

# IECEX International Conference 2012

## IEC 60079-19 & IECEX Service Facility Scheme



*John S Allen*  
*Technical Director*  
*Sulzer Dowding & Mills*

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**My presentation today shall include:-**

- **Some key requirements of IEC 60079-19**
- **Description of IECEx Service Facility scheme**
- **What my company had to do to obtain IECEx certificate of competency**
- **Conclusion**
- **Questions**



**In the UK Ex Equipment has been repaired to  
“Good Engineering Practice”  
since Ex Equipment was first manufactured**

**1984 BEEMA/AEMT Code of Practice**

**IEC 60079-19:1993 (1 minor amendment)**

**IEC 60079-19:2006 Ex Equipment Repair (Standard)**

**IEC 60079-19:2010 Ex Equipment Repair (Current)**



## **IEC 60079-19**

# **An International Standard for the Overhaul, Repair and Reclamation of Ex Equipment**

**Section 1 – Scope**

**Section 2 – Normative References**

**Section 3 – Terms & definitions**

**Applies to all service facilities & protection types**

## **4.4.1.1 General**

**“The repairer shall appoint a Responsible Person with responsibility **and authority** for ensuring the overhauled/repaired equipment complies with the certification status agreed with the user”**

**“Repairer shall have adequate facilities as well as the appropriate equipment necessary and trained Operatives with the required competency”**

## 4.4.1.1 General

**“The Responsible Person shall conduct an assessment of the equipment to be repaired, agree with the user the certification status of equipment after repair and the scope of work to be done”**

**“The Responsible Person shall only conduct assessments with the explosion protection techniques for which they have demonstrated his competence”**

## 4.4.1.2 Certificates & standards

**“Repairer’s attention is directed to the need to be informed of , and to comply with, the relevant explosion protection standard and certificates, including any specific conditions of use, applicable to the equipment to be repaired”**

**This is in addition to IEC 60079-19**

**In particular if there is an X after the certificate the repairer needs to see a copy of the certification documents**

### 4.4.1.3 Competency

**“All persons directly concerned with the repair and/or overhaul of the equipment shall be competent or supervised by a competent person. The competencies may be specific to the type of work”.**

**Training & competency assessments requirements are specified in Annex B**

**Re-assessment every 3 years**





### **4.4.1.5 Documentation**


**Documentation requirements, including the content of the user's job report and records , are specified**

**Any components reclaimed shall have a record of the reclamation as specified**

#### 4.4.1.7 Identification of repaired equipment

**“All equipment repaired and/or overhauled shall be marked to identify the repair and the repairer’s identity”**

**“Marking may be provided on a separate label. It may be necessary to amend or remove or supplement the label in certain circumstances”**

- a)  (See Annex A)
- b) No longer suitable for use in Ex area

## 4.4.2 Reclamation Procedures

**Not all reclamation procedures are applicable to all types of protection**

### 4.4.2.2.5 General

**Metal removal shall be minimized (guidance given)**

**“Upon completion of the reclamation , the repairer shall satisfy himself that the equipment is in a fully serviceable condition and complies with the standards for this type of protection”**

## Approved Reclamation Processes

- 4.4.2.2.6 Metal Spraying**
- 4.4.2.2.7 Electroplating**
- 4.4.2.2.8 Sleeving**
- 4.4.2.2.9 Brazing & Welding**  
MMA, MIG, TIG, Sub-arc, Hot wire
- 4.4.2.2.10 Metal Stitching**
- 4.4.2.2.11 Threaded holes for fasteners**
- 4.4.2.2.12 Re-machining**

**4.4.3.1 Alterations are only permitted if specified in equipment certification documentation**

**4.4.3.2 Modifications are not permitted**

**If the equipment is modified the user shall be informed in writing that the equipment is no longer suitable for use in an explosive atmosphere**

### 4.4.5 Rotating Machines

**Care must be taken when stripping windings that the lamination insulation is not damaged**

**“The repairer shall satisfy himself, as in all reclamation procedures, that on completion of the reclamation the equipment is in a fully serviceable condition and complies with the standard(s) for the relevant explosion concept”**



**Guidance for repairers is available from EASA.com where a report on “the Effect of Repair/Rewinding on Motor Efficiency” is freely available at:-**

