

IECEX Certified Service Facility & IECEX Personnel Competency Schemes

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Summary

- Why seek IECEx Service Facility Certification
- Introduction to IECEx
- IECEx Certified Service Facility Scheme
- Service Facility Requirements
- Responsible Person & Operator Competency
- IECEx Personnel Competency Scheme
- Examples of Ex Equipment repair
- Conclusion

IECEX Certified Service Facility Scheme

Why seek IECEX Service Facility Certification

Over the last 25 year there have been many explosions in hazardous area installations, Piper Alpha, Buncefield, Texas City, Gulf of Mexico Etc



Debruce & Port Bunge
Grain Silos

IECEx Certified Service Facility Scheme

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

Publication of and knowledge of International Standards does not ensure standardisation on its own.

International Standards provide “agreed technical requirements”

The “agreed technical requirements” need to be understood and applied in a uniform or standardised manner

IECEx Certified Service Facility Scheme

What evidence can your Service Facility provide to prove that it is overhauling and repairing Ex Equipment correctly

Health & safety legislation in most countries make the “User” responsible for safety of employees and the safety of work equipment

IECEX Certified Service Facility Scheme

IEC 60079-19 specifies in Clause 4.3.4

“It is the responsibility of the **user** to ascertain that the repair facility concerned can demonstrate compliance with the relevant stipulations of this standard”

The Service Facility has the responsibility to demonstrate to the Ex Equipment user how they comply with the requirements of IEC 60079-19

Do you have personnel with the knowledge & experience of Service Facility processes and practices to be able to access Service Facilities compliance

IECEx Certified Service Facility Scheme

A multi-site service facility asked themselves 15 years ago, what evidence could they produce in a court of law, to verify that their Service Facility was overhauling & repairing Ex Equipment correctly?

The personnel who had been trained in Ex Equipment repair, but could they demonstrate that they were following correct procedures?

Their personnel had been repairing Ex Equipment for more than 30yrs. But was this 30yrs of bad practice or 30yrs of correct practice?

The only way to evaluate this was to assess the work done by each employee but auditing across 15 sites would take up too much time

They needed an independent expert organisation to assess compliance originally this was EECS, part of UK HSE, now it is IECEx

What is IECEx?

IECEx is an IEC System with Schemes covering Certification to Standards that relate to Equipment, Services and Personnel Competency in areas relating to Explosive Atmospheres, to provide an **Internationally** accepted means of *demonstrating claimed compliance with International Standards*

IECEx is a “**Conformity Assessment Tool**” providing confidence that Products, **Services and Personnel** covered by an IECEx Certificate meet specified requirements, (International Standards)

“IECEx is the International Standard way of doing Ex Certification”

Schemes within the IECEx System

IECEX System

www.iecex.com

ExCBs 44
ExTLs 50

IECEX Equipment Scheme
Certification of Ex Equipment

Choice between:
IECEX “Certificate of
Conformity”

IECEX “Component
Certificate”

IECEX “Unit
Verification” Cert.

ExCBs 14

IECEX Conformity Mark License
Scheme



ExCBs 13

IECEX Services Scheme
Certification of Ex Service Providers, eg
Repair and overhaul workshops



ExCBs 7

IECEX Certified Persons
Scheme (CoPC)
Competency to work in Ex field (New)



IECEx Certified Service Facility Scheme

Ex equipment manufactured for use within hazardous areas is controlled by product certification schemes:-

- IECEx
- ATEX
- UL
- GOST
- CSA

Ex equipment certified by IECEx complies with International Standards e.g:-

- | | |
|----------------|----------------------|
| ▪ IEC 60079-0 | General Requirements |
| ▪ IEC 60079-1 | Ex d |
| ▪ IEC 60079-2 | Ex p |
| ▪ IEC 60079-7 | Ex e |
| ▪ IEC 60079-15 | Ex n |

This is to ensure that the Ex equipment does not produce a source of ignition when used within a hazardous area

IECEx Certified Service Facility Scheme

To ensure that the essential safety features of Ex Equipment are maintained, Ex Equipment has to be installed and maintained to international standards:-

- IEC 60079-14
- IEC 60079-17

When following the IEC 60079-14 standard for installation, after the equipment has been installed, but before it is energised, an “initial inspection” is conducted, this is a safety critical requirement

In many countries on going maintenance of Ex Equipment is a legal duty of the hazardous area operating company, (i.e. the User) to ensure work equipment is maintained safe for use

Following are examples of why an Initial Inspection is essential

IECEx Certified Service Facility Scheme

Ex d

GII

New motor with
Terminal Box Flamepath Defect



IECEx Certified Service Facility Scheme

Ex d

GII

New motor with
Inappropriate cable gland



IECEx Certified Service Facility Scheme

Ex equipment is subject to the environmental conditions of hazardous area installations, these can be very arduous resulting in corrosion and equipment Ex protection type failure.

