



National Unit Specification: general information

UNIT Process Operations: Utilities (SCQF level 5)

CODE F6XC 11

SUMMARY

This Unit is designed for candidates with little or no prior knowledge of the principles of Utilities Operations who wish to develop their existing skills and provide a foundation of knowledge and practice in this subject.

The aim of this Unit is to provide candidates with basic knowledge and understanding of the principles and practice of Utilities Operations which would lead to further training within the oil and gas industry allowing them to become a skilled worker in the industry.

For this Unit candidates will be required to demonstrate knowledge and understanding of:

- ◆ disposing of waste water
- ◆ generating electrical power
- ◆ operating gas turbines and diesel engine prime movers
- ◆ generating nitrogen
- ◆ providing chlorine
- ◆ providing diesel
- ◆ providing heating medium (ie hot oil and/or hot water)
- ◆ providing heating, ventilation and air conditioning (HVAC)
- ◆ providing instrument and service air
- ◆ providing cooling water
- ◆ working with fire and gas and Emergency Shut Down (ESD) systems
- ◆ utility systems specific safety awareness

This Unit is an optional Unit of the National Certificate in Engineering Systems or may be offered on a free-standing basis. It will also contribute towards providing underpinning knowledge for the level 2 SVQ in *Process Operations: Hydrocarbons*.

Administrative Information

Superclass: YB

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National Unit Specification: general information (cont)

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OUTCOMES

- 1 Describe the components and functions of utility systems.
- 2 Describe the process of starting up and shutting down utility systems equipment safely.
- 3 Describe the process of operating and monitoring utility systems equipment safely.
- 4 Describe the process of isolating and reinstating utility systems equipment safely.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have a working knowledge of basic maths and chemistry or be educated to General level at Standard Grade in these subjects.

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)

Communication (SCQF level 5)

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

Describe the components and functions of utility systems.

Performance Criteria

- (a) Describe clearly the main components and functions of waste water systems.
- (b) Describe clearly the main components and functions of electrical power generation systems.
- (c) Describe clearly the main components and functions of nitrogen generation systems.
- (d) Describe clearly the main components and functions of chlorine distribution systems.
- (e) Describe clearly the main components and functions of diesel distribution systems.
- (f) Describe clearly the main components and functions of heating medium systems.
- (g) Describe clearly the main components and functions of gas turbines and diesel engine prime movers.
- (h) Describe clearly the main components and functions of heating, ventilation and air conditioning (HVAC) systems.
- (i) Describe clearly the main components and functions of instrument and service air systems.
- (j) Describe clearly the main components and functions of cooling water systems.
- (k) Describe clearly the main components and functions of fire and gas and emergency shut down (ESD) systems.

National Unit Specification: statement of standards (cont)

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OUTCOME 2

Describe the process of starting up and shutting down utility systems equipment safely.

Performance Criteria

- (a) Describe clearly the main checks and actions to be considered prior to starting up and shutting waste water systems.
- (b) Describe clearly the main checks and actions to be considered prior to starting up and shutting down electrical power generation systems.
- (c) Describe clearly the main checks and actions to be considered prior to starting up and shutting down nitrogen generation systems.
- (d) Describe clearly the main checks and actions to be considered prior to starting up and shutting down chlorine distribution systems.
- (e) Describe clearly the main checks and actions to be considered prior to starting up and shutting down diesel distribution systems.
- (f) Describe clearly the main checks and actions to be considered prior to starting up and shutting down heating medium systems.
- (g) Describe clearly the main checks and actions to be considered prior to starting up and shutting down gas turbines and diesel engine prime movers.
- (h) Describe clearly the main checks and actions to be considered prior to starting up and shutting down heating, ventilation and air conditioning (HVAC) systems.
- (i) Describe clearly the main checks and actions to be considered prior to starting up and shutting down instrument and service air systems.
- (j) Describe clearly the main checks and actions to be considered prior to starting up and shutting down cooling water systems.
- (k) Describe clearly the main checks and actions to be considered prior to starting up and shutting down equipment used to support the fire and gas and emergency shut down (ESD) systems.

National Unit Specification: statement of standards (cont)

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OUTCOME 3

Describe the process of operating and monitoring utility systems equipment safely.

Performance Criteria

- (a) Describe clearly the main checks and actions to be considered when operating and monitoring waste water systems.
- (b) Describe clearly the main checks and actions to be considered when operating and monitoring electrical power generation systems.
- (c) Describe clearly the main checks and actions to be considered when operating and monitoring nitrogen generation systems.
- (d) Describe clearly the main checks and actions to be considered when operating and monitoring chlorine distribution systems.
- (e) Describe clearly the main checks and actions to be considered when operating and monitoring diesel distribution systems.
- (f) Describe clearly the main checks and actions to be considered when operating and monitoring heating medium systems.
- (g) Describe clearly the main checks and actions to be considered when operating and monitoring gas turbines and diesel engine prime movers.
- (h) Describe clearly the main checks and actions to be considered when operating and monitoring heating, ventilation and air conditioning (HVAC) systems.
- (i) Describe clearly the main checks and actions to be considered when operating and monitoring instrument and service air systems.
- (j) Describe clearly the main checks and actions to be considered when operating and monitoring cooling water systems.
- (k) Describe clearly the main checks and actions to be considered when operating and monitoring fire and gas and emergency shut down (ESD) systems.
- (l) Describe clearly the main safety considerations specific to utility operations.

National Unit Specification: statement of standards (cont)

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OUTCOME 4

Describe the process of isolating and reinstating utility systems equipment safely.

