



National Unit Specification: general information

UNIT Electrical Plant Maintenance (SCQF level 6)

CODE F5HG 12

SUMMARY

This Unit has been designed to introduce candidates to electrical plant maintenance and provide opportunities to develop their knowledge and understanding of the regulations, safety procedures and systems of work used in electrical plant maintenance. Candidates will learn how to perform a risk assessment on an item of electrical equipment to be maintained. They will study the benefits, limitations and relative costs of various maintenance methods. Candidates will be provided with the opportunities to demonstrate their ability to undertake safe maintenance procedures on electrical equipment.

This Unit may be suitable for candidates who may be 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 Identify the regulations and explain the safety procedures and systems of work used when carrying out electrical plant maintenance.
- 2 Carry out a risk assessment on electrical plant in preparation for a given maintenance task.
- 3 Explain the benefits, limitations and relative costs of electrical plant maintenance methods.
- 4 Carry out maintenance procedures on an electrical plant system.

Administrative Information

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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 — Credit level
- ◆ Standard Grade Technological Studies — Credit level
- ◆ NQ Unit *Electrical Plant Safety and Maintenance* (SCQF level 5)

CREDIT VALUE

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

**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.

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

- ◆ Problem Solving (SCQF level 6)
- ◆ Working with Others (SCQF level 6)
- ◆ Communication (SCQF level 6)

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

National Unit Specification: statement of standards

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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

Identify the regulations and explain the safety procedures and systems of work used when carrying out electrical plant maintenance.

Performance Criteria

- (a) Explain correctly the obligations on employers, employees and self employed relevant to the safe operation and maintenance of electrical plant and equipment.
- (b) Identify correctly the requirements of statutory and non-statutory regulations applying to electrical plant maintenance work.
- (c) Explain correctly safe isolation procedures for electrical plant.
- (d) Explain accurately a Permit to Work system and its relevant documentation for an electrical plant maintenance exercise.

OUTCOME 2

Carry out a risk assessment on electrical plant in preparation for a given maintenance task.

Performance Criteria

- (a) Identify correctly hazards associated with the maintenance of electrical plant.
- (b) Identify and assess accurately the risks associated with the identified hazards.
- (c) State correctly the control measures required to minimise the identified risks.
- (d) Complete accurately risk assessment documentation for the given maintenance task.

OUTCOME 3

Explain the benefits, limitations and relative costs of electrical plant maintenance methods.

Performance Criteria

- (a) Describe clearly Corrective, Planned Preventative, Reliability Centred and Condition Based maintenance methods used on electrical plant systems.
- (b) Explain correctly the benefits and limitations of Corrective, Planned Preventative, Reliability Centred and Condition Based maintenance methods used on electrical plant systems.
- (c) Explain clearly the relative costs of Corrective, Planned Preventative, Reliability Centred and Condition Based maintenance methods used on electrical plant systems.

National Unit Specification: statement of standards (cont)

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OUTCOME 4

Carry out maintenance procedures on an electrical plant system.

Performance Criteria

- (a) Carry out correctly a safe isolation procedure on given electrical plant.
- (b) Complete correctly permit to work documentation for the isolated electrical plant.
- (c) Carry out correctly maintenance operations on the isolated electrical plant in accordance with appropriate instructions.
- (d) Complete fully and correctly maintenance documentation for the given electrical plant.

EVIDENCE REQUIREMENTS FOR THIS UNIT

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

Outcomes 1 and 3:

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

Outcomes 1 and 3 may be assessed on an individual basis or as a single assessment covering both Outcomes. The assessment for Outcomes 1 and 3 should be no longer than 60 minutes and conducted under closed-book conditions.

Outcomes 2 and 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 Outcomes 2 and 4 to the standards specified in the Outcome and Performance Criteria. This evidence should be obtained under supervised conditions.

Outcomes 2 and 4 may be assessed on an individual basis or as a single assessment covering both Outcomes. The assessment for Outcome 2 should be no longer than 30 minutes and conducted under closed-book conditions.

