National Unit Specification: general information

UNIT Electrical Plant Safety and Maintenance (SCQF level 5)

CODE F5HH 11

SUMMARY

This Unit has been designed to introduce candidates to electrical plant safety, maintenance requirements and precautions that should be taken when working on electrical plant and equipment. Candidates will also study the various factors involved in the maintenance of electrical equipment as well as the relative benefits of various maintenance methods and regimes. In addition, they will perform routine maintenance and fault diagnosis on an item of electrical equipment. This Unit is suitable for those candidates who wish to learn about basic electrical plant safety and maintenance. Such candidates may be currently employed or seeking employment as electrical, mechanical or marine craft persons or technicians.

This Unit may form part of a National Qualification Group Award or may be offered on a free-standing basis

OUTCOMES

1 Describe the safety and operational measures to be taken when working on electrical plant and equipment.
2 Describe the factors to determine the maintenance requirement of electrical plant.
3 Describe maintenance methods and the factors used in determining their selection for electrical plant and equipment.
4 Perform basic routine maintenance and fault diagnosis on an item of electrical equipment.

Administrative Information

Superclass: XK

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Version: 01

National Unit Specification: general information (cont)

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RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following, or equivalent:

- Standard Grade Physics — General level
- Standard Grade Technological Studies — General level

CREDIT VALUE

1 credit at SCQF level 5 (6 SCQF credit points at SCQF level 5*).

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

CORE SKILLS

There is no automatic certification of Core Skills in this Unit.

This Unit provides opportunities for candidates to develop aspects of the following Core Skills:

- Problem Solving (SCQF level 5)
- Information Technology (SCQF level 5)
- Working with Others (SCQF level 5)

These opportunities are highlighted in the Support Notes of this Unit Specification.

National Unit Specification: statement of standards

UNIT Electrical Plant Safety and Maintenance (SCQF level 5)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME 1

Describe the safety and operational measures to be taken when working on electrical plant and equipment.

Performance Criteria

(a) Describe clearly the dangers of electricity and the causes of electrical accidents when working on electrical equipment.
(b) Describe correctly the safety and operational precautions that need to be taken to minimise the danger of accidents and plant damage when working on electrical plant and equipment.
(c) Identify correctly the regulations and codes of practice relevant to the safe operation and maintenance of electrical plant and equipment.
(d) Identify correctly the steps involved in a safe isolation of electrical plant and equipment.

OUTCOME 2

Describe the factors to determine the maintenance requirement of electrical plant.

Performance Criteria

(a) Identify correctly types of electrical and mechanical faults that can occur on rotating electrical plant, transformers and switchgear.
(b) Describe clearly the factors that determine the maintenance requirements of an item of electrical plant.
(c) State clearly the information and documentation required for the maintenance of rotating electrical plant, transformers and switchgear.

OUTCOME 3

Describe maintenance methods and the factors used in determining their selection for electrical plant and equipment.

Performance Criteria

(a) Describe clearly Planned Preventative, Reliability Centred and Condition Based maintenance methods.
(b) Identify correctly the relative benefits of Planned Preventative, Reliability Centred and Condition Based maintenance methods.
(c) Describe clearly the factors involved in selecting a maintenance method for a given electrical plant system.

National Unit Specification: statement of standards (cont)

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OUTCOME 4

Perform basic routine maintenance and fault diagnosis on an item of electrical equipment.

Performance Criteria

(a) Perform safely and correctly routine maintenance operations in accordance with appropriate instructions.
(b) Identify correctly electrical and mechanical faults associated with the item of electrical plant.
(c) Complete correctly given maintenance documentation.

EVIDENCE REQUIREMENTS FOR THIS UNIT

Evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

Outcomes 1, 2 and 3:

Written and/or recorded oral evidence is required which demonstrates that the candidate has achieved Outcomes 1, 2 and 3 to the standards specified in the Outcomes and Performance Criteria. This evidence should be obtained under controlled, supervised conditions.

Outcomes 1, 2 and 3 may be assessed on an individual basis or as a combination of Outcomes (eg Outcome 1 and 2 together and Outcome 3 separately) or as a single assessment covering all three Outcomes. The assessment for Outcomes 1, 2 and 3 should be no longer than 60 minutes and conducted under closed-book conditions.

