



## National Unit Specification: general information

**UNIT** Plant Maintenance Practice (SCQF level 5)

**CODE** F5J3 11

### SUMMARY

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

This largely practical Unit is designed to provide candidates with a basic knowledge, understanding and skills in mechanical plant maintenance. During delivery of the Unit candidates will be introduced to different types of maintenance strategies and documentation. They will learn to carry out the necessary tasks prior to undertaking maintenance on items of equipment removed from an engineering system. Candidates will carry out given maintenance tasks on items of equipment. On completion of maintenance tasks and reassembly of equipment candidates will perform basic functional checks on the equipment and complete relevant maintenance documentation. Candidates will learn to apply safe working procedures and practices throughout the delivery of the Unit.

This Unit is suitable for candidates training to be mechanical, maintenance or multi-disciplinary engineering crafts persons.

### OUTCOMES

- 1 Outline different types of maintenance strategies and documentation.
- 2 Carry out necessary preparations prior to undertaking maintenance on an item of equipment removed from an engineering system.
- 3 Carry out given maintenance tasks on an item of equipment removed from an engineering system.
- 4 Test and report on the completed maintenance of the reassembled item of equipment.

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#### Administrative Information

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## **National Unit Specification: general information (cont)**

**UNIT**        Plant Maintenance Practice (SCQF level 5)

### **RECOMMENDED ENTRY**

While entry is at the discretion of the centre some knowledge and experience of working in a practical engineering environment would be an advantage.

### **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.

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

- ◆ Communication                    (SCQF level 5)
- ◆ Problem Solving                    (SCQF level 5)
- ◆ Working with Others                (SCQF level 4)

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

## **National Unit Specification: statement of standards**

### **UNIT      Plant Maintenance Practice (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**

Outline different types of maintenance strategies and documentation.

##### **Performance Criteria**

- (a) State correctly different types of maintenance strategies.
- (b) Describe correctly the principles behind one type of maintenance strategy.
- (c) State correctly typical documentation which may be used in maintenance tasks.

#### **OUTCOME 2**

Carry out necessary preparations prior to undertaking maintenance on an item of equipment removed from an engineering system.

##### **Performance Criteria**

- (a) Identify correctly the component parts of a given item of equipment.
- (b) Complete correctly a Risk Assessment in connection with maintenance on the given item of equipment.
- (c) Participate effectively in a work team meeting prior to starting maintenance tasks.

#### **OUTCOME 3**

Carry out given maintenance tasks on an item of equipment removed from an engineering system.

##### **Performance Criteria**

- (a) Select and use correctly tools appropriate to systematic dismantling, repair and re-assembly of a given item of equipment in accordance with the manufacturer's manual/procedures and Risk Assessment.
- (b) Demonstrate correctly an ability to follow instructions in manufacturer's manual/procedures while performing maintenance tasks.
- (c) Dismantle correctly an item of equipment using correct techniques to remove an unserviceable component.
- (d) Carry out a visual inspection of component parts and replace and report any faulty components
- (e) Reassemble correctly the item of equipment.
- (f) Comply fully with safety procedures and practices, good housekeeping and appropriate tool/equipment storage while undertaking all maintenance tasks.

## **National Unit Specification: statement of standards (cont)**

### **UNIT Plant Maintenance Practice (SCQF level 5)**

#### **OUTCOME 4**

Test and report on the completed maintenance of the reassembled item of equipment.

#### **Performance Criteria**

- (a) Carry out correctly simple functional tests on a given item of equipment.
- (b) Complete correctly maintenance documentation.

#### **EVIDENCE REQUIREMENTS FOR THIS UNIT**

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

Written and/or recorded oral and performance evidence supplemented with an assessor observation checklist should be produced to demonstrate that a candidate has achieved all Outcomes and Performance Criteria.

