

Higher National Unit Specification

General information for centres

Unit title: Plumbing Technology

Unit code: DP0P 34

Unit purpose: The aim of this Unit is to develop candidate understanding of the underlying principles of a range of plumbing and sanitation systems and to provide an opportunity to experience the process of completing designs in a range of complex industrial/commercial buildings. It will also enable candidates to interpret the water supply, sanitation drainage and waste disposal requirements of a building, develop practical schemes for a range of locations and evaluate the effectiveness of alternative schemes.

On completion of this unit candidates should be able to:

- ◆ Evaluate the requirements for water supply and waste disposal and investigate the potential for recycling/re-circulation
- ◆ Produce and evaluate a design for water supply installations
- ◆ Produce and evaluate a design for above ground sanitation, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal systems
- ◆ Investigate the methods of solid waste disposal and propose systems of recycling/re-circulation of solid and liquid wastes.

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

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

Recommended prior knowledge and skills: It would be an advantage for candidates to have a basic understanding and knowledge of building services engineering science and technology. Such understanding and knowledge may be evidenced by the possession of a National Certificate in Building Services Engineering or a related subject. The unit includes all the basic principles necessary to allow candidates possessing other qualifications or experience to succeed in this unit.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: This unit was developed for the HNC in Building Services Engineering. If this Unit is delivered as part of another group award (s), it is recommended that it should be taught and assessed within the context of the group award (s) to which it contributes.

General information for centres (cont)

Assessment: It is possible to assess candidates either on an individual Outcome basis, combinations of Outcomes or by a single holistic assessment combining all Outcomes. The assessment paper/s should be composed of an appropriate balance of short answer, restricted response and structured questions. Assessment should be conducted under supervised, controlled conditions. A single assessment covering all outcomes should not exceed 2 hours in duration. It should be noted that candidates must achieve all the minimum evidence specified for each Outcome in order to pass this Unit.

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.

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.

(If you think holistic assessment is the best assessment strategy for the Unit and you wish to state *Knowledge and/or Skills* and *Evidence requirements* for the Unit as a whole, please add the following statement here: ‘Please refer to *Knowledge and/or skills for the Unit* and *Evidence requirements for the Unit* after the Outcomes.’)

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

Evaluate the requirements for water supply and waste disposal and investigate the potential for recycling/re-circulation.

Knowledge and/or skills

- ◆ Analysis and interpretation of building operational requirements
- ◆ Interpretation and application of statutory requirements
- ◆ Sanitation and waste disposal services, water supply services

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ establish client and building requirements for water supply, sanitation and waste disposal systems
- ◆ identify alternative strategies for the provision of sanitation and waste disposal systems
- ◆ establish design parameters and standards
- ◆ produce design specifications

In any assessment of this Outcome **all** knowledge and/or skills items should be included. Candidates must provide a satisfactory response to all items.

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment should be conducted under closed book conditions and as such candidates should not be allowed to bring textbooks, handouts or notes to the assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Plumbing Technology

Assessment guidelines

Questions used to elicit candidate evidence should take the form of an appropriate balance of short answer, restricted response and structured questions.

The assessment for this outcome might be combined with that for Outcomes 2, 3, 4 to form a single assessment paper.

Outcome 2

Produce and evaluate a design for water supply installations.

Knowledge and/or skills

- ◆ Water properties and analysis, types sources of supply and methods of collection
- ◆ Organisation and legal framework for water supply
- ◆ Water distribution networks, fire-fighting requirements.
- ◆ Application of current standards and procedures for the commissioning and testing of water supply systems

Evidence requirements

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can:

- ◆ analyse the properties of water extracted from a range of catchment areas and establish treatment requirements for these
- ◆ identify water quality standards appropriate to potable water supplies
- ◆ produce and evaluate design solutions to satisfy the identified water needs to and within industrial, commercial and health care buildings
- ◆ determine pipework, plant and equipment sizes and duties and produce component specifications and schedules
- ◆ develop testing and commissioning schedules for cold and hot water storage and distribution systems
- ◆ measure and record variables in cold water supply installations.