Outcome 4:

Performance evidence supplemented with an assessor observation checklist, and written and/or recorded oral evidence is required which demonstrates that the candidate has achieved Outcome 4 to the standards specified in the Outcome and Performance Criteria. This evidence should be obtained under supervised conditions. The assessment of Outcome 4 should take no longer than 60 minutes to complete. The practical assessment exercise for Outcome 4 should be undertaken by candidates individually and conducted over the duration of Outcome 4 delivery.

With regard to Outcome 1:

- candidates to state three dangers of electricity and three causes of electrical accidents
- candidates to describe four safety and operational precautions
- candidates to identify three Regulations/Codes of Practice

With regard to Outcome 2:

- candidates to identify one type of electrical fault and one type of mechanical fault for each of the following types of plant ie rotating electrical plant, transformers, switchgear
- candidates to describe three factors for one of the following items ie rotating electrical plant, transformers, switchgear

National Unit Specification: statement of standards (cont)

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With regard to Outcome 3:

- candidates to state three benefits for each of the maintenance methods ie Planned Preventative, Reliability Centred and Condition Based
- candidates to describe three factors in selecting a maintenance method

With regard to Outcome 4:

- candidates to identify two faults the chosen item of electrical plant

National Unit Specification: support notes

UNIT Electrical Plant Safety and Maintenance (SCQF level 5)

This part of the Unit Specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

This is a restricted core Unit within the National Certificate in Electrical Engineering at SCQF level 5. This Unit can also be delivered on a free-standing basis.

Successful completion of this Unit enhances the employability skills for candidates to gain employment in the marine, power utility sector or an industrial employer with electrical plant systems.

This Unit provides the opportunity for candidates to develop their knowledge of electrical plant safety and maintenance to prepare for an industry position or to progress to a National Certificate in Electrical Engineering at SQCF level 6 and the Unit *Electrical Plant Maintenance* at SCQF level 6.

For candidates with little or no experience of the use of electrical instruments, it is recommended that this Unit is delivered in conjunction with the Unit: *Electrical Testing and Measurement* at SCQF level 5.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

An organised visit to an industrial complex with electrical plant systems accompanied by an electrically competent person would be beneficial to the candidates in achieving the above Outcomes of this Unit. Visual and physical examination of component parts of ac motors, dc motors, power transformers, diesel generators and switchgear is recommended. Industrial maintenance methods in use are needed to emphasise the operational and maintenance factors that influence the selection of the type of maintenance methods and procedures. It is recommended that candidates can conduct internet searches into propriety software packages that illustrate Planned Preventative Maintenance, Reliability Centred Maintenance and Condition Based Maintenance to enable candidates to learn the relative benefits of each type of maintenance approach. Candidates should be instructed in relevant health and safety techniques including manual handling and electrical safety.

It is recommended that candidates conduct internet searches of websites that highlight the causes and nature and prevention of electrical accidents.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

Skills in critical thinking, planning and organising, will be naturally developed as candidates apply knowledge and skills to complete a practical task. As they undertake routine maintenance operations, identifying and reporting on electrical and mechanical faults, candidates have to consider and take account of all factors affecting safety and efficiency. Formative work can provide an environment in which to discuss and evaluate possible approaches suggested.

Access to and opportunities to evaluate and compare technical information sites on the Internet would provide increased knowledge and understanding of current industry requirements, as well as enhance skills in using ICT.

Access to and evaluation of a range of complex technical information, including maintenance documentation would develop underpinning knowledge and critical reading skills. Examples of industrial maintenance reports could be provided to indicate acceptable formats, structure and terminology in written communication.

Candidates will also develop skills in *Working with Others*. Practical work provides an environment in which to discuss and practise team working, and to review and evaluate the process with assessor guidance.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by information and communications technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005).*

Outcomes 1, 2 and 3:

Outcome 1, 2 and 3 require written and/or oral evidence and can be individually set or combined in the form of a short answer, multiple choice or on-line assessment to give the candidate an opportunity to display knowledge of electrical plant safety and maintenance.

Outcome 4:

Outcome 4 requires performance, written and/or recorded oral evidence and should in the form of a practical exercise to demonstrate the routine maintenance and fault identification of an item of electrical plant. Candidates should complete the given maintenance documentation.

Work-place evidence, verified by certificated assessors, may be considered as being valid for the assessment of Outcomes 4.

National Unit Specification: support notes (cont)

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DISABLED CANDIDATES AND/OR THOSE WITH ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**