When Ex equipment is overhauled and/or repaired to return defective equipment into operational condition this also is done to an International Standard:-

- IEC 60079-19

Usually only equipment with high cost or long lead time is repaired, typically electric motors, transformers, pumps, fans, gearboxes etc.

Lower cost equipment such as luminaires or junction boxes would normally be replaced & not repaired whilst other equipment like some types of gas detection devices can not be repaired

Ex Equipment Evidence of Corrosion

Ex d

GII

Small LV Motor
Beyond
Economic Repair



Ex Equipment Evidence of Corrosion

Ex d

GII

Pump motor
Is there Internal
Corrosion?



IECEx Certified Service Facility Scheme

The IECEx Certified Service Facility Scheme Certification Bodies assesses Service Facilities for their competency in conducting work to IEC standards in or relating to hazardous areas

Only an IECEx Certification Body, who has been assessed by IECEx for their competency to assess Service Facilities, will conduct the assessment of the applicant Service Facility

Initially this scheme was set up for the assessment of Service Facilities overhauling and repairing Ex Equipment to IEC 60079-19

Now the scheme includes Service Facilities covering a wider range of services including design, selection, erection, inspection and maintenance of electrical installations to IEC standards

IECEx Certified Service Facility Scheme

An initial assessment will review the applicant scope and Quality Management System, including procedures for compliance with the relevant IEC standard & the specific IECEx Certified Service Facility requirements

The Service Facility Scheme documents have been established with a common numbering system with a suffix number from 1 - 5 for example the IECEx 03 Scheme Rules

Scheme Rules	Rules of Procedure for
IECEx 03-1	Area Classification Service
IECEx 03-2	Selection of Ex equipment & design of Ex installation
IECEx 03-3	Ex Installation & initial inspection
IECEx 03-4	Ex inspection & maintenance
IECEx 03-5	Repair, overhaul & reclamation of Ex Equipment

IECEx Certified Service Facility Scheme

IECEx Certified Service Facility Scheme for Overhaul & Repair of Ex Equipment assesses compliance with IEC 60079-19 and the following IECEx documents:-

IECEx 01 IECEx Basic Rules

IECEx 03-5 IECEx Certified Service Facility Scheme Rules - Repair

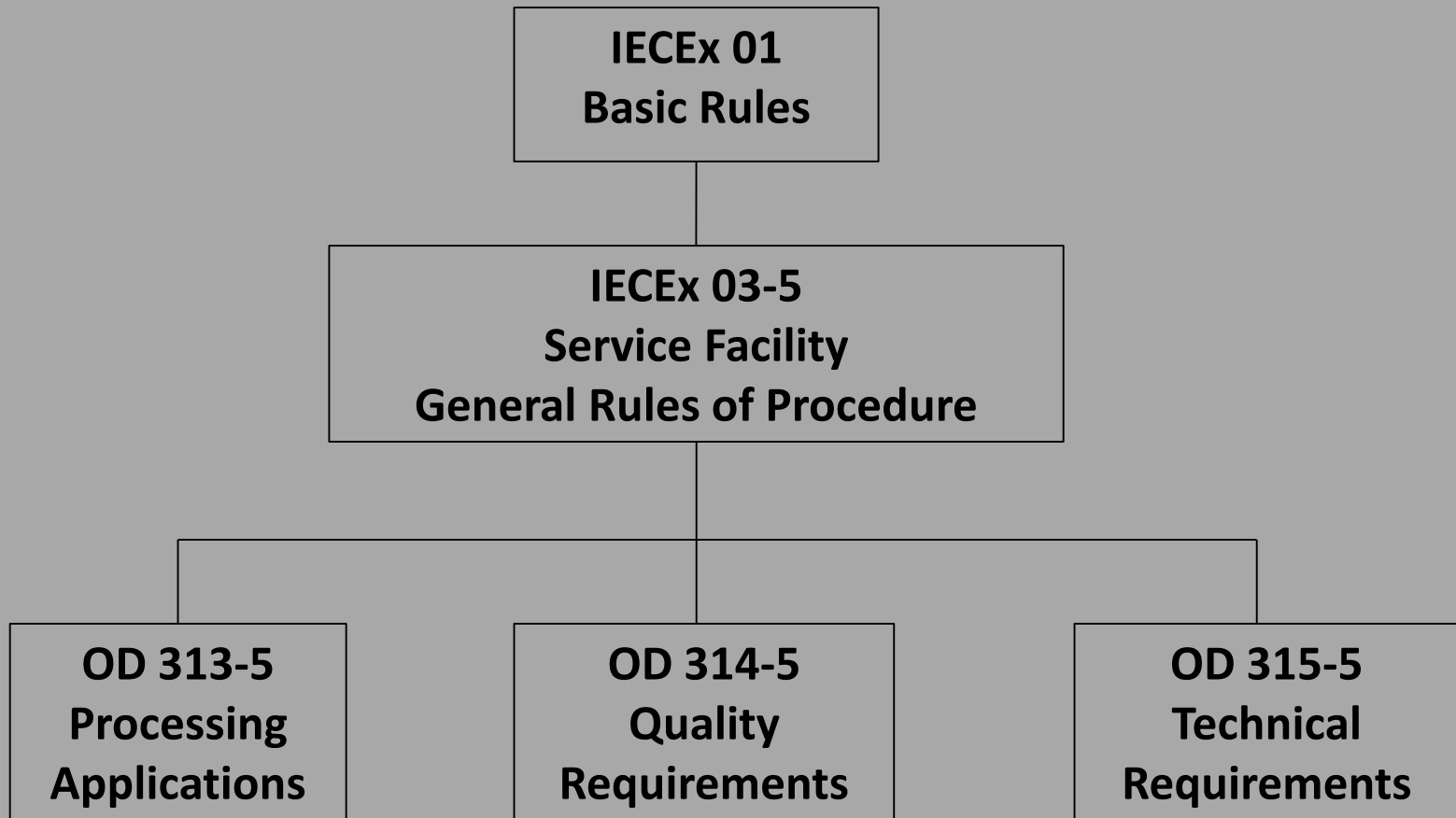
OD 313-5 Certified Service Facility Assessment Procedures - Repair

