



Higher National Graded Unit Specification

General Information for Centres

This Graded Unit has been validated as part of the HNC Building Services Engineering: Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Graded Unit Title: Building Services Engineering: Graded Unit 1

Graded Unit Code: DP0M 34

Type of Graded Unit: Project

Assessment Instrument: Case Study

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 National 1 to Doctorates.*

Purpose: This Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HNC Building Services:

This Group Award Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HNC Building Services Engineering to:

- ◆ prepare candidates for a range of technical, professional and management careers in Building Services Engineering,
- ◆ provide specialised studies which build upon previous study and experience, and are directly relevant to the individual vocations and professions in which candidates are currently working, or in which they intend to seek employment
- ◆ enable candidates to make an immediate contribution in employment in the building services sector

Generally the Graded Unit aims to:

- ◆ skills of study, research and analysis
- ◆ ability to define and solve problems
- ◆ transferable skills
- ◆ ability to be flexible and work cooperatively with others
- ◆ responsibility for own learning

General Information for Centres (cont)

- ♦ planning, organisational and review/evaluation skills
- ♦ technical skills — broadening and deepening
- ♦ oral, written and pictorial communication skills
- ♦ numerical and ICT skills
- ♦ resource management ability

Recommended Prior Knowledge and Skills: It is recommended that the candidate should have completed or be in the process of completing the following Units relating to the above specific aims prior to undertaking this Graded Unit:

Mandatory Units

Design Principles and Application	Unit Number: DP12 34
Building Services Engineering Science	Unit Number: DP11 34
Analytical Methods	Unit Number: DP0X 34
Building Services Engineering Project (Graded Unit)	Unit Number: DP0M 34
Health, Safety and Welfare in the Building Services Industry	Unit Number: DP17 34
Building Services Project Management	Unit Number: DP10 34

Optional Units

Thermofluids and Acoustic Criteria	Unit Number: DP0T 34
Air Conditioning A	Unit Number: DP0V 34
Air Conditioning B	Unit Number: DP0W 34
Heating A	Unit Number: DP15 34
Heating B	Unit Number: DP16 34
Pipe Distribution Services	Unit Number: DP0N 34
Engineering Mathematics	Unit Number: DP13 35
Maintenance and Quality Assurance in Building Services	Unit Number: DP18 34
Piped Distribution Services	Unit Number: DP0N 34
Energy Utilisation and Efficiency	Unit Number: DP14 34
Building Management Systems	Unit Number: DP0Y 34
Plumbing Technology	Unit Number: DP0P 34
Electricity and Lighting	Unit Number: DP0R 34

There are two pathways available to candidates –

Heating, Ventilating and Air Conditioning - comprising the Mandatory Units above together with a minimum of six Optional Units excluding that of Plumbing Technology.

Plumbing – comprising the Mandatory Units above together with a minimum of six Optional Units excluding that of Air Conditioning B.

Core Skills: There is no automatic certification of Core Skills or a Core Skill component as part of this Graded Unit. However, opportunities exist in this assessment to develop the Core Skills of Problem Solving.

Assessment: This Group Award Graded Unit will be assessed by the use of a Case Study. The investigation, analysis and development of solutions should provide the candidate with the opportunity to produce evidence that demonstrates she/he has met the aims of the Group Award that this Group Award Graded Unit covers.

An exemplar instrument of assessment and marking guidelines have been produced to provide examples of the type of evidence required to demonstrate achievement of the aims of the group award covered by this integrative assessment and to indicate the national standard of achievement at SCQF level 7.

Administrative Information

Graded Unit Code: DP0M 34

Graded Unit Title: Building Services Engineering: Graded Unit 1

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Higher National Graded Unit Specification: Instructions for designing the assessment task and assessing candidates

Graded Unit Title: Building Services Engineering: Graded Unit 1

Conditions of Assessment

The candidate should be given a date for completion of the Project. Project parameters should be agreed with the client (the tutor/supervisor) by the design team (the candidate(s)) on a continuing basis providing clarification, guidance and reasonable assistance. Reasonable assistance is the term used by SQA to describe the difference between providing candidates with some direction to generate the required evidence for assessment and providing too much support which would compromise the integrity of the assessment. Reasonable assistance is part of all learning and teaching processes.

