

## Higher National Unit Specification

### General information for centres

**Unit title:** Piped Distribution Services

**Unit code:** DP0N 34

**Unit purpose:** The purpose of this unit is to develop candidate understanding of the underlying principles of the design, installation, operation and commissioning of a range of piped distribution systems and equipment.

It will provide an opportunity to experience the process of undertaking piped services designs in complex industrial and commercial applications.

It will enable candidate to interpret the requirements of modern commercial and industrial buildings, develop practical schemes and evaluate the effectiveness of alternative schemes for hot and cold water, fuel gas, medical and industrial gas and, fire fighting and mechanical fire protection.

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

- ◆ Evaluate the need for mechanical services distribution networks including fire fighting and fire protection services.
- ◆ Identify design strategies for cold and hot water supply systems.
- ◆ Identify design strategies for mechanical fire fighting and fire protection systems.
- ◆ Identify design strategies fuel gas, industrial and medical gas and compressed air installations.

**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.

## General information for centres (cont)

**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.

**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.

The application of knowledge and skills obtained from study of this unit will be appropriately tested in the Graded Unit (Project)

## Higher National Unit specification: statement of standards

**Unit title:** Piped Distribution Services

**Unit code:** DP0N 34

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 need for mechanical services plant and distribution systems including fire fighting and fire protection services.

#### Knowledge and/or skills

- ◆ Identify piped distribution services requirements for buildings

#### Evidence requirements

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

- ◆ establish building requirements for mechanical distribution services, fire fighting services and fire protection services.
- ◆ evaluate alternative strategies for the provision of piped distribution services and fire protection and fire fighting services systems.
- ◆ establish design parameters and standards and legislative requirements

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 2, 3, 4 to form a single assessment paper.

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

**Unit title:** Piped Distribution Services

### Outcome 2

Produce and evaluate design strategies for cold and hot water supply systems.

#### Knowledge and/or skills

- ◆ System design strategies, commissioning and maintenance
- ◆ Plant and equipment
- ◆ Water treatment

#### Evidence requirements

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

- ◆ select and evaluate hot and cold design strategies for commercial/industrial buildings
- ◆ determine hot and cold water pipework, plant and equipment sizes and duties and produce component specifications and schedules
- ◆ interpret water analysis and identify appropriate water treatment methods and equipment for hot and cold water installations
- ◆ identify appropriate testing, commissioning and maintenance schedules for cold and hot water storage and distribution systems

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 **two out of three** 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.

#### 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.

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

**Unit title:** Piped Distribution Services

### Outcome 3

Produce and evaluate design strategies for mechanical fire fighting and fire protection systems.

#### Knowledge and/or skills

- ◆ Fire dynamics
- ◆ Strategies for fire fighting systems

#### Evidence requirements

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

- ◆ explain the factors and principles in the establishment and development of fire, smoke generation and distribution
- ◆ describe the principles of fire and smoke ventilation
- ◆ select and evaluate design strategies for commercial/industrial buildings
- ◆ outline the operation, application, design and installation requirements for sprinkler, dry riser and CO<sub>2</sub> systems
- ◆ installations

In any assessment of this Outcome **one out of two** 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, 4 to form a single assessment paper.

### Outcome 4

Evaluate the need for fuel gas, industrial and medical gas and compressed air installations.

#### Knowledge and/or skills

- ◆ Applications of fuel, industrial, medical gases, vacuum and compressed air systems
- ◆ Design strategies
- ◆ Testing and commissioning

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

**Unit title:** Piped Distribution Services

### Evidence requirements

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

- ◆ Identify requirements for fuel, medical and industrial gases, vacuum and compressed air distribution systems within buildings
- ◆ Identify appropriate materials, plant, components, equipment and pipework
- ◆ Describe appropriate testing and commissioning schedules for the commissioning, and testing of fuel gas, industrial and medical gas, vacuum and compressed air installation systems

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 **two out of three** 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.

