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NATIONAL OCCUPATIONAL STANDARDS FOR MEASUREMENT PROCESSES

**Approved by UKCG
May 2003**



***The Sector Skills Council for Chemicals, Nuclear, Oil and Gas,
Petroleum and Polymers***

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Unit 1: Perform Pre-Measurement Processes Operations

This unit is about your contribution to the preparation for carrying out maintenance, inspection, calibration or proving activities relating to the process and associated plant. You will be involved in:

- preparing for worksite attendance
- performing pre-job worksite inspection and Risk Assessment
- scheduling activities

During this work you must take account of the relevant operational requirements and safe working practices.

Unit Scope

You will be expected to demonstrate your competence in Performing Pre-Job Operations in the maintenance or proving context.

Unit-Wide Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- the applicable codes of practice and guidelines
- the product knowledge, handling characteristics and procedures
- the worksite safety requirements and procedures. To include requirement for worksite safety induction; worksite entry arrangements; permit to work system; worksite safety regulations for contractors; worksite survey
- how to select, use and care for PPE including sight/hearing protection, gloves, footwear, hard hats, appropriate workwear
- current legislative requirements (eg HASAWA and COSHH) and organisational requirements
- emergency shut down procedures
- nature and location of worksite services
- limits of own authority and procedures in the event of breaching those limits
- how to interpret operational requirements, e.g. policies, procedures, instructions, codes of practice, standards, schedules

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Element 1.1 : Prepare for Worksite Attendance

Standards of Performance

In achieving this element you will have:

worked safely in accordance with operational requirements
confirmed that the worksite complies with relevant safety requirements
confirmed the scope and definition of work with relevant documentation and staff
ensured all relevant documentation to be in place and valid
selected and ensured fitness for purpose of all equipment and consumables
safely stored and secured the equipment and consumables prior to transportation to worksite
made arrangements for the safe transportation of equipment to worksite

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

how to access and interpret all documentation relevant to worksite safety compliance
how to confirm the scope of work, e.g. agreed procedures/method statement, resource, requirement, time allocation, and with whom
how to confirm that the worksite complies with safety requirements
the appropriate actions to take where the worksite does not comply with all safety requirements
how to select and ensure fitness for purpose of all equipment e.g. availability; appropriate certification; worksite approved; compliance with the appropriate classification of hazardous areas; compatibility with process application; type of job to be performed; types of reference devices; type of measurements; types of product on worksite; accuracy and precision required; compatibility with client's systems; traceability pack; fittings; consumables; product disposal
how to select, prepare and interpret supporting documentation e.g. system documentation, Process and Instrumentation Diagrams, electrical loop drawings

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Element 1.2 : Perform Pre-job Inspection

This element is about your contribution to the pre-job worksite inspection and the preparation of a Risk Assessment.

Standards of Performance

In achieving this element you will have

worked safely in accordance with operational requirements
 established nature, location and specification of equipment to be worked on and checked
 access arrangements
 identified and checked any potential problems and deviations from normal practices with
 appropriate personnel
 accurately recorded the pre-job status in the appropriate log books
 accurately completed a Risk Assessment
 obtained the Permit to Work and other relevant permissions
 effectively ensured a safe working environment for self and others by positioning of
 equipment
 agreed the safe disposal of waste materials with worksite personnel

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

the principles and purpose of pre-job inspection
 how to access, interpret and complete the appropriate log books and other
 documentation
 the principles and purpose of Risk Assessment. To include the procedures;
 documentation; primary hazards; hazardous substances; safe location of equipment;
 and area classification
 your own responsibilities for the scope of work
 agreed calibration and verification procedures
 equipment maintenance, manufacturer's safety data, operating instructions
 how to establish site safety and operating procedures including safe lone working
 the product pipework routes, isolating valve location and operating procedures

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Element 1.3 : Schedule Activities

This element is about your competence in planning a programme of worksite visits and organising daily schedules of work and availability of equipment including responding to changes required by clients.

Standards of Performance

In achieving this element you will have:

worked safely in accordance with operational requirements
ensured and agreed own understanding of client requirements
effectively planned and sequenced the activity
promptly identified and responded to contingencies

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

how to plan and sequence activities to minimise disruption to client plant operation. To include the sequence of events for the day/week/month; worksite work patterns; client equipment availability; availability of consumables; meal and rest breaks; work output and time available.

how to identify and respond to contingencies. To include schedule alterations; third party assistance; equipment, spares' and consumables' availability; calibration status and maintenance schedules; cost effective use of time; and changes in worksite work plan.