**<http://www.easa.com/energy>**

## Additional Requirements for the repair & overhaul of equipment with type protection “d” (flameproof)

**5.1 Application (clause 4 + IEC60079-1)**

**5.2 Repair & Overhaul**

**5.3 Reclamation**

**5.4 Alterations and modifications**





## **Additional Requirements for the repair & overhaul of equipment with type protection “i” (intrinsic safety)**

- 6.1 Application (Clause 4 + standards used when the equipment manufactured )**
- 6.2 Repair & Overhaul**
- 6.3 Reclamation (No reclamation permitted)**
- 6.4 Modifications (any change is a modification)**

**Section 7 Ex p (pressurised)**

**Section 8 Ex e (increased safety)**

**Section 9 Ex n**

**Section 10 IEC 60079-26 Equipment**

**Section 11 Ex td Group III (DIP)**

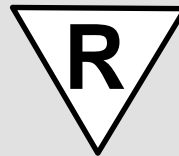
**Section 12 Ex dp Group III**

## Identification of repaired equipment

**R**

**“This mark is to be used only when the repair or reclamation is in accordance with this standard and the repairer has sufficient evidence of full compliance with the certificate documentation and/or manufacturer’s specifications”**

## Identification of repaired equipment



**“This mark is to be used either”:-**

**a) “The equipment is changed during repair or reclamation so that it still complies with the restrictions imposed by this standard and the explosion-protection standards to which it was manufactured, but the repairer has insufficient evidence of full compliance with the certificate documents, or”**

**b) “The standards to which the equipment was manufactured are not known, but the requirements of this standard and the current edition of the relevant explosion-protection standards have been applied, but the repairer has insufficient evidence of full compliance with the certificate document”.**

**“An assessment, by a person competent in assessing explosion-protected equipment has been conducted to verify compliance with the relevant levels of safety prior to release of the equipment by the repairer”**

**“This annex specifies the knowledge, skills and competencies of persons referred to in this standard”**

## **B2 Knowledge & skills**

### **B2.1 Responsible persons**

### **B2.2 Operatives**

## B3 Competencies

### B 3.1 General

**“Competencies shall apply to each explosion – protection techniques for which the person is involved. For example: it is possible for a person to be competent in the field of repair and overhaul of Ex ‘d’ motors only and not be fully competent in repair of Ex ‘d’ switchgear or Ex ‘e’ motors. In such cases, the repair facility management shall define this in their documentation system”**

## B3.2 Responsible persons

### B3.3 Operatives

“Responsible persons/Operatives shall be able to **demonstrate** their competency and provide evidence of attaining the knowledge and skill requirements specified in B2.1 & B2.2 relevant to the types of protection and/or types of equipment involved”



## B4 Assessment

**“The competency of responsible persons and operatives shall be verified and attributes, at intervals in accordance with 4.4.1.3, on the basis of sufficient evidence that the person”:-**

- a) “Has the necessary skills required for the scope of work**
- b) Can act competently across the specified range of activities**
- c) Has the relevant knowledge and understanding underpinning competency”**



**“Requirements for measurements in flameproof equipment during overhaul, repair and reclamation (including guidance on tolerances)”**

**“Evidence has come to light that there have been instances where equipment passed the Ex d flame transmission test with the gaps set to the maximum specified by the manufacturer but failed the test when set to the larger gaps permitted by the Ex d standard”**

**“As such equipment has not necessarily been marked with an “X” on the certificate, there is no way of knowing whether the equipment can be safely repaired to the values allowed by the standard or whether it needs to be repaired to the smaller gaps specified by the manufacturer**

**Therefore in the absence of drawings showing the manufacturer’s gaps, repairers shall use the guidance given in Table C1”**

