

**Pearson BTEC International Level 2  
Specialist Diploma for Process  
Technicians in Oil and Gas Facilities**

**Pearson BTEC International Level 2  
Specialist Diploma for Electrical  
Technicians in Oil and Gas Facilities**

**Pearson BTEC International Level 2  
Specialist Diploma for Instrument  
Technicians in Oil and Gas Facilities**

**Pearson BTEC International Level 2  
Specialist Diploma for Mechanical  
Technicians in Oil and Gas Facilities**

## **Specification**

Competence-based qualifications

First registration April 2020

Issue 1

## **Edexcel, BTEC and LCCI qualifications**

Edexcel, BTEC and LCCI qualifications are awarded by Pearson, the UK's largest awarding body offering academic and vocational qualifications that are globally recognised and benchmarked.

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# Welcome

With a track record built over 40 years of learner success, our BTEC International qualifications are recognised internationally by governments, industry and higher education.

## What are BTEC International Specialist and Professional qualifications?

These BTEC qualifications are available at Levels 1–3 (Specialist) and at Levels 4–7 (Professional). The qualifications are designed to have one of two different purposes: some aim to give learners the knowledge and/or skills that they need to prepare for employment in a sector or job role; others are competence-based qualifications.

## What are competence-based qualifications?

Competence-based qualifications are work-based qualifications that allow learners to develop and demonstrate their competence in the area of work or job role to which the qualification relates. Completing the qualification therefore provides evidence that learners are fully competent in the job role.

Learners will work towards their qualification in the workplace or (if permitted by the assessment requirements) in settings that replicate the working environment. Colleges, training centres and/or employers can offer these qualifications as long as they have access to appropriate physical and human resources and have the necessary quality assurance systems in place.

## Sizes of qualification

Pearson estimates the number of guided learning hours (GLH) that will be needed for centre staff to deliver the qualification. This includes all training that involves centre staff in teaching and supervising learners, as well as all assessment activities.

BTEC Specialist and Professional qualifications are available in the following sizes:

Award – a qualification with a GLH value of 10–120 hours

Certificate – a qualification with a GLH value of 121–369 hours

Diploma – a qualification with a GLH value of 370 or above.

## **Collaborative development**

These qualifications have been developed with input from industry experts. We are grateful to all the individuals and organisations who generously shared their time and expertise to help us develop these new qualifications.

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# Introduction to BTEC International competence qualifications for the oil and gas sector

This specification contains all the information you need to deliver the following qualifications:

- Pearson BTEC International Level 2 Specialist Diploma for Process Technicians in Oil and Gas Facilities
- Pearson BTEC International Level 2 Specialist Diploma for Electrical Technicians in Oil and Gas Facilities
- Pearson BTEC International Level 2 Specialist Diploma for Instrument Technicians in Oil and Gas Facilities
- Pearson BTEC International Level 2 Specialist Diploma for Mechanical Technicians in Oil and Gas Facilities.

These qualifications are part of a suite of qualifications offered by Pearson.

The suite of oil and gas frontline production operations qualifications has been developed in collaboration with industry experts. The qualifications are designed to cover the minimum competence standards to meet the job requirements for key health, safety and environmental (HSE)-critical roles in the oil and gas industries.

## What other qualifications are available?

In the oil and gas sector, the other qualifications available are:

- Pearson BTEC International Level 3 Specialist Diploma in Control Room Operations in Oil and Gas Facilities
- Pearson BTEC International Level 3 Specialist Diploma in Electrical Engineering Operations in Oil and Gas Facilities
- Pearson BTEC International Level 3 Specialist Diploma in Instrument Engineering Operations in Oil and Gas Facilities
- Pearson BTEC International Level 3 Specialist Diploma in Mechanical Engineering Operations in Oil and Gas Facilities
- Pearson BTEC International Level 4 Professional Diploma in Oil and Gas Facility Management
- Pearson BTEC International Level 4 Professional Diploma in Oil and Gas Installation Management.

These qualifications are not regulated in England.

## What else does this specification contain?

This specification signposts the other essential documents and support that you need as a centre in order to deliver, assess and administer the Level 2 Specialist Diplomas, including the staff development required. A summary of all essential documents is given in *Section 6 Administrative arrangements*.

The information in this specification is correct at the time of publication.

## Overview of qualification sizes and purposes in the oil and gas suite

### Level 2 qualifications

Title	Size and structure	Summary purpose
<b>Pearson BTEC International Level 2 Specialist Diploma for Process Technicians in Oil and Gas Facilities</b>	605 GLH. Six mandatory units.	This qualification allows learners to demonstrate their occupational competence as a process technician.
<b>Pearson BTEC International Level 2 Specialist Diploma for Electrical Technicians in Oil and Gas Facilities</b>	540 GLH. Six mandatory units.	This qualification allows learners to demonstrate their occupational competence as an electrical technician.
<b>Pearson BTEC International Level 2 Specialist Diploma for Instrument Technicians in Oil and Gas Facilities</b>	550 GLH. Six mandatory units.	This qualification allows learners to demonstrate their occupational competence as an instrument technician.
<b>Pearson BTEC International Level 2 Specialist Diploma for Mechanical Technicians in Oil and Gas Facilities</b>	610 GLH. Six mandatory units.	This qualification allows learners to demonstrate their occupational competence as a mechanical technician.

### Level 3 qualifications

Title	Size and structure	Summary purpose
Pearson BTEC International Level 3 Specialist Diploma in Control Room Operations in Oil and Gas Facilities	630 GLH. Three mandatory units plus optional units worth at least 280 GLH.	This qualification allows learners to demonstrate their occupational competence as a control room operator.
Pearson BTEC International Level 3 Specialist Diploma in Electrical Engineering Operations in Oil and Gas Facilities	500 GLH. Five mandatory units.	This qualification allows learners to demonstrate their occupational competence as an electrical technician engineer.
Pearson BTEC International Level 3 Specialist Diploma in Instrument Engineering Operations in Oil and Gas Facilities	460 GLH. Four mandatory units.	This qualification allows learners to demonstrate their occupational competence as an instrument technician engineer.
Pearson BTEC International Level 3 Specialist Diploma in Mechanical Engineering Operations in Oil and Gas Facilities	480 GLH. Four mandatory units.	This qualification allows learners to demonstrate their occupational as a mechanical technician engineer.



## Level 4 qualifications

Title	Size and structure	Summary purpose
Pearson BTEC International Level 4 Professional Diploma in Oil and Gas Facility Management	At least 810 GLH. Four mandatory and two optional units.	This qualification allows learners to demonstrate their occupational competence when managing oil and gas production facilities. It also prepares them to deputise for the installation manager in emergencies.
Pearson BTEC International Level 4 Professional Diploma in Oil and Gas Installation Management	1020 GLH. Seven mandatory units.	This qualification allows learners to demonstrate their occupational competence as the manager of oil and gas installations. This includes managing production facilities on-site and any supporting facilities on- and off-site.

An overview of the structures of these qualifications can be found in *Appendix B: Structures of the qualification suite at a glance*.

# 1 Qualification purpose and progression

## **Pearson BTEC International Level 2 Specialist Diploma for Process Technicians in Oil and Gas Facilities**

## **Pearson BTEC International Level 2 Specialist Diploma for Electrical Technicians in Oil and Gas Facilities**

## **Pearson BTEC International Level 2 Specialist Diploma for Instrument Technicians in Oil and Gas Facilities**

## **Pearson BTEC International Level 2 Specialist Diploma for Mechanical Technicians in Oil and Gas Facilities**

### **Who are these qualifications for?**

Each of the four qualifications in this specification gives learners the opportunity to develop knowledge and skills to work as operations technicians in their respective discipline.

Due to the hazardous nature of oil and gas operations, for each of these qualifications learners are required to gain knowledge and skills in process safety by implementing oil and gas frontline safety barriers and responding to emergency situations. The remaining units will vary between the four qualifications.

- *Process Technicians* will gain the knowledge and skills needed to operate and monitor oil and gas processes and their associated systems.
- *Electrical Technicians* will gain the knowledge and skills needed to operate and perform 'routine maintenance on electrical drive and motor-control centres, power generation, power supplies and lighting systems.
- *Instrument Technicians* will gain the knowledge and skills needed to operate and perform routine maintenance on process measuring and analyser devices, converters, process controllers and control valves.
- *Mechanical Technicians* will gain the knowledge and skills needed to operate and perform routine maintenance on static equipment, engines, pumps, turbines and compressors.

## What could these qualifications lead to?

These qualifications support career progression. Learners who have completed them will be ready to progress on to more senior roles, for example:

- control room operator
- electrical technician engineer
- instrument technician engineer
- mechanical technician engineer.

Learners can also progress on to qualifications at higher levels that relate to these job roles, for example:

- Pearson BTEC International Level 3 Specialist Diploma in Control Room Operations in Oil and Gas Facilities
- Pearson BTEC International Level 3 Specialist Diploma in Electrical Engineering Operations in Oil and Gas Facilities
- Pearson BTEC International Level 3 Specialist Diploma in Instrument Engineering Operations in Oil and Gas Facilities
- Pearson BTEC International Level 3 Specialist Diploma in Mechanical Engineering Operations in Oil and Gas Facilities.

## 2 Qualification summaries and key information

The qualifications are summarised separately below.

Qualification title	Pearson BTEC International Level 2 Specialist Diploma for Process Technicians in Oil and Gas Facilities
Operational start date	1 April 2020
Entry requirements	<p>Learners must be aged at least 18 and employed in a relevant role that allows them to demonstrate the knowledge and skills as part of their normal work activities.</p> <p>Learners must also have EITHER:</p> <ul style="list-style-type: none"> <li>completed an engineering diploma (Level 3 or equivalent)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>attended in-house training with at least three years' experience working in the oil and gas sector.</li> </ul>
Guided Learning Hours (GLH)	605
Assessment	Portfolio of evidence (internal assessment)
Grading information	The qualification and units are graded pass/fail.

Qualification title	Pearson BTEC International Level 2 Specialist Diploma for Electrical Technicians in Oil and Gas Facilities
Operational start date	1 April 2020
Entry requirements	<p>Learners must be aged at least 18 and employed in a relevant role that allows them to demonstrate the knowledge and skills as part of their normal work activities.</p> <p>Learners must also have EITHER:</p> <ul style="list-style-type: none"> <li>completed an engineering diploma (Level 3 or equivalent)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>attended in-house training with at least three years' experience working in the oil and gas sector.</li> </ul>
Guided Learning Hours (GLH)	540
Assessment	Portfolio of evidence (internal assessment)
Grading information	The qualification and units are graded pass/fail.

<b>Qualification title</b>	<b>Pearson BTEC International Level 2 Specialist Diploma for Instrument Technicians in Oil and Gas Facilities</b>
Operational start date	1 April 2020
Entry requirements	<p>Learners must be aged at least 18 and employed in a relevant role that allows them to demonstrate the knowledge and skills as part of their normal work activities.</p> <p>Learners must also have EITHER:</p> <ul style="list-style-type: none"> <li>completed an engineering diploma (Level 3 or equivalent)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>attended in-house training with at least three years' experience working in the oil and gas sector.</li> </ul>
Guided Learning Hours (GLH)	550
Assessment	Portfolio of evidence (internal assessment)
Grading information	The qualification and units are graded pass/fail.

<b>Qualification title</b>	<b>Pearson BTEC International Level 2 Specialist Diploma for Mechanical Technicians in Oil and Gas Facilities</b>
Operational start date	1 April 2020
Entry requirements	<p>Learners must be aged at least 18 and employed in a relevant role that allows them to demonstrate the knowledge and skills as part of their normal work activities.</p> <p>Learners must also have EITHER:</p> <ul style="list-style-type: none"> <li>completed an engineering diploma (Level 3 or equivalent)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>attended in-house training with at least three years' experience working in the oil and gas sector.</li> </ul>
Guided Learning Hours (GLH)	610
Assessment	Portfolio of evidence (internal assessment)
Grading information	The qualification and units are graded pass/fail.

## 3 Structure

### Qualification structures

The structures for the four qualifications in this specification are shown below. Learners will need to meet the requirements shown in the relevant table before the qualification can be awarded.

Pearson BTEC International Level 2 Specialist Diploma for Process Technicians in Oil and Gas Facilities		
Unit number	Unit title	GLH
<b>Mandatory units – learners must achieve all three units</b>		
1	Control Frontline Barriers in Oil and Gas Operations	120
2	Respond and Recover in Emergencies and Incidents	60
3	Implement Process Safety	130
<b>Mandatory units for Process Technicians – learners must achieve all three units</b>		
4	Operate and Monitor Oil Production Processes and Associated Systems	135
5	Operate and Monitor Gas Processes and Dehydration Systems	110
6	Operate and Monitor the Gas Condensate Process and System	50

Pearson BTEC International Level 2 Specialist Diploma for Electrical Technicians in Oil and Gas Facilities		
Unit number	Unit title	GLH
<b>Mandatory units – learners must achieve all three units</b>		
1	Control Frontline Barriers in Oil and Gas Operations	120
2	Respond and Recover in Emergencies and Incidents	60
3	Implement Process Safety	130
<b>Mandatory units for Electrical Technicians– learners must achieve all three units</b>		
7	Perform Routine Operations and Maintenance of Electrical Drives and the Motor-control Centre	80
8	Perform Routine Operations and Maintenance of Power Generation and Control Equipment	80
9	Perform Routine Operations and Maintenance of Power Supplies and Lighting Systems	70

**Pearson BTEC International Level 2 Specialist Diploma for Instrument Technicians in Oil and Gas Facilities**

Unit number	Unit title	GLH
<b>Mandatory units – learners must achieve all three units</b>		
<b>1</b>	Control Frontline Barriers in Oil and Gas Operations	<b>120</b>
<b>2</b>	Respond and Recover in Emergencies and Incidents	<b>60</b>
<b>3</b>	Implement Process Safety	<b>130</b>
<b>Mandatory units for Instrument Technicians – learners must achieve all three units</b>		
<b>10</b>	Perform Routine Operations and Maintenance of Process Measuring and Analyser Devices	<b>70</b>
<b>11</b>	Perform Routine Operations and Maintenance of Current-to-Pneumatic Converters	<b>60</b>
<b>12</b>	Perform Routine Operations and Maintenance of Process Controllers and Control Valves	<b>110</b>

**Pearson BTEC International Level 2 Specialist Diploma for Mechanical Technicians in Oil and Gas Facilities**

Unit number	Unit title	GLH
<b>Mandatory units – learners must achieve all three units</b>		
<b>1</b>	Control Frontline Barriers in Oil and Gas Operations	<b>120</b>
<b>2</b>	Respond and Recover in Emergencies and Incidents	<b>60</b>
<b>3</b>	Implement Process Safety	<b>130</b>
<b>Mandatory units for the Mechanical Technicians – learners must achieve all three units</b>		
<b>13</b>	Perform Routine Operations and Maintenance of Static Equipment	<b>120</b>
<b>14</b>	Perform Routine Operations and Maintenance of Reciprocating Engines and Pumps	<b>90</b>
<b>15</b>	Perform Routine Operations and Maintenance of Compressors and Turbines	<b>90</b>

## 4 Units

### Understanding your units

The units in this specification set out our expectations of assessment in a way that helps you to prepare your learners for assessment. The units help you to undertake assessment and quality assurance effectively.

Each unit in the specification is set out in a similar way. This section explains how the units work. It is important that all teachers, assessors, internal verifiers and other staff responsible for the programme review this section.