Performance Criteria

- (a) Describe clearly the main checks and actions to be considered when isolating and reinstating waste water systems.
- (b) Describe clearly the main checks and actions to be considered when isolating and reinstating electrical power generation systems.
- (c) Describe clearly the main checks and actions to be considered when isolating and reinstating nitrogen generation systems.
- (d) Describe clearly the main checks and actions to be considered when isolating and reinstating chlorine distribution systems.
- (e) Describe clearly the main checks and actions to be considered when isolating and reinstating diesel distribution systems.
- (f) Describe clearly the main checks and actions to be considered when isolating and reinstating heating medium systems.
- (g) Describe clearly the main checks and actions to be considered when isolating and reinstating gas turbines and diesel engine prime movers.
- (h) Describe clearly the main checks and actions to be considered when isolating and reinstating heating, ventilation and air conditioning (HVAC) systems.
- (i) Describe clearly the main checks and actions to be considered when isolating and reinstating instrument and service air systems.
- (j) Describe clearly the main checks and actions to be considered when isolating and reinstating cooling water systems.
- (k) Describe clearly the main checks and actions to be considered when isolating and reinstating or applying and removing inhibits or overrides on fire and gas and emergency shut down (ESD) systems.

National Unit Specification: statement of standards (cont)

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EVIDENCE REQUIREMENTS FOR THIS UNIT

Written and/or oral evidence is required, to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

Assessment should be supervised, open-book and delivered at an appropriate time in the Unit when candidates have developed knowledge and understanding of all of the following:

- ◆ disposing of waste water
- ◆ generating electrical power
- ◆ operating gas turbines and diesel engine prime movers
- ◆ generating nitrogen
- ◆ providing chlorine
- ◆ providing diesel
- ◆ providing heating medium (hot oil and/or hot water)
- ◆ providing heating, ventilation and air conditioning (HVAC)
- ◆ providing instrument and service air
- ◆ providing cooling water
- ◆ working with fire and gas and Emergency Shut Down (ESD) systems such as:
 - firewater and foam pumps
 - deluge valves
 - fixed fire extinguishing systems (sprinklers, Halon and carbon dioxide systems)
- ◆ utility systems specific safety awareness

In this Unit an appropriate instrument of assessment covering all Outcomes could include a question paper consisting of a balance of multiple choice, short answer, restricted response and structured questions. Total assessment time covering all Outcomes should not exceed two hours.

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

It is recommended that this Unit be delivered in the context of the Oil and Gas sector. This Unit is designed to provide candidates with an understanding of the principles and practices associated with the equipment and processes used in Gas Process Operations.

The Unit is designed to allow centres the flexibility to deliver knowledge and understanding based on the range of equipment available in a simulated or real work environment. The main areas to be covered are:

- ◆ disposing of waste water
- ◆ generating electrical power
- ◆ operating gas turbines and diesel engine prime movers
- ◆ generating nitrogen
- ◆ providing chlorine
- ◆ providing diesel
- ◆ providing heating medium (hot oil and/or hot water)
- ◆ providing heating, ventilation and air conditioning (HVAC)
- ◆ providing instrument and service air
- ◆ providing cooling water
- ◆ working with fire and gas and Emergency Shut Down (ESD) systems
- ◆ utility systems specific safety awareness

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

While the use of case study material is particularly recommended for both the learning and teaching components of this Unit, other suggested teaching and learning methods for this Unit could include the use of visual aids, Information Communication Technology (ICT), group lectures and discussion, practical demonstrations, question and answer sessions, directed study, and industrial/site visits.

Formative work for the Unit could specifically include group discussion and role play emphasising workplace health and safety issues and events specific to Utilities Operations. Such an approach could be particularly beneficial to candidates with no industrial experience.

Case studies could be used as a stimulus to provide opportunities for completing appropriate documentation and reading and evaluating relevant legislation, policies and procedures. Role play of typical industry scenarios could additionally enhance the co-operative working skills of candidates.

National Unit Specification: support notes (cont)

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OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

Candidates will develop skills in *Problem Solving*, which are in Critical Thinking, Planning and Organising, and Reviewing, as they undertake the Unit. They need to examine and take account of all issues affecting utilities operations before starting practical work. This will include identifying process faults and troubleshooting to resolve these faults. They will meet all health and safety requirements before carrying out any practical sessions. Review and evaluation of achievement with assessor support and guidance should be a naturally occurring process in formative and summative work.

Group discussion of safety issues during formative work could enhance both problem solving and oral communication skills and would ensure opportunities to practise use of appropriate terminology and improve listening skills in a work related context.

Although skills in Written Communication are not formally assessed candidates should be given opportunities to develop their abilities to communicate to a standard acceptable in the vocational area. They need to be able to read, understand Operating Procedures and Piping and Instrument Diagrams (P&IDs) and could also be encouraged to refer to and evaluate a range of background information and advice on safety issues and equipment. Reports should be technically accurate, with attention to spelling and punctuation.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Candidates should be made aware of what will be required of them in order to achieve credit for the Unit. They should be encouraged to discuss the work with the trainer/tutor and their colleagues. Help and encouragement should be given throughout the Unit so that the candidates become confident in their ability to achieve the Performance Criteria.

Preparation for assessment should include formative work with opportunities for constructive feedback.

In this Unit an appropriate instrument of assessment for Outcomes 1, 2, 3 and 4 could include:

- ◆ a question paper consisting of a balance of multiple choice, short answer, restricted response and structured questions
- ◆ workshop practical in a real or simulated workplace setting (eg oral questioning associated with ‘walking the line’ or tracing fluid flow paths using Piping & Instrument Diagrams (P&IDs))

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)*.

Where candidates require re-assessment there should be a different set of questions available for that re-assessment.

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