OD 314-5 Quality Management System Requirements - Repair

OD 315-5 IECEx Service Facility Scheme Additional Requirements - Repair

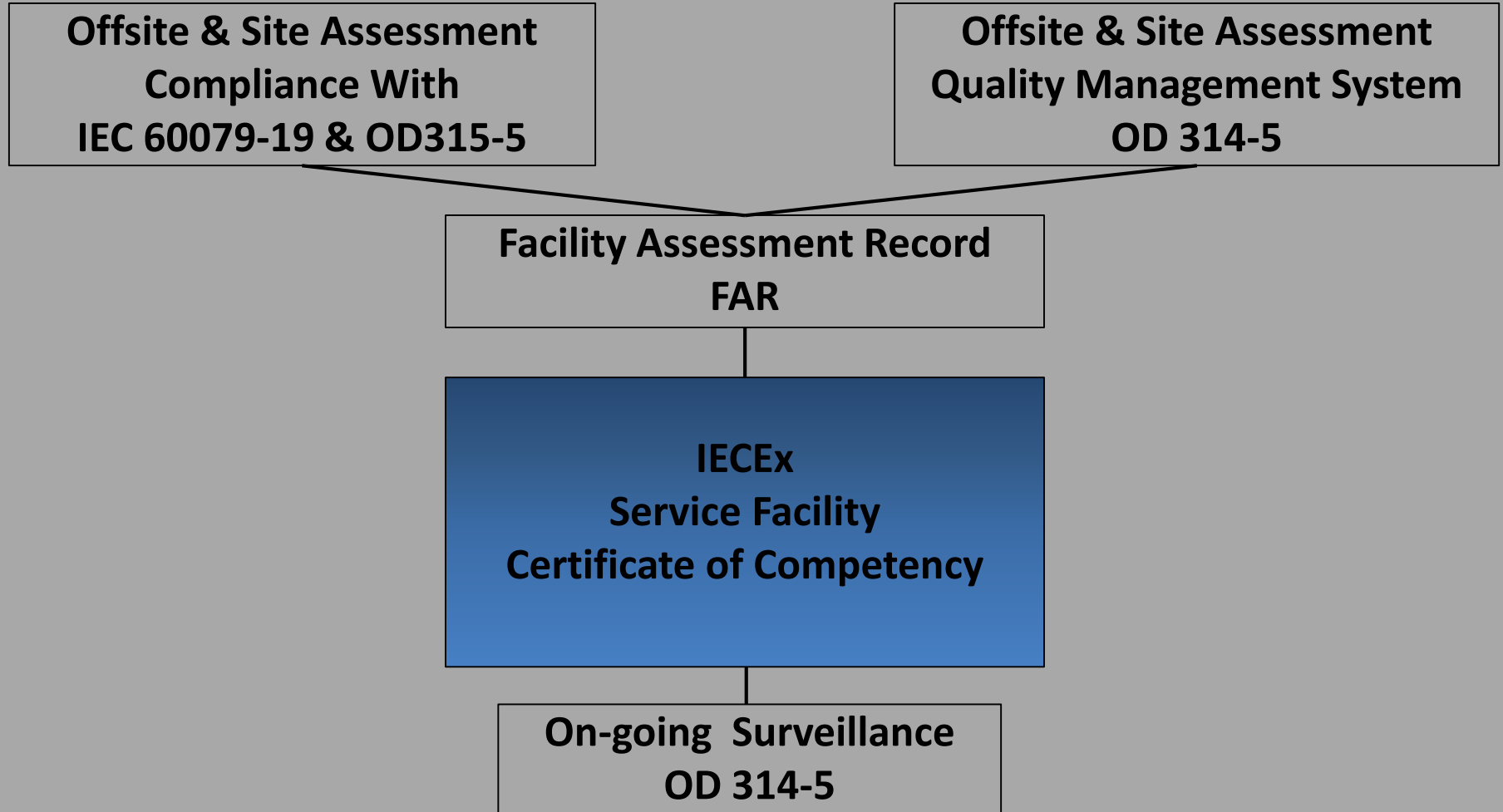
IECEX Certified Service Facility Scheme

IECEX Certified Service Facility Rules & Requirements



IECEX Certified Service Facility Scheme

Service Facility Assessment Process



IECEx Certified Service Facility Scheme

The IECEx Certified Service Facility needs to have:-

- Documented quality management system
- Documented repair process controls
- Effective control of repair processes
- Control systems for any sub-contractors
- Effective control of measurement & test equipment with traceability to International Standards
- Sufficient plant & equipment to process Ex Equipment in scope
- Competent Operatives & Responsible Persons

IECEx Certified Service Facility Scheme

IEC 60079-19 Clause 4.4.1.1

“The repair facility shall appoint a person (“Responsible Person”) with the required competency (see annex B), within the management organisation, ***to accept responsibility and authority for ensuring that the overhauled / repaired equipment complies with the certification status agreed with the user.*** The person shall have a working knowledge of the appropriate explosion protection standards and an understanding of this standard.”

IECEx Certified Service Facility Scheme

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

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

(i.e. repair to standard or repair to certification documents)

The Responsible Person must have the competency and authority to control how each Ex Equipment is overhauled and repaired and only when he is satisfied that it complies with the agreed certification status can it can be returnerd to the User

IECEx Certified Service Facility Scheme

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 management systems need to be adapted to integrate the Responsible Person into the management systems, e.g. the Responsible Person needs to be part of the QMS Management Review, sub-contractor review, etc.

IECEx Certified Service Facility Scheme

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

Ex Operatives have been defined by this company 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 of Ex Equipment

IECEx Certified Service Facility Scheme

Competency of Ex Operatives & Responsible Persons is one of the most critical aspect of Service Facility certification

- How do you assess a person, in particular an employee, as competent
- Do you assess competency in house or use 3rd party assessment
- What is it that demonstrates somebody is competent
- What is the competency of the assessor
- What is the right level of competency

IECEx Certified Service Facility Scheme

As a Service Facility holding an IECEx Certified Service Facility Scheme Certificate of Competency, the company decided that all EX competent persons, (i.e. Operators & Responsible Persons) had to be 3rd party independently assessed for their competency in an IEC/ISO17024 Scheme where assessment of competency is independent from training

Because their existing training provider was not prepared to provide the required independent assessment of competency they set up such a ISO 17024 competency assessment scheme in 2005 with EASA Region 9 & SIRA

