Sulzer Dowding & Mills

UNECE Regulatory Workshop - Forteleze

IECEx Service Facility Scheme

John Allen | 20/8/13

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 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 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 standardised or uniform manner

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

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 work equipment

IEC 60079-19 specified 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

IECEx Certified Service Facility Scheme

As Technical Director of a multi-site Service facility I asked myself 15 years ago, what evidence I could produce for a court of law, to verify that my Service Facility was overhauling & repairing Ex Equipment correctly?

We had personnel who had been trained in Ex Equipment repair

How could I prove that they were following correct procedures?

We had personnel who 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 but auditing 15 sites would take up too much time

I needed an independent expert organisation to assess compliance initially this was EECS, part of UK HSE, currently it is IECEx

What is IECEx?

An International 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

Sulzer Dowding & Mills

IECEx System
www.iecex.com

ExCBs 44
ExTLs 43

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 such as:-

- 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, which ensure no sources of ignition are present, Ex Equipment has to be installed and maintained to international standards:-

- IEC 60079-14
- IEC 60079-17

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 safe working equipment is provided

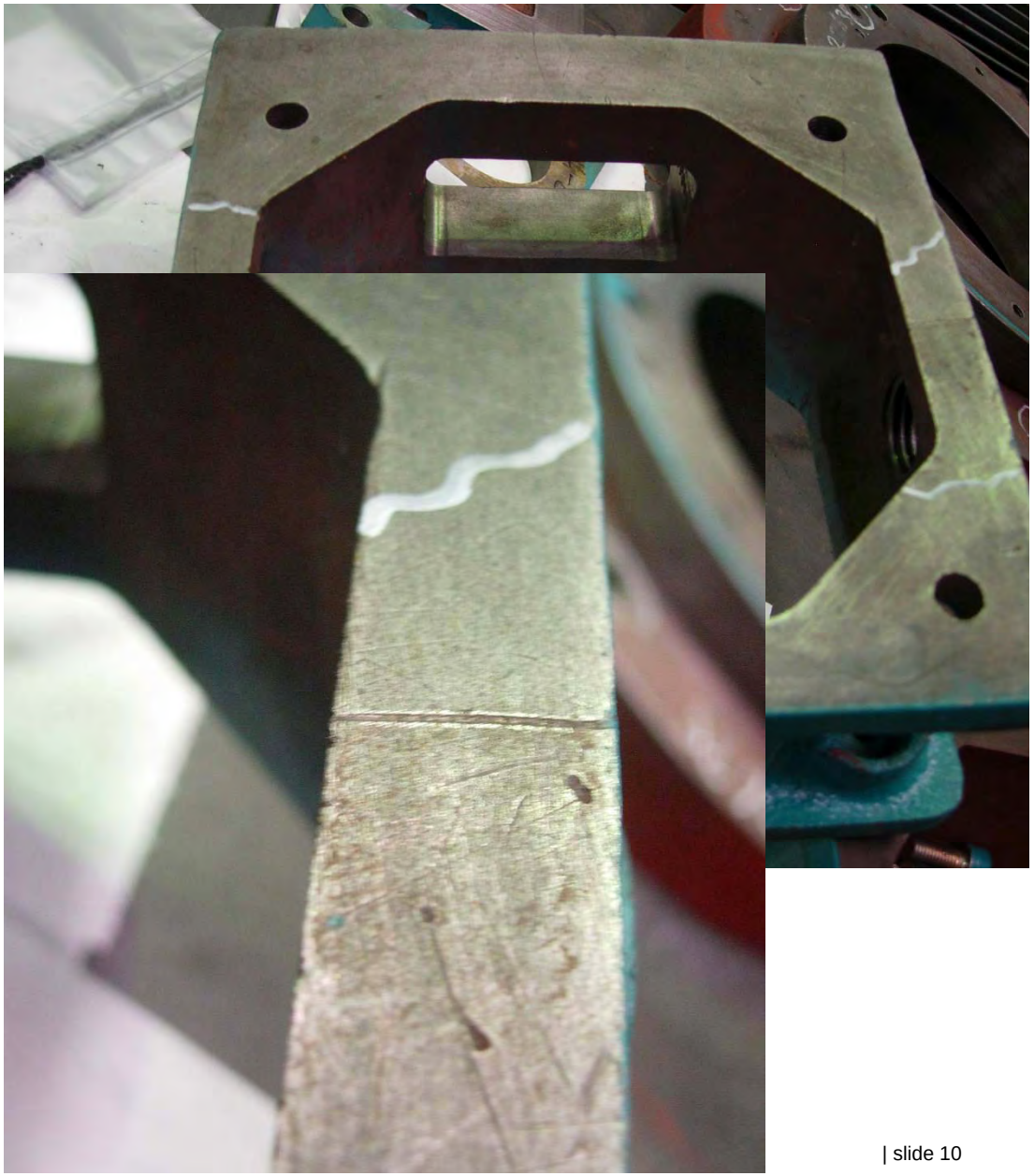
Following are a couple of examples of why an Initial Inspection ie required