Section	Explanation
<b>Unit number</b>	The number is in a sequence in the specification. Where a specification has more than one qualification, numbers may not be sequential for an individual qualification.
<b>Unit title</b>	This is the formal title that we always use, and it will appear on learners' certificates.
<b>Level</b>	All units and qualifications have a level assigned to them. The levels correspond with the levels used in the UK's Regulated Qualification Framework.
<b>Unit type</b>	This says if the unit is mandatory or optional for the qualification.
<b>Guided Learning Hours (GLH)</b>	Guided Learning Hours (GLH) is an estimate of the number of hours that will be needed for a typical learner to achieve the unit. GLH include all training involving centre staff in teaching and supervising learners, as well as all assessment activities.
<b>Unit summary</b>	This summarises the purpose of the unit.
<b>Unit assessment requirements</b>	This section outlines any requirements for the assessment of the unit.
<b>Range statements</b>	Range statements specify the scope and contexts to which the assessment criteria apply. All items in the range must be covered, except for items that follow an 'e.g.'
<b>Learning outcomes</b>	The learning outcomes set out what a learner must know, understand or be able to do as the result of a process of learning.
<b>Assessment criteria</b>	The assessment criteria specify the standard the learner is required to meet to achieve a learning outcome. Space is provided to record the date and type of evidence when the assessment criteria have been evidenced.
<b>Declarations</b>	This section is signed and dated by the learner and assessor after all the assessment criteria have been evidenced. If sampled, it must be signed and dated by the internal verifier.



## Index of units

This section contains all the units developed for these qualifications. Please refer to *page 8* to check which units are available in each qualification.

Unit 1:	Control Frontline Barriers in Oil and Gas Operations	13
Unit 2:	Respond and Recover in Emergencies and Incidents	21
Unit 3:	Implement Process Safety	27
Unit 4:	Operate and Monitor Oil Production Processes and Associated Systems	35
Unit 5:	Operate and Monitor Gas Processes and Dehydration Systems	49
Unit 6:	Operate and Monitor the Gas Condensate Process and System	57
Unit 7:	Perform Routine Operations and Maintenance of Electrical Drives and the Motor-control Centre	63
Unit 8:	Perform Routine Operations and Maintenance of Power Generation and Control Equipment	69
Unit 9:	Perform Routine Operations and Maintenance of Power Supplies and Lighting Systems	75
Unit 10:	Perform Routine Operations and Maintenance of Process Measuring and Analyser Devices	81
Unit 11:	Perform Routine Operations and Maintenance of Current-to-Pneumatic Converters	87
Unit 12:	Perform Routine Operations and Maintenance of Process Controllers and Control Valves	91
Unit 13:	Perform Routine Operations and Maintenance of Static Equipment	97
Unit 14:	Perform Routine Operations and Maintenance of Reciprocating Engines and Pumps	107
Unit 15:	Perform Routine Operations and Maintenance of Compressors and Turbines	113



# Unit 1: Control Frontline Barriers in Oil and Gas Operations

Level: 2

Unit type: **Mandatory for all qualifications**

Guided learning hours: 120

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to implement frontline safety barriers so that activities are carried out safely and in accordance with company standards and operating procedures.

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Be able to handle chemicals safely

1.1 Allowable exposure limits of chemicals based on:

- occupational safety standards
- manufacturers' standards for chemicals.

1.2 Chemical receipt and storage activities:

- risk assessment
- use of control measures
- use of personal protective equipment (PPE).

1.3 Handle chemicals safely:

- interpret information found on material safety data sheets (MSDS), including symbols, signage and chemical coding
- follow handling and storage procedures in accordance with safe handling of chemicals (SHOC) principles
- describe relevant emergency procedures.

## **2 Understand the hazards associated with working at height**

### 2.1 Hazards:

- falls
- falling objects.

### 2.2 Limitations of fall protection and barrier systems:

- limiting worker movement
- slowing down maintenance work.

### 2.3 Considerations for a rescue plan:

- equipment is suitable and checked regularly
- limiting overload or overreach when working at height
- protection from falling objects
- emergency evacuation and rescue procedures
- competence of rescue team.

## **3 Know the preparations for the safe entry into a confined space**

### 3.1 Definition of a confined space:

- a physical space that is substantially enclosed.

### 3.2 Hazards in a confined space:

- lack of oxygen
- poisonous gas, fumes or vapour
- liquids and solids that can suddenly fill the space or release gases when disturbed
- fire and explosion, and residues left in tank
- heat and darkness.

### 3.3 How the hazards can be mitigated:

- use of Permit to Work system
- safe system of work
- confined space entry certificate.

### 3.4 Permit to Work requirements to enter a confined space:

- isolation
- cleaning before entry
- provision of ventilation
- gas testing
- provision of special tools and lighting
- certified and trained personnel.

### 3.5 Considerations for a rescue plan:

- preparation of emergency arrangement
- provision of rescue harnesses
- communication
- first-aid procedure.

## **4 Be able to control static hazards in the facility**

### 4.1 Static risks and hazards:

- discharge from static electricity
- flammable or combustible substances
- explosion
- oil tanker loading and offloading.

### 4.3 Types of static hazard controls:

- earthing of instruments and control system in hazardous locations
- use of safety certified equipment
- use of fire- and explosion-proof equipment.

### 4.4 Checks after maintenance:

- correct reinstallation of static control equipment.

## **5 Be able to perform lifting, rigging and slinging operations**

### 5.1 Hazards associated with lifting, rigging and slinging:

- suspended loads
- uneven working surfaces
- wet and slippery working surfaces
- working surfaces not clear of obstructions
- wind and swell limitations.

### 5.2 Hand signals:

- standardised signals
- standardised instructions.

### 5.3 Tools and lifting gears:

- correct tools
- certified tools
- certified gears.

5.4 Visual inspections:

- to check for defects, e.g. worn shackle body and pin, worn rope sling
- to check the expiry date of certified components
- to check the correct colour codes.

5.5 Lifting operations:

- company requirements
- compliance with Permit to Work
- supervised and performed by competent personnel
- weather considerations.

5.6 Hand signals:

- raise hoist
- lower hoist
- swing boom
- move slowly.

**6 Be able to perform manual handling of materials in the facility**

6.1 Risks involved in manual handling:

- muscle sprain due to stretching or repetitive tasks
- bending leading to back injury
- fingers caught in heavy materials
- awkward postures.

6.2–6.4 Manual handling involving:

- lifting
- carrying
- lowering.

6.5 Coach others:

- subordinates
- peers
- contractors.

**7 Be able to demonstrate personal safety at work**

7.1 Safety tools:

- tool box meeting
- job hazards analysis
- Permit to Work.

## 7.2 Controls:

- audits and reviews
- levels of approval
- guidelines and procedures.

## 7.3 Arrangements for safe systems:

- isolation status display
- access controls
- mechanical aids
- Permit to Work.

## 7.4 Reviews and evaluation of own work and effectiveness:

- peer reviews
- site safety checks and audits within own area of responsibility.

## 7.5 Risks arising from changes:

- facility changes
- maintenance
- operations.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to handle chemicals safely	1.1	Describe the allowable exposure limits for chemicals used in oil and gas operations			
		1.2	Complete chemical receipt and storage activities in accordance with standard operating procedures			
		1.3	Apply procedures for the safe handling of chemicals			
2	Understand the hazards associated with working at height	2.1	Explain the hazards associated with working at height			
		2.2	Explain the limitations of fall protection and barrier systems			
		2.3	List the considerations for a rescue plan for working at height			
3	Know the preparations for the safe entry into a confined space	3.1	Define what is meant by 'confined space'			
		3.2	List the hazards that exist when entering a confined space			
		3.3	Describe how hazards associated with entering a confined space can be mitigated			
		3.4	Explain the Permit to Work requirements for entering a confined space			
		3.5	Describe the considerations for rescue of personnel in a confined space			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to control static hazards in the facility	4.1	Describe static hazards that exist in an oil and gas facility			
		4.2	Follow standard operating procedures for static prevention during operations and maintenance			
		4.3	Describe the function of various types of static hazard controls that are built into equipment design			
		4.4	Check, after maintenance activities, that the static control equipment is reinstalled correctly			
5	Be able to perform lifting, rigging and slinging operations	5.1	Explain the hazards associated with lifting, rigging and slinging			
		5.2	Explain an agreed range of hand signals during lifting operations			
		5.3	Select correct tools and lifting gears			
		5.4	Perform visual inspection on lifting, rigging and slinging tools and equipment			
		5.5	Perform lifting operations in accordance with company procedures			
		5.6	Use and follow correct hand signals during lifting operations			
6	Be able to perform manual handling of materials in the facility	6.1	Describe the risks associated with manual handling			
		6.2	Describe correct procedures for manual handling			
		6.3	Carry out a risk assessment to determine the correct manual handling for each activity			
		6.4	Perform safe manual handling of materials			
		6.5	Coach others in manual handling techniques			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
7	Be able to demonstrate personal safety at work	7.1	Apply appropriate safety tools to develop a safe system of work			
		7.2	Monitor the effectiveness of controls in operation within own work area to maintain safety			
		7.3	Work with other colleagues to establish key arrangements for safe systems of work			
		7.4	Carry out reviews and evaluation of own work and effectiveness			
		7.5	Identify the risks from potential or actual changes to facility, operations or maintenance			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*

# Unit 2: Respond and Recover in Emergencies and Incidents

Level: 2

Unit type: **Mandatory for all qualifications**

Guided learning hours: 60

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## Unit summary

This unit gives learners the knowledge and skills required as operations technicians to respond and recover in the event of control failures of frontline barriers to ensure minimal damage to people, the environment and assets in accordance with company procedures.

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Be able to use breathing apparatus

#### 1.1 Types of breathing apparatus:

- open-circuit self-contained breathing apparatus (SCBA)
- closed-circuit SCBA
- supplied-air respirator
- emergency escape set.

## 1.2 Uses and limitations:

- uses:
  - structural firefighting, e.g. open circuit SCBA
  - extended operations, e.g. closed circuit SCBA
  - specialised operations, e.g. supplied air respirator
- limitations:
  - amount of air in cylinder
  - time and effort to reach the destination, to complete tasks and to reach safe area after task completion
  - face-piece limits visibility, communication and hearing
  - physical weight requires additional energy
  - psychological limitations of users.

## 1.3 Critical checks for SCBA:

- pressure in the cylinder bottle
- leakages in hose and other SCBSA parts
- face mask tightness
- whistle alarm level
- types of demand valves used in SCBA (automatic vs. manual valve).

## 2 Be able to respond to emergencies and drills

### 2.1 Emergency response procedures:

- various types of incident, e.g. fire, explosion, rescue, terrorists
- roles of key persons
- strategies and tactics.

### 2.2 Key requirements for communication in emergency incidents:

- clarity of message
- in a timely manner
- to appropriate personnel on board.

### 2.3 Emergency response organisational structures:

- mustering stations
- roles of key persons
- training and competence requirements for each role
- escape routes
- location of emergency-response equipment.

## 2.4 Use emergency response equipment:

- break glass
- walkie-talkie
- telephones
- lift raft
- lift boat
- firefighting equipment.

## 2.5 Perform assigned roles on different occasions:

- firefighting team member
- muster-checker
- coxswain
- first-aider.

## **3 Be able to report near misses and incidents**

### 3.1 Policy on reporting incidents:

- all incidents
- learning process to reduce and prevent incidents recurring
- record keeping.

### 3.2 Near miss report and incident report:

- complete a report for any unplanned event that may or may not involve injury, illness or damage
- all near misses to be reported.

### 3.3 Follow up:

- rectification action to be taken immediately
- corrective action to reduce harm to people, environment and asset
- analyse root causes to prevent future incidents
- roles and responsibilities of different parties.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to use breathing apparatus	1.1	Describe types of breathing apparatus			
		1.2	Describe the uses and limitations of breathing apparatus			
		1.3	Perform critical checks when putting on breathing apparatus			
		1.4	Put on breathing apparatus in accordance with manufacturer's instructions			
		1.5	Take off breathing apparatus in accordance with manufacturer's instructions			
2	Be able to respond to emergencies and drills	2.1	Explain emergency-response procedures			
		2.2	Describe the key requirements for communication with other members of staff during emergency situations			
		2.3	Describe emergency response organisational structures of own facility			
		2.4	Use appropriate types of emergency response equipment in an emergency drill			
		2.5	Perform assigned roles in an emergency drill			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to report near misses and incidents	3.1	Describe the company policy on reporting incidents			
		3.2	Complete a near miss report and an incident report			
		3.3	Follow up on incidents that have been reported to ensure that they are dealt with and closed			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*





# Unit 3: Implement Process Safety

Level: 2

Unit type: **Mandatory for all qualifications**

Guided learning hours: **130**

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to implement process safety requirements and ensure that all activities are being carried out safely and in accordance with company standards and operating procedures.

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Be able to verify line and equipment specifications and associated drawings

1.1 Use piping and instrument drawings (P&IDs):

- identify symbols
- interpret drawings to explain functions of facility and process
- interpret cause-and-effects diagram.

1.2 Functions of process instrumentation:

- transmitter
- controller
- valves
- safe-guarding instruments, including detecting devices
- limit switches
- pressure safety valve (PSV) and pressure relief valve (PRV).

1.3 Checks of P&ID drawings for accuracy:

- process and instruments
- symbols and legend
- piping specifications and materials.

**2 Be able to carry out temporary facility changes in accordance with company standards**

2.1 Facility change request procedures:

- technical basis for the proposed changes
- impact of change on health and safety
- modification to operating procedures
- time required for change
- management of change (MOC).

2.2 Barrier-reduction effect:

- preliminary review
- risk assessment and/or technical review
- effect on operating procedures
- effect on technical integrity of facility.

2.3 Overall process integrity:

- operations integrity guidelines
- technical integrity as per design
- approval of all changes by in-house technical authority.

2.4 Propose temporary facility change requests to include:

- case for change
- resource requirements
- follow-up action party
- time frame.

**3 Be able to perform work within the area zone classification**

3.1 Zone classifications:

- hazardous areas are classified based on frequency and duration of occurrence of explosive atmosphere
- types, e.g. zone 0, 1, 2 and safe zone
- zone boundaries.

### 3.2 Checks after maintenance or shutdown activity:

- correct equipment is installed that complies to zone classification
- explosion-proof equipment for designated zone
- maintenance considerations in classified zone areas.

### 3.3 Types of equipment for different zones:

- zone-classification and symbol/marketing schemes
- explosion proof equipment, including categories and uses.

### 3.4 Permit to Work requirements:

- attention to zone classifications and precautions.

## 4 Be able to work safely in a hazardous atmosphere

### 4.1 Risks assessments for work on facilities containing hazardous atmosphere:

- risks associated with increased concentrations of oxygen
- risks associated with increased concentrations of flammable and toxic gases, vapour, mist or fumes.

### 4.2 Precautions for work in hazardous atmosphere:

- breathing
- risk of explosion
- explosive limit.

### 4.3 Respiratory protection equipment:

- protection equipment, e.g. dusk mask, self-contained breathing apparatus (SCBA).

### 4.4 Communicate risks and precautions to other staff:

- subordinates
- colleagues
- control room operator
- contractors.

### 4.5 Functional checks of monitoring equipment:

- calibration
- battery life
- bump test.

## **5 Be able to apply maintenance override switch (MOS)/operations override switch (OOS)**

### 5.1 Risks when executing overrides in the facility:

- operations
- technical.

### 5.2 Risks when overrides are removed:

- systematic failures due to human error.

### 5.3 Disable alarms in preparation for overrides:

- causes and effects understood and executed
- in accordance with company procedures.

### 5.4 Record overrides:

- override registers
- shift-handover log
- override certificate.

