



Arrangements for:
**National Certificate (NC): Building
Services Engineering**
at SCQF level 6

Group Award Code: GC6X 46

Validation date: August 2011

Date of original publication: December 2011
Version: 01

Acknowledgement

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of National Qualification Group Awards.

Contents

1	Introduction	1
2	Rationale for the revision of the Group Award	1
2.1	Objectives.....	1
2.2	Building Services Engineering	2
2.3	SSC and Professional Bodies	2
3	Aims of the Group Award	3
3.1	Principal aims of the Group Award.....	3
3.2	General aims of the Group Award.....	3
3.3	Target groups	3
3.4	Employment opportunities	4
4	Access to Group Award.....	4
5	Group Award structure	5
5.1	Framework.....	5
5.2	Mapping information	6
5.3	Core Skills	6
5.4	Articulation, professional recognition and credit transfer	7
6	Approaches to delivery and assessment	8
7	General information for centres	10
8	General information for candidates.....	11
9	Glossary of terms	12
10	Appendices.....	12
Appendix 1:	Mapping of Units against aims.....	19
Appendix 2:	Mapping of Units to the National Occupational Standards — NOS for BSE Technology and Project Management (SCQF level 6) vs NC (SCQF level 6) Mandatory Units	20

1 Introduction

This is the Arrangements Document for the revised Group Award in National Certificate: Building Services Engineering, at SCQF level 6, which was validated in August 2011. This document includes: background information on the development of the Group Award, its aims, guidance on access, details of the Group Award structure, and guidance on delivery.

2 Rationale for the revision of the Group Award

This National Course replaces the award (Ref: G8GD 46) which was validated and implemented successfully across the sector.

This Course is designed to prepare candidates for employment, career development or progression to more advanced study at HNC level through a combination of practical level skills and intermediate theoretical knowledge that are recognised by employers and FE colleges.

With the development and validation of the Skills for Work (SfW) and National Progression Awards (NPA) in BSE (both also in August 2011) then the positioning of the NC is crucial to the career aspirations of the expected surge in numbers showing an interest from an earlier age than ever before in the BSE sector in Scotland.

It allows progression to the HNC but also allows an important stand alone entrance and exit point for those seeking to develop a career in the sector.

The revisions made replaced Mathematics Units with Units of a more appropriate level and to replace closed-book assessments with open-book assessments to model industry practice and encourage Holistic Assessment across the Units and award.

2.1 Objectives

National Certificate programmes are intended primarily for people who are in, or plan to enter, employment and who have reached the minimum age of 16, typically with appropriate school leaving qualification. Entry via a craft qualification is also possible and can provide the bridge to a higher level qualification.

The National Certificate in Building Services Engineering is designed to provide:

- ◆ a national qualification, with detailed common standards and learning.
- ◆ outcomes recognisable to centres, candidates employers and professional bodies.
- ◆ a common mandatory element of study for various vocational pathways.
- ◆ a choice of optional Units appropriate to the main career disciplines of the Building Services Engineering part of the Construction Industry.
- ◆ flexible approach within a national framework.
- ◆ the opportunity to preserve and build upon existing good practice.
- ◆ compatibility with feeder qualifications.
- ◆ a response to changing training and educational needs.
- ◆ preparation for employment.
- ◆ a contribution to the skills, knowledge and understanding required to underpin relevant occupational standards and SVQs.
- ◆ progression to higher level qualifications.
- ◆ a focus on the development of candidates practical knowledge, skills and understanding that underpins performance in the workplace.

2.2 Building Services Engineering

The Building Services Engineering sector includes the design and installation, in domestic, commercial and industrial buildings, of heating, ventilating, air conditioning, refrigeration, plumbing and electrical services. Other services often involved in building services engineering contracts, include communication, data and security systems.

Work within the sector comprises new build projects undertaken within construction contracts, with a significant proportion involving refurbishment of existing building stock. On many new build and refurbishment contracts the building services installer is the main contractor.

The majority of the larger organisations in Scotland are branches of national and Multinational firms.

