



National Unit Specification: general information

UNIT Plant Installation (SCQF level 5)

CODE F5J2 11

SUMMARY

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

This Unit has been designed to provide candidates with the opportunity to develop basic knowledge, understanding and skills in mechanical plant installation thus enabling them to contribute to plant installation in a safe and logical manner. During delivery of the Unit candidates will learn how to extract plant installation information from appropriate sources. They will also develop the knowledge and skills to install mechanical plant using approved lifting and handling equipment and techniques. Candidates will learn to level, align and secure plant using correct tools and equipment. They will also learn to test plant after installation and complete appropriate test documentation.

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

OUTCOMES

- 1 Extract information relating to a plant installation.
- 2 Install a given item of mechanical plant.
- 3 Level, align and secure a given item of plant.
- 4 Test a given item of plant after installation and complete relevant documentation.

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

Administrative Information

Superclass: VG

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National Unit Specification: general information (cont)

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CREDIT VALUE

1 credit at SCQF 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)
- ◆ Numeracy (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

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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

Extract information relating to a plant installation.

Performance Criteria

- (a) Interpret and extract correctly information from current legislation and manufacturers' specifications relating to foundations, positioning of plant, mountings and access routes.
- (b) Identify correctly on an installation drawing the services required for a given plant installation.

OUTCOME 2

Install a given item of mechanical plant.

Performance Criteria

- (a) Work correctly to installation documentation provided for a given item of plant.
- (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 given item of plant correctly using approved lifting equipment and handling techniques.
- (d) Identify and connect correctly mechanical services to a given item of plant.
- (e) Apply correctly safety regulations, safe working practices and procedures while installing a given item of plant.

OUTCOME 3

Level, align and secure a given item of plant.

Performance Criteria

- (a) 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.

National Unit Specification: statement of standards (cont)

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OUTCOME 4

Test a given item of plant after installation and complete relevant documentation.

- (a) Test and monitor a given item of plant to ensure correct operation.
- (b) Complete correctly test documentation for the given item of plant.
- (c) Apply correctly safety regulations, safe working practices and procedures while testing a given item of plant.

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 40 minutes and must be conducted under supervised, closed-book conditions in which candidates may use reference materials provided by the centre but are not allowed to bring their own notes, handouts, textbooks or other materials into the assessment. Assessment of Outcomes 2, 3 and 4 should be conducted under supervised, open-book conditions.

With regard to Outcome 1

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

With regard to Outcomes 2, 3 and 4

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

With regard to Outcome 2

- ◆ the documentation for installing the given item of plant must include the correct identification of tools and lifting equipment in line with current legislation, manufacturers' specifications and relevant safety legislation

National Unit Specification: statement of standards (cont)

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- ◆ it is strongly recommended that all mechanical 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. Candidates must not make any electrical service connections. Such connections should only be made by a person deemed qualified and approved by the centre to deliver the Unit

With regard to Outcome 4

- ◆ 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 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 and testing of a given item of plant. However, 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 2, 3 and 4.

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 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 the opportunity to develop basic knowledge, understanding and skills in mechanical plant installation. On successful completion of the Unit candidates will be able to extract plant installation information from appropriate sources. They will also have developed the knowledge and skills to install mechanical plant using approved lifting and handling equipment and techniques. Candidates will also be able to level, align and secure plant using correct tools and equipment and be capable of testing plant after installation and completing appropriate test documentation.

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

In Outcome 1 candidates should be introduced to the ways in which plant installation information is normally presented. They should learn how to interpret and extract information from current legislation and manufacturers' specifications relating to foundations, positioning of plant, mountings and access routes. Candidates should also be taught the services required for different items of plant.

In Outcome 2 candidates should be provided with opportunities to install practical items of mechanical plant. 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 connect mechanical services to items of plant correctly and safely. Appropriate site areas should be taped off during installation.

In Outcome 3 candidates should be provided with opportunities to gain practical experience of levelling, 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 2.

National Unit Specification: support notes (cont)

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In Outcome 4 candidates should carry out simple tests on items of plant to ensure that they are operating correctly. It is recommended that testing is carried out on the same items of plant installed and levelled and aligned in Outcomes 2 and 3. 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.

Group discussions should be encouraged to allow candidates to explore issues associated with, for example, the interpretation of plant installation drawings, selecting appropriate levelling and alignment equipment etc.

In order to make Unit content as interesting and relevant as possible centres are encouraged to use practical examples of industrial plant installations, plant installation drawings, manufacturers' data sheets 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.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

The Oral Communication Core Skill component at SCQF level 5 may be developed in Outcomes 2, 3 and 4 while candidates work in groups discussing issues relevant to mechanical plant installation and when giving and receiving instructions while undertaking plant installation tasks.

National Unit Specification: support notes (cont)

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The Using Graphical Information Core Skill component at SCQF level 5 may be developed in all four Outcomes while candidates are extracting information from plant installation drawings.

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

The Working with Others Core Skill component at SCQF level 4 may be developed in Outcomes 2, 3 and 4 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 interpreting plant installation information and in undertaking practical activities involving the installation, levelling, alignment, securing and testing of items of mechanical plant.

Outcome 1 may be assessed by an assessment paper comprising of a suitable balance of short answer and restricted response 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 a series of practical exercises involving the installation, levelling, alignment, securing and testing of an item of plant. 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