**Table C.1 – Determination of maximum gap of reclaimed parts**

Ref.	Condition		Maximum gap
1.	Dimensions are available in certificate documentation.		Use the values specified in that documentation.
2.	Original national standard <sup>a</sup> required that the test gap be set at the value in that standard.		Use the values specified in the standard used.
3.a)	Original standard or certification body policy required that suffix 'X' is marked where the test gap is less than the values in the standard used.	Certificate has suffix 'X'.	Use values specified in the 'conditions of use' with the certificate.
3.b)		Certificate has no suffix.	Use the values specified in the standard used.
4.	Relevant dimensions accurately determined: <ul style="list-style-type: none"> <li>– by measurement of the equipment in 'as new' condition; or</li> <li>– from identical undamaged equipment; or</li> <li>– from undamaged parts of the equipment; or</li> <li>– from partially damaged parts of the equipment.</li> </ul>		Use the values determined by measurement.
5.	Other method by which the original dimensions are accurately determined.		Use the values so determined.
6.a)	Other conditions <sup>b,c,d</sup>	Cylindrical joints for shaft glands of rotating electrical machines with rolling-element bearings.	Use 80 % of the value specified in the current edition of IEC 60079-1.
6.b)		Other joints	40 % of the appropriate value in the current edition of IEC 60079-1 is smaller than the credible manufacturing gap.
6.c)			40 % of the appropriate value in the current edition of IEC 60079-1 is greater than the credible manufacturing gap.

