



## National Unit Specification: general information

**UNIT** Plant Installation (SCQF level 6)

**CODE** F5J8 12

### 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 knowledge, understanding and skills in mechanical plant installation. During delivery of the Unit candidates will learn to produce plant installation drawings. They will also develop the knowledge and understanding to prepare Method Statements and Risk Assessments for plant installation processes. Candidates will develop the knowledge and skills to install, level, align and secure mechanical plant and commission plant after installation.

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

### OUTCOMES

- 1 Produce a drawing for a given plant installation.
- 2 Produce a Method Statement and Risk Assessment for a given plant installation.
- 3 Install a given item of mechanical plant.
- 4 Level, align and secure a given item of plant.
- 5 Commission a given item of plant after installation.

---

#### Administrative Information

**Superclass:** VG

**Publication date:** March 2009

**Source:** Scottish Qualifications Authority

**Version:** 01

© Scottish Qualifications Authority 2008

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit Specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre, telephone 0845 279 1000.

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

**UNIT**      Plant Installation (SCQF level 6)

### **RECOMMENDED ENTRY**

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

- ◆ Plant Installation (SCQF level 5)
- ◆ Appropriate industrial experience in the field of plant installation

It is also recommended that candidates have knowledge and skills in lifting and handling objects before starting this Unit

### **CREDIT VALUE**

1 credit(s) 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:

- ◆ Communication                      (SCQF level 6)
- ◆ Numeracy                              (SCQF level 6)
- ◆ Problem Solving                      (SCQF level 6)
- ◆ 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      Plant Installation (SCQF level 6)**

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**

Produce a drawing for a given plant installation.

##### **Performance Criteria**

- (a) Extract information accurately from current legislation and manufacturers' specifications relating to foundations, positioning of plant, mountings and access routes.
- (b) Produce correctly a plant installation drawing to current engineering drawings Standards.
- (c) Identify correctly services requirements on plant installation drawing.
- (d) Identify correctly the specific safety regulations relating to the intended installation tasks.

#### **OUTCOME 2**

Produce a Method Statement and Risk Assessment for a given plant installation.

##### **Performance Criteria**

- (a) Produce correctly a Method Statement for a given installation process in accordance with an installation drawing and identified safety regulations relating to the intended installation.
- (b) Produce correctly a Risk Assessment for a given installation process in accordance with a method statement and identified safety regulations relating to the intended installation.

#### **OUTCOME 3**

Install a given item of mechanical plant.

##### **Performance Criteria**

- (a) Generate correctly a Permit to Work using a recognised permit procedure.
- (b) Select and use correctly tools appropriate to systematic installation of a given item of plant in accordance with manufacturers' manuals.
- (c) Manoeuvre and position heavy loads correctly in accordance with Permit to Work, installation drawing, method statement, Risk Assessment and relevant safety legislation.
- (d) Identify and connect correctly supply services at installation site.
- (e) Communicate instructions accurately to team members.
- (f) Cooperate effectively with others while undertaking plant installation tasks.

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

### **UNIT        Plant Installation (SCQF level 6)**

#### **OUTCOME 4**

Level, align and secure a given item of plant.

#### **Performance Criteria**

- (a) Select and use correctly appropriate equipment to level, align and secure a given item of plant to given specification.
- (b) Apply correctly safety regulations, safe working practices and procedures while levelling, aligning and securing a given item of plant.

#### **OUTCOME 5**

Commission a given item of plant after installation.

- (a) Test and monitor given plant in accordance with requirements set out in the method statement and Risk Assessment.
- (b) Set correctly plant parameters to ensure optimum operating plant performance.
- (c) Close out correctly a Permit to Work document.
- (d) Complete correctly test documentation for the given item of plant.
- (e) Apply correctly safety regulations, safe working practices and procedures while undertaking plant commissioning.

### **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, 4 and 5 may be assessed on an individual basis, or as a combination of Outcomes (eg Outcomes 1 and 2 together and Outcomes 3, 4 and 5 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 Outcomes 1, 2, 3, 4 and 5 must be conducted under supervised, open-book conditions.