Evidence for the knowledge and /or skills for this Outcome will be provided on a sample basis. In any assessment of this Outcome a minimum of **three out of four** knowledge and/or skills items should be sampled. In order to ensure that candidates will not be able to foresee what items they will be questioned on, a different sample of knowledge/skill items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all three items.

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment should be conducted under closed book conditions and as such candidates should not be allowed to bring textbooks, handouts or notes to the assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Plumbing Technology

Assessment guidelines

Questions used to elicit candidate evidence should take the form of an appropriate balance of short answer, restricted response and structured questions.

The assessment for this outcome might be combined with that for Outcomes 1, 3, 4 to form a single assessment paper.

Outcome 3

Produce and evaluate a design for above ground sanitation, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal systems.

Knowledge and/or skills

- ◆ Organisation and legal framework
- ◆ Standards governing provision
- ◆ Design of systems
- ◆ Application of current standards and procedures for the commissioning

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ produce and evaluate design solutions to satisfy identified needs for above ground sanitation, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal within a complex commercial/industrial building
- ◆ determine sizes and duties of components and pipework and produce component lists and specifications
- ◆ apply current standards and procedures to the commissioning and testing of above ground sanitation, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal installations
- ◆ develop testing and commissioning schedules for above ground sanitation, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal installations

Evidence for the knowledge and /or skills for this Outcome will be provided on a sample basis. In any assessment of this Outcome a minimum of **three out of four** knowledge and/or skills items should be sampled. In order to ensure that candidates will not be able to foresee what items they will be questioned on, a different sample of knowledge/skill items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all three items.

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment should be conducted under closed book conditions and as such candidates should not be allowed to bring textbooks, handouts or notes to the assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Plumbing Technology

Assessment guidelines

Questions used to elicit candidate evidence should take the form of an appropriate balance of short answer, restricted response and structured questions.

The assessment for this outcome might be combined with that for Outcomes 1, 2, 4 to form a single assessment paper.

Outcome 4

Investigate methods of solid waste disposal and propose systems of recycling/re-circulation of solid and liquid wastes.

Knowledge and/or skills

- ◆ Solid waste disposal methods
- ◆ Recycling and re-circulation technologies
- ◆ Conceptual design solutions

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ analyse the methods employed to dispose of solid and liquid waste from complex commercial/industrial buildings
- ◆ evaluate the latest recycling and recirculation technologies for solid and liquid waste disposal systems
- ◆ produce and evaluate conceptual design solutions to satisfy the identified solid and liquid waste disposal requirements incorporating the latest recycling and recirculation technologies.

In any assessment of this Outcome **all** knowledge and/or skills items should be included. Candidates must provide a satisfactory response to all items.

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment should be conducted under closed book conditions and as such candidates should not be allowed to bring textbooks, handouts or notes to the assessment.

Assessment guidelines

Questions used to elicit candidate evidence should take the form of an appropriate balance of short answer, restricted response and structured questions.

The assessment for this outcome might be combined with that for Outcomes 1, 2, 3 to form a single assessment paper.

Administrative Information

Unit code:	DP0P 34
Unit title:	Plumbing Technology
Superclass category:	TH
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Higher National Unit specification: support notes

Unit title: Plumbing Technology

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

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This unit is intended to develop a candidate's understanding of water supply and waste disposal systems within commercial and industrial buildings. The unit is intended for those candidates who are, or will be involved in the design and installation of public health services systems in such buildings. Candidates undertaking this unit should, in addition to the requirements for design and selection of plant and systems, be required to undertake critical evaluation of the effectiveness of those schemes. Learning experiences should allow for integration of content from all elements in the unit. Analysis using 'rules of thumb' and software are to be encouraged providing that candidates understand the underlying principles.

Recommended time allocations to each outcome are given as guidance towards the depth of treatment which might be applied to each topic. This guidance has been used in the design of the assessment exemplar material provided with the unit.