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IEC60079-19:2010

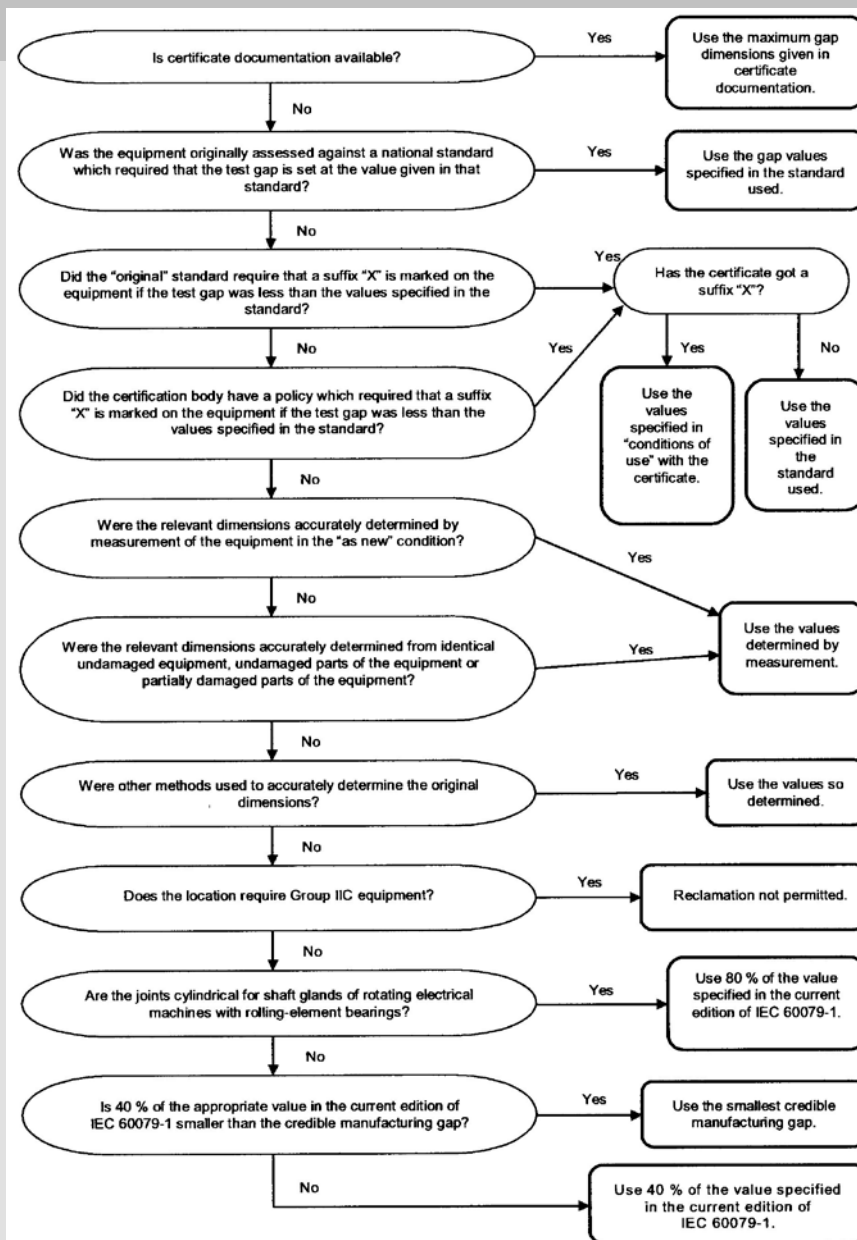


Figure C.1 – Determination of maximum gap of reclaimed parts

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IEC60079-19:2010

**Publication of an International Standard does not ensure standardisation on its own**

**International standards provides  
‘agreed technical requirements’**

**The ‘agreed technical requirements’ need to be understood and applied in a standardised or uniform manner**



**How do you, as a user of Ex Equipment, know that your Ex Service Facility is operating in accordance to the requirements of IEC 60079-19 and returning your Ex Equipment safe for use,**

**Especially in our current competitive market**



**Ex Equipment user assessment of Service Facility competency requires significant allocation of resources within the user**

**Multiple User assessments requires significant allocation of resources within the Service Facility**

**1998 EECS set up voluntary UK Ex Repair License Scheme**

**2006 IECEx Certified Service Facility Scheme**

**2009 IECEx Certificate of Personnel Competency Scheme**





## **Provides Service Facilities & Users:**

- **Single assessment & certification world wide**
- **Scheme set up & managed by Ex industry**
- **Reduced costs for user & service facility**
- **On line verification of Service Facility  
Certificate of Conformity**



## **IECEX Scheme Rules Clause 5.1**

**“The IECEx Certified Service Facility Scheme provides the means for Service Facilities to obtain an IECEx certificate which is intended to provide the international Ex community with confidence that such Service Facilities undertake repair and overhaul work in accordance with the technical and quality system requirements of the IECEx Service Facility Scheme”**