IECEx Certified Service Facility Scheme

Ex d

GII

New motor with
Terminal Box Flamepath Defect

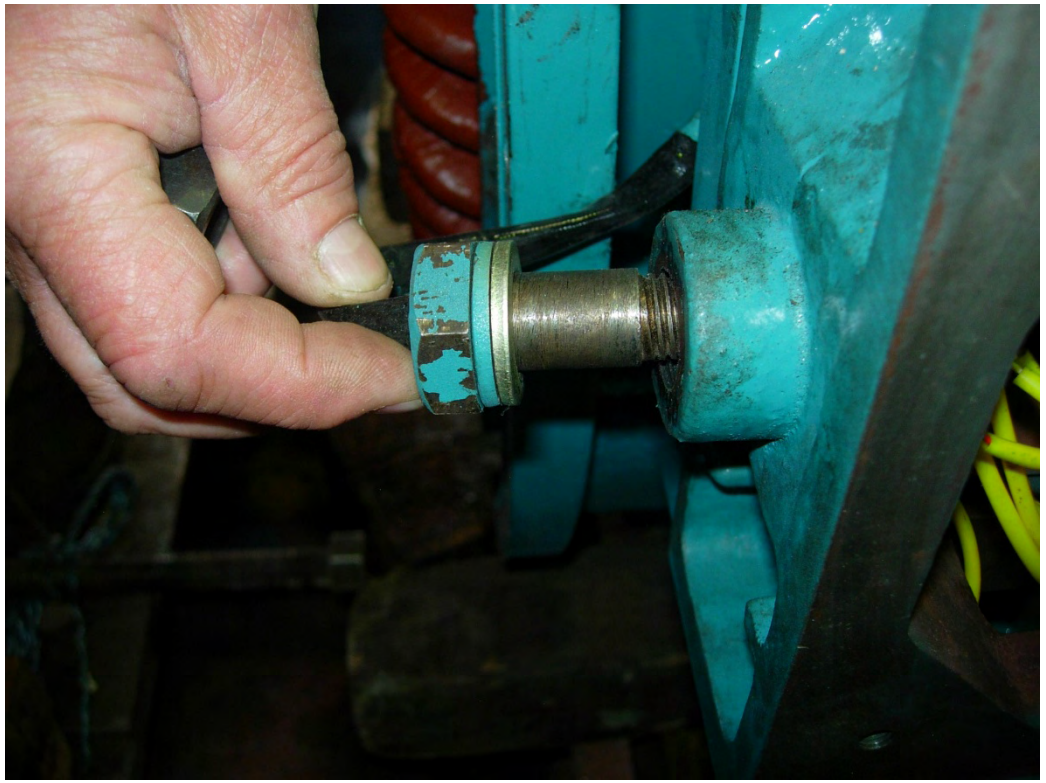


IECEx Certified Service Facility Scheme

Ex d

GII

New motor with
Inappropriate cable gland



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

When Ex equipment is overhauled and/or repaired in order to return defective equipment into a safe 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