In relation to the assessment of Higher National Project-based Graded Units, assessors may provide advice, clarification, and guidance during the time between the distribution of the project instructions and the completion date, ie at each stage of the project.

Remediation allows an assessor to clarify candidate responses, either by requiring a written amendment or by oral questioning, where there is a minor shortfall or omission in evidence requirements. In either case, such instances must be formally noted by the assessor, either in writing or by recording, and be made available to the internal and external verifier.

In relation to Higher National Project-based Graded Units, candidates must be given the opportunity for remediation at each stage of the project.

The evidence for a Higher National Project-based Graded Unit is generated over time and involves three distinct stages, each of which has to be achieved before the next is undertaken. This means that any reassessment of stages must be undertaken before proceeding to the next stage. The overall grade is derived from the total number of marks *across all* sections, and should reflect the ability of the candidate to work autonomously and the amount of support required. In relation to Higher National Project-based Graded Units, candidates who have failed any stage of the project and have been unable to provide the necessary evidence through remediation must be given the opportunity for reassessment of that stage.

The assessment task should be marked as soon as possible after the completion date. The final grading given should reflect the quality of the candidate's evidence at the time of the completion date.

At this level, candidates should work independently within the context of a design team. It is up to Centres to take reasonable steps to ensure that the candidates bring their specialist knowledge and experience to the project. For example, Centres may wish to informally question candidates at various stages on their knowledge and understanding of the project on which they have embarked. Centres should ensure that where research etc, is carried out in other establishments or under the supervision of others that the candidate does not receive undue assistance. Candidates should be allowed to use appropriate technology within and outwith the college environment.

To ensure authentication of work it is advisable for candidates to complete a log or diary recording progress and tasks completed. There should be regular meetings between the tutor and candidate(s) to review progress and these meetings should be recorded.

The final evaluation should include an oral examination of each candidate's understanding of the evidence submitted. Where possible the involvement of an employer in the oral examination is encouraged.

Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates (cont)

Any candidate who has failed their graded unit or wishes to upgrade their award must be given a reassessment opportunity, or in exceptional circumstances, two reassessment opportunities. In the case of project-based graded units, this must be done using a substantially different project.

The final grading given must reflect the quality of the candidate's evidence at the time of the completion of the graded unit. Candidates must be awarded the highest grade achieved — whether through first submission or through any reassessment, remediation, and/or reasonable assistance provided.

Instructions for designing the assessment task

The assessment task is a project. The project undertaken by the candidate must be a complex task which involves:

- ◆ variables which are complex or unfamiliar
- ◆ relationships which need to be clarified
- ◆ a context which may be familiar or unfamiliar to the candidate

The assessment task must require the candidate to:

- ◆ analyse the task and decide on a course of action for undertaking the project
- ◆ plan and organise work and carry it through to completion
- ◆ reflect on what has been done and draw conclusions for the future
- ◆ produce evidence of meeting the aims which this Graded Unit has been designed to cover

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Guidance on grading candidates

Candidates who meet the minimum Evidence Requirements will have their achievement graded as C – competent, or A – highly competent or B somewhere between A and C. The grade related criteria to be used to judge candidate performance for this Graded Unit is specified in the following table.

