## Higher National Unit specification

## General information for centres

**Unit title:** Process Operations: Oil and Gas Separation

**Unit code:** F814 34

**Unit purpose:** The purpose of this Unit is to provide candidates with the knowledge and understanding of the process of separating of oil and gas well products at the upstream production installation.

On completion of the Unit the candidate should be able to:

1 Explain the principles and processes of oil and gas separation
2 Evaluate the features and characteristics of oil and gas separators and ancillary equipment
3 Explain the operation and control of oil and gas separation processes

**Credit points and level:** 1HN credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

**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.*

**Recommended prior knowledge and skills:** Access to this Unit is at the discretion of the centre. However, candidates will find it beneficial to have some knowledge and understanding of the oil and gas process context in which this Unit appertains which may be evidenced by the possession of the following Unit:

*F811 34: Petroleum Industry: Organisation, Products and Processes*

**Core Skills:** There are opportunities to develop the Core Skill of *Communication* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components

**Context for delivery:** This Unit was developed as an optional Unit within the context of the HNC/HND award in Petroleum Process Technology, Operations and Control. If this Unit is delivered as part of another group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

**Assessment:** Assessment on Outcomes 1, 2 and 3 may be conducted individually or integrated into one or more combined assessments as appropriate. Assessment for all Outcomes should be composed of short answer, restricted response and/or structured essay type questions. Assessment must be carried out under controlled, closed-book, supervised conditions.

Candidates must achieve all of the minimum evidence specified for each outcome in order to pass the Unit.

# Higher National Unit specification: statement of standards

## Unit title: Process Operations: Oil and Gas Separation

## Unit code: F814 34

The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

## Outcome 1

Explain the principles and processes of oil and gas separation

**Knowledge and/or Skills**

- Well products
- Separators
- Separation processes
- Export and metering of separated products

### Evidence Requirements

Candidates will need to provide evidence to demonstrate their knowledge and/or skills by showing that they can explain the principles and processes of oil and gas separation.

Evidence for this Outcome will be provided by candidates being required to provide evidence for all of the Knowledge and/or Skills items. Assessment must be carried out under controlled, closed-book, supervised conditions.

Candidates will be required to provide evidence to demonstrate their Knowledge and/or Skills by showing they can:

- Explain the types and forms of raw materials extracted from oil wells and the reasons for separation including customer requirements, equipment protection and the removal of sedimentary materials and impurities.
- Explain the principles of operation of separators, their construction features and their operating conditions.
- Explain the processes involved in separating well products and the removal of impurities.
- Explain the removal/export of separated and waste products to the next stage of processing or storage.

### Assessment Guidelines

Outcome 1 may be assessed separately with a planned duration of approximately one hour. Alternatively, Outcome 1 may be assessed together with Outcomes 2 and/or 3.
Assessments could be composed of a suitable balance of short answer, restricted response and/or structured questions and must be carried out in closed book and supervised conditions. As such, candidates should not be allowed to bring text books, course notes or handouts to the assessment.

## Higher National Unit specification: statement of standards (cont)

## Unit title: Process Operations: Oil and Gas Separation

## Outcome 2

Evaluate the features and characteristics of oil and gas separators and ancillary equipment

### Knowledge and/or Skills

- Separator types
- Operational characteristics
- Ancillary equipment

### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can evaluate the features and characteristics of oil and gas separators.

Evidence for Outcome 2 will be provided on a sample basis with candidates being required to provide evidence for item one (separator types) and one other of the Knowledge and/or Skills items. Assessment must be carried out under controlled, closed-book, supervised conditions.

Candidates will be required to provide evidence to demonstrate their Knowledge and/or Skills by showing they can:

- Explain, with the aid of diagrams, the construction features of separators to include a caissons, free water knockout drum, a Corrugated Plate Interceptor (CPI), a slug catcher, a bubble agitator, a two phase separator, and a three phase separator.
- Evaluate the operational characteristics of separators in terms of specifications, capacities, flow rates, pressures and temperatures.
- Evaluate the requirements for ancillary equipment in the separation process to include instrumentation and metering, compressors and pumps, and valves and drains.

### Assessment Guidelines

Outcomes 2 may be assessed separately with a planned duration of approximately one hour. Alternatively, Outcome 2 may be assessed together with Outcomes 1 and/or 3. Assessments could be composed of a suitable balance of short answer, restricted response and/or structured questions and must be carried out in closed-book and supervised conditions. As such, candidates should not be allowed to bring text books, course notes or handouts to the assessment.