### 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**

<b>Unit code:</b>	DP0N 34
<b>Unit title:</b>	Piped Distribution Services
<b>Superclass category:</b>	TH
<b>Date of publication:</b>	August 2005
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## Higher National Unit specification: support notes

### Unit title: Piped Distribution Services

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 hot and cold water, industrial and fuel gas distribution systems and fire fighting/protection 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 mechanical building 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 design software is to be encouraged providing that candidates understand the underlying principles.

There are major links between the content of this Unit and that of the other technical units in the award eg Air Conditioning, Heating, Plumbing Technology etc. Delivery of elements of this Unit might well be combined with that of these other appropriate Units.

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 Need for mechanical distribution services, fire fighting and fire protection services (10 hours)**

*Specifications and requirements:* analysis and interpretation of client and building operational requirements, balance between clients needs, commercial constraints, health, safety and welfare arrangements, aesthetic and energy efficiency considerations, statutory requirements, design standards and relevant publications for commercial and industrial buildings.

#### **2 Cold and hot water supply systems (10 hours)**

*Systems :* cold and hot water storage and distribution systems: for multi-storey buildings containing a wide variety of environments and requirements, effect of demand patterns on storage capacities and fill rates., system layout, specification, control systems and valve arrangements, booster and pumping systems, codes on the design, maintenance and commissioning of hot and cold water installations.

*Plant and equipment:* hot water generation and distribution plant, cold water boosting, pumping and storage equipment, comparison of capital and operating costs for storage and non-storage installations, design of plant-rooms for cold and hot water system components and plant, sizing and selection of plant, expansion devices, and pressure vessels and pipework, use of manufacturers' data, sizing and selection software.



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

### Unit title: Piped Distribution Services

*Water treatment:* water properties and analysis, feed water treatment for hot and cold water installations in complex buildings.

*Commissioning and maintenance:* application of current standards and procedures for the commissioning and testing of cold and hot water storage and distribution systems, commissioning schedules, procedures, equipment and documentation, maintenance schedules.

### 3 Mechanical fire fighting and fire protection systems (10 hours)

*Fire dynamics:* ignition, fire growth, fire parameters, flash over, limiting fire development, smoke hazards, smoke plumes, smoke filling.

*Fire engineering over-view:* overview of fire and smoke ventilation and alarms installations.

*Mechanical fire engineering systems:* mechanical fire fighting systems and an appreciation of sprinkler and other mechanical fire protection systems for use in multi-storey buildings containing a wide variety of environments and requirements, sizing and selection of pipework, plant and equipment for fire fighting installation, application of current standards and procedures for the protection and fire fighting systems. Testing and maintenance procedures

### 4 Fuel gas, industrial and medical gas and compressed air installations (10 hours)

*Properties and application:* range, properties and usage of fuel gases, industrial and medical gases, vacuum and compressed air.

*Installation design:* design strategies for fuel gas, industrial and medical gases, vacuum and compressed air installations for industrial and commercial buildings. Layout, specification and control systems systems. Sizing and selection of materials, plant and equipment, and components use of manufacturers' data, sizing and selection software.

*Testing and commissioning:* application of current standards and procedures for the testing, commissioning, testing and purging of fuel gas, industrial and medical gases, vacuum and compressed air installation systems. Commissioning schedules and documentation.

## 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 particularly the Project (Integrative Assignment).**

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

### **Unit title:** Piped Distribution Services

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](http://www.sqa.org.uk)

## **General information for candidates**

### **Unit title:** Piped Distribution Services

On completion of this unit you should be able to:

- ◆ Evaluate the need for mechanical services distribution networks including fire fighting and fire protection services.
- ◆ Identify design strategies for cold and hot water supply systems.
- ◆ Identify design strategies for mechanical fire fighting and fire protection systems.
- ◆ Identify design strategies for fuel gas, industrial and medical gas and compressed air installations.

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.