### 5.5 Communicate active overrides:

- to staff
- to contractors
- on the Permit to Work certificate.

### 5.6 Perform overrides:

- in accordance with company procedures.

## **6 Be able to perform gas-freeing safely**

### 6.1 Isolation of process equipment and systems:

- vessel and pipes to be drained and flushed/cleaned of hydrocarbons.

### 6.2 Controls for gas freeing or purging activity:

- methods and techniques, e.g. drain and flush vessels and pipes via closed drain system to a sealed drain tank.

### 6.3 Carry out gas freeing or purging:

- methods and techniques, e.g. liquid hydrocarbon must be cleared before purging
- special requirement for purging, e.g. certain filter beds require purging in a specific direction only
- in accordance with company procedures and manufacturer's instructions.

### 6.4 Record gas-free condition:

- in accordance with company standard and procedures
- gas-test record.

## **7 Be able to carry out gas testing in the facility**

### 7.1 Explosive limits:

- upper explosive limits (UEL)
- lower explosive limits (LEL).

### 7.2 Carry out gas testing:

- normal
- confined space
- hot work.

### 7.3 Perform functional tests in accordance with:

- company standard operating procedures
- manufacturer's operating instructions.

### 7.4 Interpret gas-testing results:

- oxygen level
- LEL of gases
- carbon monoxide
- volatile organic compounds
- H<sub>2</sub>S.

### 7.5 Record gas-testing results:

- gas test certificate
- in accordance with Permit to Work requirements.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to verify line and equipment specifications and associated drawings	1.1	Describe the operations of facility process using piping and instrumentation (P&ID) drawings for own facility			
		1.2	Describe the functions of process instrumentation			
		1.3	Check the accuracy of piping and instrumentation drawings			
2	Be able to carry out temporary facility changes in accordance with company standards	2.1	Describe facility change request procedures			
		2.2	Explain the barrier-reduction effect of a temporary facility change			
		2.3	Explain the impact of temporary facility changes on overall process integrity			
		2.4	Propose temporary facility change requests			
3	Be able to perform work within the area zone classification	3.1	Explain zone classifications			
		3.2	Perform checks after maintenance or shutdown activity			
		3.3	Use correct equipment types within the respective area classification zones			
		3.4	Raise the necessary permits required to work in various zone-classification areas			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to work safely in a hazardous atmosphere	4.1	Carry out risk assessments for work on facilities containing hazardous atmosphere			
		4.2	Implement precautions for work in hazardous atmosphere			
		4.3	Select appropriate respiratory protection equipment for work on facilities containing a hazardous atmosphere			
		4.4	Communicate risks and precautions to other staff working in hazardous atmosphere			
		4.5	Perform functional checks on the condition of monitoring equipment prior to use			
5	Be able to apply maintenance override switch (MOS)/operations override switch (OOS)	5.1	Describe process-related safety risks when executing overrides in facility			
		5.2	Describe process-related safety risks when overrides are removed from the facility			
		5.3	Disable alarms in preparation for override tasks			
		5.4	Record overrides in shift report and override log			
		5.5	Communicate active overrides during shift handover			
		5.6	Perform overrides in accordance with company procedures			
6	Be able to perform gas-freeing safely	6.1	Identify and carry out correct isolation of process equipment and systems in relation to gas freeing			
		6.2	Apply necessary controls for a gas-freeing or purging activity			
		6.3	Carry out gas freeing or purging to the required standards			
		6.4	Record the gas-free condition of equipment in facility logs			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
7	Be able to carry out gas testing in the facility	7.1	Describe explosive limits			
		7.2	Carry out gas tests in accordance with standards			
		7.3	Carry out functional tests prior to gas-testing operations			
		7.4	Interpret gas-testing results			
		7.5	Record the gas-testing results in accordance with company procedures			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*



# Unit 4: Operate and Monitor Oil Production Processes and Associated Systems

Level: 2

Unit type: Mandatory for Process Technicians

Guided learning hours: 135

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## Unit summary

The aim of this unit is to give learners the knowledge and skills required as an operations technician to operate and monitor oil production processes and associated systems, ensuring that all activities are carried out safely and in accordance with company standards and operating procedures.

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Understand the principles associated with oil processes and systems

#### 1.1 Oil processes and systems:

- two and three-phase separation
- produced water and process
- utility system and process
- chemical injection facilities
- open and closed drain system
- gas-lift system
- water-injection system
- flare and knock-out system
- wellhead control panel.

1.2 Functions of each component in a piping and instrumentation drawing:

- functions, including its primary purpose in process, measurement and control
- components to include:
  - static and rotating equipment
  - instrumentation such as transmitter, recorder, controller, control valves, current to pneumatic convertors, relief valves.

1.3 Risks and hazards associated with oil processes:

- operations, e.g. oil sampling
- technical, e.g. stopping/starting of machineries, operating well head control panel.

1.4 Different alarm limits and their consequences if exceeded:

- lower
- upper
- impact on operations integrity
- differentiate between process alarms, critical alarms and alerts.

1.5 Associated systems:

- produced water and process
- utility system and process – fuel, water and instrument air systems
- chemical-injection facilities
- drain system.

1.6 Purposes of enhanced recovery systems:

- increased production
- de-bottlenecking.

1.7 Different enhanced recovery techniques:

- gas lift (secondary recovery and artificial lift)
- water flood
- chemical injection
- de-bottlenecking
- de-emulsification
- descaling
- sizing
- compression.

## 2 Be able to operate and monitor the wellhead and header system

### 2.1 Well status:

- wells reporting
- SSV and SCSSV leaks, e.g. threshold limit and associated risks
- wellhead handover certificate.

### 2.2 Report at least **three** of the following well abnormalities:

- sand/water breakthrough
- high H<sub>2</sub>S content
- packing or plug not holding – inconsistent conductor casing pressure (CCP) and conductor head pressure (CHP) pressure monitoring
- faulty barriers
- problems associated with surface control subsurface safety valve (SCSSV) and sub surface valve (SSV)
- problems associated with well head casing manifold (WHCM).

*(For any types of abnormality that are **not** evidenced, learners must explain how they would recognise them if they were to occur.)*

### 2.3 Open and close a well:

- in accordance with operating procedures
- comply with production programmes.

### 2.4 Monitor wellhead pressures in accordance with company operating procedures:

- monitor basic well integrity issues from CCP and CHP
- close in tubing head pressure (CITHP)
- flowline working pressure (FWP)
- reservoir management (well pressure maintenance).

### 2.5 Take samples and analyse:

- sand
- water cut (gas moistures, oil in water, water in oil, water in condensate)
- emulsions
- H<sub>2</sub>S content
- fluid properties (density, pH, true vapour pressure (TVP)).

### 2.6 Operate and maintain wellhead control panel and pressures:

- types of wellhead control panel used in own facility
- hydraulic pumps.

- 2.7 Inspect and change well beans and bean box in accordance with wells programme:
- correct sizes of beans
  - in accordance with company procedures of bean up/down.

### **3 Be able to operate and monitor oil production processes and systems during normal operations**

- 3.1 Operating parameters of the oil production process and its associated systems:
- all parameters for production process and utilities
  - alarms status and their effects.
- 3.2 Operate and monitor production processes for:
- the operating envelope being exceeded
  - excessive vibration or noises
  - erratic process condition fluctuating/controls
  - frequent trips
  - poor process quality (bad glycol quality, high water content in export, high sand content)
  - chemical-injection system trips leading to no chemical injection, e.g. corrosion inhibitor, O<sub>2</sub>/H<sub>2</sub>S scavengers, biocide, nitrate, methanol, methyl ethyl glycol (MEG).
- 3.3 Actions to rectify abnormal conditions in a timely manner:
- inform supervisor or panel room operator.
- 3.4 Key communication during shifts:
- overrides
  - outstanding Permit to Work
  - any safety concerns
  - shift handover meeting.

### **4 Be able to carry out pigging operations in an oil and gas transmission pipeline**

- 4.1 Prepare and plan:
- Permit to Work and job hazard analysis
  - review platform activities in accordance with manual of permitted operations (MOPO)
  - pig selection and pigging plan
  - check sheets
  - tools and PPE requirements.

#### 4.2 Launch and recover:

- follow company standards and operating procedures
- site-specific procedure.

#### 4.3 Re-establish pipeline to operational conditions:

- in accordance with company procedures
- follow site-specific procedure.

#### 4.4 Completion of work:

- data recording in accordance with company requirements.

### **5 Be able to operate and monitor a well testing system**

#### 5.1 Start up a well testing system:

- in accordance with company procedures.

#### 5.2 Operate well testing operations:

- in accordance with company procedures and standards
- by well group.

#### 5.3 Monitor test separator process parameters:

- level
- flow
- pressure
- temperature.

#### 5.4 Report any deviation in well test operations:

- deviations from test programme
- report abnormalities to site supervisor.

#### 5.5 Communicate the status of well test conditions:

- to control room operator
- to supervisor.

#### 5.6 Record well test results:

- in accordance with company procedures.

### **6 Be able to operate and monitor associated systems**

#### 6.1 Associated systems:

- produced water and process
- utility system and process
- chemical-injection facilities
- drainage system (open and closed drain systems).

6.2 Report any abnormalities:

- to relevant personnel for action
- in a timely manner.

6.3 Isolate and de-isolate to allow maintenance or facility changes:

- to be carried out in accordance with company procedures
- ensure compliance with all HSE frontline barrier management practice.

6.4 Communicate with relevant personnel:

- control room operator
- site supervisor.

6.5 Record and report any changes:

- in accordance with company procedures
- company computerised system, e.g. SAP or Maximo.

**7 Be able to perform tank and cargo operations**

7.1 Tank-dipping operations:

- manual reading
- automatic level gauge readings
- comparison of manual and automatic readings.

7.2 Maintain tank-stock capacity:

- transfer liquids to ensure sufficient capacity for new stocks
- maintain ship stability and proper tank pressure as result of bulk movement (for floater operations only)
- implement stock reconciliation procedures (including measurement and temperature correction), minimising losses within agreed targets.

7.3 Tank-water dipping and drainage operations:

- apply procedures for safe operations to minimise the risk of spill and exposure to vapour and inert gas
- perform water draining from floating or fixed roof tanks, as applicable.

7.4 Take crude oil samples:

- take samples from designated locations
- prepare composite samples
- carry out basic testing in accordance with procedures
- label and store samples to required standards.

## 8 Be able to start up integrated oil production facilities

### 8.1 Operational instructions:

- readiness for start-up
- resources available
- HSSE risks.

### 8.2 Prepare a production process and utilities for start-up:

- prepare acceptance/handover certificate
- follow operational procedures for starting up the facility
- use start-up logic diagram
- follow fire and gas cause-and-effects diagram
- attend pre-start-up meetings
- attend toolbox meetings
- prepare check sheets
- allocate appropriate manpower distribution
- apply job hazard analysis and Permit to Work
- comply with PPE requirements.

### 8.3 Start up a production process and utilities:

- in accordance with company procedures
- follow pre-start-up sequence
- record response of critical valves
- execute overrides or MOS
- monitor parameters of all key processes
- record data
- apply manual of permitted operations (MOPO) where required.

### 8.4 Abnormalities during start-up, e.g.:

- equipment failures
- process irregularities
- alarms.

### 8.5 Record any changes:

- in accordance with company procedures
- use company computerised system, e.g. SAP.

## **9 Be able to shut down integrated oil production facilities**

### 9.1 Operational instructions:

- readiness for shutdown
- shut down window
- resources available
- HSE risks.

### 9.2 Prepare facilities for shutdown:

- assess risks and resources
- prepare acceptance/handover certificate
- follow operations procedures for shutting down of facility
- use shutdown logic diagram
- follow process shutdown (PSD)/ emergency shutdown (ESD) cause-and-effects diagram
- follow fire and gas cause-and-effects diagram
- attend pre-shutdown meetings
- attend toolbox meetings
- prepare check sheets
- allocate manpower
- apply job hazard analysis and complete Permit to Work.

### 9.4 Shut down the oil production facility system in accordance with company procedures:

- follow production shutdown sequence
- record key shutdown parameters
- follow shutdown sequence shown in cause-and-effects diagram
- record response of critical valves
- activate operations override or maintenance override switches
- prepare backup utilities, power, water and air supplies
- test functionality of ESD systems.

### 9.5 Faults and problems during shutdown:

- equipment failures
- process irregularities
- alarms and shutdown parameters.

### 9.6 Record any changes:

- in accordance with company procedures
- use company computerised system, e.g. SAP.



## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the principles associated with oil processes and systems	1.1	Explain oil processes and systems using piping and instrumentation drawings			
		1.2	Describe the functions of each component in a piping and instrumentation drawing			
		1.3	Describe the risks and hazards associated with oil processes and systems			
		1.4	List different alarm limits and their consequences when exceeded			
		1.5	Explain the operating principles of associated systems			
		1.6	Explain the purposes of enhanced recovery systems			
		1.7	Describe different enhanced recovery techniques used in oil and gas industries			
		1.8	Explain oil enhanced recovery processes and systems used in own area			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
2	Be able to operate and monitor the wellhead and header system	2.1	Inspect and confirm the status of the well			
		2.2	Report well abnormalities to a supervisor			
		2.3	Open and close a well in accordance with company operating procedures			
		2.4	Monitor wellhead pressures in accordance with company operating procedures			
		2.5	Take samples and analyse in accordance with company standards			
		2.6	Operate and maintain a wellhead control panel and pressures in accordance with company operating procedures			
		2.7	Inspect and change well beans and bean box in accordance with the company well programme			
3	Be able to operate and monitor oil-production processes and systems during normal operations	3.1	Describe the operating parameters of oil-production processes and its associated systems in own facility			
		3.2	Operate and monitor production processes within allowable operating parameters during normal operations			
		3.3	Execute appropriate actions to rectify abnormal conditions in a timely manner			
		3.4	Carry out key communication during shifts			
4	Be able to carry out pigging operations in an oil and gas transmission pipeline	4.1	Prepare and plan for the pigging of a pipeline			
		4.2	Launch and recover a pipeline pig			
		4.3	Re-establish pipeline to operational conditions			
		4.4	Notify supervisor on completion of work			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to operate and monitor a well testing system	5.1	Start up a well testing system			
		5.2	Operate well testing operations			
		5.3	Monitor test-separator process parameters to ensure that well test operations are normal			
		5.4	Report any deviation in well test operations promptly to relevant personnel for actions			
		5.5	Communicate the status of well test conditions with the panel operator and other relevant personnel in a timely manner			
		5.6	Record well test results and submit these to relevant personnel for analysis			
6	Be able to operate and monitor associated systems	6.1	Operate and monitor associated systems in accordance with company procedures			
		6.2	Report any abnormalities to relevant personnel for actions			
		6.3	Isolate and de-isolate associated systems to allow for maintenance and facility changes in accordance with company procedures			
		6.4	Communicate readiness of associated system to relevant personnel			
		6.5	Record and report any changes in the system			
7	Be able to perform tank and cargo operations	7.1	Carry out tank-dipping operations in accordance with company standards and procedures			
		7.2	Maintain tank-stock capacity			
		7.3	Perform tank water dipping and drainage operations			
		7.4	Take crude oil samples in accordance with company procedures			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
8	Be able to start up integrated oil production facilities	8.1	Obtain operational instructions			
		8.2	Prepare a production process and utilities for start-up			
		8.3	Safely start up the oil production facility system			
		8.4	Take necessary actions to resolve any abnormalities during start-up			
		8.5	Record all data in accordance with company procedures			
9	Be able to shut down integrated oil production facilities	9.1	Obtain operational instructions			
		9.2	Prepare facilities for shutdown			
		9.3	Correctly input and set shutdown settings, process variables and services			
		9.4	Safely shut down the oil production facility system			
		9.5	Rectify faults and problems arising during shutdown			
		9.6	Record all data in accordance with company procedures			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*



# Unit 5: Operate and Monitor Gas Processes and Dehydration Systems

Level: 2

Unit type: Mandatory for Process Technicians

Guided learning hours: 110

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to operate and monitor gas process and dehydration systems, ensuring that all activities are being carried out safely and in accordance with company standards and operating procedures.