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Unit 2 : Contribute to the Health and Safety of the Working Environment

This unit is about contributing to the Health and Safety of your working environment. You will be involved in:

monitoring and maintaining the health and safety of self and others
monitoring and maintaining pollution control measures

During this work you must take account of the relevant operational requirements and safe working practices.

Unit Scope

You will be expected to demonstrate your competence in contributing to the Health and Safety of the working environment in the maintenance or proving context.

To demonstrate your competence in contributing to the Health and Safety of the working environment you must generate and gather and present evidence of:

working on your own
working in a team
consideration of hazardous substances
maintaining continuous communication
reacting to on-worksites emergencies

Unit-Wide Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- the worksite safety requirements and procedures. To include the requirement for worksite safety induction; worksite entry arrangements; permit to work system; worksite safety regulations for contractors; and worksite survey.
- how to select, use and care for PPE including sight/hearing protection, gloves, footwear, hard hats and the appropriate workwear.
- current legislative requirements (eg HASAWA and COSHH) and organisational requirements
- emergency shut down procedures
- nature and location of worksite services
- limits of own authority and procedures in the event of breaching those limits
- how to interpret operational requirements e.g. policies, procedures, instructions, codes of practice, standards, schedules

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Element 2.1 : Monitor and Maintain Health and Safety of Self and Others

Standards of Performance

In achieving this element you will have

- a. ensured that the area within your own personal responsibility is maintained, clean and hazard free
- b. positioned and used relevant safety equipment (including guards) safely and securely
- c. correctly identified and reported unsafe equipment and potential danger
- d. correctly used the specified PPE
- e. correctly handled all materials, tools and equipment
- f. worked safely in accordance with operational requirements

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to implement workplace reporting procedures
- how to identify and access fire protection, first aid and survival equipment
- how to deal with materials e.g. flammable, toxic, corrosive, explosive, radioactive
- your own responsibilities as they relate to Organisational Safety Policy
- how to use safe lifting and handling techniques

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Element 2.2 : Monitor and Maintain Pollution Control Measures

Standards of Performance

In achieving this element you will have

- a. monitored and controlled the discharges, within your responsibility, to within prescribed limits
- b. correctly identified and reported unplanned discharges
- c. correctly used the specified PPE
- d. correctly identified, packaged, labeled and transferred materials for disposal
- e. worked safely in accordance with operational requirements

Scope (See also Unit Scope)

You will be expected to provide evidence of your competence in dealing with each of the following types of discharge:

Solid
Liquid
Gas

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

how to deal with materials e.g. flammable, toxic, corrosive, explosive and radioactive
the principles and practice of dealing with discharge and waste materials
your own responsibilities as they relate to Organisational Safety Policy; the Classification, Packaging and Labeling of Dangerous Substances Regulations; Environmental Protection Act

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Unit 3 : Establish and Maintain Effective Working Relationships in the Measurement Processes Environment

This unit is about establishing and maintaining effective working relationships. You will be involved in:

establishing and maintaining effective working relationships with colleagues
 establishing and maintaining effective communications with colleagues
 carrying out work handovers

During this work you must take account of the relevant operational requirements and safe working practices.

Unit Scope

You will be expected to demonstrate your competence in establishing and maintaining effective working relationships in the maintenance or proving context.

The situations in which you will be expected to demonstrate your competence in establishing and maintaining effective working relationships will include:

- informal meetings
- formal meetings
- normal work situation
- vendor communication
- team briefings

Unit-Wide Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

Unit wide Underpinning Knowledge and Understanding

- the implications of relevant statutory (eg HASAWA and COSHH) and organisational requirements
- how to interpret operational requirements e.g. policies, procedures, instructions, codes of practice, standards, schedules
- the implications of the relevant fiscal and Excise requirements
- the implications of poor communication
- the need for good relationships
- the need for proper hand-over and the impact of inadequate hand-over
- the means to ensure information given has been effectively received

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Element 3.1 : Establish and Maintain Effective Working Relationships with Colleagues

This element is about establishing and maintaining effective working relationships with your clients, co-workers, supervisors, managers, other company employees and third parties (eg contractors)

Standards of Performance

In achieving this element you will have

- a. treated colleagues in a manner which promotes and maintains goodwill
- b. promptly and willingly met reasonable requests from colleagues
- c. provided clear, accurate and prompt information regarding daily work schedules to colleagues
- d. supported and offered help to colleagues
- e. worked safely in accordance with operational requirements

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

- your own responsibilities under Company Personnel Policies
- how to recognise reasonable requests
- what is considered essential information regarding daily work schedules
- when a working relationship has broken down and the appropriate procedures to follow
 - e.g. company grievance procedure

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Element 3.2 : Establish and Maintain Effective Communications with Colleagues

This unit is about establishing and maintaining effective communications with your clients, co-workers, supervisors, managers, other company employees.