With regard to Outcome 1

- ◆ for a given plant installation candidates must extract a minimum of two pieces of information for each of the following: foundations, positioning of plant, mountings and access routes

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

### UNIT Plant Installation (SCQF level 6)

With regard to Outcome 2

- ◆ the Method Statement must include each operational stage in the plant installation process with associated tooling and equipment requirements to ensure satisfactory installation, testing and commissioning of the given plant.
- ◆ candidates must undertake a Risk Assessment for one operational stage in the plant installation process. As part of the Risk Assessment candidates must identify four hazards associated with the installation tasks, estimate the level of risk associated with each hazard and identify steps to minimise the risk(s) associated with each hazard.
- ◆ the Method Statement and Risk Assessment must include reference to legislative requirements and manufacturers' specifications where appropriate.

With regard to Outcomes 3, 4 and 5

- ◆ candidates must wear appropriate Personal Protective Equipment (PPE), carry out appropriate safety procedures and practices and demonstrate appropriate workplace behaviour while installing, aligning, testing and commissioning a given item of plant

With regard to Outcome 3

- ◆ candidates must use the Method Statement and Risk Assessment to support the generation of the Permit to Work
- ◆ it is strongly recommended that all mechanical and electrical service connections are checked by a person deemed qualified and approved by the centre to deliver the Unit prior to the item of plant being started up

With regard to Outcome 5

- ◆ candidates would normally only monitor the given item of plant over a short time period to ensure its correct operation.
- ◆ test documentation must include details of acceptable working limits and parameters for optimum operating conditions for the given item of plant equipment in accordance with current legislation and manufacturers' specifications. Documentation can be in either paper or electronic format.

Candidates are likely to work in groups while completing the installation, alignment, testing and commissioning of a given item of plant. Centres must ensure that candidates have produced on an individual basis sufficient evidence to demonstrate that they have met the requirements of the Performance Criteria in Outcomes 3, 4 and 5.

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 Installation (SCQF level 6)

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 Mechanical Engineering at SCQF level 6, but may also be offered on a free standing basis.

The aim of this Unit is to provide candidates with knowledge, understanding and skills in mechanical plant installation. On successful completion of the Unit candidates will have learnt to produce plant installation drawings. They will also have developed the knowledge and understanding to prepare Method Statements and Risk Assessments for plant installation processes. Candidates will also be able to install, level, align and secure mechanical plant and commission plant after installation.

The Outcomes and Performance Criteria for this Unit have been written in general terms to allow flexibility in the choice of plant equipment that is installed, aligned and tested. The Unit could, for example, be applied to:

- ◆ the installation and commissioning of a range of industrial plant such as compressors, turbines, steam plant, conveyor belt systems, material handling systems, vacuum pumps, refrigeration systems, diesel/petrol engines, pumps, fans or valves
- ◆ or machine tools such as lathes, CNC machining centre, milling machines, CNC punching machines or brake presses

It is recommended that the delivery of Outcomes 1 and 2 are combined together as they include many of the concepts and ideas underpinning plant installation. During delivery candidates should learn how to produce plant installation drawings to current engineering standards using, where appropriate, relevant information on foundations, positioning of plant, mountings and access routes extracted from appropriate sources. Drawings should clearly identify all service requirements. Candidates should also learn how to prepare Method Statements for given plant installation processes taking into account the corresponding installation drawings. They should also learn to develop Risk Assessments for stages in plant installation processes. Such Risk Assessments should take account of the corresponding Method Statement and relevant safety regulations.

In Outcome 3 candidates should be provided with opportunities to install items of mechanical plant. Prior to any practical work they should complete an appropriate Permit to Work using a recognised permit procedure. Candidates should learn to select and use appropriate tools to perform installation tasks correctly and safely. It is particularly important that candidates are taught how to use approved lifting equipment and correct handling techniques when manoeuvring and positioning heavy loads. Candidates should also be taught to identify and connect mechanical and electrical services to items of plant correctly and safely. Appropriate site areas should be taped off during installation. Throughout delivery of Outcome 3 particular emphasis should be placed on communicating instructions to fellow team members and working cooperatively as part of a team.