From 2014 Q3 assessment of competency will be to IECEx ExPCC Unit of Competency Ex 005 where training is provided by EASA Region 9 and assessment of competency is by SGS BASEEFA

IECEx Certified Service Facility Scheme

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

70% of the candidates failed

The training was adapted to re-enforce knowledge gaps identified during the 1st course and EASA scheduled a 2 week period between training and assessment for individuals to improve their knowledge and/or skills before assessment

This also ensures better assessment of knowledge and competency rather than assessment of short term memory capability

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

IECEx Certified Service Facility Scheme

Although this Service Facilities had been repairing Ex Equipment successfully since Ex Equipment was first manufactured, their documentation & records of reclamation procedures did not fully meet the requirements of the IECEx service Facility Scheme

Their 1st major change was the introduction of a drawing recording details of the repaired component, detailing exactly what had to be repaired and where in the component, together with inspections and measurements

A record of the decisions taken in preparing the reclamation procedure and choice of reclamation techniques being used, also had to be introduced

IECEx Certified Service Facility Scheme

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 instrument used for each measurement

Control of purchasing required some minor amendment, but where this included sub-contracting of, or part of, a reclamation procedure which may affect the Ex type protection, then much greater assessment and monitoring of that sub-contractor is required & the sub-contractor may need to be audited by the IECEx CB

IECEx Certified Service Facility Scheme

An IECEx Certified Service Facility will provide the Ex Equipment User a job report in accordance with the requirements of IEC 60079-19 which is sent 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

This job report is essential information for the “initial inspection”, as required by IEC 60079-17 before the repaired equipment is returned to service

IECEx Certified Service Facility Scheme

The IECEx Service Facility **Certificate of Conformity** enables the Ex Equipment User to have 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

IECEX Certified Service Facility Scheme

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

Currently they have 6 Service Facilities with IECEx Certificates of Conformity and they are working their way through their other branches who overhaul & repair large numbers of Ex Equipment

IECEx Certified Service Facility Scheme

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 in controlling the repair processes and the competency of the people doing the work that ensures compliance with IEC 60079-19 & the IECEx Scheme

IECEx Certificate of Personnel Competancy

When the IECEx Certified Service Facility Scheme was set up, it was recognised by IECEx, that the competency of Ex Operatives and Responsible Persons was critical to the competency of the Service Facility.