The practical assessment exercise for Outcome 4 should be undertaken by candidates individually and be conducted over the duration of Outcome 4 delivery.

With regard to Outcome 1:

- ◆ two obligations for each of employers, employees and self employed to be identified
- ◆ three requirements from statutory regulations which must include two from the Electricity at Work Act (1989), and two requirements from non-statutory regulations

With regard to Outcome 2:

- ◆ four hazards to be identified
- ◆ the assessment of risk level should be clearly stated (eg High, Medium Low)

National Unit Specification: statement of standards (cont)

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With regard to Outcome 3:

- ◆ three benefits and three limitations for each of the maintenance methods, Corrective, Planned Preventative, Reliability Centred and Condition Based to be explained correctly

The Assessment Support Pack for this Unit provides sample assessment material. Centres wishing to develop their own assessments should refer to the Assessment Support Pack to ensure a comparable standard.

National Unit Specification: support notes

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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 Qualification Group Award in Electrical Engineering at SCQF level 6 but may also be offered as a free-standing Unit.

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 and practical experience of electrical plant maintenance to prepare for an industry position.

This Unit is particularly suitable for candidates who have completed the Unit *Electrical Plant Safety and Maintenance* (SCQF level 5).

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

An organised visit to an industrial complex with the electrical plant systems accompanied by an electrically competent person would be beneficial to the candidates in achieving the Outcomes of this Unit. Visual and physical examination of component parts of rotating electrical plant, power transformers, and switchgear is recommended.

This Unit should be delivered in a practical electrical environment by a combination of lectures, demonstrations and practical exercises.

It is recommended that candidates conduct internet searches into proprietary software packages that illustrate the benefits, limitations and relative costs of Corrective Maintenance, Planned Preventative Maintenance, Reliability Centred Maintenance and Condition Based Maintenance.

The practical exercise of Outcome 4 requires the safe isolation of electrical plant and requires close personal supervision by an electrically competent person in a workshop/laboratory setting. The safe isolation and permit to work documentation should be checked and verified by the tutor prior to the maintenance work being carried out by the candidate. Maintenance can be carried out on ac motors, dc motors, diesel generators, power transformers or switchgear.

National Unit Specification: support notes (cont)

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OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

Problem Solving skills, that is, critical thinking, planning, organising, reviewing and evaluating, will be developed and enhanced as candidates undertake maintenance operations. Consideration of a complex range of factors, including relevant legislation and regulations, is an essential aspect of risk assessment. Analysing the benefits, limitations and costs of a range of potential approaches and methods, candidates will make decisions which assure safe, efficient practice. Practical work can provide an environment in which to discuss, review and evaluate the process, enhancing skills in co-operative communication. Candidates could be encouraged to negotiate and agree the nature and scope of team goals, roles and responsibilities in electrical plant maintenance. They could be asked to demonstrate and explain methodology selected and to review and evaluate their own abilities in working with others in a workshop environment.

Access to and evaluation of a range of complex technical information, including permit and health and safety requirements, 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.

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)*.

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

Outcome 2 requires performance, written and/or recorded oral evidence and should take the form of a practical exercise to demonstrate risk assessment procedures and documentation. The electrical plant can be ac motors, dc motors, diesel generators, power transformers or switchgear as part of a larger system.

Outcome 4 requires performance, written and/or recorded oral evidence and should in the form of a practical exercise to demonstrate the safe isolation, safety documentation and the maintenance procedure of electrical plant which can be ac motors, dc motors, diesel generators, power transformers or switchgear as part of a larger system.

It is recommended that the assessment of Outcomes 2 and 4 be combined in a single assessment exercise.

National Unit Specification: support notes (cont)

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Work-place evidence, verified by certificated assessors, may be considered as being valid for the assessment of Outcomes 2 and 4.

CANDIDATES WITH DISABILITIES AND/OR ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (www.sqa.org.uk).