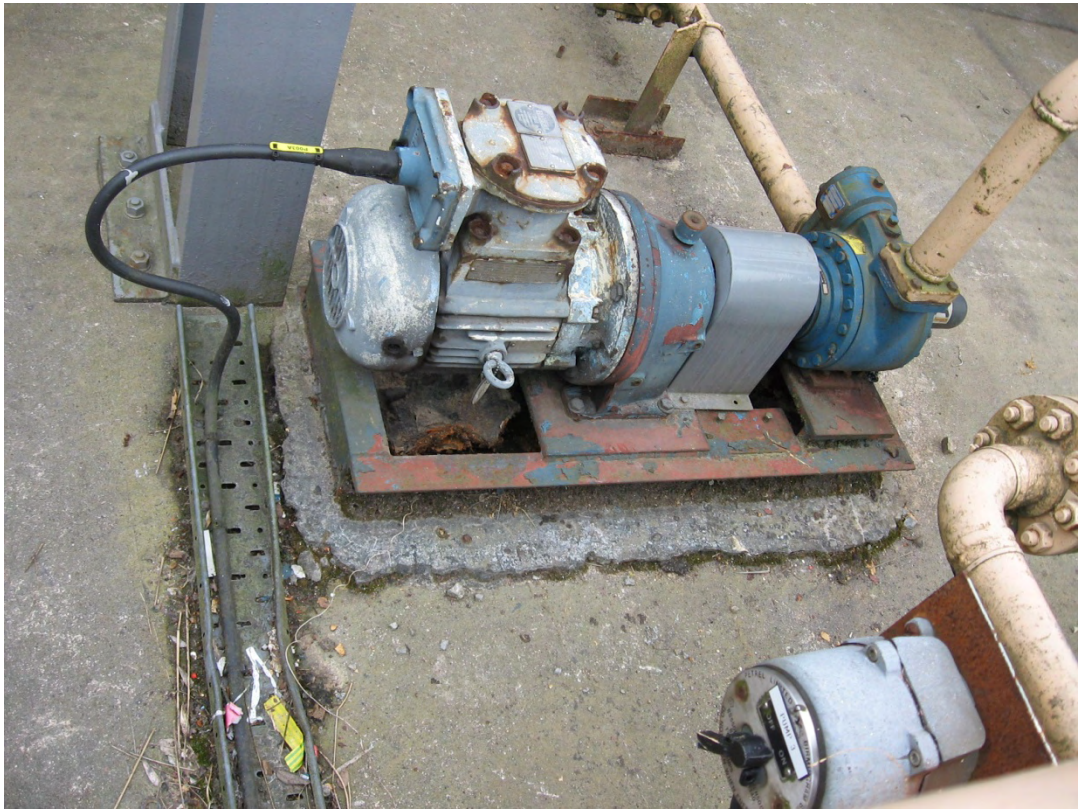
Ex Equipment Evidence of Corrosion

Ex d

GII

Pump motor

Is there Internal Corrosion?



IECEx Certified Service Facility Scheme

The IECEx Certified Service Facility Scheme assesses individual Service Facilities for their competency in conducting overhauls and/or repairs of Ex Equipment to IEC 60079-19

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

The initial assessment will review the applicant scope and Quality Management System including Ex Equipment overhaul and repair procedures for compliance with IECEx Certified Service Facility requirements