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Understand gas production processes and dehydration systems

1.1 Gas processes and dehydration systems:

- piping and instrumentation drawings
- reference materials from manufacturers' instruction.

1.2 Properties and behaviour of hydrocarbon gases found in own facility:

- specific gravity
- dew point
- viscosity
- pour point
- explosive limits.

1.3 Interpret flow readings and calculate flow rate:

- using a basic flow equation.

## **2 Be able to operate and monitor gas production and dehydration processes**

### 2.1 Operating parameters of gas processes and associated dehydration systems:

- key operating parameters
- what they mean in operational terms
- calculate glycol requirements.

### 2.2 Operate gas processes and dehydration systems:

- start-up sub-processes in accordance with standard operating procedures
- shut down sub-processes in accordance with standard operating procedures.

### 2.3 Monitor key process parameters during normal operations:

- to within the designed operating envelope
- in accordance with company operating procedures.

### 2.4 Respond to process abnormalities, e.g.:

- process upsets
- equipment failures
- isolate for maintenance works
- de-isolate after maintenance
- function tests.

### 2.5 Monitor and control alarms

- in accordance with safety critical element guidelines
- alarm management guidelines.

### 2.6 Key communication during shifts:

- overrides
- outstanding Permit to Work
- any safety concerns
- shift handover.

### 2.7 Product sampling in accordance with company procedures:

- glycol sampling
- gas properties sampling.



### **3 Be able to operate and monitor major equipment and associated systems in gas processes and dehydration systems**

3.1 Operate and monitor major equipment, in accordance with company procedures and manufacturers' instructions:

- coolers
- exchangers
- pumps
- compressors.

3.2 Report abnormalities to appropriate personnel, e.g.:

- excessive noise, temperatures, vibrations
- deviation from norms
- panel operator or shift supervisor.

3.3 Prepare the isolation of major equipment:

- in accordance with company procedures
- in line with frontline barrier management.

3.4 Reinstate associated systems:

- in accordance with company procedures
- de-isolate equipment
- functional tests
- handover back to operations.

3.5 Record and report changes to gas processes and dehydration systems:

- in accordance with company procedures
- facility change guidelines
- documentation control guidelines.

### **4 Be able to start up integrated gas production facilities**

4.1 Operational instructions:

- readiness for start-up
- resources available
- HSE risks.

4.2 Prepare production processes and utilities for start-up:

- prepare acceptance/handover certificate
- follow operations procedures for starting up of facility
- follow start-up logic diagram
- follow fire and gas cause-and-effects diagram
- attend pre-start-up meetings
- conduct toolbox meetings
- perform check sheets
- allocate manpower
- follow job hazard analysis and Permit to Work
- comply with PPE requirements.

4.3 Start up:

- in accordance with company procedures
- perform pre-start-up sequence
- record response of critical valves
- perform overrides or MOS
- monitor all key processes
- maintain data recording
- follow manual of permitted operations (MOPO).

4.4 Abnormalities during start up, e.g.:

- equipment failures
- process irregularities
- alarms.
- 4.5 Record any changes:
- in accordance with company procedures
- company computerised system, e.g. SAP/Maximo.

**5 Be able to shut down integrated gas production facilities**

5.1 Operational instructions:

- readiness for shutdown
- shutdown window
- resources available
- HSE risks.

## 5.2 Prepare facilities for shutdown:

- prepare acceptance/handover certificate
- follow operations procedures for shutting down of facility
- comply with all site specific procedures
- follow shutdown logic diagram
- follow PSD/ESD cause-and-effects diagram
- follow fire and gas cause-and-effects diagram
- attend and contribute in pre-shutdown meetings
- attend toolbox meetings
- follow check sheets
- allocate manpower required for shutdown
- follow job hazard analysis and Permit to Work
- comply with PPE requirements.

## 5.3 Shut down the system:

- in accordance with company procedures
- ensure sufficient backup utilities, power, water and air supplies
- test functionalities of ESD systems
- follow production shutdown sequence
- follow shutdown sequence shown in cause-and-effects diagram
- apply overrides or MOS
- record key shutdown parameters.

## 5.4 Faults and problems during shut down, e.g.:

- equipment failures
- process irregularities
- alarms and shutdown parameters.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand gas-production processes and dehydration systems	1.1	Explain gas processes and dehydration systems			
		1.2	Explain the properties and behaviour of hydrocarbons			
		1.3	Interpret flow meter readings and calculate the flow rate of fluids			
2	Be able to operate and monitor gas production and dehydration processes	2.1	Describe the operating parameters of gas processes and the associated dehydration systems in own facility			
		2.2	Operate gas processes and dehydration systems within their designed operating envelope			
		2.3	Monitor key process parameters during normal operations in accordance with company procedures			
		2.4	Respond to process abnormalities to restore operations in accordance with company procedures			
		2.5	Monitor and control alarms			
		2.6	Carry out key communication during shift			
		2.7	Perform product sampling in accordance with company procedures			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to operate and monitor major equipment and associated systems in gas processes and dehydration systems	3.1	Operate and monitor major equipment			
		3.2	Report abnormalities in a timely manner to appropriate personnel so that they can be rectified			
		3.3	Prepare the isolation of major equipment			
		3.4	Reinstate associated systems in accordance with company procedures			
		3.5	Record and report changes to gas processes and dehydration systems			
4	Be able to start up integrated gas production facilities	4.1	Obtain operational instructions			
		4.2	Prepare production processes and utilities for start-up			
		4.3	Start up the integrated gas production system safely in accordance with company procedures			
		4.4	Take necessary actions to resolve any abnormalities during start-up			
		4.5	Record all data in accordance with company procedures			
5	Be able to shut down integrated gas production facilities	5.1	Obtain operational instructions			
		5.2	Prepare facilities for shutdown			
		5.3	Input and set shutdown settings, process variables and services accurately			
		5.4	Shut down the system safely			
		5.5	Rectify faults and problems arising during shutdown			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*

# Unit 6: Operate and Monitor the Gas Condensate Process and System

Level: 2

Unit type: **Mandatory for Process Technicians**

Guided learning hours: 50

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to operate and monitor the gas condensate process and system, ensuring that all activities are being carried out safely and in accordance with company standards and operating procedures.

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Understand gas condensate systems

1.1 Interpret condensate and liquid separation facilities flow diagrams using:

- piping and instrument drawings
- operating manuals.

1.2 Basic three-phase separation:

- principles of three-phase separation.

1.4 Functions of key components in the gas condensate system:

- tilted plate coalescer
- porous media coalescer
- skimmer
- condensate-export system.

## **2 Be able to operate and monitor the condensate process**

- 2.1 Obtain operational instructions and permits:
- in accordance with company procedures.
- 2.2 Start up the condensate system:
- in accordance with company standards
  - in accordance with standing operating procedures (SOP).
- 2.3 Operate the condensate system:
- in accordance with company procedures
  - within its designed operating envelope.
- 2.4 Monitor key process parameters during normal operations:
- pressure
  - level
  - flow
  - temperature.
- 2.5 Rectify process abnormalities in a timely manner:
- in accordance with company procedures
  - in accordance with manufacturers' instructions.
- 2.6 Monitor and control alarms:
- in accordance with safety critical element (SCE)
  - alarm management requirements.
- 2.7 Key communication during shifts:
- overrides
  - outstanding Permit to Work
  - any safety concerns.

## **3 Be able to operate and monitor major equipment in a condensate system**

- 3.1 Operate and monitor major equipment:
- in accordance with company procedures
  - including tilted-plate coalescer, porous-media coalescer, skimmer and condensate-export system.
- 3.2 Report abnormalities to appropriate personnel in a timely manner, e.g.:
- excessive noise, temperatures, vibrations
  - deviation from norms
  - report to panel operator or shift supervisor.



3.3 Prepare the isolation and de-isolation of major equipment:

- in accordance with company procedures
- in line with frontline barrier management.

3.4 Reinstate systems:

- in accordance with company procedures
- de-isolate equipment
- perform functional tests
- hand over systems back to operations.

3.5 Record and report changes to the gas condensate processes and systems:

- in accordance with company procedures
- follow facility change guidelines
- follow documentation control guidelines.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand gas condensate systems	1.1	Interpret condensate and liquid-separation facility flow diagrams			
		1.2	Explain the basic three-phase separation process			
		1.3	Explain the functions of key components in the gas condensate system			
2	Be able to operate and monitor the condensate process	2.1	Obtain operation instructions and permits in accordance with company procedures			
		2.2	Start up the condensate system in accordance with company standards			
		2.3	Operate the condensate system within its designed operating envelope			
		2.4	Monitor key process parameters during normal operations in accordance with company procedures			
		2.5	Rectify process abnormalities in a timely manner			
		2.6	Monitor and control alarms in accordance with company alarm management system			
		2.7	Carry out key communication activities during shift			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to operate and monitor major equipment in a condensate system	3.1	Operate and monitor major equipment in accordance with company operating procedures			
		3.2	Report abnormalities to appropriate personnel in a timely manner			
		3.3	Prepare the isolation and de-isolation of major equipment in accordance with company procedures			
		3.4	Reinstate systems after maintenance or facility change in accordance with company procedures			
		3.5	Record and report changes in gas condensate processes and systems			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*



# Unit 7: Perform Routine Operations and Maintenance of Electrical Drives and the Motor-control Centre

Level: 2

Unit type: Mandatory for Electrical Technicians

Guided learning hours: 80

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to carry out routine operation and maintenance of electrical drives and the motor-control centre (MCC), ensuring that all activities are being carried out safely and in accordance with company standards and operating procedures.

In this unit, 'routine maintenance' refers to maintenance activities scheduled to be carried out at least once every 12 months (e.g. weekly, monthly, every three months, yearly).

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Be able to carry out the pre-start checks on electrical drives and the motor-control centre (MCC)

#### 1.1 Safety considerations:

- risk of electric shocks
- insulation failures
- isolation/de-isolation checklists
- motor-control area clear from obstruction
- coupling guard secured for load test
- fuses are installed properly
- correct PPE used during racking in of starter unit with main isolator off.

1.2 Operating principles of MCC:

- three-phase induction motor
- electric motor drives
- motor control centre
- with reference to manufacturers' manual
- MCC starter (direct online, star delta, VSD, auto transformer)
- overload, underload and stall current.

1.3 Make safe the operating environment:

- in accordance with company operating procedures
- general safety and precautions
- permits followed
- electrical safety rules
- site-specific procedures.

1.4 Perform pre-start checks:

- visual inspection
- measurements and monitoring using electrical meters and instruments
- in accordance with company operating procedures
- motor control area clear of obstruction
- coupling guard secured for load test
- fuses installed properly
- appropriate PPE
- all protection systems to be set within operating limits.

1.5 Record all pre-start checks and report any discrepancies to senior electrician in charge:

- in accordance with company procedures
- in accordance with check sheets
- all key parameters (voltage, speed, amperes, rotation, vibration and temperature) are operating within operating limit
- all protection system are set with an operating limit.

## **2 Be able to perform functional checks on electrical drives and the motor-control centre**

### 2.1 Perform functional tests of electrical drives and the MCC:

- in accordance with company procedures
- follow manufacturers' instructions
- switch electrical drives and MCC onto TEST mode
- keep worksite safe, e.g. clear personnel on site, MCC on TEST mode, appropriate PPE, check the condition of testing instruments
- all key parameters (voltage, speed, amperes, rotation, vibration and temperatures) are within operating limits
- all protection systems are set within operating limits
- comply with isolation/de-isolation checklists/permits or other electrical permits.

### 2.2 Report any abnormalities to the senior electrician onsite:

- insulation test results
- continuity test result
- deviations from operating parameters, e.g. voltage, speed, rotation, vibration and temperatures.

### 2.3 Record all functional check readings:

- in accordance with company procedures
- comply with site check sheet
- key parameters (voltage, speed, rotation, vibration, and temperatures) are within operating limits
- all protection systems are within operating limits
- insulation test results
- continuity test results.

## **3 Be able to perform planned maintenance on electrical drives and the motor-control centre**

### 3.1 Operational requirements to conduct routine maintenance of electrical drives and motor-control centres:

- planned maintenance jobs
- based on CMMS/SAP/Maximo job pack.

3.2 Obtain relevant authorisation for planned maintenance:

- conduct job hazard analysis
- obtain isolation and de-isolation checklists and other relevant electrical permits
- communicate with operations personnel
- follow frontline barriers management (FLBM) guidelines
- attend toolbox talk.

3.3 Perform maintenance work:

- in accordance with company procedures
- follow manufacturers' instructions
- in accordance with planned maintenance task list requirements.

3.4 Perform functional tests:

- monitor essential readings, such as full load amperes (FLA), voltage and frequency
- carry out visual inspection on equipment response/behaviour
- check that key parameters (voltage, speed, rotation, vibration and temperatures) are within operating limits
- check that all protection systems are within operating limits.

3.5 Return electrical drives and MCCs back to operation after satisfactory tests:

- in accordance with company procedures.

3.6 Record completed tasks:

- in accordance with company procedures
- all key parameters including equipment operating voltage, speed, amperes, rotation, vibration and temperature
- all protection system set points
- insulation test results
- continuity test results.



## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to carry out pre-start checks on electrical drives and the motor-control centre (MCC)	1.1	Describe safety considerations when performing planned operations and maintenance of electrical drives and the MCC			
		1.2	Describe the operating principles of the motor, electric motor drives and the MCC			
		1.3	Make safe the operating environment to avoid any harm to personnel or equipment			
		1.4	Perform pre-start checks in accordance with company procedures			
		1.5	Record all pre-start checks and report any discrepancies to the senior electrician in charge			
2	Be able to perform functional checks on electrical drives and the motor-control centre	2.1	Perform functional tests of electrical drives and the MCC in accordance with company procedures			
		2.2	Report any abnormalities to the senior electrician on site			
		2.3	Record all functional check readings			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to perform planned maintenance on electrical drives and the motor-control centre	3.1	Explain the operational requirements to conduct routine maintenance of electrical drives and the MCC			
		3.2	Obtain relevant authorisation for planned maintenance to proceed			
		3.3	Perform maintenance work in accordance with company procedures			
		3.4	Perform functional tests in accordance with company procedures			
		3.5	Return electrical drives and MCCs back to operation after satisfactory tests			
		3.6	Record completed tasks			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*

# Unit 8: Perform Routine Operations and Maintenance of Power Generation and Control Equipment

Level: 2

Unit type: Mandatory for Electrical Technicians

Guided learning hours: 80

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## Unit summary

This unit gives learners the knowledge and skills required for an operations technician to carry out routine operations and maintenance of power generation and control, ensuring that all activities are carried out safely and in accordance with company standards and operating procedures.

In this unit, 'routine maintenance' refers to maintenance activities scheduled to be carried out at least once every 12 months (e.g. weekly, monthly, every three months, yearly).

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Be able to perform and record routine monitoring

#### 1.1 Characteristics of power generation:

- operating parameters of turbine engines
- voltage, kW, voltage ampere reaction (KVAR), voltage ampere (KVA), power factor (PF), speed, vibration system, protection relay
- on-site visual check of unit.