However at that time there were no schemes established to access competency of persons working in Hazardous areas other than those operated by individual employers

As a result this IECEx ExCoPC Scheme was set up and the first assessments of competence were conducted in 2011

IECEx Certificate of Personnel Competency

Competency of persons will be assessed to IEC standards

IEC 60079-10	Classification of Areas
IEC 60079-14	Design, Selection & Erection
IEC 60079-17	Inspection & Maintenance
IEC 60079-19	Repair, Overhaul & Reclamation

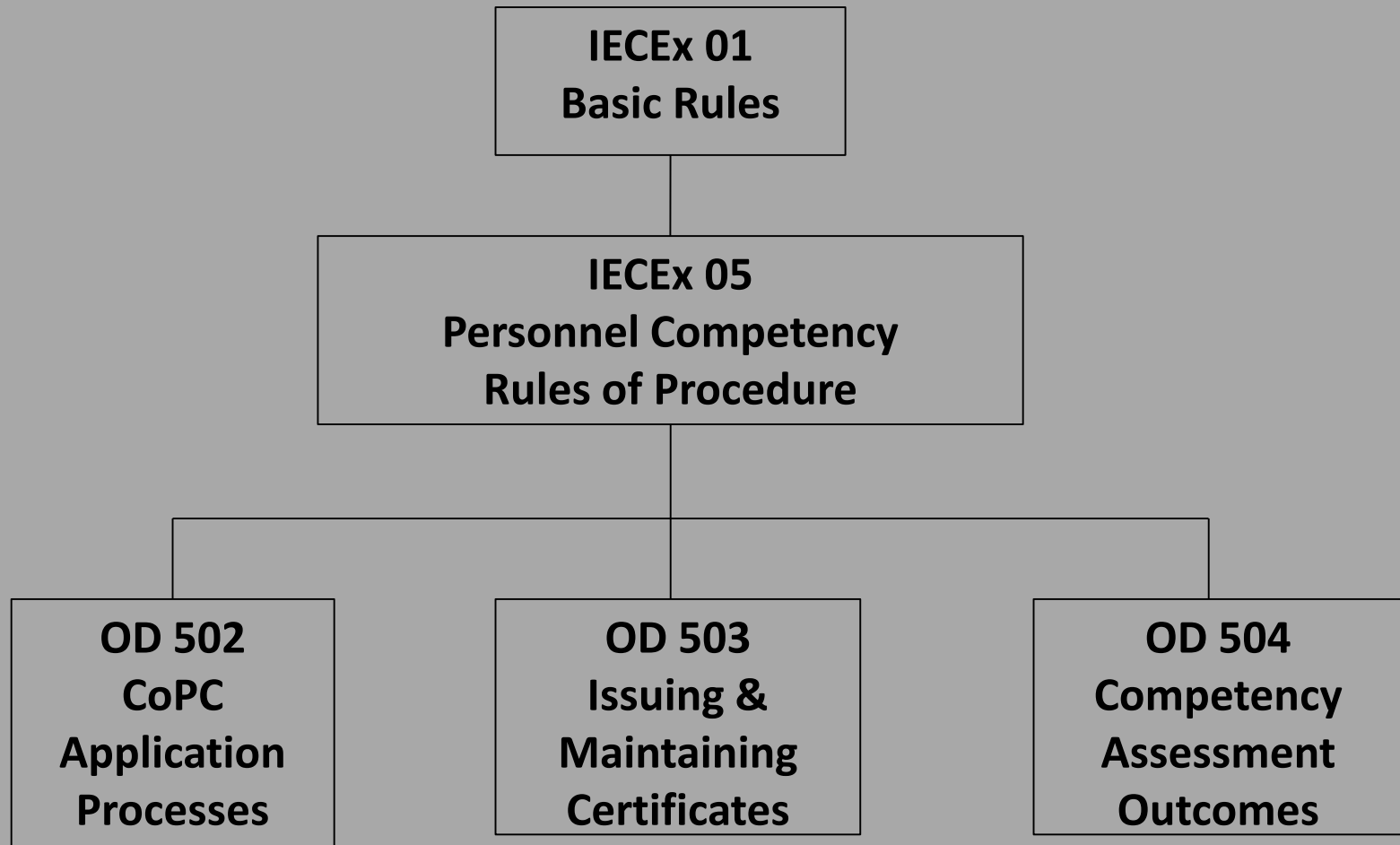
The assessment process will comply with the requirements of
ISO/IEC 17024

International Standard for Bodies Operating Certification of Persons

The competency assessment outcomes have been set by IECEx Ex
CoPC Scheme in Operational Document OD 504

