



Higher National Unit Specification

General information for centres

Unit title: Water Operations: Water Distribution

Unit code: F53N 34

Unit purpose: This Unit is designed to enable the candidate to develop the skills and knowledge associated with the principles of water network distribution system within the water industry.

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

- 1 Design a typical water distribution system and explain the operation and maintenance strategy required.
- 2 Explain the significance of flow and pressure within a water distribution system.
- 3 Analyse a water supply zone and make recommendations to resolve leakage issues within a water supply zone.
- 4 Explain operational methods used in pipe laying within a water distribution network system.
- 5 Explain inspection techniques used to inspect plumbing systems for compliance with Water Byelaws.

Credit points and level: 1.5 HN credit at SCQF level 7: (12 SCQF credit points at SCQF level 7*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Recommended prior knowledge and skills: Access to this Unit is at the discretion of the centre. However, it is recommended that candidates have *Communication* and *Numeracy* skills level 4 or equivalent.

Core Skills: There are opportunities to develop the Core Skills of *Communications*, *Problem Solving*, and *Working with Others* to level SCQF 6, and *Numeracy* and *Information and Communication Technology* to level 5, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: It is possible to assess candidates on an individual Outcome basis, by combinations of Outcomes, or by a single holistic assessment encompassing all Outcomes. Assessment should be conducted under supervised conditions. The assessment(s) should consist of an appropriate balance of restricted response and structured questions. If a single assessment covering all Outcomes is used, it should not exceed three hours in duration.

Higher National Unit specification: statement of standards

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

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

Outcome 1

Design a typical water distribution system and explain the operation and maintenance strategy required

Knowledge and/or Skills

- ◆ Water distribution systems.
- ◆ Layout for new build
- ◆ Planned maintenance strategy
- ◆ Current standards
- ◆ Service reservoirs
- ◆ Pumping systems
- ◆ Flow and pressure

Evidence Requirements

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

- ◆ design a water distribution system, from service reservoir to customer tap, for a new build housing estate. The design must include layout, pipe sizes, branches and components.
- ◆ describe a planned maintenance strategy for the water distribution system designed in the previous ER in line with current industry and legislative standards. The strategy must include inspection, timescale and priorities.
- ◆ explain the operation of a service reservoir and pumping system within a distribution system. Explanation must include the design of a service reservoir and the operating procedures including flow and pressure.

Assessment for the theoretical aspects must be conducted under closed-book conditions.

Assessment Guidelines

For this Outcome, it is suggested that part of the assessment could consist of a report which might be combined with that of Outcomes 1–3, and part a closed-book end assessment. Questions used to elicit candidate response could take the form of an appropriate balance of multiple choice and restricted response type and should reflect the Evidence Requirements.

Higher National Unit specification: statement of standards (cont)

Unit title: Water Operations: Water Distribution

Outcome 2

Explain the significance of flow and pressure within a water distribution system

Knowledge and/or Skills

- ◆ Pressure flow and Head.
- ◆ Calculation of pressure, flow and head

Evidence Requirements

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

- ◆ explain at least four factors which must be considered to maintain flow, pressure and head within a water distribution network system
- ◆ explain the significance of pressure, flow and head and their relationship to the water distribution system
- ◆ calculate pressure flows and available head in a distribution system using at least four typical formulae

Assessment for the theoretical aspects must be conducted under closed-book conditions.

Assessment Guidelines

For this Outcome, it is suggested that part of the assessment could consist of a report which might be combined with that of Outcomes 1–3, and part a closed-book end assessment. Questions used to elicit candidate response could take the form of an appropriate balance of multiple choice and restricted response type and should reflect the Evidence Requirements.

Higher National Unit specification: statement of standards (cont)

Unit title: Water Operations: Water Distribution

Outcome 3

Analyse a water supply zone and make recommendations to resolve leakage issues within a water supply zone

Knowledge and/or Skills

- ◆ Leakage identification
- ◆ Leakage detection
- ◆ Leakage repair or renewal
- ◆ Leakage monitoring

Evidence Requirements

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

- ◆ describe how a water undertaker identifies, detects repairs and monitors leakage throughout a reorder water supply zone within a geographical area. The description must include at least two methods used in detection.
- ◆ analyse a water supply zone and make recommendations to resolve leakage within a water supply zone.