The National Certificate in Building Services Engineering has been designed to provide the opportunity to satisfy hard to fill vacancies and skill shortages by allowing maximum flexibility in access and delivery.

2.3 SSC and Professional Bodies

In December 2003 the Government licensed SummitSkills as the Sector Skills Council with strategic responsibility for education and training for this sector. Registration with the Engineering Council (ECUK), via one of the licensed professional bodies, is the endorsement of knowledge and experience for technical and managerial personnel in the building services engineering sector. UKSpec the ECUK definition of knowledge and competences identifies possession of a National Certificate, or 'an approved qualification at level 6 in the SCQF', as satisfying the educational base for registration as an Engineering Technician (Eng Tech).

Registration at Incorporated Engineer and Chartered Engineer level are available for those candidates progressing to, and successfully completing HNC/HND and degree programmes.

Related professional bodies in the sector include:

CIBSE — Chartered Institution of Building Services Engineers

IPHE — Institution of Plumbing and Heating Engineers

IoR — Institution of Refrigeration

IET — Institution of Electrical Technologists (recent merger of IIE and IEE)

3 Aims of the Group Award

3.1 Principal aims of the Group Award

The award should:

- 1 Prepare candidates for a range of technical and managerial careers in Building Services Engineering including design, project management, service and maintenance and facilities management.
- 2 Provide specialised studies which build upon previous study and work based 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.
- 3 Enable candidates to make an immediate contribution in employment in the building services sector.

3.2 General aims of the Group Award

The award should develop:

- 1 Skills of study, research and analysis.
- 2 Ability to define and solve problems.
- 3 Transferable skills.
- 4 Ability to be flexible and work cooperatively with others.
- 5 Responsibility for own learning.
- 6 Planning, organisational and review/evaluation skills.
- 7 Technical skills — broadening and deepening.
- 8 Oral, written and pictorial communication skills.
- 9 Numerical and ICT skills.
- 10 Resource management ability.
- 11 Flexibility, knowledge, skills and motivation as a basis for progression to higher level studies.

3.3 Target groups

The NC at SCQF level 6 is designed to equip candidates with the knowledge, understanding and skills required to further their career within the BSE sector and/or to progress onto higher levels of education (eg the HNC) or on to the more practical NPA.

This National Certificate programme is suitable for a wide range of candidates including:

- ◆ School leavers (*now expected to be greater in number due to the SfW and NPA*).
- ◆ Candidates with an NC or NPA in a related discipline who wish to retrain to building services engineering.
- ◆ Adult returners to education.
- ◆ Candidates in employment who wish to enhance their career prospects.
- ◆ Candidates with craft qualifications who wish to transfer to technical and managerial roles.

3.4 Employment opportunities

Candidates will normally be employed as technical trainees in the building services sector, and will undertake the National Certificate on a part time basis. The award can also help prepare candidates for progression to managerial careers in the Building Services Engineering Industry. The National Certificate is also suitable for those returning to work, transferring from other sectors and could be delivered on a full time basis.

Employment opportunities exist with contracting (installation), service/maintenance and consultancy employers. Private, local authority, government, military and academic employers are involved within the sector.

Progression opportunities exist for candidates to achieve higher level academic and professional qualifications.

4 Access to Group Award

As with all SQA qualifications, access to the awards will be at the discretion of the centre. The following recommendations are for guidance only.

Formal qualifications for entry to NC year 1

National Certificate programmes are intended primarily for people who are in, or plan to enter employment. Candidates who enter with at least one of the following qualifications are likely to benefit more readily from the programme:

- ◆ Standard Grade in appropriate science or technology Subject(s).
- ◆ A National Certificate in a related discipline.
- ◆ Those with other entry qualifications, including work experience, who demonstrate a realistic chance of success.
- ◆ A craft qualification which might be combined with appropriate further study, prior to, or in parallel with, the NC programme.