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

### **UNIT        Plant Installation (SCQF level 6)**

In Outcome 4 candidates should be provided with opportunities to gain practical experience of levelling and aligning and securing plant in-line with manufacturers' specifications. It is recommended that levelling and alignment is carried out on the same items of plant installed in Outcome 3.

In Outcome 5 candidates should carry out tests on items of plant to ensure that they are operating within specification. Candidates should also learn how to adjust plant parameters to ensure optimum plant performance. It is recommended that testing is carried out on the same items of plant installed and levelled and aligned in Outcomes 3 and 4. Tests should involve monitoring plant variables (eg pressure, temperature, flow etc) over short periods of time. Candidates should learn to complete simple test documentation. Documentation can be in either paper or electronic format. Candidates should be encouraged to comment on irregularities in plant performance: for example, where any variable(s) does not conform to the value(s) shown in a manufacturer's documentation.

### **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. This Unit could be delivered by a combination of lecturing, group discussions, practical activities, investigations and industrial visits. The Unit should be delivered principally in a mechanical engineering environment where plant installation tasks can be performed although some of the underpinning knowledge aspects of the Unit could be delivered in a classroom.

In order to make the subject as interesting as possible centres are encouraged to use practical examples of industrial plant installation and up-to-date manufacturers' catalogues, technical publications and specifications, Method Statements and Risk Assessments.

Group discussions should be encouraged to allow candidates to explore issues associated with, for example, preparing plant installation drawings, producing Method Statements and Risk Assessments, selecting appropriate levelling and alignment equipment etc.

Industrial visits, particularly for candidates with little or no industrial experience, can often be of great benefit in allowing them to see some of the issues involved in carrying out plant installations in practice.

Candidates should also be encouraged to explore both paper based and electronic (including the Internet) sources of information on the installation, alignment and testing of industrial plant systems.

Wall charts, videos/DVDs and models relating to mechanical plant installation subjects can be very useful learning and teaching aids. For example, models and cut-outs can be used in the planning of plant installation processes.

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

### **UNIT            Plant Installation (SCQF level 6)**

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

The Oral Communication Core Skill component at SCQF level 6 may be developed in Outcomes 3, 4 and 5 while candidates work in groups discussing issues relevant to mechanical plant installation and when giving and receiving instructions while undertaking plant installation tasks.

The Using Graphical Information Core Skill component at SCQF level 6 may be developed in Outcome 1 while candidates prepare plant installation drawings and in Outcomes 3, 4 and 5 while candidates are extracting information from plant installation sources of information.

The Critical Thinking Core Skills component at SCQF level 6 may be developed in all five Outcomes while candidates analyse relevant legislation and manufacturers' specifications, prepare Method Statements and Risk Assessments and while they perform various practical tasks involved with installing, aligning and testing mechanical plant especially where unpredictable situations arise. The Planning and Organisation Core Skill component at SCQF level 6 may be developed in Outcomes 2, 3, 4 and 5 while candidates are planning the installation, alignment and testing of items of plant

The Working with Others Core Skill component at SCQF level 5 may be developed in Outcomes 3, 4 and 5 while candidates are involved in group discussions on various aspects of plant installation and while they are working in groups to perform plant installation tasks.

#### **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 knowledge, understanding and skills in such areas as preparing plant installation drawings, writing Method Statements and Risk Assessments and undertaking practical activities involving the installation, levelling, alignment, securing and testing of items of mechanical plant.

Outcomes 1 and 2 may be assessed together by an assignment in which candidates are required to produce an installation drawing and Method Statement for a given plant installation process. Candidates should also produce a Risk Assessment for one stage in the plant installation process.



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

### **UNIT        Plant Installation (SCQF level 6)**

Outcomes 3, 4 and 5 may be assessed by a series of practical exercises involving the installation, levelling, alignment, securing and commissioning of an item of plant. A suitable checklist(s) should be developed to record evidence of candidate achievement in the Outcomes and Performance Criteria.

It is strongly recommended that centres integrate assessment as far as possible so that for the installation of a given item of plant candidates produce a plant installation drawing, Method Statement and Risk Assessment and install, level, align, secure and commission the plant.

### **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)**