#### 1.2 Record key parameters for power generation and control system:

- voltage
- frequency
- speed
- power factor
- output (kW/MW).

1.3 Record and report abnormal operating parameters:

- based on site check sheets
- unit operating and manufacturer's requirements.

**2 Be able to synchronise and perform load sharing**

2.1 Operating principles of generators and of voltage and speed controls for synchronising parallel generators:

- manual synchronising
- automatic synchronising
- PMS – load shedding
- auto-synchronising via PMS unit.

2.2 Conditions required for synchronising:

- frequency and voltage
- power synchronisation procedures.

2.3 Appropriate safety procedures

- use of correct personal protective equipment
- proper tools – synchroscope or dark lamp method
- speed/voltage trimmer
- standard operating procedures for synchronising.

2.4 Assess operating parameters from appropriate sources for the synchronising and load sharing of generators:

- follow check sheets
- in accordance with company procedures
- site-specific procedures pertaining to load sharing and power synchronisation.

2.5 Pre-start checks on the generator:

- fuel
- coolant
- lube oil
- air intake
- starter
- battery
- ready-to-start light, e.g. green mode
- all electrical controls and protection systems are in normal/healthy conditions
- all electrical auxiliary support equipment is ready to start up.

## 2.6 Functional tests on generators:

- operate, start/stop, auto and manual synchronising and load sharing
- in accordance with standard operating procedures (SOP) for synchronising of power generators
- comply job package and Permit to Work instructions
- in accordance with control panel manufacturers' instructions.

## 2.7 Monitor and adjust relevant system parameters:

- to ensure optimal system operations
- in accordance with SOP for synchronisation power generators.

## **3 Be able to perform planned routine maintenance**

### 3.1 Obtain and work within relevant authorisation for planned maintenance to proceed:

- job card/job package in accordance with CMMS/SAP/Maximo
- in accordance with company procedures
- isolation/de-isolation checklists/permit or other electrical permit required
- safety system isolation certificate (SSIC) if required.

### 3.2 Permit to Work requirements:

- job hazard analysis
- communication with operations
- frontline barriers management
- isolation/de-isolation checklists/permit or other electrical permit required
- attend toolbox talk
- SSIC if required.

### 3.3 Perform planned maintenance:

- all planned routine maintenance
- in accordance with company procedures.

### 3.4 Test power-generation operations after maintenance:

- in accordance with company procedures
- follow manufacturers' instruction and standards
- follow check sheets
- in accordance with SOP.

### 3.5 Record completed task on the computer maintenance system:

- complete check sheets
- close the job in accordance with company procedures.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to perform and record routine monitoring	1.1	Explain the characteristics of power generation			
		1.2	Record key parameters for power generation and associated control systems			
		1.3	Record and report abnormal operating parameters			
2	Be able to synchronise and perform load sharing	2.1	Describe the operating principles of generators and voltage and speed controls for synchronising parallel generators			
		2.2	Explain the conditions required for synchronising			
		2.3	Follow appropriate safety procedures			
		2.4	Assess operating parameters from appropriate sources for the synchronising and load sharing of generators			
		2.5	Perform pre-start checks on the generator in accordance with company standards			
		2.6	Perform functional tests on generators in accordance with operational procedure			
		2.7	Monitor and adjust system parameters to ensure optimal system operations			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to perform planned routine maintenance	3.1	Obtain and work within relevant authorisation for planned maintenance			
		3.2	Obtain a Permit to Work for the job			
		3.3	Perform planned routine maintenance in line with company standards and procedures			
		3.4	Test power-generation operations after maintenance in accordance with company standards and procedures			
		3.5	Record completed tasks in the computer maintenance system.			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*





# Unit 9: Perform Routine Operations and Maintenance of Power Supplies and Lighting Systems

Level: 2

Unit type: Mandatory for Electrical Technicians

Guided learning hours: 70

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to carry out routine operation and maintenance of power supplies and lighting systems, ensuring that all activities are being carried out safely and in accordance with company standards and operating procedures.

In this unit, 'routine maintenance' refers to maintenance activities scheduled to be carried out at least once every 12 months (e.g. weekly, monthly, every three months, yearly).

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Be able to operate and change over uninterruptable power supply (UPS) and battery charger systems

1.1 Principles of power electronics, batteries and battery-charger systems:

- principles and the parameters of UPS used in your facility
- functions of the major components of UPS, e.g. battery charger, inverter, static bypass, maintenance bypass, and battery bank
- how to operate and change over UPS and battery charger systems.

1.2 Safety hazards associated with UPS and battery charger systems:

- flash over
- toxic gas in and around battery bank
- wrong switching leads to loss of power supply to load.

1.3 Abnormal operating parameters of UPS and battery charger systems:

- parameters to be monitored: excessive or low current, abnormal voltage readings
- monitor abnormal operating indicators via human machine interface (HMI)
- be alert for overheating and burning smells
- monitoring to be done with reference to manufacturers' technical information and company standards and procedures.

1.4 Perform a changeover of battery charger and UPS systems:

- in accordance with company procedures
- equipment vendor's operating instructions manual.

**2 Be able to maintain the auxiliary power system**

2.1 Relevant authorisation for planned maintenance to proceed:

- approved job card or job package
- approved site-specific procedures.

2.2 Permit to Work requirements:

- conduct job hazard analysis
- communicate with operations personnel
- follow frontline barriers management (FLBM) guidelines
- obtain any electrical permit required
- obtain safety system isolation certificate (SSIC)
- attend toolbox talk.

2.3 Maintain the auxiliary power system:

- in accordance with company procedures
- routine maintenance checks on UPS and chargers.

2.4 Perform functional tests of the auxiliary power system:

- in accordance with company procedures
- recognise abnormalities (visual and measurements).

2.5 Rectify and report abnormalities:

- to senior electrician in charge (authorised electrical person (AEP))
- update SAP/Maximo (for onshore support reviews).

2.6 Record completed tasks:

- in accordance with company procedures
- complete check sheets.

### **3 Be able to maintain lighting systems**

3.1 Interpret an electrical line diagram for a lighting system:

- normal circuit
- emergency circuit
- hazard of neutral line.

3.2 Hazards associated with the maintenance of lighting systems:

- electrical shock
- fall from height
- falling objects.

3.3 Faulty lighting systems, e.g.:

- control failure
- moulded case circuit breaker (MCCB) failure
- miniature circuit breaker (MCB)/fuse
- circuit fault
- component fault.

3.5 Record completed tasks:

- update the computer maintenance management system (CMMS), e.g. SAP, Maximo.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to operate and change over uninterruptable power supply (UPS) and battery charger systems	1.1	Explain the operating principles of power electronics, batteries and battery charger systems			
		1.2	Describe the safety hazards associated with UPS and battery charger systems			
		1.3	Identify abnormal operating parameters of UPS and battery-charger systems			
		1.4	Perform a changeover of battery charger and UPS systems			
2	Be able to maintain the auxiliary power system	2.1	Obtain the relevant authorisation to proceed with planned maintenance			
		2.2	Obtain a Permit to Work for the job			
		2.3	Maintain the auxiliary power system			
		2.4	Perform functional tests of the auxiliary power system and identify any abnormalities			
		2.5	Rectify and report abnormalities in accordance with company procedures			
		2.6	Record completed tasks in the computer maintenance system			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to maintain lighting systems	3.1	Interpret an electrical line diagram for a lighting system			
		3.2	Describe the hazards associated with maintenance of lighting systems			
		3.3	Replace faulty lighting systems in accordance with company procedures			
		3.4	Record completed tasks in the computer maintenance system			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*



# Unit 10: Perform Routine Operations and Maintenance of Process Measuring and Analyser Devices

Level: 2

Unit type: Mandatory for Instrument Technicians

Guided learning hours: 70

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to carry out routine maintenance of process measuring and analyser devices, ensuring that all activities are being carried out safely and in accordance with company standards and operating procedures.

In this unit, 'routine maintenance' refers to maintenance activities scheduled to be carried out at least once every 12 months (e.g. weekly, monthly, every three months, yearly).

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Understand the specification data of measuring devices and analysers

1.1 Operating principles of process measuring instruments:

- process measuring instruments to cover pressure, level, flow and temperature devices
- different facility requirements, e.g. liquid heads, different specific gravity of liquids.

1.2 Operating principles of process analysers:

- common types of process analyser used in a facility, e.g. oil in water, oxygen analysers
- requirements during installation of process analysers
- components of various types of process analyser
- functions of major components in an analytical sampling system.

1.3 An instrument's operating range based on engineering and/or process data provided:

- design versus safe working ranges
- suppressed/elevated operating ranges
- unit-to-signal conversions.

**2 Be able to perform calibration checks on process measuring devices and analysers**

2.1 Permit to Work requirements:

- conduct job hazard analysis
- communicate with field and control room operators
- follow frontline barrier management (FLBM) guidelines
- attend toolbox talk.

2.2 Perform process isolation and depressurisation in accordance with company procedures:

- operations override or maintenance overrides
- override alarms if required
- depressurise impulse and process lines if required.

2.3 First-line maintenance on measuring devices and analysers:

- in accordance with company procedures and standards
- planned routine maintenance activities
- perform standard loop checks.

2.4 In-situ functional checks on measuring devices and analysers:

- in accordance with company procedures and standards
- in accordance with manufacturers' instructions
- include zero checks for process measuring instruments
- perform sampling checks for analysers.

2.5 Correct errors or deviations of the measuring devices and analysers:

- in accordance with company standards and procedures
- in accordance with manufacturers' instructions
- first-line maintenance only.

**3 Be able to reinstate process instruments and analysers back to normal operating conditions after maintenance**

3.1 Confirm correct functioning of measuring instruments and analysers:

- with input from, or witnessed by, operations
- functioning in accordance with instrument design and within its accuracy limits.



- 3.2 Reinstatement the measuring instruments and analysers back to normal operating conditions:
- follow reinstatement procedures in accordance with company procedures and standards
  - normalise measuring instruments and analysers in accordance with manufacturers' instructions.
- 3.3 Report and record completed calibration work performed on the measuring instruments and analysers:
- document calibration in accordance with company procedures
  - close job and report details in the computer maintenance system.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the specification data of measuring devices and analysers	1.1	Describe the operating principles of process measuring instruments			
		1.2	Describe the operating principles of process analysers			
		1.3	Calculate an instrument's operating range based on the engineering and/or process data provided			
2	Be able to perform calibration checks on process measuring devices and analysers	2.1	Obtain a Permit to Work for the job			
		2.2	Perform process isolation and depressurisation in accordance with company procedures			
		2.3	Perform first-line maintenance on measuring devices and analysers in accordance with company procedures			
		2.4	Perform in-situ functional checks on the measuring devices and analysers			
		2.5	Correct any errors or deviations of the measuring devices and analysers			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to reinstate process instruments and analysers back to normal operating conditions after maintenance	3.1	Confirm correct functioning of the measuring instruments and analysers			
		3.2	Reinstate the measuring instruments and analysers back to their normal operating conditions			
		3.3	Record completed calibration work that was performed on the measuring instruments and analysers			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*



# Unit 11: Perform Routine Operations and Maintenance of Current-to-Pneumatic Converters

Level: 2

Unit type: Mandatory for Instrument Technicians

Guided learning hours: 60

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to carry out first-line maintenance and field functional tests for current-to-pneumatic (I/P) converters, ensuring that all activities are being carried out safely and in accordance with company standards and operating procedures.

In this unit, 'routine maintenance' refers to maintenance activities scheduled to be carried out at least once every 12 months (e.g. weekly, monthly, every three months, yearly).

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Understand the operating principles of current-to-pneumatic (I/P) converters

- 1.1 Operating principles of current-to-pneumatic (I/P) converters used in your location:
  - in accordance with manufacturers' technical information and manuals.
- 1.2 Components of I/P converters and their functions:
  - in accordance with manufacturers' technical information and manuals.
- 1.3 Interpret information from drawings and technical specifications:
  - in accordance with manufacturers' technical information and manuals
  - piping and instrument drawings (P&ID).

## **2 Be able to perform I/P converter maintenance and calibration**

### 2.1 Permit to Work requirements:

- job hazard analysis
- communication with operations
- frontline barriers management
- attend toolbox talk.

### 2.2 Perform process isolation and depressurisation in accordance with procedure:

- need for operations override or maintenance overrides
- alarm override if required.

### 2.3 Perform functional checks on I/P converters:

- using appropriate test instruments
- in accordance with company procedures
- following manufacturers' manuals.

### 2.4 Adjust converter to correct any errors or deviations:

- follow manufacturers' instructional manuals
- in accordance with company standards.

## **3 Be able to reinstate an I/P converter back to normal operating conditions after maintenance**

### 3.1 Reinstall an I/P converter back to its normal operating conditions:

- validate I/P converter functionality with operations
- follow company procedures for reinstatement.

### 3.2 Record final calibration readings:

- in accordance with the required standards.

### 3.3 Record job completion:

- close job card
- record job details in the computer maintenance system.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the operating principles of current-to-pneumatic (I/P) converters	1.1	Describe the operating principles of current-to-pneumatic (I/P) converters			
		1.2	Identify the main components of I/P converters and their functions			
		1.3	Interpret information from drawings and technical specifications for fault diagnosis of E/P converters			
2	Be able to perform I/P converter maintenance and calibration	2.1	Apply Permit to Work requirements to I/P converter maintenance			
		2.2	Perform process isolation and depressurisation of the pneumatic supply in preparation for maintenance of the I/P converter			
		2.3	Perform functional checks on I/P converters using test and calibration equipment			
		2.4	Adjust the converter as necessary to correct any errors or deviations in accordance with required standards			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to reinstate an I/P converter back to normal operating conditions after maintenance	3.1	Reinstate an I/P converter back to its normal operating conditions after maintenance			
		3.2	Record final calibration readings in accordance with the required standards			
		3.3	Record job completion in accordance with the company's operating procedures			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*



# Unit 12: Perform Routine Operations and Maintenance of Process Controllers and Control Valves

Level: 2

Unit type: **Mandatory for Instrument Technicians**

Guided learning hours: **110**

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to carry out maintenance and field functional tests of process controllers and control valves, ensuring that all activities are being carried out safely and in accordance with company standards and operating procedures.

In this unit, 'routine maintenance' refers to maintenance activities scheduled to be carried out at least once every 12 months (e.g. weekly, monthly, every three months, yearly).

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Understand the operating principles of process control and control valves

#### 1.1 Basic principles of process control:

- open and closed loops
- feedback and feed forward controls
- cascade and split-range control loops.

#### 1.2 Functions of controllers in process control:

- proportional control
- 2-term control or proportional integral (PI) controller
- 3-term control or proportional integral derivative (PID) controller.

1.3 Functions of at least **two** of the following types of control valve:

- ball valve
- rotary vane
- butterfly valve
- plug valve
- globe valve
- gate valve
- diaphragm valve.

1.4 Control valve engineering data and specifications:

- control valve engineering data, including
  - flange-to-flange distance
  - valve sizes
  - control valve coefficient (Cv)
  - valve materials and valve types, e.g. rotary disc, butterfly, ball valve or plug
- manufacturer's technical information.

**2 Be able to perform controller maintenance and function checks**

2.1 Permit to Work requirements:

- job hazard analysis
- communication with operations
- frontline barrier management.

2.2 Apply correct override switches to controller:

- maintenance override switch (MOS) and operational override switch (OOS)
- to controller alarm signals prior to carrying out input testing.