5 Group Award structure

5.1 Framework

The National Certificate (SCQF level 6) is shown below:

Ref	Title	Status	SCQF level	Credits	SCQF points
F1AJ 11	Health, safety and welfare in the Building Services Engineering Industry	M	5	1	6
F1AK 11	Construction Technology and Design	M	5	1	6
F1AL 12	Building Services Engineering Science	M	6	1	6
F1AM 12	Graphic Detailing	M	6	1	6
F3HX 12	Mathematics: Technician 1	M	6	1	6
F1AN 11	Electrical and Electronic Technology	M	5	1	6
F1AP 11	Building Services Engineering Technology	M	5	1	6
F1AR 12	Building Services Engineering: Design Project	M	6	1	6
F1AS 12	Planning, Organisation and Control of Resources in Construction	O	6	1	6
F3HY 12	Mathematics: Technician 2	O	6	1	6
F1AT 12	Heating and Plumbing Technology	O	6	1	6
F1AV 12	Air Conditioning and Ventilation Technology	O	6	1	6
F1AW 12	Refrigeration Technology	O	6	1	6
F1AX 12	Building Services Engineering: Thermofluids	O	6	1	6

12 credits are required consisting of eight mandatory Units and four optional Units (from six).

5.2 Mapping information

Appendix 1 shows mapping of the Units in the framework against the General and Specific aims of the National Certificate.

Appendix 2 shows mapping of Units to the National Occupational Standards.

5.3 Core Skills

Exemplar minimum entry Core Skill statement

- ◆ *Communication* SCQF level 4
- ◆ *Information and Communication Technology (ICT)* SCQF level 3
- ◆ *Numeracy* SCQF level 4
- ◆ *Problem Solving* SCQF level 4
- ◆ *Working with Others* SCQF level 3

Some candidates in each cohort may not meet minimum exemplar entry levels. It will be for centres to enable these candidates to take maximum advantage of opportunities within the programme to raise their Core Skill achievement levels.

Opportunities for the development of Core Skills

Applied *Problem Solving*, including creative thinking and ongoing evaluation of proposed and actual design solutions are essential elements in all Building Services activities. There are also ample opportunities within the award to develop key numerical and graphical competencies in the context of applied knowledge and skills. The focus in the award on technology as a current industry tool in the design process ensures sound competence and understanding of its applications and uses. Access to technology, with appropriate support systems, is available all centres for reference, research and the production and presentation of accurate written and graphic materials. As candidates undertake the award, formative activities will replicate group problem solving approaches using the communication techniques required in the industry today.

Awareness and development of Core Skills is also incorporated into the award by the fact that candidates, supported by assessors, have to take responsibility for their own learning programmes and produce and present a Design project.

The Qualifications Design Team has agreed, therefore, that the delivery of mandatory and optional Units should provide many opportunities for tailoring relevant elements of the Core Skills to the specific demands of the vocational area.

Output Core Skill statement

Candidates who achieve the award will have opportunities to develop relevant aspects of Core Skills to the following levels as a minimum

- ◆ *Communication SCQF level 5*
- ◆ *Information and Communication Technology (ICT) SCQF level 5*
- ◆ *Numeracy SCQF level 6*
- ◆ *Problem Solving SCQF level 5*
- ◆ *Working with Others SCQF level 5*

Across the award the mandatory and optional Units can all provide a development focus for Core Skills during delivery; candidate needs will vary, opportunities for development of Core Skills are identified in each Unit.

Achievement of this Group Award gives automatic certification of the following:

- ◆ *Problem Solving at SCQF level 5*
- ◆ *Using Graphical Information at SCQF level 5*

5.4 Articulation, professional recognition and credit transfer

Articulation

The NC award at SCQF level 6 is an important point on the BSE career path. The revisions (and supporting rationale) will facilitate an easier and more meaningful transition between the NC and the HNC should candidates wish to do this. It will also allow those candidates not in employment to apply for employment within the sector as appropriate. It will also allow candidates to move onto the more practical NPA at SCQF level 5 should they so wish. Note that achievement of the award will also allow candidates the opportunity to move to allied occupational areas, such as Construction and Engineering, or on to higher levels of study should they so wish.