IECEx Certificate of Personnel Competency

The IECEx Ex CoPC Scheme has the following documentation



IECEx Certificate of Personnel Competancy

IECEx CoPC Units of Competency

Reference	Title
Unit Ex 000	Basic knowledge & awareness to enter hazardous area site
Unit Ex 001	Apply basic principles in explosive atmospheres
Unit Ex 002	Perform classification of hazardous areas
Unit Ex 003	Install explosion protected equipment & wiring systems
Unit Ex 004	Maintain equipment in hazardous areas
Unit Ex 005	Overhaul & repair of explosion protected equipment
Unit Ex 006	Test electrical installations
Unit Ex 007	Perform visual & close inspection of electrical installations
Unit Ex 008	Perform detailed inspection of electrical installations
Unit Ex 009	Design electrical installations
Unit Ex 0010	Perform audit inspection of electrical installations

Note: Unit Ex 000 This is a unit of knowledge NOT a unit of competency

IECEx Certificate of Personnel Competency

When Unit 005 competency is assessed 3 areas are considered

1st is the assessment of prior knowledge & experience

Candidates have to be able to provide evidence of competency for the work they are doing in a non-hazardous e.g. industrial area

For example an Ex repair operator, their competency as a repairer will have been assessed by a college, trade school or equivalent

They will have had to have had at least 3 years experience before they can be assessed as competent in Ex equipment repair

IECEx Certificate of Personnel Competancy

When Unit 005 competency is assessed 3 areas are considered

2nd is the assessment of knowledge

Candidates will have to pass a written examination

The 1st paper/section will have a selection of questions with multi-choice answers all these will be safety critical questions with 100% pass mark

The 2nd paper/section will have a larger number of questions with multi-choice answers with 80% pass mark

The 3rd paper/section will have a smaller number of questions with short written answers with 80% pass mark

IECEx Certificate of Personnel Competancy

When Unit 005 competency is assessed 3 areas are considered

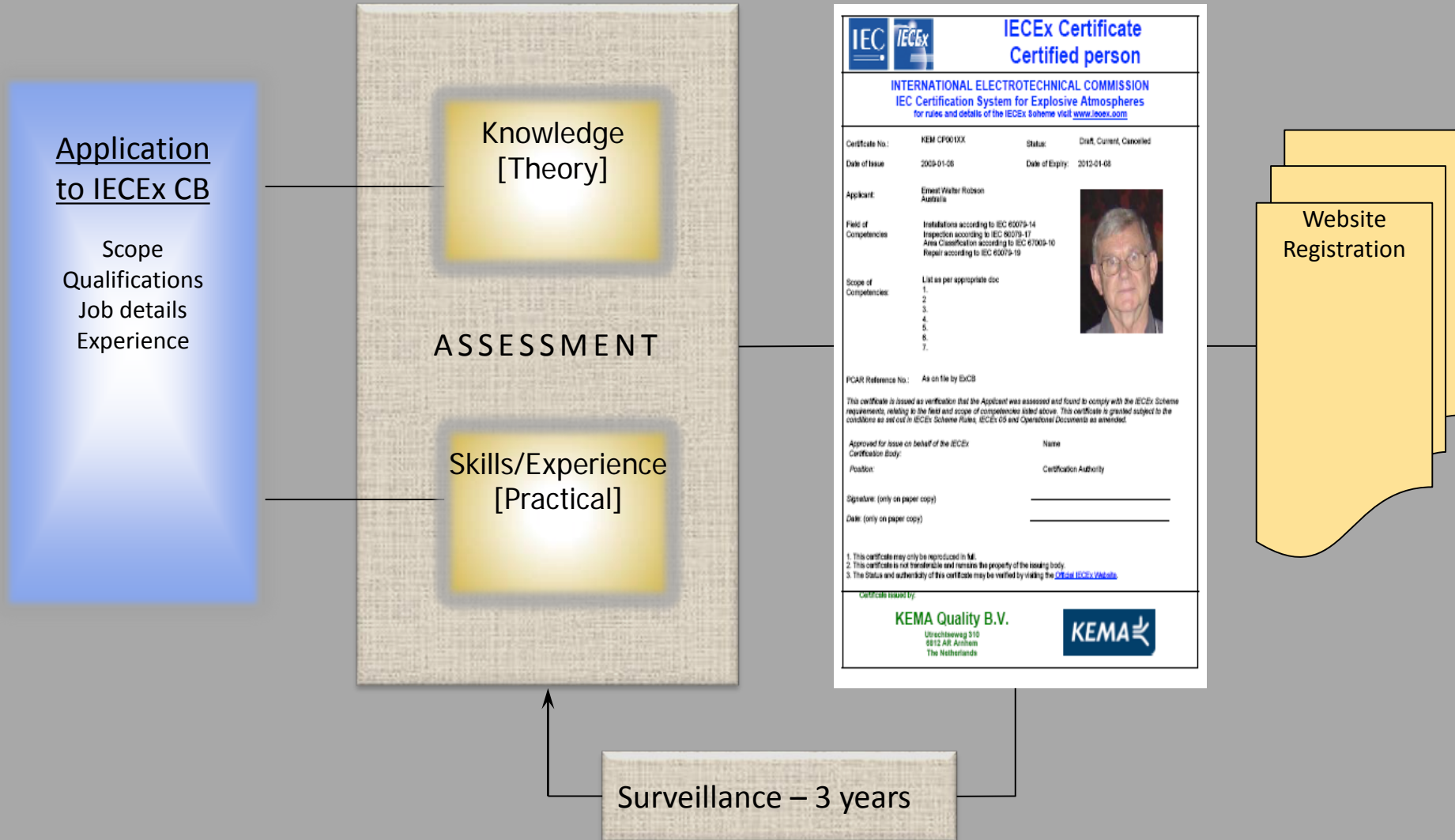
3rd is the demonstration of knowledge, skills & experience