Assessment for the theoretical aspects must be conducted under closed-book conditions.

Assessment Guidelines

For this Outcome, it is suggested that part of the assessment could consist of a report which might be combined with that of Outcomes 1–3, and part a closed-book end assessment. Questions used to elicit candidate response could take the form of an appropriate balance of multiple choice and restricted response type and should reflect a representative sample of the Evidence Requirements.

Higher National Unit specification: statement of standards (cont)

Unit title: Water Operations: Water Distribution

Outcome 4

Explain operational methods used in pipe laying within a water distribution network system

Knowledge and/or Skills

- ◆ Operational Methods
- ◆ Signing and Excavation
- ◆ Safety procedures
- ◆ Pipe laying
- ◆ Bedding and Reinstatement
- ◆ Renewal and Rehabilitation Techniques
- ◆ Open and closed Trench
- ◆ Current regulations

Evidence Requirements

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

- ◆ explain at least two operational method used in signing and excavation for pipe laying. The explanation must include safety procedures, supports and plant in line with current regulations.
- ◆ explain at least two method of pipe laying. The explanation must include laying out, jointing and testing.
- ◆ describe what is meant by bedding and reinstatement in relation to pipe laying. The explanation must include at least two types of bedding and reinstatement for two different situations.
- ◆ explain at least **two** techniques used in the renewal and rehabilitation of pipelines for **both** open and closed trench construction one technique for each.

Assessment must be conducted under closed-book conditions.

Assessment Guidelines

For this Outcome, the assessment could consist of questions used in the form of an appropriate balance of multiple choice and restricted response type.

Higher National Unit specification: statement of standards (cont)

Unit title: Water Operations: Water Distribution

Outcome 5

Explain inspection techniques used to inspect plumbing systems for compliance with Water Byelaws

Knowledge and/or Skills

- ◆ Inspection Techniques
- ◆ Plumbing systems
- ◆ Water Byelaws
- ◆ Fire fighting systems

Evidence Requirements

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

- ◆ explain the principles of domestic and industrial plumbing systems. The explanation must include one hot and one cold water systems and two simple heating systems.
- ◆ explain at least three inspection techniques used to identify contraventions of water byelaws for a given system.
- ◆ describe how water based fire fighting systems comply with regulations.

Assessment must be conducted under closed-book conditions.

Assessment Guidelines

For this Outcome, it is suggested that the questions used to elicit candidate response could take the form of an appropriate balance of multiple choice and restricted response type.

Administrative Information

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Unit title: Water Operations: Water Distribution
Superclass category: TL
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Version	Description of change	Date

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Higher National Unit specification: support notes

Unit title: Water Operations: Water Distribution

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 60 hours.

Guidance on the content and context for this Unit

This Unit is designed to give the candidates a sound underpinning knowledge of how to design a typical water distribution system from the service reservoir to the customers tap, to enable them to function as water operatives or technicians, or to enable further progress to advanced study. It is suitable for candidates, who are employed in, or seeking employment within the water or related industry.

This Unit is intended as part of the framework for the HNC in Water Operations but it may be suitable for inclusion in other HNC and/or HND.

Recommended time allocations to each Outcome are given as guidance towards the depth of treatment that might be applied to each topic. The use of industry specialists would be a positive addition to the delivery of this programme.

Outcome 1 20 Hours

Understand the principles involved in the design of a water distribution system from the service reservoir to the customers tap.

Outcome 2 10 Hours

Enable candidates to appreciate the importance of flow and pressure head in terms of delivering and sustaining a supply of water to the customer efficiently.

Outcome 3 15 Hours

The candidate should be able to interpret electronic data and Understand methods of detection eg sounding, steptesting and metering in relation to leakage detection. This will also involve an insight into repair and monitoring.

The evidence for could Outcomes 1–3 could be taken in the form of a report, the report should could if possible be drawn from a new build housing development in which the candidate is furnished with outline plans together with other details to enable the candidate to successfully design a network installation.