Professional recognition

This award, and its place in the developing BSE suite of awards, is currently recognised by the relevant trade associations and other relevant sector bodies in Scotland. The NC award is at SCQF level 6 and so is below that associated with professional (chartered institute) recognition however it is anticipated that CIBSE will support the aims, objectives and strategic positioning of the NPA.

Credit transfer

Candidates, in principle, can be given credit transfer. This should be considered on a case-by-case basis as appropriate with the final decision being confirmed by the relevant External Verifier.

6 Approaches to delivery and assessment

Content and context

This National Certificate is designed to prepare candidates for employment, career development or progression to more advanced study at HNC/HND level. It also aims to develop a range of transferable knowledge including Core Skills.

It is mainly aimed at those who are interested in pursuing a career in one of the BSE sector industries but would welcome the opportunity to identify which of the BSE industries is most appropriate to their own skills and career aspirations.

This award is not designed to train people to full industrial competence. There is an emphasis on developing the knowledge and associated competences (through application of the knowledge) relevant to the BSE sector. Candidates can then build on these skills when working towards achieving the appropriate SVQ.

The award is designed to allow the candidate to develop an understanding of the BSE sector, the Science Technology Engineering and Mathematics (STEM) theories that underpin the sector and methods by which to use the STEM theories in a practical and meaningful way. The award is also designed to underline the importance of safety in the workplace as it applies to the candidate and others.

The programme should be delivered in the context of familiarisation with terminology, concepts, theories, working practices and disciplines, including Health and Safety.

Candidates may, in the first instance, go on to work as Air Conditioning Engineer; Domestic Plumber; Ductwork Installer; Gas Fitter; Heating Installer; Industrial And Commercial Plumber; Installation Electrician; Maintenance Electrician; Refrigeration Engineer; Service And Maintenance Engineer.

Candidates may also go on to work as a Chargehand; Foreman; H&S Officer; Site Manager; Supervisor or go onto higher levels of education, eg the HNC.

Delivery

The NC award is mainly designed to be appropriate to the 16+ age group and delivered in a college environment. The award could be offered (eg to adult returners) on a full-time, part-time, block-release, day-release or evening basis. Combination of delivery is also a possibility. Such combined study may enable candidates to complete the award within a shorter time period.

The revision of the NC at SCQF level 6 has sought to emphasise the opportunities for integrated delivery of Units within the award, eg the Design Project Unit and others could readily be integrated with the delivery of the Health, safety and welfare in the BSE Industry Unit.

There may be opportunities for the introduction of e-learning during the teaching and delivery of the award. The learning and assessments of the knowledge-based Outcomes can be conducted either by using e-learning methods (this could also be used for teaching) or else by traditional teaching techniques. For example, formal assessments may make use of IT systems and facilities when available, or alternatively can also use the standard mode of supervising candidates during classroom paper-based assignments.

It is recognised that health and safety considerations and the age profile of candidates may present a challenge to centres. However, in order that the quality and integrity of assessments are maintained, centres are reminded that all practical assessments should take place in a realistic working or training environment with appropriate use of simulation where health and safety considerations are key. In addition, appropriate levels of supervision should be applied at all times.

Course delivery should focus on the definition and solution of problems encountered in building services engineering. The use of case studies involving the servicing requirements of domestic or small commercial premises is likely to be beneficial. The Course should promote good appreciation of the need to identify alternative solutions and the interrelationship of design criteria, client preference, capital and running costs, sustainability, energy efficiency and health and safety. Candidates should be encouraged not merely to solve problems but to identify the solution most likely to provide 'best fit' to the overall criteria.

There are many opportunities for integrative delivery of Units within the award. Teaching and learning for mathematics and science Units could be integrated with technology Units, and assessment should be encouraged to be within the application of technology Units. The Project Unit provides the opportunity for integration of knowledge and skills across the Units in an award. Supporting notes with each Unit identify specific opportunities for integration with other Units.

Centres can define the order in which Units are undertaken based on candidate recruitment patterns, mode of delivery, resource issues and logical progression dictated by topic and Unit content.