Candidates will have to work, typically in a simulated work environment, on selected Ex Equipment artefacts to demonstrate their ability apply their knowledge, experience and skills

This may be as simple as correct interpretation of the information on a nameplate to ascertain which standards the equipment was manufactured to, or inspection of components to identify defects or verify suitability for use

But will include multiple practical assessments to demonstrate that the candidate has the range of skills, experience and knowledge for the competency required

IECEx Certificate of Personnel Competency



IECEx Certificate of Personnel Competency

Re-assessment is required every 3 years

Every 18 months between assessments the IECEx Competent person will have to produce evidence to satisfy the IECEx CB that they are still working within the scope of their competency

During these surveillance assessments the ExCB will take into account any feedback from the employer or other parties

IECEx Certified Service Facility Scheme

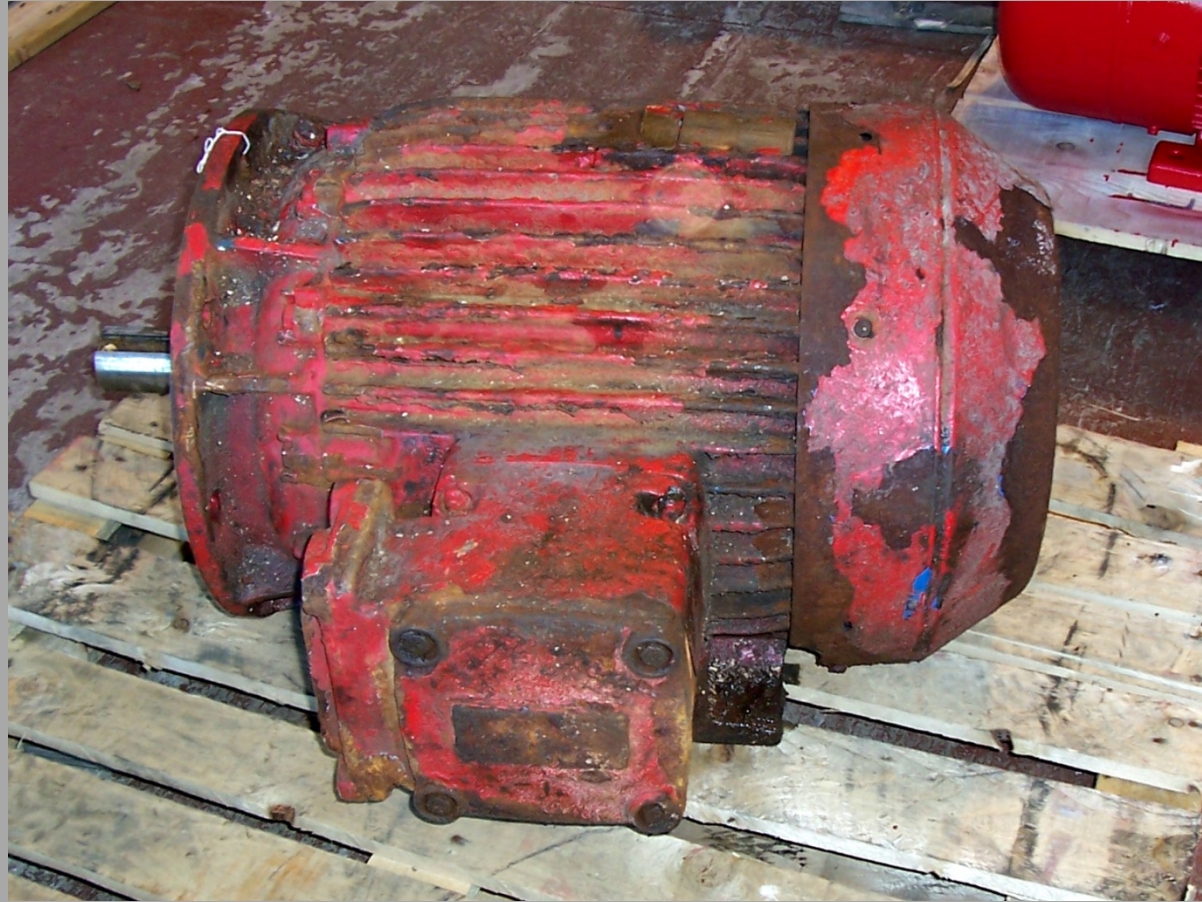
Just a few examples of Ex Equipment Repair

