.: .....
External surfaces cleaned for inspection –
Fan cowls and fans:.....
Stator case and cooling fins:..... Corrosion: .....
Endshields and fasteners:..... Bearing caps: .....
Ducts and piping: ..... Grease relief: .....
Terminal box cover and gaskets: .....
Gland entries:..... Glands: .....
General external condition:.....
Missing parts:.....
Motor dismantled:..... Degree of protection: IP.....
Internal condition – Evidence of dust or liquids: ..
Drive End D.E; Non Drive End N.D.E

Bearings and seal –	D.E.:.....	Bearing journals –	D.E.: .....
	N.D.E.:		NDE.: .....
Seals journals –	D.E.:.....	Bearing housings –	D.E.: .....
	N.D.E.:		N.D.E.: .....

Stator windings and iron circuit:.....
Rotor cage and iron circuit:.....
Internal fan clearance:.....
Details of motor repair:.....
.....

Protection type Ex "t" motor with Ex "t" terminal box: (Refer to Certificate for Ex "t"):

[Type of protection Ex "t" was formerly known as Ex "tD" and DIP.]

Cover and fasteners: ..... Condition of fastener holes: .....

Gasket: ..... Gland entries: .....

Terminals type: ..... Certificate no.:.....

Cable lugs type: ..... Sleeving fitted: .....

2. DIP Motor – Item 1 plus:

Stator – Diameter: .....

Winding to original approval: ..... or Modified: .....

Rotor – Diameter: .....

Radial gap:.....

Replaced – Radial gap: ..... Overload type:.....

Tests:

Resistance cold (ohms) – Ambient Temp .....C Phases – A..... B ..... C .....

Core test – Previous stator: ..... Rotor: .....

– Present stator:..... Rotor: .....

Insulation test to frame: ..... Phase/Phase: A..... B ..... D .....

H.V. test..... kV for 1 minute.

No load running – Vibration: ..... Noise: ..... Bearing heat:.....

Phase balance – Reduced voltage: A..... B..... C .....

(at full load amps) (Locked rotor)

OR Rated full load: A..... B..... C .....

Temperature increase test – Full load: ..... K Temperature class: T .....

Certification drawing no(s).: .....

Certification marking: .....

I,.....confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person:..... Signature:.....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.12 Report for enclosures – Type of protection "t" (Protection by enclosure)

Report no.: ..... Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no: ..... Fax no.: .....

Enclosure description: .....

Owner: ..... Order no.: .....

Serial no: ..... Date received: . . . ./. . . ./. . .

Enclosure condition when received: Old repair label no.: .....

External surfaces cleaned for inspection –

Covers and fasteners: ..... Base of enclosure: .....

Threaded holes: ..... External corrosion: .....

Surface coating: ..... Gland entries and glands: .....

General external condition: .....

Enclosure dismantled: ..... Degree of protection: IP.....

Internal condition – Dust: ..... Corrosion: .....

or, evidence of liquids: ..... Heat: .....

Missing parts: .....

Cables and terminations: ..... Terminal blocks: .....

Earth terminals: ..... General insulation: .....

Windows and seals: ..... Actuators and seals: .....

DIP parts: ..... Meters: .....

Lamps: ..... Transformers: .....

Switches: ..... Other: .....

Relays: ..... Interlocks: .....

Luminaire: ..... Lamp type and power (W): .....

Transparent part: ..... Lampholders: .....

Ballasts: ..... Capacitors: ..... Batteries: .....

Certification drawing no(s).: .....

Certification marking: .....

I, ...confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person: ..... Signature: .....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.13 Report for equipment inside enclosures – Type of protection "tD"

Report no.: .....

Certificate no.: .....

Name of overhaul service facility: .....

Service facility recognition no.: .....

Address: .....

Postcode: ..... Telephone no.: ..... Fax no.: .....

Description of unit: .....

Owner: ..... Order no.: .....

Serial no of enclosure this test certificate applies to.: .....

Enclosure test certificate no.:..... Date received: . ./. . ./. . . .

Item	Description of work	No work required	Overhauled	Repaired	Replaced (R) Modified (M)
(a)	Lamp				
(b)	Switch				
(c)	Meter – calibrate				
(d)	Switch actuator – check all seals and action				
(e)	Terminal blocks – check for heat and insulation cracks				
(f)	Bushings and insulation condition				
(g)	Cables – insulation, lugs and sleeving				
(h)	Transformer connections, tapes, bracing insulators, terminal				
(i)	Temperature sensing devices				
(j)	Mechanical interlocks				
(k)	All insulation checked – no heat				
(l)	Heaters – check condition				

Certification drawing no(s).: .....

Certification marking: .....

I,.....confirm that the above equipment has been repaired and repaired/overhauled in accordance with IEC 60079-19. The marking complies with Annex A of the standard.