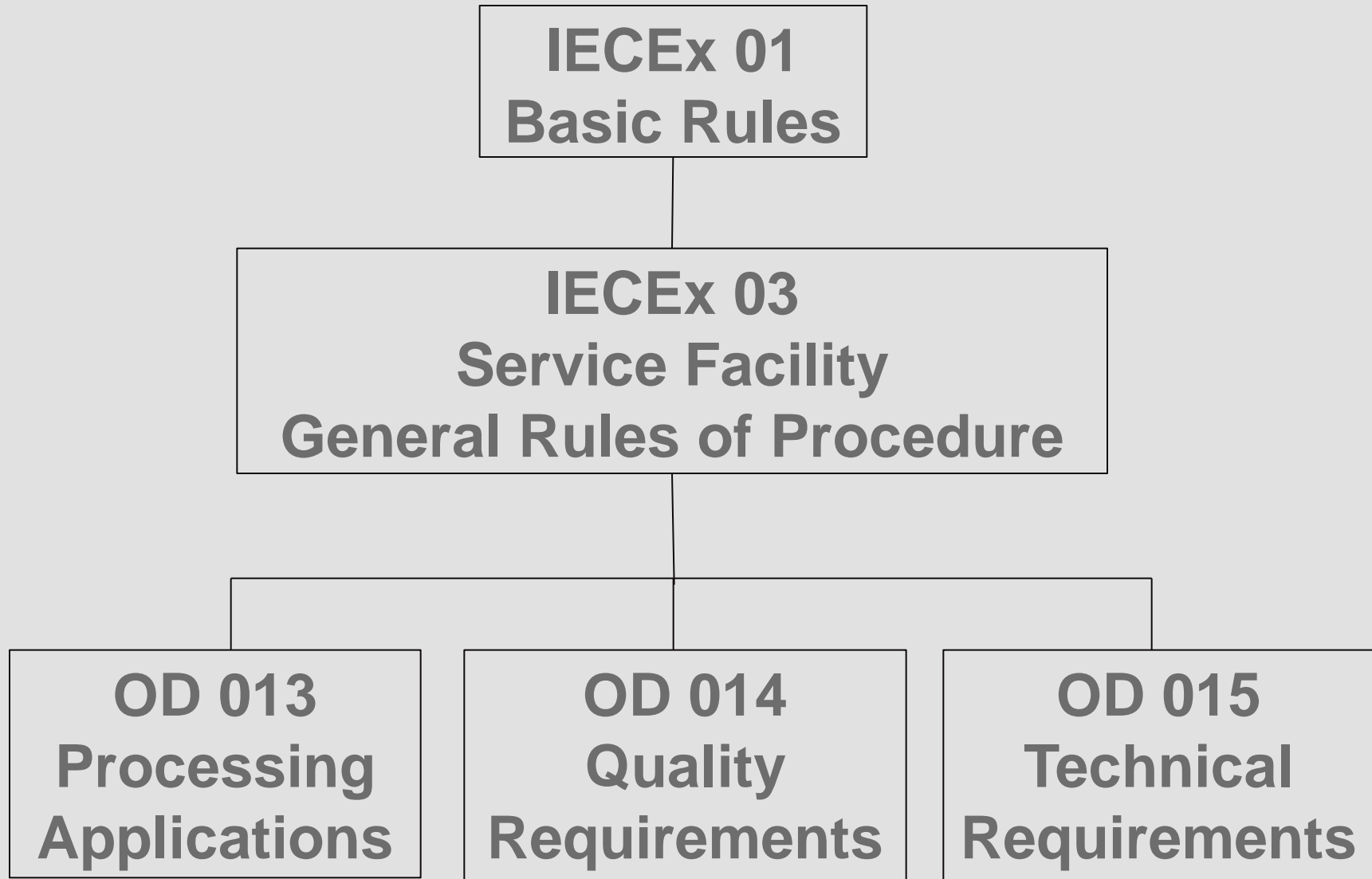
**The Service Facility has to:**

**Understand and meet the requirements of  
IEC 60079-19**

**Understand the requirements of the  
Ex Protection Type Standards**

**Understand & meet the requirements of the  
IECEX Service Facility Scheme**

**Have an effective quality management system**





**Service Facilities will be assessed for  
competency in**

**Overhaul & Repair of Ex Equipment in  
accordance with IEC 60079-19**

**for the Ex equipment types and Ex protection  
concept types as the Service Facility have  
detailed in their Scope of Competency**



## Assessment includes

- Effectiveness of the QMS
- Competency of Ex Competent Persons
- Effectiveness of overhaul & repair processes
- Control of Sub-contracting
- Process & Test equipment

The Service Facility has to be able to demonstrate to the IECEx ExCB how they satisfy the IECEx Service Facility Scheme requirements



## **Service Facility Scope**

**Defines the areas which the Service Facility claims competency and against which they will be assessed by the IECEx Certification Body e.g.:-**

**Which types of equipment i.e. Motors, Transformers, Switchgear Etc**

**Which protection types Ex d, Ex e, Ex p, Ex nA etc**

**Which Explosive atmosphere types Group I, II & III**



Site Assessment  
Compliance With  
IEC 60079-19 / OD015

Site Assessment  
Quality Management System  
OD 014

Facility Assessment Record  
FAR

IECEX  
Service Facility  
Certificate of Competency

On-going Surveillance  
OD 014





## **IEC 60079-19 Annex B (Normative)**

**Although Annex B defines the areas of competency to be demonstrated by operatives and Responsible Persons it is normative and can be ignored by Service Facilities**

**IECEX has made Annex B a mandatory requirement for the  
IECEX Certified Service Facility Scheme**



**Responsible Person has to agree the Certification Status of the overhauled or repaired equipment *before* any work commences**

**Responsible Person must have the competency and authority to control how Ex Equipment is overhauled and repaired and only when he has assessed its condition can it be returned to service**

**The Responsible Person has to advise and agree with the user any changes in work scope and certification status as a result of inspections**



**The Service Facility Manager has to delegate responsibility for Ex Equipment overhaul & repair to the Responsible Person**

**The Service Facility management systems need to be adapted to integrate the Responsible Person into the management systems for example the Responsible Person needs to be part of the QMS Management Review**



**Under H&S legislation all operatives need to be competent or under close supervision**

**Ex Operatives have been defined as those persons who's decisions, or measurements, would have an impact on the certification status of Ex Equipment. Ex Operatives work under the supervision of the Responsible Person**

**Other operatives involved in the overhaul & repair of Ex Equipment need to be made aware of the special requirements for Ex Equipment**