## Higher National Unit specification: statement of standards (cont)

## Unit title: Process Operations: Oil and Gas Separation

## Outcome 3

Explain the operation and control of oil and gas separation processes

### Knowledge and/or Skills

- Separation process operations
- Separation process control
- Separator management systems
- Health safety and environment (HSE) implications

### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can explain the operation and control of oil and gas separation processes.

Evidence for Outcome 3 will be provided on a sample basis with candidates being required to provide evidence for three of the four Knowledge and/or Skills items. Assessment must be carried out under controlled, closed-book, supervised conditions.

Candidates will be required to provide evidence to demonstrate their Knowledge and/or Skills by showing they can:

- Explain the start-up, continuous running, shutdown and likely problems encountered during separation process operations particularly in relation to level, pressure, temperature and flow.
- Explain, with the aid of a labelled sketch, the different control measures used to operate a separator safely to include operating conditions, operational requirements, condition monitoring and oil stabilisation.
- Explain separator management systems in respect of inspection and maintenance, fault diagnosis and problem preventative measures.
- Explain the health, safety and environment implication of separation process operations to include safe working practice, risk assessments, warning alarms and waste disposal.

### Assessment Guidelines

Outcomes 3 may be assessed separately with a planned duration of approximately one hour. Alternatively, Outcome 1 may be assessed together with Outcomes 1 and/or 2. Assessments could be composed of a suitable balance of short answer, restricted response and/or structured questions and must be carried out in closed-book and supervised conditions. As such, candidates should not be allowed to bring text books, course notes or handouts to the assessment.

## Administrative Information

**Unit code:** F814 34

**Unit title:** Process Operations: Oil and Gas Separation

**Superclass category:** YB

**Original date of publication:** August 2009

**Version:** 01

**History of changes:**

| Version | Description of change | Date |
|---|---|---|
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**Source:** SQA



SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

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

## Higher National Unit specification: support notes

## Unit title: Process Operations: Oil and Gas Separation

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 has been designed to contribute to the broad capacity building context of process operations within the petrochemical industries. It has specially been designed to provide knowledge, understanding and skills to support oil and gas separation operations within the upstream sector of the industry.

The Unit is at SCQF level 7 and has been developed as part of the HNC/HND awards in Petroleum Process Technology, Operations and Control. In this context, the Unit has been designed to link to appropriate National Occupational Standards that form part of the suite of Scottish/National Vocational Qualifications (S/NVQs) in Process Operation: Hydrocarbons at Technician level. However this does not preclude the use of this Unit in other awards where it is appropriate and makes a relevant contribution with additionally. The Unit may also be delivered as a stand-alone Unit.

Access to this Unit is fully inclusive and at the discretion of the SQA approved delivery centre. However, candidates may find it beneficial to have a prior knowledge of this area as provided by the SQA HN Unit *F811 34: Petroleum Industry: Organisation, Products and Processes*.

This Unit has been written in order to allow candidates to develop knowledge, understanding and skills to allow candidates to achieve the following Outcomes:

1 Explain the principles and processes of oil and gas separation
2 Evaluate the features and characteristics of oil and gas separators
3 Explain the operation and control of oil and gas separation processes

A list of topics for each Outcome is given below:

**Outcome 1**

Explain:

- the types and forms of raw materials extracted from oil wells
- the reasons for separation including customer requirements
- separation equipment protection
- sedimentary materials and impurities
- the principles of operation of separators, their construction features and their operating conditions
- the processes involved in separating well products and the removal of impurities
- the removal/export of separated and waste products to the next stage of processing or storage

## Higher National Unit specification: support notes (cont)

## Unit title: Process Operations: Oil and Gas Separation

**Outcome 2**

Explain:

- the construction features of separators to include
  — caissons,
  — free water knockout drum
  — CPI
  — slug catcher
  — bubble agitator
  — two phase separator
  — three phase separator.

Evaluate:

- operational characteristics of separators
  1 specifications
  2 capacities
  3 flow rates, pressures and temperatures
  4 the requirements for ancillary equipment in the separation process
  5 instrumentation and metering
  6 compressors and pumps
  7 valves and drains

**Outcome 3**

Explain:

1 process start-up, continuous running, shutdown
2 likely problems encountered during separation process operations in relation to level, pressure, temperature and flow
3 different control measures used to operate a separator safely to include operating conditions, operational requirements, condition monitoring and oil stabilisation
4 separator management systems in respect of inspection and maintenance
5 fault diagnosis and problem preventative measures
6 health, safety and environment implication of separation process operations including safe working practice, risk assessments, warning alarms and waste disposal

## Guidance on the delivery and assessment of this Unit

This Unit was developed as an optional Unit within the context of the HNC/HND award in Petroleum Process Technology, Operations and Control. It may also be used as a stand-alone Unit.