However if for practical reasons the candidate cannot access suitable materials, evidence could be provided by means of a desk top study and/or literature search and review of an appropriate development as long as the Evidence Requirement is met.

Higher National Unit specification: support notes (cont)

Unit title: Water Operations: Water Distribution

Outcome 4 **10 Hours**

Understand the sequence of events necessary when carrying out general repairs in terms of site protection, excavation, repair, testing and reinstatement.

Outcome 5 **5 hours**

The candidate should be able to identify byelaw contraventions in terms of misuse, contamination and wastage of water supply.

Guidance on the delivery and assessment of this Unit

This Unit forms part of the HNC Water Operations designed to increase the understanding of existing or potential Water Industry Team Leaders and Technicians or to enable Water Industry employees currently involved in other functions, to move into a more operational related role.

The emphasis should therefore be on ensuring that candidates understand the key factors involved in the design of a network distribution system in the UK Water Industry.

It is recommended that evidence for Outcomes is achieved through well planned course work reports and closed-book assessments and input from Industry specialists. Assessment may be formative and summative and both may feature as part of the process.

Opportunities for developing Core Skills

Candidates may have the opportunity to develop the Core Skill *Communication* at SCQF 6 through the assessment for Outcomes 1 to 3 where they may have to research, write and develop a report that meets the requirements of the three Units.

Other opportunities for the opportunities development of Core Skills are indicated in the table below by a ✓

Core Skill	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
Numeracy					
Using Number	✓	✓	✓	✓	✓
Using Graphical Information	✓	✓	✓	✓	✓
Information and Communication Technology					
Using Information and Communication Technology	✓	✓	✓	✓	✓
Problem Solving					
Critical Thinking	✓	✓	✓	✓	✓
Planning and Organising	✓	✓	✓	✓	✓
Reviewing and Evaluating	✓	✓	✓	✓	✓
Working with Others	✓	✓	✓	✓	✓

Higher National Unit specification: support notes (cont)

Unit title: Water Operations: Water Distribution

Open learning

This course may be delivered in a flexible/distance/open learning format with a limited physical tutor support. In this case, a considerable amount of independent study will be required, and to relate the knowledge to real events, it is recommended that the candidate should liaise with their employer so that the report for Outcome 1, 2 and 3 can be appropriately structured.

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (www.sqa.org.uk).

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General information for candidates

Unit title: Water Operations: Water Distribution

This Unit is designed to enable you to develop the skills and knowledge associated with the principles of Water Distribution used within the water industry. It is suitable for you, if you are employed in, or are seeking employment within the water or related industry.

On completion of the Unit you should be able to:

- ◆ design and explain the layout of a typical water distribution system. This will require you to develop an understanding of the principles involved in the design of a water distribution system from the service reservoir to the customers tap, by designing a system from given data.
- ◆ describe the performance of flow and pressure within distribution systems. You will develop an understanding of how flow and pressure within distribution systems influence the efficiency of delivering and sustaining a supply of water to the customer.
- ◆ make recommendations to resolve leakage issues within distribution systems. You will learn how to interpret electronic data, and understand methods of detection eg sounding, step-testing and metering in relation to leakage detection. This will also give you an insight into repair and monitoring.
- ◆ describe operational techniques used within a distribution system. This will include the sequence of events necessary when carrying out general repairs in terms of site protection, excavation, repair, testing and reinstatement.
- ◆ describe inspection techniques to plumbing systems for compliance with Water byelaws, by identifying byelaw contraventions in terms of misuse, contamination and wastage of water supply.

The assessment for this Unit will be a combination of closed-book assessments and project work which ideally will be linked to your workplace should you be employed within the water industry. There are opportunities to undertake desk based projects for candidates who may not have access to water industry workplaces.

There are opportunities to develop the Core Skills of *Communication*, *Problem Solving*, and *Working with Others* to SCQF level 6 and *Numeracy* and *Information and Communication Technology* to level 5, although there is no automatic certification of Core Skills or Core Skills components.