Standards of Performance

In achieving this element you will have

- a. effectively delivered clear, concise, accurate and unambiguous communications
- b. accurately identified difficulties in interpretation of information and sought prompt clarification
- c. worked safely and in accordance with operational requirements

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see Unit Underpinning Knowledge and Understanding)

no element specific underpinning knowledge and understanding (see Unit Scope)

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Element 3.3 : Carry out Work Handovers

Standards of Performance

In achieving this element you will have

- a. effectively recorded all relevant information
- b. ensured that information given TO you on current operational status is accurate and complete
- c. ensured that information given BY you on current operational status is accurate and complete
- d. effectively communicated all relevant operating instructions
- e. left your work area clean and hazard free
- f. worked safely and in accordance with operational requirements

Scope (See also Unit Scope)

The situations in which you will be expected to demonstrate your competence in carrying out work handovers are:

to next shift
from previous shift
to next job
from previous job
to next person
from previous person

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

how to work with and within the Permit to Work system
how to identify and control and minimise work area hazards
the relevant personnel who are to give information to you
the relevant personnel who are to receive information from you
how to adequately define the status of work progress on the metering system under your control

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Unit 4 : Perform Post-Measurement Processes Operations

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| Note: | This unit will be subject to 100% External Verification as per Assessment Strategy. |
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This unit is about your contribution to post-job operations. You will be involved in:

- performing post-job worksite inspection
- preparing for worksite departure

During this work you must take account of the relevant operational requirements and safe working practices.

Unit Scope

You will be expected to demonstrate your competence in performing post-job operations in the maintenance or proving context.

Unit-Wide Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to select, use and care for PPE including sight/hearing protection, gloves, footwear, hard hats, appropriate workwear.
- the implications of statutory, to include HASAWA and COSHH) and organisational requirements
- how to interpret operational requirements, to include policies, procedures, instructions, codes of practice, standards and schedules
- appropriate International standards
- how to work with and within the permit to Work system
- specialist safety and technical knowledge

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Element 4.1 : Perform Post-Job Worksite Inspection

Standards of Performance

In achieving this element you will have:

worked safely in accordance with operational requirements
effectively checked all relevant plant and process is left safe
effectively returned the system to service as appropriate
completed all documentation relevant to the operation
fulfilled all responsibilities regarding equipment and the spares
effectively completed all local works Permit to Work procedures
notified relevant personnel of completion

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

what the post-job inspection covers. To include the system and system configuration and all associated signing in and signing out procedure.
the principles and practice of returning the system to service including the resetting parameters
the range of your responsibilities and how to discharge those responsibilities
how to access and communicate with the personnel relevant to task completion

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Element 4.2 : Prepare for Worksite Departure

Standards of Performance

In achieving this element you will have:

- a. effectively completed all relevant documentation
- b. accurately performed all relevant calculations
- c. accurately recorded and highlighted potential mismeasurements
- d. actively and effectively taken part in a close-out meeting with relevant personnel
- e. worked safely and in accordance with operational requirements

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

- the relevant documentation to complete
- how to identify, record and highlight potential mismeasurements
- the personnel relevant to preparing for worksite departure
- client requirements for data presentation
- your responsibilities regarding the close-out meeting

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Unit 5 : Inspect and Verify Gas Measurement Systems

This unit is about your contribution to the inspection and verification of gas devices. You will be involved in:

- inspecting and verifying primary gas devices
- inspecting and verifying secondary gas devices
- inspecting and verifying gas quality devices

During this work you must take account of the relevant operational requirements and safe working practices.

Unit Scope

All scope in this unit is element specific.

Unit-Wide Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to select, use and care for PPE including sight/hearing protection, gloves, footwear, hard hats, appropriate workwear.
- the implications of statutory (eg HASAWA and COSHH) and organisational requirements
- how to interpret operational requirements e.g. policies, procedures, instructions, codes of practice, standards, schedules
- who to inform that you are going to carry out the inspection e.g. plant management staff
- the principles and practice of measurement. To include the errors; accuracy; and precision.
- isolation techniques
- the differences between inspection and verification
- the documentation relevant to inspection and verification and how to complete it effectively
- how to access and interpret information from certificates of calibration and standards
- device handling techniques
- the traceability of test equipment
- the meaning of the measurement terminology. To include errors; accuracy; precision; and uncertainty
- the sources and treatment of errors and mismeasurement within metering system