Summary of identification of released product:

a) Product conforms to original standard and certification documents **YES / NO**

b) Restrictions apply to use of this product as originally certified **YES / NO**

c) Compliance of the product has been verified by a competent person **YES/ NO /NA**

Mark which applies to released product.

Name of Responsible Person:..... Signature:.....

Service Facility Record number: ..... Date: . . ./ . . ./ . . .

A.14 Assessment of Responsible Persons and Operatives

Person verified: Organization: ExCB Name: Assessor:		Responsible Person/Operative: *Mark which applies* Date: . . . ./. . . ./. . . .
Item	**Qualifications and work history**	**Result**
(1a)	Experience in explosive atmosphere work	Number of years
(1b)	Experienced in Ex types of protection	"d" "i" "p" "e" "n" "t" "p" other Rotating machines *Mark which applies* Notes
(1c)	Working with/assessing engineering drawings	Notes
(1d)	Experience with Ex certification requirements/Standards	Notes
(1e)	What documents are required for repair, overhaul or reclamation to remain within certification? What records are required?	Notes
(1f)	Experience with Ex test requirements	Notes
Item	**Technical interview**	
(2a)	What is an explosive atmosphere?	
(2b)	Understanding of LEL, UEL, Gas groups, Zones 0,1, 2, 20, 21, 22, EPL	
(2c)	Explain where the Ex techniques are used (refer to 1b above for techniques claimed)	
Item	**Assessment of skills** (see 2b above)	
(3a)	Use of specific mechanical test equipment (shaft/hole diameter, depth, pressure, transfer measurements, flatness, threads, etc.) NOTE Over-pressure test is mandatory for Ex "d"	
(3b)	Use of specific electrical test equipment (winding resistance, insulation, surface temperature, winding temperature, current, voltage)	
(3c)	Use of calibration status, history Understanding of measurement traceability	
(3d)	Understands what to do if a piece of calibrated equipment is found to be faulty or out of calibration	
(3e)	Can show how test status is maintained throughout the repair/overhaul/reclamation process	

Annex B
(informative)

Additional information on over-pressure test procedure and machining limits

B.1 Over-pressure test procedure

B.1.1 Introduction

There are two methods suitable for the over-pressure test. These are:

a) dial gauge measurement; and

b) straightedge and feeler gauge measurement.

Typical test rigs for both of these methods are shown in (Figure B.1).

B.1.2 Test procedure

The procedure shall be as follows:

a) Check the test piece with the original drawings (that is, the dimensional check). The following faces shall be checked with a straightedge and feeler gauge:

   1) Flamepaths on enclosure or covers.

   2) Flat surfaces which will show up on the drawings as the weakest sections of the enclosure.

   3) Flanges on pressurized enclosures.

b) For dial gauge measurement (Figure B.1) install dial gauges to surfaces on top, back, front and sides of test piece.

   For straightedge and feeler gauge measurement (Figure B.2) draw a line where the straightedge is placed and mark along this line (+) or (-) deformations around the test piece.

   Seal the test piece and fill with the testing fluid, taking care that trapped air is minimized. A pressure gauge shall then be fitted to the test piece to check the pressure at the test piece, and also to crosscheck the gauge fitted in the vicinity of the regulator.

Air or gas testing fluid is recommended only for pressurized enclosures, where relatively low pressures are involved.

Apply pressure gradually until the test pressure figure is reached. A safety face shield shall be worn while a visual inspection is made to check for cracks or flaws in the test piece.

The pressure for the over-pressure test shall be held for 1 min for flameproof enclosures and 5 min for pressurized enclosures.

NOTE 1 The pressure to be used for the over-pressure test should be either the value mentioned in the certification documents for such purpose or 1.5 times the explosion pressure (reference pressure).

NOTE 2 If neither the over-pressure test value nor the reference pressure test value are known, the values of Clause 5.2 shall apply. Remove the pressure source and the testing fluid and open up the test piece for inspection.

NOTE 3 For dial gauge measurement (Figure B.1) record difference in dial gauge readings.

NOTE 4 For straightedge and feeler gauge measurement (Figure B.2) place the straightedge on the marked areas and compare to determine the deformation (if any) due to the over-pressure test.

NOTE 5 For flameproof enclosures, give particular attention to the flamepaths, as these are the most important sections. Flat sections manufactured from steel or metals having a high elongation factor may show minor deformation, but this may not take away from the structural strength of the enclosure. Threaded entries and fasteners should be checked for deformation.

B.1.3 Reporting of results

The test shall be considered satisfactory if the enclosure has not suffered structural damage or permanent deformation that may affect its explosion-protection properties.