2.3 Test and calibrate the controller:

- comply with company standards and procedures
- in accordance with manufacturers' instructions
- perform loop tests.

2.4 Reinststate the control valve back to its normal operating conditions:

- validate controller's functionality with operations
- follow company procedures for reinstatement.

2.5 Record results:

- in accordance with company procedures
- completed calibration sheet.

### **3 Be able to prepare for control valve testing or maintenance**

#### 3.1 Permit to Work requirements:

- job hazard analysis
- communication with operations
- frontline barrier management
- attend toolbox talk.

#### 3.2 Perform control valve isolation (by-pass):

- in accordance with company procedures and standards
- comply with frontline barrier management guidelines.

### **4 Be able to perform functional testing of control valves**

#### 4.1 Connect test equipment ready for testing or maintenance of control valve:

- use appropriate test equipment
- in accordance with manufacturers' instructions.

#### 4.2 Perform control valve stroking:

- in accordance with manufacturers' instructions and company procedures.

### **5 Be able to perform control valve and valve positioner maintenance and alignment checks**

#### 5.1 Perform in-situ maintenance of control valve:

- in accordance with job card requirements
- in accordance with manufacturer's instructions.

#### 5.2 Perform control valve alignment checks:

- with valve positioner
- in accordance with manufacturers' instructions.

#### 5.3 Correct deviations in the control valve response:

- in accordance with required standards
- visual inspections of the valve response
- leaks on the valve diaphragm or valve's actuator diaphragm.

#### 5.4 Reinststate the control valve back to its normal operating conditions after maintenance:

- validate control valve functionality with operations
- follow company procedures for reinstatement.

#### 5.5 Record calibration work performed on the control valve:

- completed calibration sheet.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the operating principles of process control and control valves	1.1	Explain the basic principles of process control			
		1.2	Describe the functions of controllers in process control			
		1.3	Describe the functions of different types of control valve			
		1.4	Interpret control valve engineering data and specifications to ensure correct replacement of defective valves			
2	Be able to perform controller maintenance and function checks	2.1	Raise the necessary permits for controller maintenance and functional checks			
		2.2	Apply override switches to controller prior to carrying out input testing			
		2.3	Test and calibrate the controller using equipment in accordance with required standards and procedures			
		2.4	Reinstate the controller back to its normal operating conditions after the functional check			
		2.5	Record the results of the functional check			
3	Be able to prepare for control valve testing or maintenance	3.1	Raise the necessary permits for testing or maintenance of control valves			
		3.2	Perform control valve isolation in accordance with company procedures and standards			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to perform functional testing of control valves	4.1	Connect test equipment ready for testing or maintenance of a control valve			
		4.2	Perform control valve stroking in accordance with manufacturer's and company operating procedures			
5	Be able to perform control valve and valve positioner maintenance and alignment checks	5.1	Perform in-situ maintenance of a control valve			
		5.2	Perform alignment checks together with valve positioner based on the required standard			
		5.3	Correct deviations in the control valve response based on the required standard			
		5.4	Reinstate the control valve back to its normal operating conditions after maintenance			
		5.5	Record calibration work performed on the control valve			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*



# Unit 13: Perform Routine Operations and Maintenance of Static Equipment

Level: 2

Unit type: **Mandatory for Mechanical Technicians**

Guided learning hours: 120

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to carry out routine maintenance of static equipment in an oil and gas installation, ensuring that all activities are carried out safely and in accordance with company standards and operating procedures.

In this unit, 'routine maintenance' refers to maintenance activities scheduled to be carried out at least once every 12 months (e.g. weekly, monthly, every three months, yearly).

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Be able to operate and maintain fired equipment

#### 1.1 Operating principles of fired equipment:

- using block diagrams
- reference to vendor information
- uses – glycol system, fuel gas, emulsion wax treatment
- inert gas system.

#### 1.2 Performance of fired equipment:

- air-to-fuel ratio
- fouling rate versus efficiency
- temperature
- pressure.

1.3 Common faults on fired equipment, e.g.:

- failure to start
- fouling and coking
- low flow and temperature cross
- boiler tube failure.

1.4 Routine maintenance servicing:

- planned routine maintenance
- in accordance with company maintenance procedures.

1.5 Permit to Work requirements:

- job hazard analysis
- communication with operations
- frontline barriers management
- confined space (boiler, furnace and drums).

**2 Be able to monitor the performance of pressure vessels and other process equipment**

2.1 Key parameters for pressure vessels and other process equipment:

- wall thickness on body and flanges
- integrity of vessel internals (mismat, schoepentoeter, swirl tube, vane pack)
- integrity of inlet and outlet nozzles (sand erosion).

2.2 Interpret data related to the integrity of pressure vessels and process equipment:

- wall thickness
- pressure drop
- valve leakages
- pressure safety valve.

2.3 Abnormalities:

- high pressure drop – internal fouling/clogged
- erratic liquid build level erratic – sand clogged
- liquid at gas line – exceed operating envelope
- gas at liquid line – poor degassing, blow by.



## 2.4 Maintain pressure vessels or process equipment:

- include arrangement for third-party inspection where required
- in accordance with company maintenance and inspection procedures
- compliance with Permit to Work
- preventive maintenance and inspection
- pressure safety valve (PSV) calibration.

## 2.5 Record job completion:

- close job card
- record job details in the computer maintenance system.

## 3 **Be able to inspect, test and maintain the piping, utility and heating, ventilation and air conditioning (HVAC) systems**

### 3.1 Describe piping, utility and heating, ventilation and air conditioning (HVAC) systems:

- using engineering drawings and facility specifications
- with reference to international standards
- with reference to manufacturers' technical information
- show understanding of piping specification and how to interpret piping schedule and rating
- types of gas usage and capacity.

### 3.2 Perform service and repair of piping, utility and HVAC systems:

- in accordance with company maintenance procedure
- showing a basic understanding of root-cause analysis on failure rate on utilities and HVAC system
- carry out temporary repair on piping-wrapping.

### 3.3 Shutdown, start-up, isolation and reinstatement procedures for piping, utility and HVAC systems:

- in accordance with company procedures
- comply with frontline barrier management practices
- gas charging
- pumping dome
- topping up lube oil.

### 3.4 Record job completion:

- close job card
- record job details in the computer maintenance system.

#### **4 Be able to operate lifting devices in accordance with company standards and procedures**

##### 4.1 Operating principles of lifting devices:

- types of lifting device
- their main components
- safety devices and their functions
- safe working load (SWL) consideration (capacity).

##### 4.2 Hand signals used in lifting operations:

- position of the signal person
- the need for the signal person to be competent in hand signals, including lifting operation
- why standard hand signals are needed.

##### 4.3 Lifting inspections:

- in accordance with required manufacturers' instructions
- in accordance with any legislative requirements
- visual and functional checks
- both lifting machinery and accessories (although these can be less frequent)
- must be scheduled in an examination scheme
- colour-code marking
- expiry records.

##### 4.4 Perform routine maintenance of lifting devices:

- in accordance with company standards and procedures
- planned routine maintenance jobs.

##### 4.5 Perform lifting activities:

- in accordance with company standards and procedures
- lifting plan for heavy lifts
- risk assessment by authorised/competent person to determine lift method and right equipment
- lifting equipment to be visually inspected prior lifting operations
- lifting equipment certificate
- trained and certified personnel including rigger, lifting supervisor and signal person
- established communication methods during lifting operation
- barricade required
- MOPO considerations.

## **5 Be able to inspect safeguarding vent and relief systems in accordance with company standards and procedures**

### 5.1 Functions of safeguarding vent and relief systems:

- purging system – minimum purge amount and function
- functional ignition system
- operational and legislation standards for venting
- hazardous area classification – understand dispersion study
- wind conditions.

### 5.2 Isolate equipment for the inspection:

- in accordance with company procedures
- Permit to Work compliance.

### 5.3 Inspection of safeguarding vent and relief systems:

- hazardous area classification
- settings of safeguarding vent and relief systems.

### 5.4 Designed operating specifications:

- settings of each safeguarding vent and relief system
- maximum relief volume
- unit shutdown (USD).

### 5.5 Abnormal conditions:

- excessive flaring (change of dispersion radius)
- flare ignition out of service – venting impact to environment
- liquid carry over into vent stack.

### 5.6 Return a vent and relief system to service:

- in accordance with company standards and procedures
- comply with frontline barrier management.

### 5.7 Record job completion:

- close job card
- record job details in the computer maintenance system.

## **6 Be able to maintain the heat exchanger in accordance with company standards and procedures**

### 6.1 Describe the functions of a heat exchanger:

- types – shell and tube, and plate types
- main components
- functions.

6.2 Performance of heat exchanger equipment:

- temperature cross
- not meeting desired temperature
- flow rate
- pressure.

6.3 Common faults of heat exchanger equipment, e.g.:

- tube leaking within shell – communicating hot and cold fluid
- fouling and coking
- plate type – gasket leaks, wrong installation
- PSV/PRV malfunction
- ancillary equipment failures – vacuum steam ejector, level controller malfunctions.

6.4 Perform isolation and de-isolation procedures on heat exchanger equipment:

- in accordance with the required standards and procedures
- comply with frontline barrier management
- Permit to Work and isolation certification
- mechanical isolation principles.

6.5 Perform servicing and repair:

- routine maintenance activities
- in accordance with maintenance procedure.

6.6 Perform reinstatement and start-up procedures on heat exchanger equipment:

- in accordance with company procedures
- in accordance with manufacturers' instructions.

**7 Understand the operating principles of inert gas generators (IGG)**

7.1 Describe the main components of the inert gas generator (IGG) and their functions:

- burner – ignition plug, pilot burner, main burner, swirl plate/air register
- scrubber – corrugated plate, wire mesh/demister
- oxygen analyser, IGG monitor panel
- accessory components, e.g. deck seal, mechanical non return valve, PV breaker, deck-isolating valve, cargo-tank isolating valve, mast riser
- fuel pump.

7.2 Explain the maintenance considerations of IGG:

- in accordance with company's planned maintenance
- follow manufacturers' instructions.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to operate and maintain fired equipment	1.1	Describe the operating principles of fired equipment			
		1.2	Interpret data on the performance of fired equipment			
		1.3	Diagnose common faults on fired equipment			
		1.4	Perform routine maintenance servicing in accordance with maintenance procedure			
		1.5	Apply Permit to Work systems and safety procedures			
2	Be able to monitor the performance of pressure vessels and other process equipment	2.1	Explain the key parameters for pressure vessels and other process equipment in own plant			
		2.2	Interpret data related to integrity of pressure vessels and process equipment			
		2.3	Raise maintenance requests to rectify abnormalities			
		2.4	Maintain pressure vessels or process equipment in accordance with procedures			
		2.5	Record job completion			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to inspect, test and maintain the piping, utility and heating ventilation and air conditioning (HVAC) systems	3.1	Describe piping, utility and HVAC systems of own location using drawings and plant specifications			
		3.2	Perform service and repair of piping, utility and HVAC systems in accordance with maintenance procedure			
		3.3	Perform shutdown, start-up, isolation and reinstatement procedures for piping, utility and HVAC systems			
		3.4	Record job completion in accordance with maintenance procedure			
4	Be able to operate lifting devices in accordance with company standards and procedures	4.1	Describe the operating principles of lifting devices			
		4.2	Explain the hand signals used in lifting operations			
		4.3	Perform routine lifting inspections in accordance with manufacturers' instructions			
		4.4	Perform routine maintenance of lifting devices in accordance with company standards and procedures			
		4.5	Perform lifting activities in accordance with lifting procedures			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to inspect safeguarding vent and relief systems in accordance with company standards and procedures	5.1	Describe the functions of safeguarding vent and relief systems			
		5.2	Isolate equipment/plant for the inspection of safeguarding vent and relief systems			
		5.3	Perform inspection of safeguarding vent and relief systems			
		5.4	Check that the equipment operates and meets its designed operating specification			
		5.5	Rectify if an abnormal condition is observed			
		5.6	Reinstate a vent and relief system to service			
		5.7	Record job completion in accordance with maintenance procedures			
6	Be able to maintain the heat exchanger in accordance with company standards and procedures	6.1	Describe the functions of a heat exchanger			
		6.2	Monitor the performance of the heat exchanger equipment			
		6.3	Diagnose common faults on heat exchanger equipment			
		6.4	Perform isolation and de-isolation procedures on heat exchanger equipment in accordance with the required standards and procedures			
		6.5	Perform servicing and repair maintenance procedure			
		6.6	Perform reinstatement and start-up procedures on heat exchanger equipment after maintenance			
7	Understand the operating principles of inert gas generators (IGG)	7.1	Describe the main components of inert gas generators (IGG) and their functions			
		7.2	Describe the maintenance considerations of IGG			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*



# Unit 14: Perform Routine Operations and Maintenance of Reciprocating Engines and Pumps

Level: 2

Unit type: **Mandatory for Mechanical Technicians**

Guided learning hours: **90**

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to carry out routine operations and maintenance of reciprocating engines and pumps, ensuring that all activities are being carried out safely and in accordance with company standards and operating procedures.

In this unit, 'routine maintenance' refers to maintenance activities scheduled to be carried out at least once every 12 months (e.g. weekly, monthly, every three months, yearly).

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Understand the operating principles of reciprocating engines and pumps

1.1 Operating principles of reciprocating engines:

- internal and external combustion engines
- four stroke engines
- engine cycles – timing diagrams.

1.2 Functions of the main components of a reciprocating engine:

- internal and external components
- auxiliary systems, e.g. lubricating system, cooling water system, safeguarding system, safety valves, governor and over-speed, fuel oil system, starting system, boost air and turbocharging system.

1.3 Operating principles of different pumps:

- positive displacement pumps: reciprocating pump, screw and gear
- centrifugal pumps: impeller and vane.

1.4 Functions of the main components in a pump:

- piston (simplex or multiplex, single or double acting)
- plunger (simplex or multiplex, single or double acting)
- diaphragm (fluid and mechanical).

**2 Be able to operate reciprocating engines in accordance with company procedures**

2.1 Functional checks on a reciprocating engine:

- pre-start checks
- stop (local and remote)
- start (local and remote)
- in accordance with company procedures
- start interlock system.

2.2 Monitor the performance of engines based on:

- noise
- temperature (casing and fluid)
- vibration
- speed
- fuel gas consumption
- differential pressure
- batteries.

**3 Be able to perform routine maintenance of reciprocating engines in accordance with company procedures**

3.1 Permit to Work requirements:

- job hazard analysis
- communication with operations
- frontline barriers management
- attend toolbox talk.

### 3.2 Isolate the engine to allow routine maintenance work:

- isolate from controls, e.g. DCS
- isolate on site (local control panel (LCP))
- process
- auxiliary
- power (if motor)
- lock out and tag out (LOTO).

### 3.3 Perform routine maintenance:

- all planned maintenance
- in accordance with company procedures.

### 3.4 Record job completion:

- close job card
- record job details in the computer maintenance system.

## 4 Be able to operate pumps in accordance with company procedures

### 4.1 Perform functional checks:

- pre-start-up checks, e.g. ESD bypass, valve arrangements, resets of ESD
- shutdown
- start (auto start, compressor stop, recycle, controls)
- in accordance with company procedures
- trip functions
- overrides
- normal operations checks
- standby unit – cut in/cut out.

### 4.2 Performance of the pump:

- discharge pressure
- noise and vibration
- speed, as compared to pump curve
- efficiency
- condition performance based monitoring (CPBM)
- bearing temperature
- motor ampere/load.

**5 Be able to perform routine maintenance of pumps in accordance with company procedures**

5.1 Permit to Work requirements:

- job hazard analysis
- communication with operations
- frontline barriers management
- attend toolbox meeting.