Outcomes 1, 2, 3 and 4 may be assessed on an individual basis, or as a combination of Outcomes (eg Outcome 1 on its own and Outcomes 2, 3 and 4 together) or as a single, holistic assessment. Which ever approach is taken, assessment of the Outcomes must take place at suitable points in the delivery of the Unit. Assessment of Outcome 1 must last no more than 30 minutes and must be conducted under supervised, closed-book conditions in which candidates are not allowed to bring their own notes, handouts, textbooks or other materials into the assessment. Assessment of Outcomes 2, 3 and 4 must be conducted under supervised, open-book conditions.

With regard to Outcome 1

- ◆ candidates must state three different types of maintenance strategies from the following: planned preventative, breakdown, schedule, periodic, condition monitoring or any suitable other
- ◆ candidates must state three typical maintenance documents from the following: facilities and asset list, job lists, job cards, history records, Risk Assessment, Permit to Work or Permit to Test or any suitable other

With regard to Outcome 2

- ◆ candidates must identify six component parts of an item of equipment
- ◆ as part of the Risk Assessment candidates must identify three hazards associated with the maintenance tasks, estimate the level of risk associated with each hazard and identify steps to minimise the risk(s) associated with each hazard.

With regard to Outcome 3

- ◆ candidates must use an appropriate marking procedure (eg witness marking) when dismantling and reassembling an item of equipment
- ◆ an unserviceable part should be regarded as one that is broken or corroded
- ◆ the item of equipment must contain at least one faulty component

## **National Unit Specification: statement of standards (cont)**

### **UNIT**      Plant Maintenance Practice (SCQF level 5)

With regard to Outcome 4

- ◆ candidates must complete appropriate maintenance documentation such as a report form or job card either on paper or electronically

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**

### **UNIT        Plant Maintenance Practice (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 Unit forms part of the National Qualification Group Award in Maintenance Engineering at SCQF level 5, but may also be offered on a free standing basis.

The aim of this Unit is to provide candidates with a basic knowledge, understanding and skills in mechanical plant maintenance. On successful completion of the Unit candidates will be able to identify different types of maintenance strategies and documentation. They will also have learnt to carry out the necessary tasks prior to undertaking maintenance on equipment removed from an engineering system. Candidates will be capable of carrying out given maintenance tasks on items of equipment. They will also be able, on completion of the maintenance tasks and reassembly of the equipment, to perform basic functional checks on the equipment and complete relevant maintenance documentation. During delivery of the Unit candidates will have learnt to apply safe working procedures and practices, good housekeeping and appropriate tool/equipment storage.

The delivery of this Unit involves mainly practical exercises on items of equipment removed from an engineering system. The equipment used and fault(s) on equipment should represent those normally encountered by candidates studying at SCQF level 5. Suggested equipment may include the following (this list is not intended to be exhaustive):

- ◆ fan
- ◆ hoist
- ◆ motor
- ◆ pump
- ◆ valve
- ◆ spark ignition engine
- ◆ compression ignition engine

In Outcome 1 candidates should learn briefly about different types of maintenance strategies (eg planned preventative, breakdown, schedule, periodic, condition monitoring) and the principles behind a commonly used maintenance strategy. They should also learn about common types of documentation used in mechanical maintenance such as facilities and asset lists, job lists, job cards, history records, Risk Assessment, Permit to Work or Permit to Test or any suitable other. It is recommended that lecturers briefly explain the purpose of each of these documents.

In Outcome 2 candidates should be taught about the preparations required prior to undertaking maintenance tasks. These should include identifying the main component parts of items of equipment they will be performing maintenance on, learning about and completing a Risk Assessment as applied to maintenance on an item of equipment and participating in on-site work team meetings prior to undertaking maintenance tasks.

## **National Unit Specification: support notes (cont)**

## **UNIT      Plant Maintenance Practice (SCQF level 5)**

Risk Assessments should be produced by taking account of manufacturers' instructions, the working environment and relevant safety standards.