1. Operational requirements (2 hours)

Analysis and interpretation of building operational requirements, recognition of the balance between client, statutory, commercial, health, safety and welfare arrangements, aesthetic and energy efficiency considerations

2. Statutory requirements (2 hours)

Interpretation and application of statutory requirements, design standards and relevant publications for commercial and industrial buildings

3. Inter-relationship between (4 hours)

Sanitation and waste disposal services, water supply services and other mechanical and electrical building services

4. Water quality (2 hours)

Water properties and analysis, types and sources of supply and methods of collection, water quality standards, methods of water treatment for potable supplies. Private water supplies. Feed water treatment for industrial, laboratory and commercial usage

5. Legislation & standards (2 hours)

Organisation and legal framework for water supply, standards governing the provision of water supply to, and within a building

Higher National Unit specification: support notes (cont)

Unit title: Plumbing Technology

6. System design (8 hours)

Water distribution networks, fire-fighting requirements. Pumps and pumping installations, water supply system components. Patterns and quantities of water demand. Water supplies to buildings, methods of charging and metering. Design of water supply installations systems for complex specialised use in multi-storey commercial buildings containing a wide variety of environments and requirements. Sizing and selection of plant and pipework, health, safety and welfare considerations in the design and installations of water supplies. Impact of health and safety legislation and codes on the design, maintenance and commissioning of hot and cold water installations

7. Commissioning & Maintenance (8 hours)

Application of current standards and procedures for the commissioning and testing of water supply systems to a building and within them. Commissioning schedules, procedures, equipment and documentation. Maintenance schedules

8. Legislation & Standards (2 hours)

Organisation and legal framework for above ground drainage, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal systems. Standards governing the provision of above ground drainage, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal systems

9. System design (6 hours)

Design of above ground sanitation, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal systems for complex specialised use in multi-storey commercial buildings containing a wide variety of environments and requirements. The designs to include: layout, specification and control systems for the various systems, integration of system requirements with water services and other building services installations. Sizing and selection of components and pipework, use of manufacturer's data, sizing and selection software. Design implications on space, maintenance and commissioning requirements, capital and operating costs

10. Commissioning & Maintenance (4 hours)

Application of current standards and procedures for the commissioning and testing of above ground sanitation, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal systems. Instruments and procedures for the measurement of flow, soundness and other quantities as required by the current standards and procedures. Commissioning schedules and documentation

11. Solid waste (4 hours)

Investigation of methods of disposal of solid waste for complex specialised use in multi-storey commercial buildings containing a wide variety of environments and requirements. The investigations to include: layout, specification and control systems for the various systems, integration of system requirements with other waste and drainage systems, water services and other building services installations

12. Recycling (2 hours)

Investigation of applying the latest recycling and re-circulation technologies to the solid and liquid waste disposal needs of commercial and industrial buildings

Higher National Unit specification: support notes (cont)

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Guidance on the delivery and assessment of this Unit

Opportunities for developing Core Skills

It is recommended that evidence for learning outcomes is achieved through well-planned course work, assignments and projects. Assessment may be formative and summative and both may feature as part of the process. Although assessments must be focused on the individual achievement of each candidate, group work and role-play activities may contribute to the assessment. Integrative assignments and project work will help to link this unit with other related units.

The volume of evidence required for each assessment should take into account the overall number of assessments being contemplated within this unit and the design of the overall teaching programme.

In designing the assessment instrument/s, opportunities should be taken to generate appropriate evidence to contribute to the assessment of Core Skills units.

Where available, evidence from the workplace can also be incorporated to enhance the learning outcomes, provided that this evidence is appropriate and authenticated as the candidate's own work.

Open learning

Given that appropriate materials exist this unit could be delivered by distance learning, which may incorporate some degree of on-line support. However, with regard to assessment, planning would be required by the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that assessment/s were conducted under controlled, supervised conditions.

Candidates with additional support needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. 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. For information on these, please refer to the SQA document *Guidance Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on the SQA website www.sqa.org.uk.

General information for candidates

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On completion of this unit candidates should be able to;

- ◆ Evaluate the requirements for water supply and waste disposal and investigate the potential for recycling/re-circulation
- ◆ Produce and evaluate a design for water supply installations
- ◆ Produce and evaluate a design for above ground sanitation, specialist waste, rainwater and surface water removal, foul water drainage and sewage disposal systems
- ◆ Investigate the methods of solid waste disposal and propose systems of recycling/re-circulation of solid and liquid wastes.

Evidence that you can satisfy the knowledge and skill elements of this unit will be obtained by assessment in controlled, supervised conditions to which you will not be allowed to bring textbooks, handouts or notes to the assessment.