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Element 5.1 : Inspect and Verify Primary Gas Devices

Standards of Performance

In achieving this element you will have:

- a. effectively notified all relevant personnel of your intention to carry out the inspection
- b. effectively inspected and verified the Primary Device against approved procedures and standards
- c. effectively re-instated the Primary Device
- d. followed the appropriate procedures should the Primary Device be unsuitable for re-instatement
- e. accurately completed all relevant documentation
- f. effectively safeguarded the integrity of tools and equipment
- g. worked safely and in accordance with operational requirements

Scope

To demonstrate your competence you must generate Performance Evidence of 2 of the following 5 Primary Devices and Knowledge Evidence only of the remaining 3 Primary Devices:

- Differential Pressure Generating Devices (e.g. orifice plates, venturi meters and nozzles as appropriate)
- Turbine Meters
- Ultrasonic Meters
- Coriolis Meters
- Vortex Meters

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to safeguard the integrity of the Primary Device to be inspected and verified
- how to carry out the inspection e.g. visual checks and dimensional checks, on the Primary Device
- why and when to perform safe isolation and de-isolation
- what to do if the Primary Device is unsuitable for re-instatement
- the installation requirements and limitations and their effects upon performance of the Primary Device
- the operating principles of the Primary Device
- performance characteristics and calibration techniques for all of the relevant Primary devices

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Element 5.2 : Inspect and Verify Secondary Gas Devices

Standards of Performance

In achieving this element you will have:

- a. effectively notified all relevant personnel of your intention to carry out the inspection
- b. effectively isolated, removed, inspected and verified the Secondary Device against approved procedures and standards
- c. effectively re-instated the Secondary Device
- d. followed the appropriate procedures should the Secondary Device be unsuitable for re-instatement
- e. accurately completed all relevant documentation
- f. effectively safeguarded the integrity of tools and equipment
- g. worked safely and in accordance with operational requirements

Scope

To demonstrate your competence you must generate Performance Evidence for all of the following Secondary Devices:

Flow computers (to include system loop drawings; input and output signals; mode of operation; configuration; flow calculations)

Pressure Transmitters (to include valve manifolds; footprinting techniques; calibrating devices for the calibration of transmitters)

Temperature Transmitters and Resistance Temperature Detectors (to include electrical loop drawings; test equipment connections; signal transmission techniques)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

how to safeguard the integrity of the Secondary Device to be inspected and verified

how to carry out the inspection on the Secondary Device

why and when to perform safe isolation and de-isolation

what to do if the Secondary Device is unsuitable for re-instatement

the installation requirements and limitations and their effects upon performance of the Secondary Device

the operating principles of the Secondary Device

the function of loop components and the impact of their performance on the loop. To include barrier devices; power supplies; cabling; and connectors.

performance characteristics and system characteristics of all relevant Secondary devices

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Element 5.3 : Inspect and Verify Gas Quality Devices

Standards of Performance

In achieving this element you will have:

- a. effectively notified all relevant personnel of your intention to carry out the inspection
- b. effectively isolated, removed, inspected and verified the Quality Device against approved procedures and standards
- c. effectively re-instated the Quality Device
- d. followed the appropriate procedures should the Quality Device be unsuitable for re-instatement
- e. accurately completed all relevant documentation
- f. effectively safeguarded the integrity of high pressure standards gases and carrier gases
- g. worked safely and in accordance with operational requirements

Scope

To demonstrate your competence you must generate Performance Evidence of 1 of the following 5 Quality Devices and Knowledge Evidence only of the remaining 4 Quality Devices:

- Chromatographs. To include sampling and conditioning; specification of calibration and carrier gas; and methods of interpreting results.
- Densitometers. To include vacuum tests requirements; actual density calculations from relationships between density constants; periodic time and temperature.
- RD Analysers. To include Appendix A correction; specification of calibration gases; actual density calculations from relationships between density constants; periodic time and temperature.
- Sampling Systems. To include proportional sampling; iso-kinetic sampling; process probe location and condition; process sample handling; sample conditioning and response times.
- Analysers. T
- o include Hydrocarbon Dew Point; moisture and H₂S.

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

how to safeguard the integrity of the Quality Device to be inspected and verified
 how to carry out the inspection on the Quality Device
 why and when to perform safe isolation and de-isolation
 what to do if the Quality Device is unsuitable for re-instatement
 the installation requirements and limitations and their effects upon performance of the Quality Device
 the operating principles of the Quality Device

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Unit 6 : Inspect and Verify Liquid Measurement Systems

This unit is about your contribution to the inspection and verification of liquid devices. You will be involved in:

- inspecting and verifying primary liquid devices
- inspecting and verifying secondary liquid devices
- inspecting and verifying liquid quality devices

During this work you must take account of the relevant operational requirements and safe working practices.