5.2 Isolate the pump to allow routine maintenance work:

- electrical isolation
- mechanical isolation
- lock out and tag out (LOTO).

5.3 Perform routine maintenance:

- all planned maintenance
- in accordance with company procedures.

5.4 Record job completion:

- close job card
- record job details in the computer maintenance system.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the operating principles of reciprocating engines and pumps	1.1	Describe the operating principles of reciprocating engines			
		1.2	Identify the main components of reciprocating engines and describe their functions			
		1.3	Describe the operating principles of positive displacement pumps and centrifugal pumps			
		1.4	Explain the functions of the main components in a pump			
2	Be able to operate reciprocating engines in accordance with company procedures	2.1	Perform functional checks on the reciprocating engine			
		2.2	Monitor the performance of reciprocating engines based on observations and site readings			
3	Be able to perform routine maintenance of reciprocating engines in accordance with company procedures	3.1	Raise the necessary permits for maintenance work in accordance with company procedures			
		3.2	Isolate the engine to allow routine maintenance work to be carried out			
		3.3	Perform routine maintenance in accordance with company procedures			
		3.4	Record job completion in accordance with company procedures			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to operate pumps in accordance with company procedures	4.1	Perform functional checks on the pump in accordance with company procedures			
		4.2	Monitor the performance of the pump based on observations and site readings			
5	Be able to perform routine maintenance of pumps in accordance with company procedures	5.1	Raise the necessary permits for maintenance work in accordance with company procedures			
		5.2	Isolate the pump to allow routine maintenance work to be carried out			
		5.3	Perform routine maintenance in accordance with company procedures			
		5.4	Record job completion in accordance with company procedures			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*

# Unit 15: Perform Routine Operations and Maintenance of Compressors and Turbines

Level: 2

Unit type: Mandatory for Mechanical Technicians

Guided learning hours: 90

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## Unit summary

This unit gives learners the knowledge and skills required as an operations technician to carry out routine operation and maintenance of compressors and turbines, ensuring ensure that all activities are being carried out safely and in accordance with company standards and operating procedures.

In this unit, 'routine maintenance' refers to maintenance activities scheduled to be carried out at least once every 12 months (e.g. weekly, monthly, every three months, yearly).

## Unit assessment requirements

This unit must be assessed using evidence from real work activities. For further details, please refer to *Appendix A: Assessment rules*.

Simulation is **not** permitted for this unit.

## Range statements

The range statements must be read in conjunction with the assessment criteria to which they relate. All items in the range must be covered, except for items that follow an 'e.g.'

### 1 Understand the operating principles of turbines and compressors

#### 1.1 Operating principles of a turbine:

- turbine basic operating cycle
- single- and two-shaft gas turbine
- radial-flow and axial-flow turbines
- turbine construction
- steam turbine.

1.2 Functions of the main components in a turbine:

- gas fuel system and functions
- diesel fuel system and functions
- dual-fuel gas turbine
- auxiliary components of gas turbines, e.g. labyrinth seal, carbon rings, starters, governors, boost pump, fuel-filtration system
- oil-circulation system
- ignition (dual fuel).

1.3 Turbine controls:

- simple anti-surge controls
- process condition that can lead to surge
- understand surge controls
- governor operations
- temperature and pressure control, e.g. pressure control domain (PCD) and turbine exhaust temperature (T5)
- vibration
- shutdown sequence
- emergency shutdown indicators, e.g. gas and flame detectors
- simple control logic.

1.4 Principles of a centrifugal compressor:

- basic terms and compressor theory
- compressor types, e.g. dynamic and positive displacement
- principles and operations
- construction.

1.5 Functions of the main components in compressor:

- control system
- cooling system.

1.6 Multi-stage compressor control:

- anti-surge
- discharge return.



## **2 Be able to operate a turbine in accordance with manufacturer's and operational designs**

### 2.1 Perform functional checks on a turbine:

- pre-start-up checks
- turbine control systems
- stop
- start sequence
- in accordance with company procedures
- temperature monitoring control
- emergency shutdown functions.

### 2.2 Monitor performance of a turbine:

- ambient air pressure
- ambient air temperature
- track actual parameters against performance graph.

## **3 Be able to perform routine planned maintenance of a turbine**

### 3.1 Permit to Work requirements:

- job hazard analysis
- communication with operations
- frontline barriers management
- attend toolbox talk.

### 3.2 Isolate a turbine to allow planned maintenance work:

- operating procedure for process
- operating procedures for turbine and compressor
- electrical isolation
- mechanical isolation
- lock out and tag out (LOTO).

### 3.3 Perform planned maintenance:

- water wash/chemical wash
- all planned routine maintenance
- in accordance with company procedures.

### 3.4 Record job completion:

- close job card
- record job details in the computer maintenance system.

#### **4 Be able to operate a compressor in accordance with manufacturer's and operational designs**

##### 4.1 Perform functional checks on a compressor:

- pre-start-up checks
- stop
- start
- high-temperature trip
- high-pressure trip
- emergency shutdown.

##### 4.2 Performance of compressors:

- control system
- suction pressure
- discharge pressure
- split range control system
- head capacity load control
- inter-stage temperature control
- lube oil temperature control
- lube oil pressure control.

#### **5 Be able to perform routine planned maintenance of a compressor**

##### 5.1 Permit to Work requirements:

- job hazard analysis
- communication with operations
- frontline barrier management
- attend toolbox talk.

##### 5.2 Isolate a compressor to allow routine maintenance work:

- process isolation (recycle).

##### 5.3 Perform planned maintenance:

- daily routine checks
- online turbine wash
- offline turbine wash
- all planned routine maintenance.

##### 5.4 Record job completion:

- close job card
- record job details in the computer maintenance system.

## Learning outcomes and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the operating principles of turbines and compressors	1.1	Describe the operating principles of turbines			
		1.2	Explain the functions of the main components in turbines			
		1.3	Explain typical turbine controls			
		1.4	Describe the operating principles of centrifugal compressors			
		1.5	Explain the functions of the main components in compressors			
		1.6	Explain typical multi-stage compressor control			
2	Be able to operate a turbine in accordance with manufacturer's and operational designs	2.1	Perform functional checks on a turbine			
		2.2	Monitor the performance of a turbine based on observations and site readings			
3	Be able to perform routine planned maintenance of a turbine	3.1	Raise the necessary permits for maintenance work			
		3.2	Isolate a turbine to allow planned maintenance work to be carried out			
		3.3	Perform planned maintenance jobs on a turbine in accordance with company procedures			
		3.4	Record job completion			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to operate a compressor in accordance with manufacturer's and operational design	4.1	Perform functional checks on a compressor			
		4.2	Monitor the performance of a compressor based on observations and site readings			
5	Be able to perform routine planned maintenance of a compressor	5.1	Raise the necessary permits for maintenance work			
		5.2	Isolate a compressor to allow planned maintenance work to be carried out			
		5.3	Perform planned maintenance jobs on a compressor in accordance with company procedures			
		5.4	Record job completion			

## Declarations

*I confirm that the evidence for this unit is authentic and a true representation of my own work.*

Learner name: \_\_\_\_\_

Learner signature: \_\_\_\_\_ Date: \_\_\_\_\_

*I confirm that the evidence for this unit is authentically that of the learner whose name and signature appears above. The assessment has been carried out in accordance with any specified assessment requirements for the unit and qualification.*

Assessor name: \_\_\_\_\_

Assessor signature: \_\_\_\_\_ Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(if sampled)*

## 5 Assessment

To achieve a pass for qualifications in this suite, the learner must achieve all the units required in the qualification structure.

### Internal assessment

The units are assessed through an internally- and externally quality-assured Portfolio of Evidence, consisting of evidence gathered during the course.

Each unit has learning outcomes and assessment criteria. To pass each unit, learners must:

- achieve **all** the learning outcomes
- satisfy **all** the assessment criteria by providing sufficient and valid evidence for each criterion, including meeting any range statements
- prove that the evidence is their own.

The learner must have an assessment record that identifies the assessment criteria that have been met. The assessment record should be cross-referenced to the evidence provided. The assessment record should include details of the type of evidence and the date of assessment. Suitable centre documentation should be used to form an assessment record.

<b>Valid</b>	is relevant to the standards for which competence is claimed
<b>Authentic</b>	is produced by the learner
<b>Current</b>	is sufficiently recent to create confidence that the same skill, understanding or knowledge persists at the time of the claim
<b>Reliable</b>	indicates that the learner can consistently perform at this level
<b>Sufficient</b>	fully meets the requirements of the assessment criteria, including any range statements

Learners can provide evidence of occupational competence from:

- **current practice** – where evidence is generated from a current job role
- a **programme of development** – where evidence comes from assessment opportunities built into a learning programme. The evidence provided must meet the assessment requirements for the qualification and reflect current practice in the sector
- the **Recognition of Prior Learning (RPL)** – where a learner can demonstrate that they can meet a unit's assessment criteria through knowledge, understanding or skills they already possess. The assessor must be confident that the same level of skill, understanding and knowledge exists at the time of the claim as existed at the time the evidence was produced. RPL is acceptable for accrediting part of a unit, one or more units, or a whole qualification

Further guidance is available in our *Recognition of Prior Learning Policy and Process* document, available on our website.

- a combination of the above.

## Assessment rules

The assessment rules for the qualifications in this sector are included in *Appendix A*. They set out the principles for assessing the units to ensure that the qualifications remain valid and reliable.

## Types of evidence

To achieve a unit, the learner must gather evidence that shows that they have met the required standard specified in the assessment criteria, Pearson's quality assurance arrangements (please see *Section 7 Quality assurance*) and the requirements of the assessment rules given in *Appendix A*.

In line with the assessment rules, evidence for internally-assessed units can take a variety of forms as indicated below:

- direct observation of the learner's performance by their assessor (O)
- outcomes from oral or written questioning (Q&A)
- products of the learner's work (P)
- personal statements and/or reflective accounts (RA)
- outcomes from simulation (S)
- professional discussion (PD)
- witness testimony (WT)
- expert witness testimony (EWT)
- evidence of Recognition of Prior Learning (RPL).

Learners can use the abbreviations in their portfolios for cross-referencing purposes.

Learners can also use one piece of evidence to prove their knowledge, skills and understanding across different assessment criteria and/or across different units. One piece of evidence may be used to demonstrate achievement of several assessment criteria in the same or different units.

Any specific evidence requirements for a unit are given in the *Unit assessment requirements* section of the unit.

Further guidance on centre quality assurance and internal verification processes can be found in *Section 7 Quality Assurance*.

## Assessment of knowledge and understanding

Knowledge and understanding are key components of competent performance, but it is unlikely that performance evidence alone will provide sufficient evidence for knowledge-based learning outcomes and assessment criteria. Where the learner's knowledge and understanding is not apparent from performance evidence, it must be assessed through other valid methods, listed above.

## 6 Administrative arrangements

### Introduction

This section focuses on the administrative requirements for delivering a BTEC qualification. It is of particular value to Quality Nominees, Lead IVs and Programme Leaders.

### Learner registration and entry

Shortly after learners start the programme of learning, you need to make sure that they are registered for the qualification. You need to refer to the *International Information Manual* for information on making registrations for the qualification.

Learners can be formally assessed only for a qualification on which they are registered. If learners' intended qualifications change, for example if a learner decides to choose a different pathway specialism, then the centre must transfer the learner appropriately.

### Access to assessment

Assessments need to be administered carefully to ensure that all learners are treated fairly, and that results and certification are issued on time to allow learners to progress to their chosen progression opportunities.

Pearson's *Equality Policy* requires that all learners should have equal opportunity to access our qualifications and assessments, and that our qualifications are awarded in a way that is fair to every learner. We are committed to making sure that:

- learners with a protected characteristic are not, when they are undertaking one of our qualifications, disadvantaged in comparison to learners who do not share that characteristic
- all learners achieve the recognition they deserve for undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Further information on access arrangements can be found in the Joint Council for Qualifications (JCQ) document *Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational Qualifications*.

## Administrative arrangements for assessment

### Records

You are required to retain records of assessment for each learner. Records should include decisions reached and any adjustments or appeals. Further information can be found in the *International Information Manual*. We may ask to audit your records, so they must be retained as specified.

### Reasonable adjustments to assessment

To ensure that learners have fair access to demonstrate the requirements of the assessments, a reasonable adjustment is one that is made before a learner is assessed. You are able to make adjustments to internal assessments to take account of the needs of individual learners. In most cases, this can be achieved through allowing the use of assistive technology or adjusting the format of evidence. Any reasonable adjustment must reflect the normal learning or working practice of a learner in a centre or working within the occupational area. We can advise you if you are uncertain as to whether an adjustment is fair and reasonable. You need to plan for time to make adjustments if necessary.

Further details on how to make adjustments for learners with protected characteristics are given on our website, in the document *Supplementary guidance for reasonable adjustment and special consideration in vocational internally-assessed units*.

### Appeals against assessment

Your centre must have a policy for dealing with appeals from learners. These appeals may relate to assessment decisions being incorrect or assessment not being conducted fairly. The first step in such a policy could be a consideration of the evidence by a Lead IV or other member of the programme team. The assessment plan should allow time for potential appeals after assessment decisions have been given to learners. If there is an appeal by a learner, you must document the appeal and its resolution. Learners have a final right of appeal to Pearson but only if the procedures that you have put in place have not been followed. Further details are given in the document *Enquiries and appeals about Pearson vocational qualifications and end point assessment policy*.



## Dealing with malpractice in assessment

Malpractice means acts that undermine the integrity and validity of assessment, the certification of qualifications and/or may damage the authority of those responsible for delivering the assessment and certification.

Pearson does not tolerate actual or attempted actions of malpractice by learners, centre staff or centres in connection with Pearson qualifications. Pearson may impose penalties and/or sanctions on learners, centre staff or centres where malpractice or attempted malpractice has been proven.

Malpractice may occur or be suspected in relation to any unit or type of assessment within a qualification. For further details on malpractice and advice on preventing malpractice by learners, please see Pearson's *Centre Guidance: Dealing with Malpractice*, available on our website.

The procedures we ask you to adopt vary between units that are internally assessed and those that are externally assessed.

Centres are required to take steps to prevent malpractice and to investigate instances of suspected malpractice. Learners must be given information that explains what malpractice is for internal assessment and how suspected incidents will be dealt with by the centre. The *Centre Guidance: Dealing with Malpractice* document gives full information on the actions we expect you to take.

Pearson may conduct investigations if we believe a centre is failing to conduct internal assessment according to our policies. The above document gives further information and examples, and details the penalties and sanctions that may be imposed.

In the interests of learners and centre staff, centres need to respond effectively and openly to all requests relating to an investigation into an incident of suspected malpractice.

### Learner malpractice

The head of centre is required to report incidents of suspected learner malpractice that occur during Pearson qualifications. We ask centres to complete JCQ Form M1 ([www.jcq.org.uk/malpractice](http://www.jcq.org.uk/malpractice)) and email it with any accompanying documents (signed statements from the learner, invigilator, copies of evidence, etc) to the Investigations Processing team at [candidatemalpractice@pearson.com](mailto:candidatemalpractice@pearson.com). The responsibility for determining appropriate sanctions or penalties to be imposed on learners lies with Pearson.

Learners must be informed at the earliest opportunity of the specific allegation and the centre's malpractice policy, including the right of appeal. Learners found guilty of malpractice may be disqualified from the qualification for which they have been entered with Pearson.

Failure to report malpractice constitutes staff or centre malpractice.