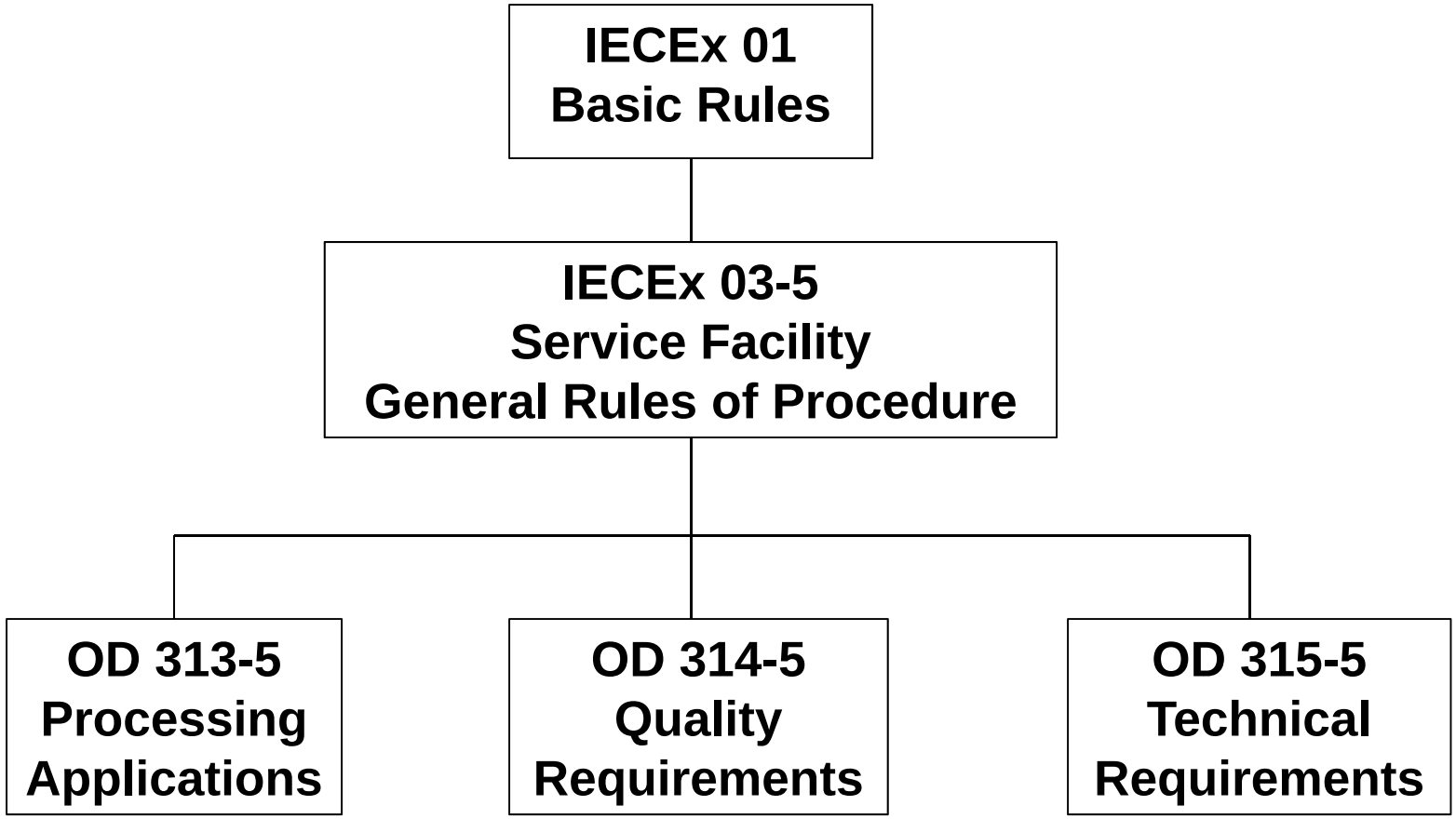
IECEx Certified Service Facility Scheme

IECEx Certified Service Facility Scheme 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
OD 316-5	IECEx Service Facility Scheme ExCB Assessment Procedures

IECEx Certified Service Facility Scheme

IECEX Certified Service Facility Rules & Requirements



IECEx Certified Service Facility Scheme

IECEx 01 IECEx Basic Rules

These are the base rule that apply to all IECEx Schemes within the IECEx System

This document describes how the IECEx System and IECEx Schemes are organised, managed & financed, detailing the operation of the Ex Management Committee and the Scheme Committees

IECEx Certified Service Facility Scheme

IECEx 03-5 IECEx Certified Service Facility Scheme

Repair, Overhaul and Reclamation of Ex Equipment - Rules of Procedure

This document describes how the IECEx Certified Service Facility Scheme for Repair is operated and managed, detailing how Ex CB's are accredited, within this IECEx Scheme, and how the Service Facilities are assess by these ExCB's

This document, in association with IECEx 01, are the Rules of this IECEx Scheme

IECEx Certified Service Facility Scheme

OD 313-5 Certified Service Facility Assessment Procedures – Repair

This Operating Document details the assessment, certification and re-certification processes conducted by the IECEx CB during the assessment of a Service Facility. The flow charts show the process, whist the tables detail specific requirements for each element of the flow chart

IECEx Certified Service Facility Scheme

OD 314-5 Quality Management System Requirements - Repair

IECEx 03-5 requires the services facility to have an effective Quality Management System to the requirements of ISO 9001 and the additional requirements in this O D, which includes specific requirements for process control, operator & responsible person competency, calibration, control of non-conforming product and product recall

The Service Facility does not have to have 3rd party assessment to ISO 9001

IECEx Certified Service Facility Scheme

OD 315-5 **IECEx Certified Service Facility Scheme**
Additional Requirements – Repair

This Operating Document details additional requirements over and above the requirements specified in IEC 60079-19. These relate to control of rewind processes to maintain temperature classification, machining limits and when required pressure test requirements for Ex d

Where competency of operatives and responsible persons are assessed the requirements of IEC 60079-19 Annex B and the requirements of the IECEx CoPC Scheme Unit of Competence Ex 005 have to be included. As set forth in IECEx OD 504 (Specification for Units of Competency Assessment Outcomes)

Except where such competent personnel hold current IECEx CoPC Certificates of Competency for Unit of Competency Ex 005

IECEx Certified Service Facility Scheme

OD 316-5 **IECEx Certified Service Facility Scheme**
Assessment procedures for IECEx ExCBs