Outcome 3 involves candidates in practical activities in which they should be encouraged to develop the knowledge and skills to dismantle, repair and reassemble items of equipment. Candidates should learn to dismantle equipment using manufacturer's instructions. During the course of dismantling equipment candidates should use, where necessary, aids such as penetrating fluids, heat or special tools to remove unserviceable components. Once equipment is dismantled candidates should replace and report any defective component(s) and reassemble the equipment correctly using manufacturer's instructions. During delivery of the Outcome candidates should learn to select, use and store tools correctly and apply safe working procedures and practices at all times.

In Outcome 4 candidates should be taught to carry out simple functional checks on reassembled items of equipment after maintenance has been performed. They should also be taught to complete simple maintenance documentation such as report forms or job cards on paper or electronically.

Ideally each candidate should have the opportunity to work on plant systems on their own. However, from a practical point of view this may not always be possible and candidates may need to work in groups. However, where group work takes place centres should check that candidates are generating sufficient evidence on their own to meet the Outcome and Performance Criteria. Group working has the added advantage of enhancing the co-operative working skills of the candidates.

### **GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT**

It is recommended that the Unit is delivered in the same sequence the Outcomes are presented in the National Unit Specification: statement of standards section of the Unit. Delivery of Unit content should be principally by lecturer demonstration followed by candidates practising the skills demonstrated although classroom/workshop teaching may be used for subjects such as outlining different maintenance strategies and documentation and the necessary preparations prior to performing maintenance tasks. Prior to performing maintenance on equipment candidates should meet in groups to discuss issues relevant to the maintenance tasks. Such issues may include (the list is not intended to be exhaustive):

- ◆ clarifying manufacturer's instructions on dismantling and reassembling items of equipment
- ◆ agreeing the range of tools that should be used during the dismantling, repair and reassembly of items of equipment
- ◆ discussing how to overcome any problems which they may encounter while dismantling, repairing and reassembling an item of equipment
- ◆ identifying faults that may occur in items of equipment
- ◆ deciding which functional checks should be performed on the reassembled items of equipment

Centres should ensure that there are sufficient items of equipment available for each candidate to carry out the dismantling, repair and reassembly of items of equipment.

Centres may choose to store manufacturers' instructions, diagrams and maintenance documents in paper or electronic format. Where the latter is used centres should ensure that candidates have access to computers in the workshop so that they can source such instructions, diagrams and documents easily.

## **National Unit Specification: support notes (cont)**

**UNIT**      Plant Maintenance Practice (SCQF level 5)

### **OPPORTUNITIES FOR CORE SKILL DEVELOPMENT**

The Oral Communication Core Skill component at SCQF level 5 may be developed in Outcome 2 while candidates engage in work team meetings.

The Critical Thinking Core Skill component at SCQF level 5 may be developed in Outcome 3 while candidates are dismantling, repairing and reassembling items of equipment.

The Working with Others Core Skill at SCQF level 4 may be developed in Outcomes 2, 3 and 4 while candidates engage in team meetings and practical work as they have to interact with their lecturers, support staff and other candidates, for example while sharing engineering workshop areas, tools and equipment.

### **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 Communication 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)*.

Centres are encouraged to use formative assessment extensively as it plays a particularly important role in allowing candidates to develop a sound knowledge, understanding and skills in outlining maintenance strategies and documentation, carry out preparations prior to undertaking maintenance tasks, dismantling, repairing and reassembling equipment and testing the functionality of equipment and reporting on completed maintenance.

Outcome 1 may be assessed by an assessment paper comprising of a suitable balance of short answer and restricted questions, or objective questions (eg multi-choice questions) or a combination of both. This assessment may be suitable for on-line delivery.

Outcomes 2, 3 and 4 may be assessed by an assignment involving suitable preparations prior to undertaking maintenance on an item of equipment, the dismantling, repair and reassembly of the equipment, functional testing on the reassembled equipment and the completion of maintenance records. A suitable checklist(s) should be developed to record evidence of candidate achievement in the Outcomes and Performance Criteria.

### **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](http://www.sqa.org.uk/assessmentarrangements)