### Teacher/centre malpractice

The head of centre is required to inform Pearson's Investigations team of any incident of suspected malpractice (which includes maladministration) by centre staff, before any investigation is undertaken. The head of centre is requested to inform the Investigations team by submitting a JCQ M2 Form (downloadable from [www.jcq.org.uk/malpractice](http://www.jcq.org.uk/malpractice)) with supporting documentation to [pqsmalpractice@pearson.com](mailto:pqsmalpractice@pearson.com). Where Pearson receives

allegations of malpractice from other sources (for example Pearson staff, anonymous informants), the Investigations team will conduct the investigation directly or may ask the head of centre to assist.

Pearson reserves the right in cases of suspected malpractice to withhold the issuing of results/certificates while an investigation is in progress. Depending on the outcome of the investigation, results and/or certificates may not be released or they may be withheld.

We reserve the right to withhold certification when undertaking investigations, audits and quality assurance processes. You will be notified within a reasonable period of time if this occurs.

## **Sanctions and appeals**

Where malpractice is proven, we may impose sanctions or penalties, such as:

- mark reduction for affected external assessments
- disqualification from the qualification
- debarment from registration for Pearson qualifications for a period of time.

If we are concerned about your centre's quality procedures we may impose sanctions such as:

- working with centres to create an improvement action plan
- requiring staff members to receive further training
- placing temporary blocks on the centre's certificates
- placing temporary blocks on registration of learners
- debarring staff members or the centre from delivering Pearson qualifications
- suspending or withdrawing centre approval status.

The centre will be notified if any of these apply.

Pearson has established procedures for centres that are considering appeals against penalties and sanctions arising from malpractice. Appeals against a decision made by Pearson will normally be accepted only from the head of centre (on behalf of learners and/or members or staff) and from individual members (in respect of a decision taken against them personally). Further information on appeals can be found in the JCQ Appeals booklet (<https://www.jcq.org.uk/exams-office/appeals>).

## Certification and results

Once a learner has completed all the required components for a qualification, the centre can claim certification for the learner, provided that quality assurance has been successfully completed. For the relevant procedures, please refer to our *International Information Manual*. You can use the information provided on qualification grading to check overall qualification grades.

## Additional documents to support centre administration

As an approved centre, you must ensure that all staff delivering, assessing and administering the qualifications have access to the following documentation. These documents are reviewed annually and are reissued if updates are required.

- *Pearson International Quality Assurance Handbook*: this sets out how we will carry out quality assurance of standards and how you need to work with us to achieve successful outcomes.
- *International Information Manual*: this gives procedures for registering learners for qualifications, transferring registrations and claiming certificates.
- *Regulatory policies*: our regulatory policies are integral to our approach and explain how we meet internal and regulatory requirements. We review the regulated policies annually to ensure that they remain fit for purpose. Policies related to these qualifications include:
  - adjustments for candidates with disabilities and learning difficulties, access arrangements and reasonable adjustments for general and vocational qualifications
  - age of learners
  - centre guidance for dealing with malpractice
  - recognition of prior learning and process.

This list is not exhaustive and a full list of our regulatory policies can be found on our website.

## 7 Quality assurance

### Centre and qualification approval

As part of the approval process, your centre must make sure that the resource requirements listed below are in place before offering the qualification.

- Centres must have access to appropriate physical resources (for example equipment, IT, learning materials, teaching rooms) to support the delivery and assessment of the qualification. This may include a workplace in line with industry standards and/or a Realistic Working Environment (RWE) where this is permitted in the units. This must comply with the requirements specified in the assessment rules in *Appendix A*.
- Staff involved in the assessment process must have relevant expertise and/or occupational experience specified in the assessment rules.
- There must be systems in place to ensure continuing professional development for staff delivering the qualification.
- Centres must have in place appropriate health and safety policies relating to the use of equipment by learners.
- Centres must deliver the qualification in accordance with current equality and diversity legislation and/or regulations.

### Continuing quality assurance and standards verification

On an annual basis, we produce the *Pearson International Quality Assurance Handbook*. It contains detailed guidance on the quality processes required to underpin robust assessment and internal verification.

The key principles of quality assurance are that:

- a centre delivering BTEC programmes must be an approved centre, and must have approval for the programmes or groups of programmes that it is delivering
- the centre agrees, as part of gaining approval, to abide by specific terms and conditions around the effective delivery and quality assurance of assessment; the centre must abide by these conditions throughout the period of delivery
- an approved centre must follow agreed protocols for standardisation of assessors and verifiers, for the planning, monitoring and recording of assessment processes, and for dealing with special circumstances, appeals and malpractice.

The approach of quality-assured assessment is through a partnership between an approved centre and Pearson. We will make sure that each centre follows best practice and employs appropriate technology to support quality-assurance processes, where practicable. We work to support centres and seek to make sure that our quality-assurance processes do not place undue bureaucratic processes on centres. We monitor and support centres in the effective operation of assessment and quality assurance.

The methods we use to do this include:

- making sure that all centres complete appropriate declarations at the time of approval
- undertaking approval visits to centres
- making sure that centres have effective teams of assessors and verifiers who are trained to undertake assessment
- assessment sampling and verification, through requested samples of assessments, completed assessed learner work and associated documentation
- an overarching review and assessment of a centre's strategy for delivering and quality assuring its BTEC programmes, for example making sure that synoptic units are placed appropriately in the order of delivery of the programme.

Centres that do not fully address and maintain rigorous approaches to delivering, assessing and quality assurance cannot seek certification for individual programmes or for all BTEC programmes. An approved centre must make certification claims only when authorised by us and strictly in accordance with requirements for reporting.

Centres that do not comply with remedial action plans may have their approval to deliver qualifications removed.



## Appendix A: Assessment rules

The purpose of these assessment rules is to ensure that this suite of qualifications is assessed in a valid and reliable manner.

It covers:

1. Approaches to assessment
2. Simulation
3. Requirements for assessors and internal verifiers
4. Requirements for expert witnesses.

### 1 Approaches to assessment

- 1.1 Within the learning outcomes for the units, there may be a mix of assessment criteria that relate to **performance** and those that relate to **knowledge and understanding**. Assessment criteria relating to knowledge/understanding typically use words such as *identify, describe* and *explain*.
- 1.2 Most of the evidence for assessment criteria that relate to *performance* must derive from real work activities carried out in the workplace. In some circumstances, evidence may come from simulation in a realistic working environment (see section 2 below). For these assessment criteria, the preferred types of evidence are:
  - observation by the assessor of learner performance in the workplace
  - expert witness testimony relating to learner performance in the workplace. This is particularly useful for evidence that occurs when the assessor is not present. To be considered an expert witness, they must meet the definition outlined in section 4.
  - products of work done in the workplace, e.g. written records.
- 1.3 Assessment criteria that relate to knowledge and understanding can be assessed inside or outside the workplace, but the learner must relate their knowledge and understanding to the work environment. For these assessment criteria, evidence is likely to come mainly from:
  - learner reflective accounts
  - oral or written questioning, with questions and answers recorded by the assessor or candidate
  - professional discussion.

## **2 Simulation**

- 2.1 Where simulation is permitted, this is identified within the relevant unit.
- 2.2 Simulation is allowed only in situations where learners are required to respond to a situation that rarely occurs, for example emergencies or situations that would require a complete shutdown of production.
- 2.3 Where simulation is allowed, it must take place in a realistic working environment (RWE). In other words, the conditions should match those that would be normally found in the workplace, including:
  - facilities, equipment and materials
  - relationships with colleagues
  - pressures
  - relevant legislation, regulations and codes of practice.
- 2.4 Individuals involved in the simulation should be assigned roles, and, where appropriate, visual and sound effects should be used, e.g. to simulate explosions. To show their ability to shut down a facility, it is recommended that computer-based simulations can be used.
- 2.5 All simulations must be planned, delivered and documented by the centre in a way that ensures the simulation accurately reflects what the unit seeks to assess.

## **3 Requirements for assessors and internal verifiers**

- 3.1 Assessors and internal verifiers (IVs) must be occupationally competent. This means that each assessor/IV must be competent in the functions covered by the units they are assessing/verifying. This competence must be current and verifiable, and must be sufficient to be effective and reliable when judging the learner's competence. This can be confirmed in various ways, for example through:
  - CV and references
  - possession of relevant qualification(s).
- 3.2 Assessors and IVs must provide evidence of maintaining their occupational competence, for example by maintaining a CPD log.
- 3.3 Assessors and IVs must:
  - understand the structure of the qualification
  - recognise acceptable sources of evidence for the qualification
  - implement the required assessment recording procedures
  - understand and comply with the quality assurance and administrative requirements for the qualification.



3.5 Assessors must have sufficient expertise in the internal verification of competence-based assessment. To evidence this, they must have, or be working towards, one of the following:

- Level 3 Award in Assessing Competence in the Work Environment
- Level 3 Certificate in Assessing Vocational Achievement
- relevant units from predecessor qualifications: D32 and D33; or A1, A2
- qualifications or training that can be demonstrated to be equivalent to one or more of the above.

3.6 Internal verifiers must have sufficient expertise in the internal verification of competence-based assessment. To evidence this, they must have, or be working towards, one of the following:

- Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practice
- relevant units from predecessor qualifications: D34; or V1
- qualifications or training that can be demonstrated to be equivalent to one or more of the above.

#### **4 Expert witnesses**

4.1 Pearson supports the use of expert witness testimony as a natural and effective way of contributing to evidence of learners' competence. Nonetheless, the quality of this type of evidence will be affected by the witness's knowledge of the qualification and their own occupational competence. As a minimum, the expert witness must be:

- familiar with the part(s) of the qualification for which they are providing testimony
- occupationally competent – this means that they must be competent in the functions covered by the units they are witnessing
- fully briefed and clear about the purpose and use of the testimony.



## Appendix B: Structures of the oil and gas qualification suite at a glance

The tables below show the units and the qualifications to which they contribute in this suite of oil and gas qualifications.

<b>M</b>	<b>Mandatory units</b>	<b>O</b>	<b>Optional units</b>
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Pearson BTEC International Level 2 Specialist Diplomas for Process, Electrical, Instrument and Mechanical Technicians in Oil and Gas Facilities	Unit size (GLH)	Pathway			
		Process	Electrical	Instrument	Mechanical
1 Control Frontline Barriers in Oil and Gas Operations	120	M	M	M	M
2 Respond and Recover in Emergencies and Incidents	60	M	M	M	M
3 Implement Process Safety	130	M	M	M	M
4 Operate and Monitor Oil Production Processes and Associated Systems	135	M			
5 Operate and Monitor Gas Processes and Dehydration Systems	110	M			
6 Operate and Monitor the Gas Condensate Process and System	50	M			
7 Perform Routine Operations and Maintenance of Electrical Drives and the Motor-control Centre	80		M		
8 Perform Routine Operations and Maintenance of Power Generation and Control Equipment	80		M		
9 Perform Routine Operations and Maintenance of Power Supplies and Lighting Systems	70		M		
10 Perform Routine Operations and Maintenance of Process Measuring and Analyser Devices	70			M	

Pearson BTEC International Level 2 Specialist Diplomas for Process, Electrical, Instrument and Mechanical Technicians in Oil and Gas Facilities	Unit size (GLH)	Pathway			
		Process	Electrical	Instrument	Mechanical
11 Perform Routine Operations and Maintenance of Current-to-Pneumatic Converters	60			M	
12 Perform Routine Operations and Maintenance of Process Controllers and Control Valves	110			M	
13 Perform Routine Operations and Maintenance of Static Equipment	120				M
14 Perform Routine Operations and Maintenance of Reciprocating Engines and Pumps	90				M
15 Perform Routine Operations and Maintenance of Compressors and Turbines	90				M

Pearson BTEC International Level 3 Specialist Diploma in Control Room Operations in Oil and Gas Facilities	Unit size (GLH)	Mandatory or optional
1 Perform Functional Testing of Integrated Process Systems and Remote Control Operations	110	M
2 Perform Central Control Room Operations	120	M
3 Coordinate the Response to Emergencies and Critical Process Situations	120	M
4 Supervise Frontline Safety Barriers	60	O
5 Supervise Process Safety Within Own Area of Work	90	O
6 Supervise Materials Acquisition and Supply Chain Processes for Process-related Frontline Activities	60	O
7 Perform Constituents Testing of Process Fluids	70	O
8 Maintain Flow Assurance on Subsea Wells	150	O
9 Operate and Maintain Subsea Systems	150	O

<b>Pearson BTEC International Level 3 Specialist Diploma in Electrical Engineering Operations in Oil and Gas Facilities</b>	<b>Unit size (GLH)</b>	<b>Mandatory or optional</b>
1 Inspect and Test Installations, Cables and Conductors	100	<b>M</b>
2 Inspect and Test Power Distribution and Protection Systems	100	<b>M</b>
3 Perform Corrective Maintenance of Electrical Equipment and Distribution Systems	100	<b>M</b>
4 Perform Corrective Maintenance of Auxiliary Power and Utilities Systems	100	<b>M</b>
5 Perform Corrective Maintenance of Power Generation and Protection Systems	100	<b>M</b>

<b>Pearson BTEC International Level 3 Specialist Diploma in Instrument Engineering Operations in Oil and Gas Facilities</b>	<b>Unit size (GLH)</b>	<b>Mandatory or optional</b>
1 Perform Corrective Maintenance of Control Systems and Safeguarding Systems	100	<b>M</b>
2 Perform Corrective Maintenance of Distributed Control Systems	120	<b>M</b>
3 Perform Corrective Maintenance of Instrumented Protective Devices and Systems	120	<b>M</b>
4 Perform Corrective Maintenance of Fire and Gas Detection Devices and Systems	120	<b>M</b>

<b>Pearson BTEC International Level 3 Specialist Diploma in Mechanical Engineering Operations in Oil and Gas Facilities</b>	<b>Unit size (GLH)</b>	<b>Mandatory or optional</b>
1 Perform Corrective Maintenance of Reciprocating Engines	120	<b>M</b>
2 Perform Corrective Maintenance of Pumps	120	<b>M</b>
3 Perform Corrective Maintenance of Gas Turbines	120	<b>M</b>
4 Perform Corrective Maintenance of Compressors	120	<b>M</b>

Pearson BTEC International Level 4 Professional Diploma in Oil and Gas Facility Management	Unit size (GLH)	Mandatory or optional
1 Manage Emergency Responses	150	M
2 Manage Health, Safety, Environment and Security	150	M
3 Manage Information and Decision Making	140	M
4 Manage Operations and Asset Integrity	140	M
5 Manage Maintenance Activities	140	O
6 Manage Turnaround and Project Implementation	160	O
7 Manage Process Plant and Well Integrity	120	O
8 Manage Upstream Production and Operations Optimisation	140	O
9 Manage Marine Operations	130	O
10 Manage Marine Export Operations	140	O
11 Manage Onshore Terminal Plant, Storage and Export Facilities	110	O
12 Manage Onshore Terminal Process Optimisation and Export Operations	140	O

<b>Pearson BTEC International Level 4 Professional Diploma in Oil and Gas Installation Management</b>		<b>Unit size (GLH)</b>	<b>Mandatory or optional</b>
1	Manage Emergency Responses	150	<b>M</b>
2	Manage Health, Safety, Environment and Security	150	<b>M</b>
3	Manage Information and Decision Making	140	<b>M</b>
4	Manage Production and Maintenance Operations	150	<b>M</b>
5	Manage Simultaneous Operations	150	<b>M</b>
6	Manage Finance and Human Resources	130	<b>M</b>
7	Manage Operations and Production Plans	150	<b>M</b>

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