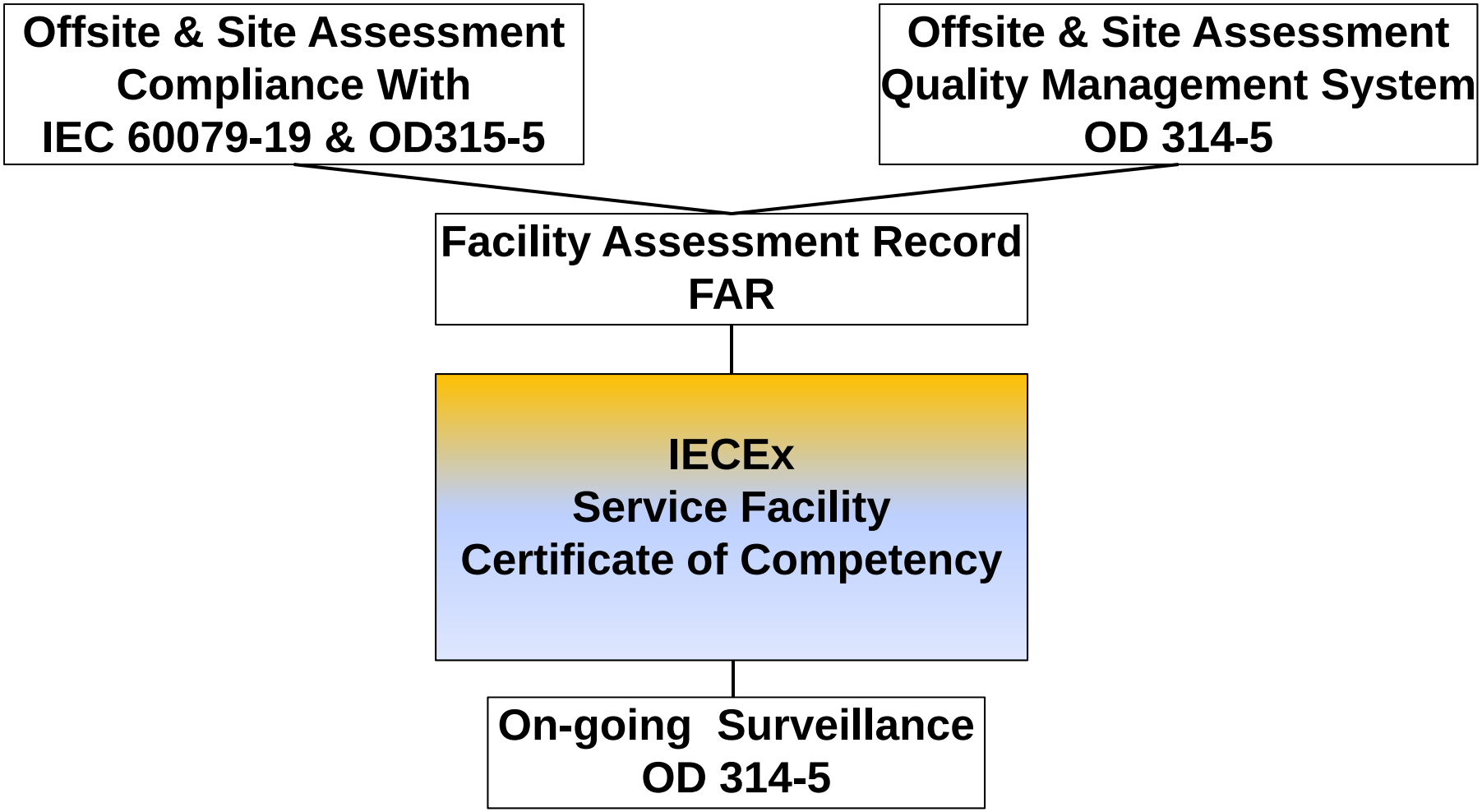
This Operating Document details the assessment and re-assessment of Certification Bodies seeking acceptance within the IECEx Certified Service Facility Scheme.