Grade A (70% - 100%)	Grade C (50% - 59%)
<i>Is a seamless, coherent piece of work which has many more strengths than weaknesses and:</i>	<i>Is a co-ordinated piece of work which has a balance of strengths and weaknesses and:</i>
Provides considerably more than the minimum evidence for each of the three tasks required by the project brief.	Provides the minimum evidence for each of the three tasks required by the project brief.
Evidence is produced to a very high standard.	Evidence is produced to an acceptable standard.
Demonstrates an accurate and particularly insightful interpretation of the project brief.	Demonstrates an acceptable interpretation of the project brief
Has continuously accessed available guidance in arriving at the outcomes submitted.	Has not amplified the initial project brief in arriving at the outcomes submitted.
Embodies non-traditional and innovative solutions.	Embodies only routine and traditional solutions.
Has accessed a wide range of available data and design guidance.	Has accessed a minimal range of available data and design guidance.
Outcomes are of a high standard in terms of level, accuracy and technical content.	Outcomes are adequate in terms of level, accuracy and technical content.
Effectively consolidates and integrates required knowledge and skills.	Consolidates and integrates knowledge and skill but this may lack some continuity and consistency
Considers possible conflicts in integrating proposed solutions with constraints imposed by the building shell and other systems.	Treats proposed system solutions in isolation from other systems and the building shell.
Includes rationale and justification for solutions proposed.	Presents proposed solutions without justification.
Clearly addresses a 'fit for purpose' objective in arriving at proposed solutions.	Has not considered cost or quality issues.
Clearly identifies key areas for improvement when undertaking the work to the defined time line action plan.	Achieves outcomes with minimal evaluation against the time line plan.
Clearly identifies key areas for improvement when reflecting on the technical solutions chosen compared with the initial objectives.	Assumes the technical solutions chosen as the 'most appropriate' with minimal retrospective comparison with initial objectives.

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

The project will be marked out of 200. Assessors will mark each stage of the project, taking into account the criteria outlined. The marks will then be aggregated to arrive at an overall mark for the project. Assessors will then assign an overall grade to the candidate for this graded unit based on the following grade boundaries.

A = 70% - 100%

B = 60% - 69%

C = 50% - 59%

Note: the candidate must achieve all of the minimum evidence specified below for each stage of the project in order to achieve the graded unit.

Evidence Requirements

The project consists of three stages: planning; developing; and evaluating. The following table specifies the minimum evidence required to pass each stage.

Note: The candidate must achieve **all of the minimum evidence** specified below for each stage of the project in order to pass the Graded Unit.

Project Stage	Suggested Task	Minimum Evidence
Stage 1 — Planning Max 25 marks	Initial project briefing (candidates representing the Main Project Contractors and the Supervisor (Lecturer) representing the Client). Develop a plan for completion of tasks 2 and 3	<ul style="list-style-type: none">◆ Minutes of meetings listing question, answers and decisions taken and agreed. including building engineering services systems required, design and operating criteria.◆ Suitable time line action plan. <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage.</i></p>

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Project Stage	Suggested Task	Minimum Evidence
Stage 2 — Developing Max 145 marks	<p>Use appropriate design methodology for the agreed range/parts of services systems.</p> <p>Produce drawings and specifications providing information required by the contractor / installation teams.</p> <p>Create a project portfolio</p>	<ul style="list-style-type: none"> ◆ Selected design criteria with reasoning/justification. ◆ Identified design data. ◆ ‘First principles’ design calculations for agreed range/parts of services systems. ◆ Design calculations using computer packages or other alternative processes. ◆ System schematic/logic diagrams. ◆ Drawings indicating plant, equipment and distribution networks including sizing and other information necessary for installation and commissioning of services. ◆ Material and equipment specifications, operating /control regimes etc. ◆ Rationale and justification for solutions proposed. ◆ Portfolio including executive summary, design calculations, schematic and physical layouts, plant and equipment specifications etc, including justification for decisions taken. ◆ Presentation as introduction to an oral examination to include design objectives and summary of chosen solutions. <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage.</i></p>

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Project Stage	Suggested Task	Minimum Evidence
Stage 3 — Evaluation Max 30 marks	Reflect on the Outcomes of Tasks 1 and 2	<ul style="list-style-type: none">◆ Evaluation of outcomes achieved and progress compared with the time line action plan.◆ Comparison of chosen design solutions against initial objectives <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluation stage.</i></p>

Equality and inclusion

This graded unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.