

Electrical Apparatus Service Association European & World Chapter



PERSONNEL COMPETENCE TRAINING AND REGISTRATION SCHEME

for the

REPAIR AND OVERHAUL

of

EXPLOSIVE ATMOSPHERE EQUIPMENT

to

IEC 60079 – 19: 2006

for

OPERATIVES & RESPONSIBLE PERSONS

ASSESSMENT CRITERIA

List of Competencies

Course Assessment

Assessment criteria for all delegates, regardless of their craft bias, i.e. mechanical or electrical.

Mechanical Practical Assessment

1. Identify faulty/worn components
2. Dimensional checks on components and checking flame paths with standards.
3. Checking surface finish.
4. Checking for wear/damage on internal threads.
5. Insert and complete a pull test on a heli-coil.
6. List appropriate reclamation procedures for faulty components based on the fault and equipment classification.
7. Identify nameplate information including : -
 - Classification of equipment
 - Standards the equipment complied with
8. Correct interpretation of drawings. (Not mandatory for operators [craftsmen])

Electrical Practical Assessment

9. Core test calculations on a given stator.
10. Winding dimensional checks and recording on a data sheet.
11. Interpret test results from three typical tests and identify areas of non-compliance.
12. Changing size or number of conductors to achieve the same CSA.

Assessments 1, 2, 3,4,7,8, are the minimum requirement for Overhaul only accreditation.

EXAMPLE COMPETENCE ASSESSMENT

Competence 01:

Syllabus Sections 2, 3, 4.

Description Identify Faulty / Worn Components

Time Allowed 20 Minutes

The test will be carried out on 3 nominated components (from a list of 10) each component will have a copy of the equipment nameplate and where appropriate it's mating part.

The delegate must correctly identify the part and any wear or damage on the component, and also, when the component is fully serviceable.

The Candidate should have available.

- Copy of IEC 60079-19 : 2006
- Copy of either /or the relevant parts of the apparatus standards, manufacturers specification or certification documents.
- Tools and measuring equipment as required.

NB. The delegate is allowed to ask questions for clarification ONLY.

COMPETANCE 01

IDENTIFY FAULTY/WORN COMPONENTS.

Trainee		Scheme No	
Assessor		Date	

ASSESSMENT SCHEDULE:

Note

Should the candidate act in an unsafe manner the assessor must stop the test immediately explaining the reasons to the candidate. Any candidate so stopped will automatically be deemed not to have achieved the required standard.

The following boxes should be ticked only when completed satisfactorily. To satisfy the requirements of this assessment, the candidate must achieve a satisfactory standard in all sections.

Component 1

Component correctly identified

Healthy / Damage identified and correctly described

Component 2

Component correctly identified

Healthy / Damage identified and correctly described

Component 3

Component correctly identified

Healthy / Damage identified and correctly described

All tests carried out safely and within specified time

Trainee signature	
Assessor signature	

FEEDBACK TO CANDIDATE IF NOT YET COMPETENT

UNDERPINNING KNOWLEDGE SPECIFICATION

The test consists of 25 Multi-Choice Questions and 5 Short Answer Questions to be completed in 90 Minutes.

Competency Criteria	Multi-Choice Questions		Short Answer Questions	
	%	No of questions	%	No of questions
Protection Principles and Techniques	32	8	40	2
Requirements of certification & IEC 60079-19: 2006	40	10	40	2
Good Practice and Quality	28	7	20	1

Requirements of Certification & IEC 60079-19: 2006 has 2 questions on certification and 8 on IEC 60079-19: 2006 Good practice and Quality has 2 questions on quality and 5 on good practice.

The Multi-choice section will carry 50% of the marks and the short answer section 50%. Multi-choice questions each carry 2 marks short answer questions 10 marks. All questions should be attempted.

The overall pass rate for this exam is 75% Operative
85% Responsible Person

SAMPLE QUESTIONS MULTI-CHOICE

Q1 A user has requested a repair facility to drill and tap the drive end shaft of a standard 112 frame Exd Motor with a M8 thread to a depth of 20mm. With reference to IEC 60079-19: 2006 which of the following is true: -

- a) IEC 6009 -19 : 2006 gives no restriction to this work
- b) IEC 6009-19 : 2006 requires the Ex certification plate to be removed
- c) IEC 6009-19 : 2006 requires this work to be done by a repair shop authorised by the manufacturer
- d) The craftsman/technician doing the job must be a time served engineer with a minimum of 5 years experience.

Q2 What is meant by the term 'Flashpoint'?

- a) Temperature at which ignition will occur
- b) Lowest liquid temperature at which, under certain standardised conditions, a liquid gives off vapours in quantity such as to be capable of forming an ignitable vapour/air mixture.
- c) Temperature that the insulation class of the machine must withstand for a minimum of 1000 hours.
- d) Temperature where the combination of the oxygen present and surface temperature will cause Auto-Ignition.

Q3 The main purpose of a core test on a damaged stator is to; -

- a) Cure the Insulation in the laminations
- b) Ensure a balanced magnetic field
- c) Check for 'Hot Spots' or core damage as a result of the rewind process
- d) Ensure the eddy currents are evenly distributed around the core.

Q4 Instruments or meters Out Of Calibration can be used during repair or final testing of an Ex motor if: -

- a) They are within 3 months of the due date for re-test
- b) They are within 6 months of the due date for re-test
- c) They are functionally tested before and after use
- d) They cannot be used.

Q5 State the minimum test voltage to complete an insulation resistance test on a 400v 3ph 50Hz Exe Motor.

- a) 250Vdc
- b) 500Vdc
- c) 1000Vdc
- d) 1500Vac

Q6 The gap present between flanges of an Exd machine is there to; -

- a) Relieve the explosion pressure
- b) Allow for normal engineering tolerances to facilitate easy disassembly and assembly.
- c) Allow for thermal expansion
- d) Facilitate alignment of the air gap between stator and rotor.

Q7 A copy winding is not permitted on which of the following machines, without verification of the protection concept requirements: -

- a) Ex d
- b) Ex e
- c) Ex p
- d) Ex n

SAMPLE QUESTIONS SHORT ANSWER.

Q1

An Exd 37kw 4 pole motor is sent for bearing replacement, state what documents would be completed during this work to comply with the requirements of IEC 60079-19 : 2006

Also what marking if any would be required along with any reports to be sent to the user on completion?

Q2

A 1.1kw Exe motor requires a rewind, the manufacturer has ceased trading and no documentation is available. You establish that the motor is being used in a non-hazardous area. The mounting of the motor is very special making a replacement time consuming difficult and costly. State if the repair can be carried out or not.

If not, why not?

If yes why and, what precautions need to be taken to protect the repairer and user?