The table details the specific requirements for each element in the process flow chart

This document is strictly not necessary for Service Facilities seeking Certification, but it does provide confidence to those Service Facilities that the ExCB assessing them has the required competencies which have been assessed by IECEx

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

The Responsible Person has to agree 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 can it can be sent back to the User

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, eg the Responsible Person needs to be part of the QMS Management Review

IECEx Certified Service Facility Scheme

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

IECEx Certified Service Facility Scheme

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

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, we decided that all EX competent persons, (i.e. Operators & Responsible Persons) would be 3rd party independently assessed for their competency in an IEC/ISO17024 Scheme and assessment of competency must be independent from training provision

Through EASA Region 9 in the UK I set up such a competency assessment scheme in 2005

We are now changing to assessment of competency to IECEx ExPCC Unit of Competency Ex 005 where training is provided by EASA Region 9 and assessment of competency is by an IECEx CB

IECEx Certified Service Facility Scheme

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

70% of the candidates failed

The training was adapted to re-enforce knowledge gaps identified during the first course and we scheduled in a period of 2 weeks between training and assessment for individuals to improve their knowledge and/or skills before presenting themselves for assessment

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

IECEx Certified Service Facility Scheme

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

Our 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 was 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 measurement

Control of purchasing required some minor amendment but where this 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

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 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 our Service Facility since our 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 we have 6 Service Facilities with IECEx Certificates of Conformity and we are working our way through our 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 Certified Service Facility Scheme

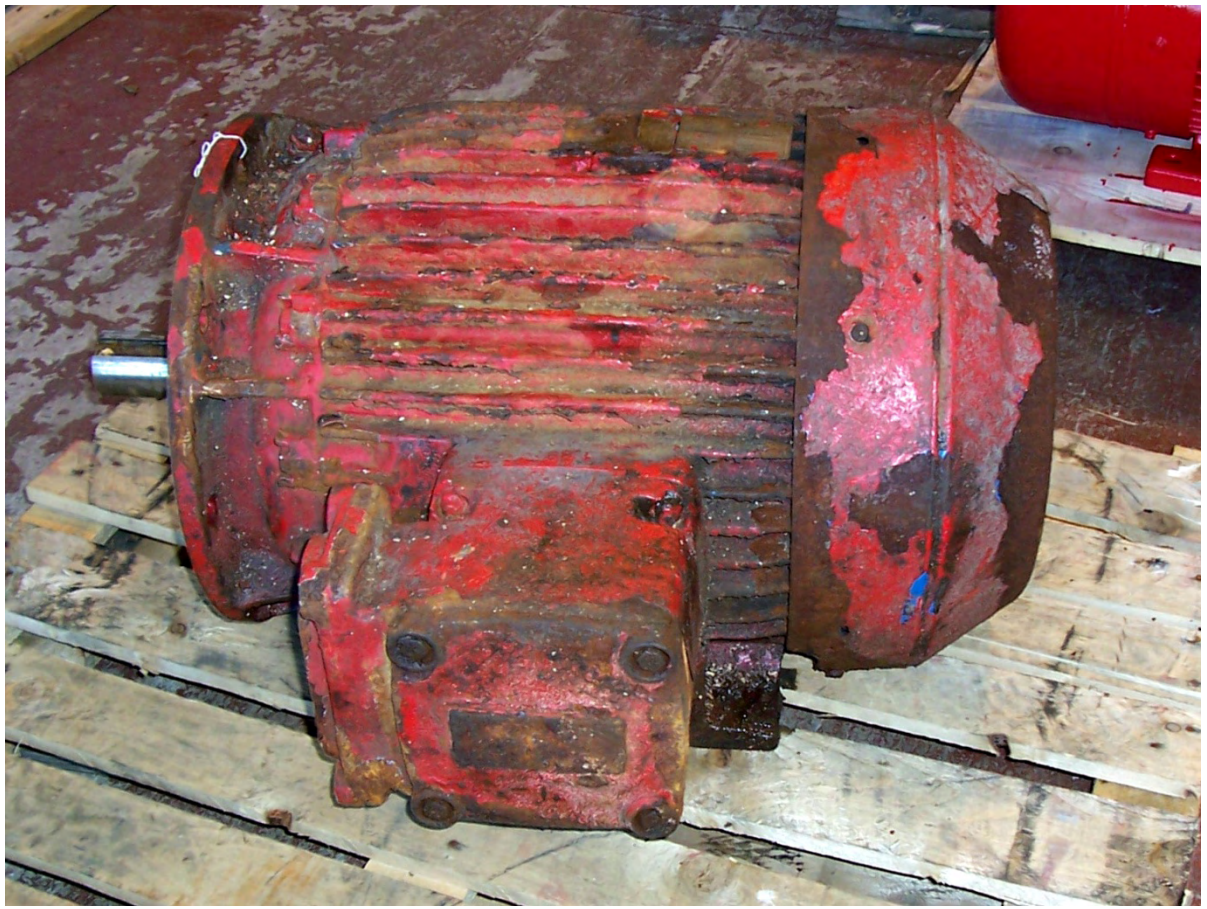
Just a few examples of Ex Equipment Repair

