



National Unit Specification: general information

UNIT Engineering: Process Analysers (SCQF level 6)

CODE F5KV 12

SUMMARY

This is an optional Unit in the National Qualification Group Award in Measurement and Control Engineering, but can also be taken as a free-standing Unit.

This Unit is designed to enable candidates to develop knowledge and understanding of on-line process analysers as used in the process industries. It will develop knowledge and understanding of sample systems, the principle of operation and performance characteristics of a range of industrial process analysers and the calibration techniques of on-line analytical measurement systems.

This Unit is suitable for candidates wishing to study the subject for the first time and acts also as a basis for progression to employment and further study.

OUTCOMES

- 1 Explain sampling methods for on-line process analysers.
- 2 Explain the principle of operation and installation of electro-chemical, electro-magnetic and inferential process analysers.
- 3 Explain the maintenance of on-line analysers.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained at least one of the following:

- ◆ Standard Grade Mathematics — General/credit Level
- ◆ Standard Grade Technological Studies/Science — General/Credit Level

Administrative Information

Superclass: VE

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National Unit Specification: general information (cont)

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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.

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

Communication (SCQF level 6)

Information Technology (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

Explain sampling methods for on-line process analysers.

Performance Criteria

- (a) Sampling methods to obtain a representative sample for gas, liquid and solid phases are explained correctly.
- (b) Methods of sample disposal that are compliant with safety procedures are explained correctly.
- (c) Maintenance procedures for a sample system are explained correctly.

OUTCOME 2

Explain the principle of operation and installation of electro-chemical, electro-magnetic and inferential process analysers.

Performance Criteria

- (a) The principle of operation and installation of an electro-chemical analyser is explained correctly.
- (b) The principle of operation and installation of an electro-magnetic analyser is explained correctly.
- (c) The principle of operation and installation of an inferential analyser is explained correctly.

OUTCOME 3

Explain the maintenance of on-line analysers.

Performance Criteria

- (a) Calibration procedures for on-line analysers are explained correctly.
- (b) Maintenance procedures for on-line analysers are explained correctly.

National Unit Specification: statement of standards (cont)

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EVIDENCE REQUIREMENTS FOR THIS UNIT

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

Written and/or oral evidence is required which demonstrates that the candidate has achieved all Outcomes to the standard specified in the Outcomes and the Performance Criteria.

The evidence for the Outcome 1, Outcome 2 and Outcome 3 should be obtained in a combined assessment under closed-book, controlled, supervised conditions and should last approximately 1 hour and 30 minutes.

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 an optional Unit in the National Certificate in Measurement and Control Engineering, but is also suitable for candidates wishing to study the Unit on a free-standing basis.

This Unit aims to develop the candidate's knowledge and understanding of on-line process analysers used in measurement and control engineering.

Outcome 1

- ◆ Sample probe
- ◆ Sample line
- ◆ Sample conditioning
- ◆ Transport time
- ◆ Safe disposal of sample

Outcome 2

- ◆ Hydrogen ion (pH)
- ◆ Sodium ion
- ◆ Dissolved oxygen
- ◆ Oxygen in a gas mixture
- ◆ Density (liquid and gas)
- ◆ Viscosity
- ◆ Turbidity
- ◆ Silica
- ◆ Gas chromatography
- ◆ Installation factors; sample flowrates, sample line pressures, sample line materials, check for leaks, thermal tracing

Outcome 3

- ◆ Preparation of standard samples
- ◆ Supply of carrier gases
- ◆ Safe handling and sample disposal

National Unit Specification: support notes (cont)

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GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

This Unit is probably best delivered after the other Engineering: Measurement Technology Units since it requires a foundation of measurement methods and techniques before the delivery.

The use of ICT (Information and Communication Technology) should be used to support the delivery of this Unit. This could take the form of candidates researching different types of on-line analysers and sampling equipment on the internet or using simulation software.

The Unit requires access to a measurement and control engineering laboratory with candidates having access to a range of on-line analysers and sampling equipment. Demonstrations and laboratory exercises can be used to improve the candidates understanding of on-line analysers in measurement and control engineering systems which will help to relate theory to practice.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

Although skills in *Communication* and *Information Technology* are not formally assessed candidates have to understand, evaluate and convey complex information on process analysers. They should be encouraged to undertake on line background research, analysing and summarising a range of technical materials. Computer simulation packages could also be used to encourage confidence in the use of ICT. Candidates should be made aware of the effective and responsible use of equipment and software.

Written responses should be technically accurate, formally expressed and supported by relevant graphics. Group discussion during formative work could help to develop oral communication skills in a work related context.

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)*.

Achievement of this Unit requires the Evidence Requirement for each Outcome to be met. A candidate who does not initially achieve the specified standard can have a further opportunity, attempting only the Outcomes(s) not previously achieved.

Outcome 1, Outcome 2 and Outcome 3 should be assessed by a closed-book test. The closed-book test should last 1 hour and 30 minutes and could consist of a series of short answer, restricted response and structured questions.

National Unit Specification: support notes (cont)

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The assessment should test the candidates knowledge and understanding of sampling systems, the principle of operation of process analysers and their calibration techniques.

It is recommended that the assessment should be taken after the completion of the delivery of all the Outcomes.

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).