Throughout all Units emphasis should be placed where appropriate on the application of Health and Safety and Sustainability. Safe working practises should be looked at in accordance with current safety codes of practise and regulations. Sustainability should include reference to criteria affecting sustainability, impact of not implementing sustainability on the environment and the legislation promoting sustainability.

Provided that adequate material and tutorial expertise existed the NC could be delivered by Open/Distance learning as well as on an online basis. Centre devised supervision agreements should detail controlled conditions to ensure authenticity of evidence.

Assessment

The approach to assessment for the revised NC at SCQF level 6 is designed to ensure an appropriate level of rigour whilst not imposing excessive demands on centres or candidates. The design principles for the award encourage an holistic approach to assessment, and this has been adopted in each Unit specification for the award.

An integrated approach to assessment across the Outcomes in this Unit, and relevant others, is strongly suggested. In addition, the project-based approach may be used to gather evidence of candidate achievement. Centres may also wish to develop the employability skills of the candidates through role-play techniques where appropriate.

Each Unit Specification includes guidance on delivery and assessment and, where appropriate, any potential opportunities for integrated delivery and assessment with other Units.

Centres can decide the order in which Units are delivered, based on candidate recruitment patterns, mode of delivery, resource issues and logical progression dictated by topics and Unit content and level.

Throughout all Units, emphasis should be placed where appropriate on the application of Health and Safety. Safe working practices should be looked at in accordance with current safety codes of practice and regulations.

7 General information for centres

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

Internal and external verification

All instruments of assessment used within this/these Group Award(s) should be internally verified, using the appropriate policy within the centre and the guidelines set by SQA.

External verification will be carried out by SQA to ensure that internal assessment is within the national guidelines for these qualifications.

Further information on internal and external verification can be found in *SQA's Guide to Assessment* (www.sqa.org.uk).

8 General information for candidates

The NC at SCQF level 6 is a mainly knowledge-based qualification with appropriate practical exercises. You will spend the majority of your time in a training/education or simulated work environment.

The award is designed to equip you with the knowledge, understanding and skills, appropriate to your age and level of employment experience, which are required by employers in the BSE sector.

It also allows you to progress towards further qualifications, such as the HNC (at SCQF level 7) or can be gained whilst in employment as an apprentice within the BSE sector. An apprenticeship in the sector will involve you undertaking the relevant SVQ which helps you to achieve full and recognised industrial competence.

The NC at SCQF level 6 requires you to achieve a minimum of 12 credits.

You will be assessed on the knowledge and skills that you have developed in each Unit. There are several possible types of assessment, including open and closed-book, multiple choice questions, practical tasks with checklists, and other practical activities working in teams. The practical Units will teach you the basic skills and knowledge needed to carry out practical work and to work with others.

The revised NC at SCQF level 6 is designed to give you an understanding of:

- ◆ flexibility, knowledge, skills and motivation as a basis for progression.
- ◆ practical skills in a safety-conscious context.
- ◆ resource management ability.
- ◆ responsibility for own learning.
- ◆ the basics of technical design.
- ◆ the Core Skills relevant to the BSE sector including numerical and graphical skills; oral, written and communication skills; planning, organisational and evaluation skills; problem-solving ability; ability to work with others and be flexible.
- ◆ the higher level occupations within the BSE sector.
- ◆ the nature and purpose of current and emerging technology.
- ◆ the progression opportunities for those who achieve the NC.
- ◆ the STEM theories associated with the BSE sector and their application in a practical environment.

Occupations are available with a variety of companies in the BSE sector. If you wish to investigate career opportunities in the building industry you can contact SummitSkills at www.summitskills.org.uk.

9 Glossary of terms

SCQF: This stands for the Scottish Credit and Qualification Framework, which is a new way of speaking about qualifications and how they inter-relate. We use SCQF terminology throughout this guide to refer to credits and levels. For further information on the SCQF visit the SCQF website at www.scqf.org.uk

SCQF credit points: One SCQF credit point equates to 10 hours of learning. NQ Units at SCQF levels 2–6 are worth 6 SCQF credit points, NQ Units at level 7 are worth 8 SCQF points.