IECEx Certified Service Facility Scheme

Ex d

GII

As Received

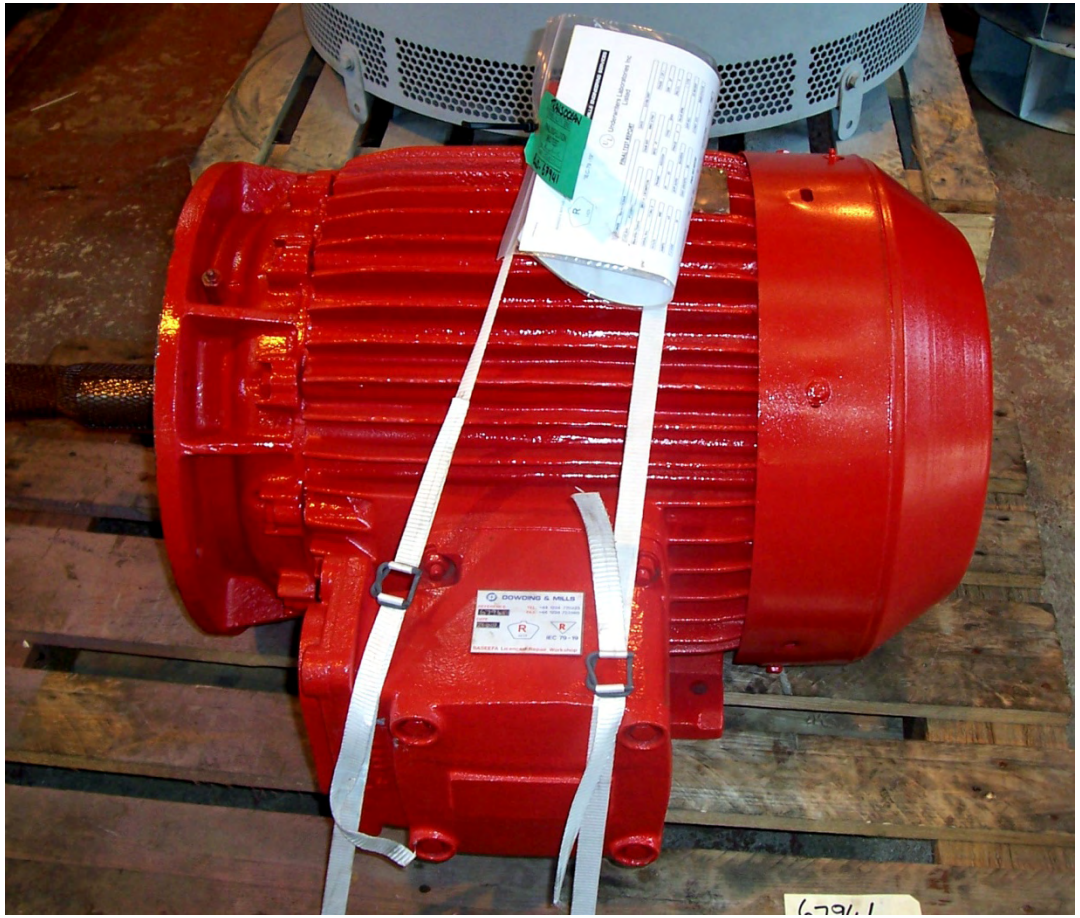


IECEx Certified Service Facility Scheme

Ex d

GII

As Returned



IECEx Certified Service Facility Scheme

Ex d

GII

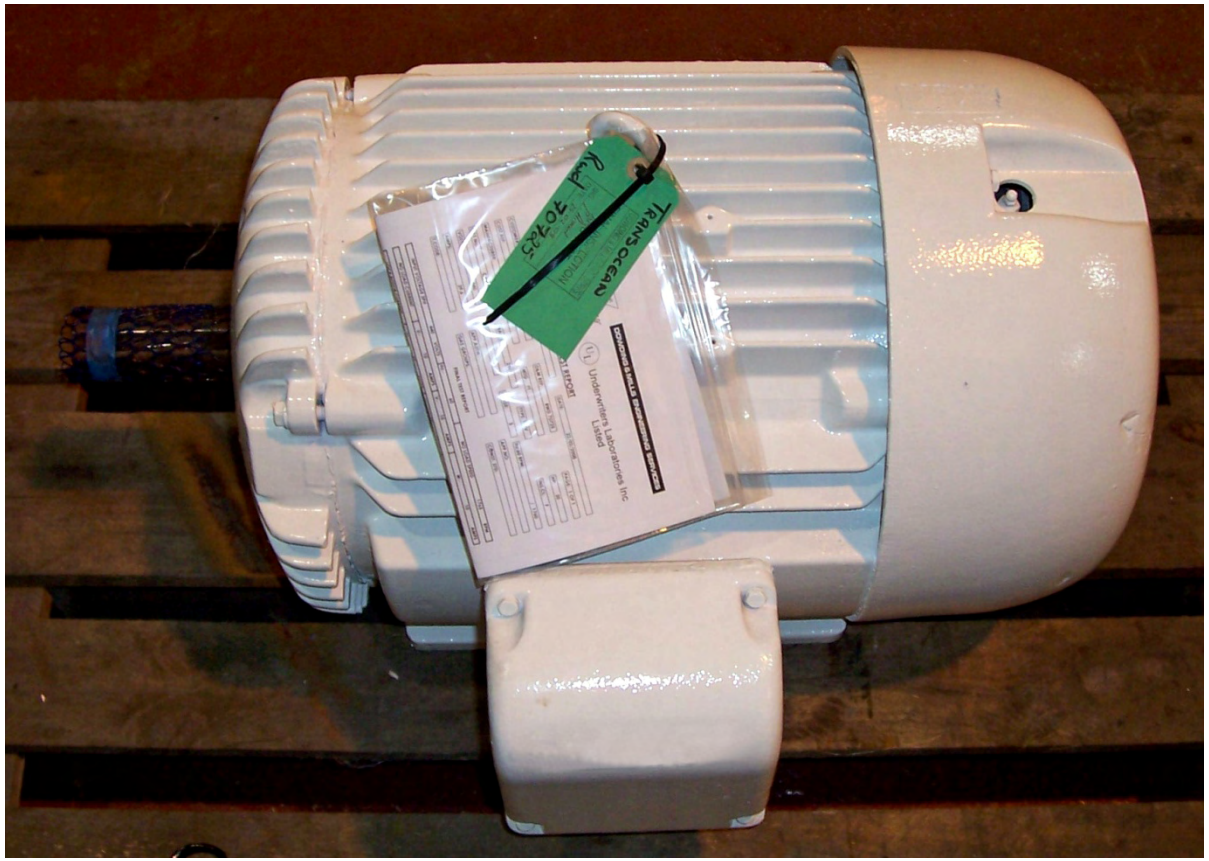
As Received

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

Sulzer Dowding & Mills

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

Flame Path & Bolt Thread

Corroded

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

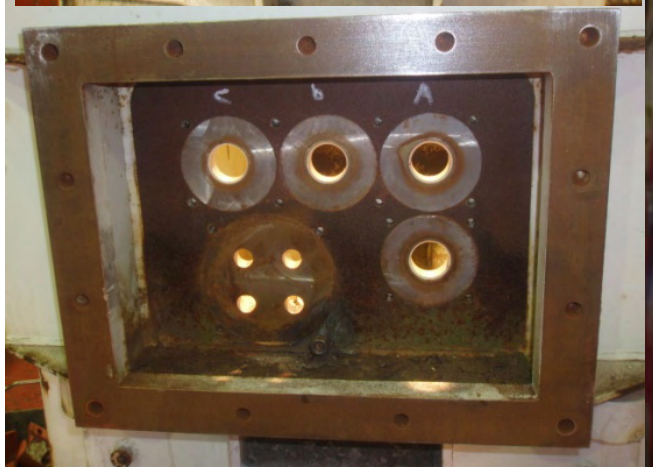
Ex d

GI

Transformer

Corroded

Flame Paths



IECEx Certified Service Facility Scheme

Ex d

GI

Transformer

Mechanical Restraints

Damaged

IECEx Certified Service Facility Scheme

Ex d

GI

Transformer

Damaged Terminals

&

Internal Contamination

IECEx Certified Service Facility Scheme

Ex d

GI

Transformer

Loose HV

Winding Blocks

IECEx Certified Service Facility Scheme

Ex d

GI

Transformer

Internal HV Phase Connections
Insulation Damaged

IECEx Certified Service Facility Scheme

Ex d

GI

Transformer Core

Earth Connection Damaged

IECEx Certified Service Facility Scheme

Ex d

GI

Transformer

Flame Paths Recovered

IECEx Certified Service Facility Scheme

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
- 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?