**How do you assess employees, as competent ?**

**What is it that demonstrates somebody is competent ?**

**What is the right level of competency ?**

**Do you assess competency in house or use 3<sup>rd</sup> party assessment ?**

**What is the competency of the assessor ?**



**IECEX recognised the assessment of competency of Ex Operatives & Responsible Persons as an important part of the IECEx Certified Service Facility Scheme to ensure uniformity of Service Facility assessment around the world**



**In 2006 IECEx started to prepare a new Scheme for the assessment of Competency of Persons.**

**The Certificate of Personnel Competency Scheme was approved by IECEx in 2008 and the scheme operating documents completed and approved in 2009.**

**To-date 4 IECEx CoPC Scheme Certification Bodies have been approved by IECEx**



**IECEX only assesses to International Standards  
and the assessment of competency of persons  
is to IEC/ISO 17024**

**This requires assessment of competency to be  
totally independent of training and to have an  
assessment process which is clearly defined  
and understood by all who want to be assessed.**





**As a Service Facility operating with IECEx Certified Service Facility Scheme Certificate of Competency, we decided that all EX competent persons, (i.e. Operators & Responsible Persons) would be 3<sup>rd</sup> party independently assessed for their competency in an IEC/ISO17024 Scheme and assessment must be independent from training provision**



**We failed to get our Ex training provider to upgrade its training and assessment to meet the requirements of IEC 60079-19 & IECEx**

**They were of the opinion that they did not need to have the practical demonstration of competency and have complete independence of assessment from training.**



**EASA Region 9 (European & World Chapter)  
agreed to develop a new program to provide  
training and 3<sup>rd</sup> party assessment of  
personnel competency as defined in IEC  
60079-19 Annex B**

**EASA R9 also agreed to achieve UKAS  
approval of the 3<sup>rd</sup> party independent  
assessment of competency to IEC/ISO 17024**



**Service Facilities have to accept the  
IEC/ISO17024 assessment competency**

**This is the assessment of competency of an  
individual which results in a Certificate of  
Personal Competence for that person**

**The Service Facility may pay for the assessment  
of competency, but the certificate is the  
individual's and not the company's**



**The written exam was constructed to test the individuals knowledge in the competency areas as defined in Annex B. A large question bank was developed to ensure variety in question**

**12 practical assessments, some with multiple objectives, were developed to enable individuals to demonstrate their competency in a simulated workshop environment on controlled Ex equipment artefacts**



**EASA 3 day training program was developed to deliver the underpinning knowledge for the competency requirements specified in Annex B of IEC60079-19**

**Class room training was interspersed with practical sessions to exercise some of the practical skills which would be part of the practical assessment**



## **SIRA Certification Services (SCS) an IECEx Certification Body assess competency**

**The examination paper is set, marked &  
adjudicated by SCS**

**SCS appoints assessors for the practical  
assessments and adjudicates their assessment  
results**



**The need for this rigorous approach was proven when the first training course and assessment ran in November 2006**

**70% failed**





**The training was adapted to re-enforce knowledge gaps identified during the first course and a gap of 2 weeks was scheduled between training and assessment for individuals to improve specific areas of knowledge and/or practical skill before assessment**

**Now those attending the course prepare better before attending & pay greater attention during training as a result pass rate is now >90%**



**EASA Region 9 is currently working with IECEx Certification Bodies to have the assessment of personal competency through the IECEx Certificate of Personal Competence Scheme**

**EASA and/or EASA approved organisations will deliver training**



**Having satisfied the IEC 60079-19 competency requirements all we had to do was to maintain and refresh the training and repeat the assessment of competency every 3 years**

**Competency re-assessment is the same as the initial assessment, the only difference is that instead of 3 days training there is only 1 day refresher training**

**Operators and Responsible Persons from the first courses have been re-assessed successfully**



## **IEC 60079-19:2006 Clause 4.4.2.3.1**

**“Operators of reclamation techniques, e.g. welding, metal spraying, shall be required to undertake a practical skill test in the technique before being permitted to utilise the technique for the first time and every 3 years thereafter . If the operator has not used the technique in the last 6 months, he shall undertake a retest“**



**This new requirement for reclamation operatives to undertake skill tests before utilizing a reclamation technique is just good engineering practice. However test piece assessment needs to be formalised and repeated every 3 years**

**Metal spray operative's test pieces were subjected to independent tensile testing and welder's test pieces were sectioned and subjected to independent inspection**