Unit Scope

All scope in this unit is element specific.

Unit-Wide Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to select, use and care for PPE including sight/hearing protection, gloves, footwear, hard hats, appropriate workwear.
- the implications of statutory (eg HASAWA and COSHH) and organisational requirements
- how to interpret operational requirements e.g. policies, procedures, instructions, codes of practice, standards, schedules
- who to inform that you are going to carry out the inspection e.g. plant management staff
- the principles and practice of measurement. To include errors; accuracy and precision
- isolation techniques
- the differences between inspection and verification
- the documentation relevant to inspection and verification and how to complete it effectively
- how to access and interpret information from certificates of calibration and standards
- device handling techniques
- the traceability of test equipment
- the meaning of the measurement terminology. To include errors; accuracy; precision; and uncertainty)
- the sources and treatment of errors and mismeasurement within metering system
- how to access and interpret information on 'proving'

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Element 6.1 : Inspect and Verify Primary Liquid Devices

Standards of Performance

In achieving this element you will have:

- a. effectively notified all relevant personnel of your intention to carry out the inspection
- b. effectively inspected and verified the Primary Liquid Device against approved procedures and standards
- c. effectively re-instated the Primary Liquid Device
- d. followed the appropriate procedures should the Primary Liquid Device be unsuitable for re-instatement
- e. accurately completed all relevant documentation
- f. effectively safeguarded the integrity of tools and equipment
- g. worked safely and in accordance with operational requirements

Scope

To demonstrate your competence you must generate Performance Evidence of 2 of the following 7 Primary Devices and Knowledge Evidence only of the remaining 5 Primary Devices:

- Differential Pressure Devices
- Turbine Devices
- Ultrasonic Meters
- Coriolis Meters
- Vortex Meters
- Positive Displacement Meters
- Electromagnetic Meters

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

how to safeguard the integrity of the Primary Device to be inspected and verified
 how to carry out the inspection on the Primary Device
 why and when to perform safe isolation and de-isolation
 what to do if the Primary Device is unsuitable for re-instatement
 the installation requirements and limitations and their effects upon performance of the Primary Device
 the operating principles of the Primary Device
 performance characteristics and calibration techniques for all of the relevant Primary devices

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Element 6.2 : Inspect and Verify Secondary Liquid Devices

Standards of Performance

In achieving this element you will have:

- a. effectively notified all relevant personnel of your intention to carry out the inspection
- b. effectively isolated, removed, inspected and verified the Secondary Device against approved procedures and standards
- c. effectively re-instated the Secondary Device
- d. followed the appropriate procedures should the Secondary Device be unsuitable for re-instatement
- e. accurately completed all relevant documentation
- f. effectively safeguarded the integrity of tools and equipment
- g. worked safely and in accordance with operational requirements

Scope

To demonstrate your competence you must generate Performance Evidence of 3 of the following Secondary Devices and Knowledge Evidence only of the remaining 1 Secondary Device:

- Flow computers. To include system loop drawings; input and output signals; mode of operation; configuration; and flow calculations.
- Pressure Transmitters. To include valve manifolds; calibrating devices for the calibration of transmitters.
- Temperature transmitters and Resistance Temperature Detectors. To include electrical loop drawings; test equipment connections; and signal transmission techniques.
- Prover/meter calibration

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

how to safeguard the integrity of the Secondary Device to be inspected and verified
 how to carry out the inspection on the Secondary Device
 why and when to perform safe isolation and de-isolation
 what to do if the Secondary Device is unsuitable for re-instatement
 the installation requirements and limitations and their effects upon performance of the Secondary Device
 the operating principles of the Secondary Device
 the function of loop components and the impact of their performance on the loop. To include barrier devices; power supplies; and cabling and connectors
 performance characteristics and calibration techniques for all of the relevant Secondary devices

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Element 6.3 : Inspect and Verify Liquid Quality Devices

Standards of Performance

In achieving this element you will have:

- a. effectively notified all relevant personnel of your intention to carry out the inspection
- b. effectively isolated, removed, inspected and verified the Quality Device against approved procedures and standards
- c. effectively re-instated the Quality Device
- d. followed the appropriate procedures should the Quality Device be unsuitable for re-instatement
- e. accurately completed all relevant documentation
- f. effectively safeguarded the integrity of high pressure standards gases and carrier gases
- g. worked safely and in accordance with operational requirements

Scope

To demonstrate your competence you must generate Performance Evidence of 1 of the following Quality Devices and Knowledge Evidence only of the remaining 2 Quality Devices:

- Water in Oil Monitors. To include calculation routines and their verification
- Densitometers. To include air tests requirements; actual density calculations from relationships between density constants; periodic time; temperature; and pressure)
- Sampling Systems. To include proportional sampling; process probe location and condition; process sample handling; and sample conditioning.