B.1.4 Interpretation of results

The extent of permanent deformation reported after over-pressure test should not exceed 0.25 mm per 300 mm when measured with a dial indicator; at the typical points depicted by the following (Figure B.2). This may be taken to be the geographical centre of those parts of the enclosure that are considered to have the least strengthening support.

Permanent deformation is the difference between measurements taken before and after the application of the required pressure test.

Measurements shall be taken at atmospheric pressure.

Where the enclosure area being measured is rectangular, the measurement to be used shall be that across the shortest side. Where this side is greater than 300 mm, the measurement shall be taken across the total length of side and the total amount of deformation shall be calculated from the above requirement.

Important

Following the over-pressure test, a test of joint surfaces using a straightedge should result in deviations over any 300 mm length of flange not exceeding one half of the flamepath gap as specified in IEC 60079-1.

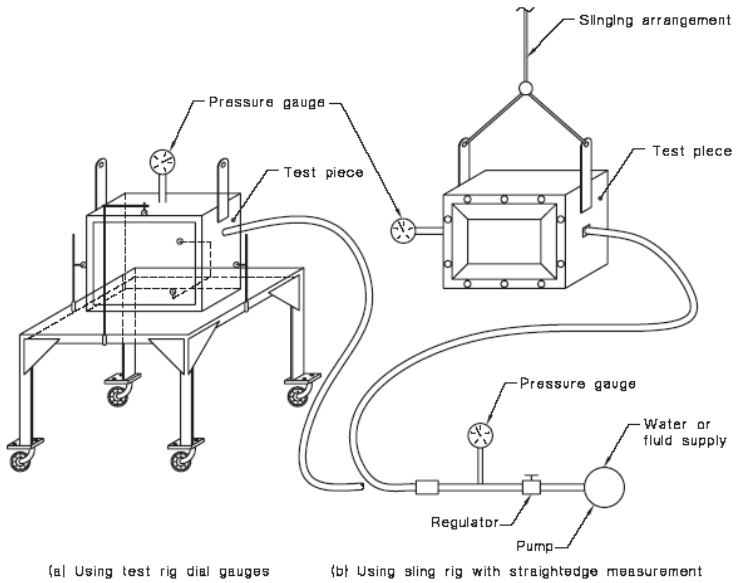
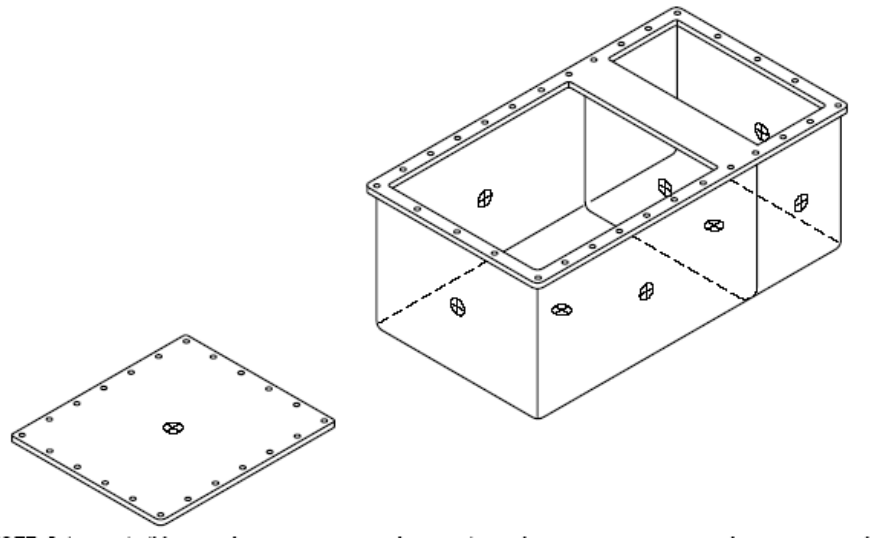


Figure B.1 – Example of over-pressure test rig



NOTE It is permissible to apply pressure to an enclosure prior to the over-pressure test to release stresses and elasticity of a protection type "d" enclosure.

Figure B.2 – Test points for deformation testing during over-pressure test

B.2 Machining limits

After repair, tests and measurements shall be performed as agreed when the repair work was accepted by the Service Facility.

Where the work involved is confined to machining flameproof surfaces, certification and approval will not be considered invalidated, provided that the cumulative effect of such machining does not:

a) reduce the flanges below the minimums where the minimum dimension of the thickness of flanges is detailed in the certification drawings;

b) alter the volume of the enclosure (without internal parts) by more than 0.5 %;

c) reduce the length of any flamepath whether plain or threaded; or

d) result in any deviation to the requirements of the relevant Standards, i.e. the Standard the item was certified to.

Where the Service Facility has doubt or questions the validity of documentation or the integrity of the enclosure, the over-pressure test of Clause 5.2 should be considered.

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