IECEx Certified Service Facility Scheme

Ex d

GII

As Received

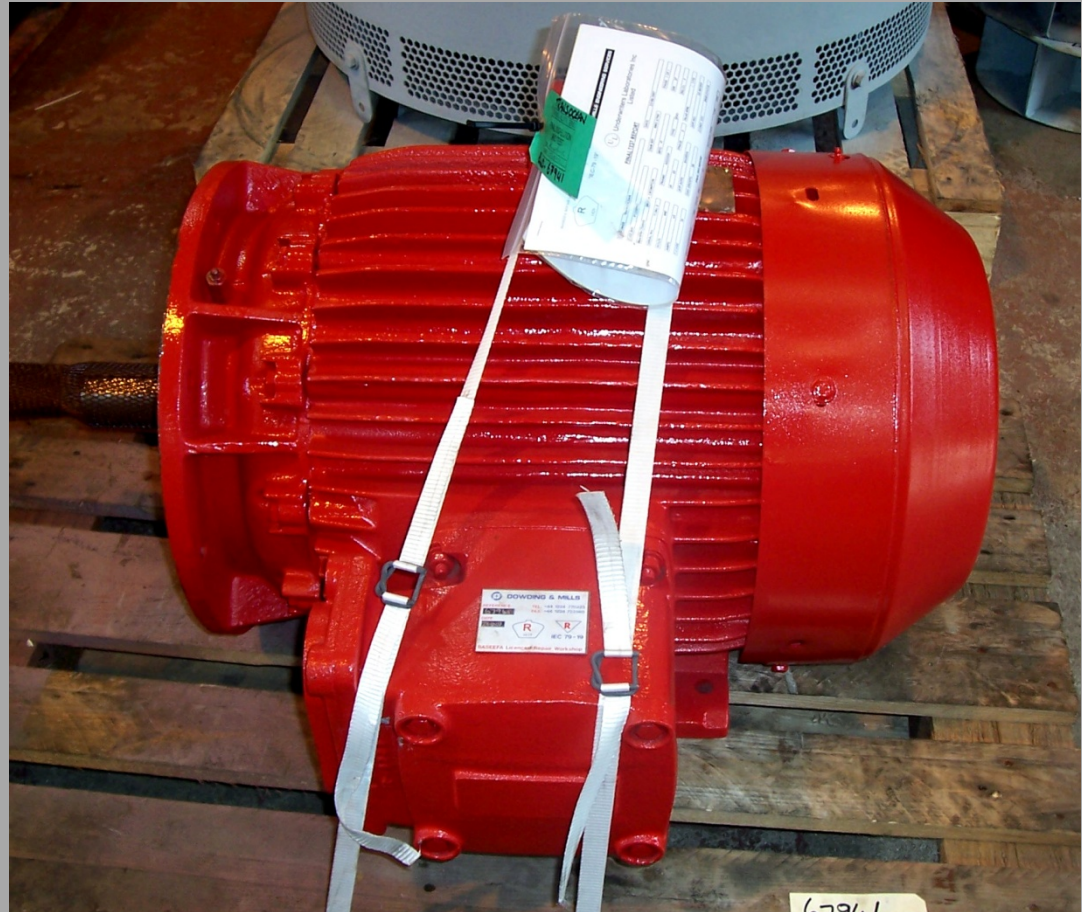


IECEx Certified Service Facility Scheme

Ex d

GII

As Returned



IECEx Certified Service Facility Scheme

Ex d

GII

As Received



IECEx Certified Service Facility Scheme

Ex d

GII

As Returned



IECEx Certified Service Facility Scheme

Ex p

GII

Pump motor



IECEx Certified Service Facility Scheme

Ex p

GII

Gas Compressor
Motor



IECEx Certified Service Facility Scheme

Ex d

GI

DC Traction
Motor



IECEx Certified Service Facility Scheme

Ex d

GI

1,100v

Shearer Motor



IECEx Certified Service Facility Scheme

Ex d

GI

Corrosion
Flame Path &
Bolt Thread



IECEx Certified Service Facility Scheme

Ex d

GI

Flame Path

Gouged



IECEx Certified Service Facility Scheme

Ex d

GI

Transformer



IECEx Certified Service Facility Scheme

Ex d

GI

Transformer

Flame Paths
Recovered



Conclusions

When you use an IECEx Certified Service Facility you have:

- On-line evidence that they are still assessed as competent
- Clear evidence of type of equipment for which they have been assessed as competent in the scope
- The assessment process has been approved by IECEx
- The status of equipment after repair will have been agreed
- The service facility Responsible Person will have signed a job report sent with the repaired equipment verifying status

In effect you will have done everything practicable to ensure the repaired Ex Equipment is safe to use whether as a User or as a Service Facility

IECEx Certified Service Facility Scheme

Thank you for your attention

Any Questions?