**Although this requirement has been dropped from IEC 60079-19:2010, this assessment of reclamation operatives is critical evidence in the Service Facility assessment of a reclamation under Clause 4.4.2.2.5**

**An individual's use of particular reclamation techniques needs to be recorded and maintained as evidence of continuity of practice**



**Although our Service Facilities has been successfully repairing Ex Equipment since Ex Equipment was first manufactured our documentation & records of reclamation procedures did not meet the requirements of the IECEx service Facility Scheme**

**One major change was the introduction of a drawing of the reclaimed component detailing exactly what had to be repaired, together with inspections and measurements**



**Generally there was a need for much better recording of reclamation activities throughout the machine shop in particular recording:-**

- **Thickness of metal removed in preparation**
- **Results of NDT testing**
- **Thickness of material added**
- **Final measurements of the component**
- **Traceability of measuring instruments**





**Our Service Facility had been operating with a robust QMS for over 30 years and currently operates an ISO9001 system audited by BSI**

**However there were parts of the QMS which required amendment to meet the IECEx OD 014 requirements integrating the responsibility and authority of the Responsible Person, with regards to Ex Equipment, into the QMS in particular his involvement in the management and review**



**Many procedure & process documents had to be amended to reinforce and clarify the authority of the Responsible Person with regards to the overhaul & repair of Ex Equipment**

**Where purchasing included sub-contracting of, or part of, a reclamation procedure then much greater assessment and monitoring of that sub-contractor is required & the sub-contractor may need to be audited by the IECEx CB**



**Traceability of measurement was an operational area which required reinforcement, not with regards to instrument calibration but with regards to recording the instrument number for each measurement**

**The IECEx Service Facility Scheme requires instrument calibration to be traceable to International Standards**



**Retention of records within our Service Facility was 2 years for industrial equipment and 5years for Ex Equipment**

**To satisfy the IECEx requirements all we had to do was buy some additional filing cabinets to retain the Ex records for 10 years**



**IECEX Certified Service Facility will provide the Ex Equipment User a job report in accordance with the requirements of IEC 60079-19 with the overhauled or repaired equipment.**

**The job report will make a clear statement with regards to the certification status of the overhauled or repaired equipment**



**Ultimately it is the User's responsibility to ensure his equipment is safe to use & that includes equipment which has been overhauled & repaired**

## **IEC 60079-19 Clause 4.3.4**

**“The user shall ascertain that the repair facility concerned can demonstrate compliance with the relevant stipulations of this standard”**



**The IECEx Certified Service Facility Scheme provides Ex Equipment Users a method of selecting sub-contractor who have been independently assessed as competent by an IECEx Certification Body**

**The IECEx Certification Body has itself been assessed and audited, by IECEx, for their competence in assessing Service Facilities competency in operating to IEC60079-19**



**IECEX Service Facility Certificate of Conformity gives the Ex Equipment User confidence that robust systems are in place and monitored, within the Service Facility, to ensure that their Ex equipment will be overhauled and repaired in conformance with IEC 60079-19, to the certification status as agreed with the Service Facility and that the equipment will be safe to return to service**





**The validity and status of any IECEx Service Facility Certificate of Conformity can be checked on-line at [www.iecex.com](http://www.iecex.com)**

**However**

**The IECEx Service Facility Scheme will only benefit Users when Users make possession of a valid IECEx Certificate of Conformity a pre-requisite of doing business**



**Meeting the requirements of the IECEx Service Facility Scheme was not a major problem for our Service Facility since our systems are regularly audited by customers ranging from nuclear, petrochemical, power generation, manufacturing, pharmaceutical, automotive, military and many others, all with their specific QMS requirements**



**Currently we have 6 Service Facilities with IECEx Certificates of Conformity and we are working our way through our other branches who overhaul & repair Ex Equipment**



**However**

**Service Facilities which do not have an effective  
Quality Management System will find it much  
more difficult to meet the requirements of the  
IECEX Service Facility Scheme**



**It is not the size of the Service Facility, which enables a Services Facility to be Certified by IECEx, it is the effectiveness of the Service Facility management to control the repair processes and the competency of the people doing the work that ensures compliance with IEC 60079-19 & the IECEx Scheme**

# IECEX International Conference 2012

## End of Session



## Any Questions