Electrical Engineering
Unit - EE06 Fault Diagnosis on Electrical Systems

This training specification has been developed from the utilities engineering technician standard. This training specification details the required skills, knowledge and behaviours to establish competence in the use of fault diagnosis on electrical systems to evaluate and analyse circuit conditions and make recommendations for repair / restoration.

The specification details the critical requirements of the activity to establish competence and does not preclude employers from adding to the skills and knowledge detailed by the specification in their own training programmes.

All work must be carried out to approved procedures and practices and in accordance with statutory health, safety and environmental requirements.

What does specification look like?
Electrical engineers need to be able to:
DFF1 Use a range of diagnostic fault finding techniques and equipment to evaluate and analyse circuit fault conditions and make recommendations for the repair / restoration of electrical systems in accordance with company procedures
DFF2 Demonstrate a safety conscious approach to the control of hazards associated with the activity whilst organising work activities and communicating effectively with other team members to complete tasks
DFF3 Take responsibility for the range of equipment and diagnostic techniques used in the analysis of fault conditions and making judgments and recommendations for the repair / restoration of electrical systems

Assessment of this module may be carried out by the direct observation of performance on-site but will normally require the candidate to produce a portfolio of evidence, gathered over a period of time from a range of organised work activities in line with company procedures and processes.

What do I need to take this module?
Candidates to be assessed as competent in this skill area should have completed the modules shown below or have evidence demonstrating an equivalent level of competence:
1. Module EE01 Inspection and Testing of Electrical Systems- to establish competence to carry out the electrical testing of systems using a range of electrical test instruments
2. Module EE02 Safe Isolation of Electrical Equipment - to establish competence to carry out the safe isolation of electrical equipment used in the utilities industry
Performance Criteria

To achieve this unit, you will need to be able to:

General Requirements

P1. Identify the equipment / system to be worked on using available information in accordance with company procedures

P2. Select and wear the correct PPE required to carry out the activity

P3. Carry out a site specific risk assessment of the work area, identifying the hazards and implementing the control measures required

P4. Maintain accurate and up to date records

P5. Interpret and report technical information in line with company procedures

Task Specific – Fault Diagnosis on Electrical Systems

P6. Plan the diagnostic work to be undertaken taking into account relevant factors e.g. equipment location, resources required, sequence of tasks, fault conditions, company policies and procedures, IET regulations

P7. Carry out a pre use inspection of the tools and equipment to be used, checking condition and service information

P8. Inform all affected parties of the work to be undertaken in line with company procedures

P9. Confirm the safe isolation of equipment / systems from all potential sources of danger in accordance with company procedures e.g. electrical, mechanical, gas, air pressure and fluids

P10. Carry out ALL of the following diagnostic techniques, using appropriate tools and equipment, in line with company procedures, methods and safety rules:
   a) Visual inspection of plant / equipment e.g. breakage, wear, deterioration, thermal damage and missing components
   b) Physical operation of plant / equipment e.g. manual operation, switching off and on and RCD test buttons
   c) Diagnostic measurement e.g. voltage, current, continuity, power, temperature and luminescence

P11. Carry out fault diagnostic techniques, using appropriate tools and equipment, in line with company procedures, methods and safety rules on a MINIMUM of SIX of the following:
   a) Single-phase power circuits
   b) Three-phase power circuits
   c) Direct current power circuits
   d) Switchgear and distribution panels
   e) Motors and starter
f) Control systems and components
g) Electrical plant
h) Lighting circuits

P12. Carry out diagnostic testing techniques using ALL of the following types of equipment:
   a) Multi-meter
   b) Watt meter
c) Voltmeter
d) Ammeter
e) Earth-loop impedance tester
   f) Insulation resistance tester
g) RCD tester
   h) Phase rotation meter

P13. Carry out testing procedures and draw conclusions from the analysis of results
P14. Make recommendations for the repair / restoration of plant / equipment based on the findings of diagnostic procedures
P15. Deal with problems encountered safely and efficiently, referring matters which cannot be rectified to the appropriate person, where required
P16. Report / record the findings of the diagnostic work carried out in accordance with company procedures
P17. Store tools and equipment safely and leave the work area in a safe condition in accordance with company procedures

Knowledge and Understanding

To achieve this unit, you will need to know and understand:

General Requirements

K1. The principles of Health, Safety and Environmental legislation in relation to work on or near electrical systems and equipment
K2. The company’s safety rules, policies, procedures and authorisation processes relating to work on or near electrical systems
K3. The company’s isolation and locking-off procedure/s relating to work on electrical systems
K4. The company’s safety document procedures that apply to work on electrical equipment and systems
K5. How to carry out a site specific risk assessment and identify workplace hazards
K6. The hazards associated with work on or near electrical systems and equipment and how to deal with them
K7. How to select, inspect and use PPE for work on or near electrical power systems
K8. The dangers of electricity and how an electric shock can be received
K9. How to respond in the event of an emergency situation in the workplace environment including electric shock
K10. How to update, report and record information in accordance with company procedures
K11. How to leave the work area in a safe and secure condition. e.g. security systems, locking and labelling procedures

Task Specific – Fault Diagnosis on Electrical Systems

K12. The range of methods used for the diagnosis of faults on electrical systems and equipment
K13. How to effectively plan diagnostic testing procedures to identify faults on power system plant and equipment
K14. The symptoms and causes of common faults on electrical power system plant and equipment
K15. How to calibrate and use electrical test instruments for the diagnosis of faults
K16. How to carry out fault diagnosis activities using a range of test equipment in accordance with company procedures
K17. How to analyse the results of diagnostic testing procedures and draw conclusions based on results
How will it be assessed?
To achieve this unit, you will need to be able to provide evidence of the performance criteria and the knowledge and understanding requirements listed above.
Assessment types:
1. External assessment – an external accrediting body will assess against a national minimum standard
2. Internal assessment process – a company led on-going assessment against requirements
3. End-point assessment - see assessment plan for further details here (will be EU Skills defined)

What type of evidence will be expected?
To achieve this unit, you will need to be able to provide evidence of the performance criteria and the knowledge and understanding requirements listed above.
Evidence types:
1. Ongoing local assessments
   a) Assessment plan, review, feedback, standard assessment sheets
2. Knowledge based learning
   a) Classroom, exams, assignments, Q&A sessions, e-learning modules
3. Evidence portfolios
   a) Learning logs, photos, observation sheets

Assessment types and process