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

how to safeguard the integrity of the Quality Device to be inspected and verified
how to carry out the inspection on the Quality Device
why and when to perform safe isolation and de-isolation
what to do if the Quality Device is unsuitable for re-instatement
the installation requirements and limitations and their effects upon performance of the Quality Device
the operating principles of the Quality Device

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Unit 7 : Inspect and Verify Bulk Storage Measurement Systems

This unit is about your contribution to the inspection and verification of measuring devices used to account for bulk movements of fluids. You will be involved in:

- inspecting and verifying primary bulk storage devices
- inspecting and verifying secondary bulk storage devices

During this work you must take account of the relevant operational requirements and safe working practices.

Unit Scope

All scope in this unit is element specific.

Unit-Wide Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to select, use and care for PPE including sight/hearing protection, gloves, footwear, hard hats and appropriate workwear)
- the implications of statutory (eg HASAWA and COSHH) and organisational requirements
- how to interpret operational requirements e.g. policies, procedures, instructions, codes of practice, standards and schedules
- who to inform that you are going to carry out the inspection e.g. plant management staff
- the principles and practice of measurement. To include errors; accuracy; and precision isolation techniques
- the differences between inspection and verification
- the documentation relevant to inspection and verification and how to complete it effectively
- how to access and interpret information from certificates of calibration and standards
- device handling techniques
- the traceability of test equipment
- the meaning of the measurement terminology. To include errors; accuracy; precision; and uncertainty.
- the sources and treatment of errors and mismeasurement within metering system
- the role of statutory and regulatory bodies and the implications on the owner of the stored materials.
- the origins and use of calibration tables.
- the applicable limits of measurement accuracy for fiscal and custody transfer.
- how to access, interpret and use relevant information. To include tank/vessel calibration tables; correction factors; and standards)
- the terminology used in tank content measurement
- device calibration methods and considerations

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Element 7.1 : Inspect and Verify Primary Bulk Storage Devices

This element is about your contribution to the inspection and verification of Primary devices (to include Liquid and Liquefied Gas). Within the context of this element the Primary device is defined as those components which bring about the detection of the fluid interface or interfaces and convert this into a form suitable for onward transmission to the secondary device(s).

Standards of Performance

In achieving this element you will have:

- a. effectively notified all relevant personnel of your intention to carry out the inspection
- b. effectively isolated, removed, inspected and verified the Primary Device against approved procedures and standards
- c. effectively re-instated the Primary Device
- d. followed the appropriate procedures should the Primary Liquid be unsuitable for re-installation
- e. accurately completed all relevant documentation
- f. properly handled calibration equipment
- g. worked safely and in accordance with operational requirements

Scope

To demonstrate your competence you must generate Performance Evidence of 2 of the following 6 methods and Knowledge Evidence only of the remaining 4 methods:

- Contacting motion sensing. To include limitations to use; isolation techniques; measurement ranges; and data conversion.
- Contacting static sensing. To include limitations to use; isolation techniques; measurement ranges; and data conversion.
- Non-contacting static sensing. To include limitations to use; isolation techniques; measurement ranges; data conversion; and correction for vapour space conditions.
- Bulk mass measurement. To include the fundamentals associated with the computation.
- Manual methods. To include problems affecting repeatability and reproducibility and the fundamental datum points
- Installation. To include sphere; fixed and floating roof tank considerations)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

why and when to bring about safe isolation and de-isolation
 how to handle the device to be inspected and/or verified
 how to carry out the inspection and verification
 the operating principles of the Primary Device
 what to do if the primary device is unsuitable for re-instatement
 installation requirements and limitations and their effects upon the performance of the primary device
 where and how to apply correction
 the impact of ill defined interface. To include vapour/liquid and liquid/liquid
 the principles and practice of static pressure effects

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Element 7.2 : Inspect and Verify Secondary Bulk Storage Devices

This element is about your contribution to the inspection and verification of Secondary Devices. Within the context of this element a "Secondary Device" is defined as that assembly of components which brings about the:

Primary Device selection (manually and/or automatically)
validation and processing of the data transmitted from the Primary Device
temporary storage of the measurement results for onward transmission to the secure
data archival and reconciliation system(s)

Standards of Performance

In achieving this element you will have:

- a. effectively notified all relevant personnel of your intention to carry out the inspection
- b. effectively isolated, removed, inspected and verified the Secondary Device against approved procedures and standards
- c. effectively re-instated the Secondary Device
- d. followed the appropriate procedures should the Secondary Device be unsuitable for re-installation
- e. accurately completed all relevant documentation
- f. properly handled calibration equipment
- g. worked safely and in accordance with operational requirements

Scope

To demonstrate your competence you must generate Performance Evidence of 2 of the following methods and Knowledge Evidence only of the remaining method:

- Measurement, Inventory Management and Display Devices. To include system loop drawings; addressing techniques; transmission coding techniques; data highway security; data management; data security; inviolate data storage access controls; and batch management.
- Temperature measurement. To include automatic and manual methods.
- Pressure Devices. To include valve manifold and calibrating devices for the calibration of transmitters.

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

why and when to bring about safe isolation and de-isolation
how to handle the device to be inspected
the operating principles of the Secondary Device
how to carry out the inspection. To include visual checks; power supply checks;
configuration violation checks; and damage check
what to do if the Secondary Device is unsuitable for re-instatement

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Unit 8 : Proving Operations

This Unit deals with the conducting of the proving and testing process using various reference devices and at various locations.

The term "Proving and Testing" will hereinafter be assumed within the term "Proving". You will be involved in:

- connecting proving equipment to client system
- preparing client system for proving
- monitoring and advising on the condition of reference devices and ancillary equipment
- carrying out proving operation using reference devices
- carrying out proving calculations on field data
- returning to normal operation

During this work you must take account of the relevant operational requirements and safe working practices.

Unit Scope

To demonstrate your competence for Proving Operations you must generate Performance, Product and associated Knowledge evidence in **only one** of the following areas:

- Reference Meter
- Aviation Meter
- Pipeline Meter
- Prover

Unit-Wide Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

the applicable measurement codes of practice and guidelines

- the product knowledge, handling characteristics and procedures
 - the documentation relevant to proving, how to access and interpret information from certificates, and gathered data
 - the meaning of measurement terminology. To include errors accuracy; precision; and uncertainty.
 - handling and treatment of test data
 - the sources of mismeasurement and treatment of errors
 - accessing and interpreting information on proving
- the site safety requirements and procedures. To include requirement for site safety induction; site entry arrangements; permit to work system; and the site safety regulations for contractors.
- how to select, use and care for PPE including sight/hearing protection, gloves, footwear, hard hats, and the appropriate workwear
 - current legislative requirements (eg HASAWA, Environment and COSHH) and organisational requirements
 - emergency shut down procedures
 - nature and location of site services
 - principles and practice of mechanical pressure envelope integrity

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limits of own authority and procedures in the event of breaching those limits

- how to interpret operational requirements e.g. procedures, instructions, codes of practice, standards, schedules
- the compatibility of product, e.g. first and last product; switch loading; high and low flash sequences; vapour balance characteristics; and associated hazards.
- how to ensure electrical integrity of the proving installation, e.g. earthing; static discharge; power requirements; and the Area Classification of the installation.

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Element 8.1: Connect Proving Equipment To Client System

Standards of Performance

In achieving this element you will have:

- a. worked safely in accordance with operational requirements
- b. ensured that all proving equipment is in serviceable condition and correctly set up
- c. correctly positioned proving equipment and fire extinguishers following site instructions and method statements
- d. confirmed isolation of the client's system and safety with client's appointed representative
- e. ensured the appropriate earthing between all proving equipment and site system and electrical continuity of hoses
- f. correctly connected site services to proving equipment
- g. ensured the safety of plant, equipment and compatibility of products
- h. effectively determined product disposal and return facilities
- i. ensured integrity of proving system

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

product compatibility. To include first and last product; high and low flash sequences; and vapour balance characteristics.