The content of the Outcomes of this Unit follows a logical delivery sequence.

Candidates should have access to examples of diagrams, schematic layouts and static displays of oil and gas separation plant and equipment to support the explanation of the process operations, functions of main plant and equipment and their construction features. Access to suitable practical or simulation facilities for demonstration purposes would be beneficial.

## Higher National Unit specification: support notes (cont)

## Unit title: Process Operations: Oil and Gas Separation

This Unit may be delivered on a full-time, block release, open or blending learning, part-time day or part-time evening basis at the discretion of the SQA approved delivery centre. Learning and teaching methods may include a combination of lectures, tutorials, practical/laboratory demonstrations, computer-based simulations, case studies and industrial visits. The use of flexible learning through on-line materials and methodologies is encouraged wherever possible to supplement and support the learning that takes place in the delivery centre. It is also recommended that candidates are directed to undertake internet research where a rich amount of material can be found that is relevant to the content of this Unit to support their learning. Wherever appropriate, it is recommended that relevant practical learning activities are used to support the development of the knowledge and understanding requirements of this Unit. At every appropriate opportunity, it is recommended that the delivery of this Unit reflects on the health, safety and environment implications relevant to the content and context of this Unit.

Formal assessment of this Unit should take the form of short answer, restricted response and structured questions. Assessments should require candidates to support their responses to question with suitable labelled process layout schematics and diagrams showing the construction features of plant and equipment. Laboratory work, simulation exercises and case studies could be used as formative assessments to enhance the learning experience of candidates.

Details on approaches to assessment are given under Evidence Requirements and Assessment guidelines under each Outcome in the Higher National Unit specification: Statement of Standards section. It is recommended that these sections be read carefully before proceeding with assessment of candidates. Where sampling of knowledge and skills items is used for assessment, the sampling should be selected to meet the specific needs of the candidate cohort within the context of their current employment or progression goals.

***Opportunities for developing Core Skills***

There may be opportunities to gather evidence toward the Core Skill of *Communication* at SCQF level 6 within this Unit, although there is no automatic certification of Core Skills or Core Skills components.

## Open learning

This Unit could be delivered by distance learning, which may incorporate some degree of on-line support. With regard to assessment, planning would be required of the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that assessments were conducted under controlled, supervised conditions. Agreement would have to be made to ensure that a single assessment for the end test is delivered in a supervised environment under controlled conditions.

## 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**

## General information for candidates

## Unit title: Process Operations: Oil and Gas Separation

This Unit has been designed to allow you to develop the knowledge and understanding involved in the operation of an oil and gas separation process which will contribute to your development as a process operations technician within the petroleum industry.

The vocational focus of this Unit combines the necessary blend of key processing related technological principles with knowledge of their industrial process applications in a safety and environmentally critical context.

The Unit comprises the following broad outcomes:

1 Explain the principles and processes of oil and gas separation
2 Evaluate the features and characteristics of oil and gas separators
3 Explain the operation and control of oil and gas separation processes

These outcomes are linked to National Occupational Standard that form part of the suite of Scottish/National Vocational Qualifications (S/NVQs) in Process Operation: Hydrocarbons at Technician level.

Within this Unit, you will also have opportunities to develop the transferable Core Skill of *Communication*, although this is not separately certificated.

Access to this Unit is fully inclusive and at the discretion of your SQA approved delivery centre. However, you may find it beneficial to have a prior knowledge of this area as provided by the SQA HN Unit *F811 34: Petroleum Industry: Organisation, Products and Processes*.

This Unit can be delivered on a full-time, block release, open or blended learning, part-time day or part-time evening basis at the discretion of your SQA approved delivery centre. Learning and teaching methods may include lectures, tutorials, group work, practical/laboratory assignments, computer-based simulations and case studies. The use of flexible learning through on-line materials and methodologies may be used to supplement and support the learning that takes place in the delivery centre.

Formal assessment of this Unit may take a number of different forms such as written and numerical tests, laboratory work, simulation exercises, practical exercises and case studies. Assessments will normally be conducted at the end of the delivery of each Outcome. Where assessments are combined, these may be conducted toward the end of the Unit.