SCQF levels: The SCQF covers 12 levels of learning. National Qualification Group Awards are available at SCQF levels 2-6 and will normally be made up of National Units which are available from SCQF levels 2–7.

Dedicated Unit to cover Core Skills: This is a non-subject Unit that is written to cover one or more particular Core Skills.

Embedded Core Skills: This is where the development of a Core Skill is incorporated into the Unit and where the Unit assessment also covers the requirements of Core Skill assessment at a particular level.

Signposted Core Skills: This refers to the opportunities to develop a particular Core Skill at a specified level that lie outwith automatic certification.

Qualification Design Team: The QDT works in conjunction with a Qualification Manager/Development Manager to steer the development of the National Certificate/National Progression Award from its inception/revision through to validation. The group is made up of key stakeholders representing the interests of centres, employers, universities and other relevant organisations.

Consortium-devised National Certificates/National Progression Awards are those developments or revisions undertaken by a group of centres in partnership with SQA.

10 Appendices

- Appendix 1: Mapping of Units against aims
- Appendix 2: Mapping of Units to the National Occupational Standards — NOS for BSE Technology and Project Management (SCQF level 6) vs NC (SCQF level 6) Mandatory Units

Appendix 1: Mapping of Units against aims

General aims		Unit
1	Skills of study, research and analysis	2, 6, 7, 8, 12, 13, 14
2	Ability to define and solve problems	2, 5, 6, 7, 11, 12, 13, 14
3	Transferable skills	See Core Skills section
4	Ability to be flexible and work cooperatively with others	8
5	Responsibility for own learning	2, 6, 7, 8, 12, 13, 14
6	Planning, organisational and review/evaluation skills	8, 10
7	Technical skills- broadening and deepening	2, 6, 7, 12, 13, 14
8	Oral, written and pictorial communication skills	4, 8
9	Numerical and ICT skills	2, 6, 7, 12, 13, 14
10	Resource management ability	2, 6, 7, 8, 10, 12, 13, 14
11	Flexibility, knowledge, skills and motivation as a basis for progression to higher level studies	2, 6, 7, 12, 13, 14, 5, 11

Principal aims		Unit
1	Prepare candidates for a range of technical, professional and management careers in Building Services Engineering	1, 2, 3, 4, 5, 7, 15, 8, 10, 11, 12, 13, 14
2	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	1, 2, 3, 4, 5, 7, 15, 8, 10, 11, 12, 13, 14
3	Enable candidates to make an immediate contribution in employment in the building services sector	1, 2, 3, 4, 5, 7, 15, 8, 10, 11, 12, 13, 14

Appendix 2: Mapping of Units to the National Occupational Standards — NOS for BSE Technology and Project Management (SCQF level 6) vs NC (SCQF level 6) Mandatory Units

Unit SST/NOS	Title	H, S and Welfare in the BSE Industry	Const. Technology and Design	BSE Science	Graphical Detailing	Mathematics: Technician 1	Electrical and Electronic Technology	BSE Technology	BSE: Design Project
1	Monitor And Implement Health And Safety During Building Services Engineering Projects	Partial (P)	Minimal (M)	M	M	M	M	M	P
2	Monitor And Implement Building Services Engineering Projects In The Work Location	M	M	P	P	P	P	P	P
3	Apply Design Principles To Building Services Engineering Projects	M	P	P	P	P	P	P	P
4	Contribute To Estimating And Tendering Processes For Building Services Engineering Projects	M	M	M	M	M	M	M	P
5	Monitor Commissioning And Testing Procedures For Building Services Engineering Projects	M	M	M	M	M	M	M	P
6	Apply Contract Conditions For Building Services Engineering Projects	M	M	M	M	M	M	M	P
7	Provide Technical And Functional Information To Relevant People	M	P	P	M	M	M	M	P
8	Contribute To Planning Work Methods, Resources And Systems To Meet Building Services Engineering Project Work Requirements	M	M	M	M	M	M	M	P