- the principles and practice of product disposal. To include isolation; storage and handling; disposal following agreed operational and environmental procedures.
- principles and practice of proving system integrity. To include earthing systems; secure connections; accumulation and elimination of static charge; purging of hoses; filters for product and flow rates; and the draining of reference devices when changing product and upon completion of proving.
- the principles and practice of switch loading and the associated hazards, e.g. isolation procedures; static electricity and its consequences; continuity testing procedures; appropriate safety tests; earthing procedures; and integrity checks.

product disposal arrangements

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Element 8.2 : Prepare Client System For Proving

Standards of Performance

In achieving this element you will have:

worked safely in accordance with operational requirements
reviewed historic data sheets for equipment under test
confirmed the safe release of equipment under test
accurately recorded readings from client's equipment and test equipment readings
e. accurately adjusted equipment under test configuration to achieve proving mode and recorded this accurately

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

- the clients specification and tolerances
- the types of metering equipment and their operating systems
- the differences between mechanical and electronic head devices
- how to interpret records
- how to work with recording systems (to include maintenance)
- the client's policy on product return to storage or disposal

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Element 8.3 : Monitor The Condition Of Reference Devices And Ancillary Equipment

This element is about your competence in monitoring the condition and validity of reference devices and ancillary equipment, ensuring re-certification.

Standards of Performance

In achieving this element you will have:

- a. worked safely in accordance with operational requirements
- b. checked that the reference equipment is fit for purpose
- c. recorded reference equipment defects and reported to appropriate personnel
- d. replaced standard parts of equipment
- e. accurately established the effect of external equipment and environmental conditions on reference device performance
- f. established the stability of reference device history
- g. identified and withdrawn suspect reference devices from use
- h. completed all relevant documentation
- i. provided ongoing advice to appropriate personnel of objectives, process and outcome of monitoring

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to check that the equipment is fit for purpose
 - how to interpret and update calibration certificates and other relevant documentation
- how to access and interpret manufacturer's instructions regarding the operation and maintenance of equipment
- the parts lists and methods of updating
- the use of electrical equipment in hazardous areas
the relevant methods of re-calibrating equipment using appropriate primary standards
the information required by clients. To include potential deterioration; product loss; meter/prover history; and the magnitude of error.

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Element 8.4: Carry Out Proving Operations Using Reference Devices

Standards of Performance

In achieving this element you will have:

- a. worked safely in accordance with operational requirements
- b. accurately recorded all relevant parameters from reference device and equipment under test
- c. effectively conducted stabilising runs
- d. conducted an appropriate number of pre-calibration runs to obtain sufficient data on performance of equipment under test
- e. checked the test readings of the equipment under test against corrected reference device reading
- f. correctly adjusted the device under test to achieve calibration
- g. accurately completed all relevant documentation

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

- your company and the customer's proving procedures
- the principles and practice of pre-calibration runs. To include the appropriate number; priming; pre-calibration; and proving at various flow rates.
- the purpose of proving runs
 - the principles and practice of calculations
 - the effect of pressure and temperature on the test
- the consequences of error
- the sources of correction factors
- how to complete all relevant documentation
 - the correction factors and their application
 - the traceability procedures
 - the tolerance parameters for proving

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Element 8.5 : Carry Out Proving Calculations

This element is about your competence in carrying out and recording the results of proving calculations.

Standards of Performance

In achieving this element you will have:

worked safely in accordance with operational requirements
collated, validated and reviewed the data and results against historic data
checked that appropriate correction factors have been applied to data using the correct methods and formulae
communicated, agreed and received client approval of test results and any subsequent need for rectification and re-proving with clients
ensured continuing integrity of reference equipment
confirmed that the results comply with regulatory requirements
generated provisional results and accurately cross-referenced them with ancillary equipment
prepared site reports including all relevant information
accurately transferred data to appropriate documentation and records
updated client and own company records following agreed procedures
ensured that final certification provides client with all necessary proving information

Scope (see also Unit Scope)

When carrying out proving calculations, you must compile:

- the final calibration certificate
- the associated documentation
- the updated Statutory records

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to use the test results to identify whether the equipment under test is in specification
- when it is appropriate to undertake recertification work and re-proving
- the principles and practice of correction factors
- how to demonstrate traceability of certification
- how to interpret and communicate results to client

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Element 8.6: Return To Normal Operation

This element is about your competence in returning the equipment under test to normal operation.

Standards of Performance

In achieving this element you will have:

- a. worked safely in accordance with operational requirement
- b. effectively followed safe shut down, isolation and disposal of waste procedures for the removal of proving equipment
- c. effectively ensured the integrity of security systems
- d. effectively disconnected the proving equipment
- e. effectively returned the site to normal and safe condition in accordance with client requirements and other regulations

Scope (See Unit Scope)

Underpinning Knowledge and Understanding (see also Unit Underpinning Knowledge and Understanding)

Within the limits of your responsibility you must be able to demonstrate that you know:

the principles and practice of safe disposal of waste. To include isolation; storage and handling; disposal following agreed operational and environmental procedures.

- the client's specification and tolerances
- the site contacts
- the normal operating parameters and ways of reinstating them