

Pearson Edexcel Level 4 NVQ Diploma in Engineering Environmental Technologies (QCF) Specification

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Qualification title covered by this specification

This specification provides the information you need to offer the Pearson Edexcel Level 4 NVQ Diploma in Engineering Environmental Technologies (QCF):

Qualification title	Qualification Number (QN)	Accreditation start date
Pearson Edexcel Level 4 NVQ Diploma in Engineering Environmental Technologies (QCF)	600/8393/1	01/07/13

This qualification has been accredited within the Qualifications and Credit Framework (QCF) and is eligible for public funding as determined by the Department for Education (DfE) under Section 96 of the Learning and Skills Act 2000.

The qualification title listed above features in the funding lists published annually by the DfE and the regularly updated website. It will also appear on the Learning Aim Reference Application (LARA), where relevant.

You should use the QCF Qualification Number (QN), when you wish to seek public funding for your learners. Each unit within a qualification will also have a unique QCF reference number, which is listed in this specification.

The QCF qualification title and unit reference numbers will appear on the learners' final certification document. Learners need to be made aware of this when they are recruited by the centre and registered with Edexcel.

Key features of the Pearson Edexcel Level 4 NVQ Diploma in Engineering Environmental Technologies (QCF)

This qualification:

- is nationally recognised
- is based on National Occupational Standards (NOS). The NOS, assessment requirements/strategy and qualification structure are owned by the SSCs ConstructionSkills, SummitSkills and Semta.

The Edexcel Level 4 NVQ Diploma in Engineering Environmental Technologies (QCF) has been approved as a component for the Level 4 Higher Apprenticeship in Environmental Technologies Framework.

What is the purpose of this qualification?

This qualification is appropriate for employees working across a broad range of areas. It is designed to assess occupational competence in the workplace, where learners are required to demonstrate skills and knowledge in engineering environmental technologies to a level required in the construction, building services and manufacturing engineering industries.

The new Level 4 Higher Apprenticeship in Environmental Technologies is dynamic and allows all delivery partners to clearly evidence modern methods of engineering environmental technologies in action.

Who is this qualification for?

This qualification is for all learners aged 18 and above who are capable of reaching the required standards.

Edexcel's policy is that the qualification should:

- be free from any barriers that restrict access and progression
- ensure equality of opportunity for all wishing to access the qualification(s)
- be offered to learners that have been recruited with integrity by the centre

This qualification is for learners who are in employment. Prior knowledge, understanding, skills or qualifications are required before learners register for this qualification.

What are the benefits of this qualification to the learner and employer?

This qualification allows learners to demonstrate competence against National Occupational Standards (NOS), which are based on the needs of the construction, building services engineering and manufacturing engineering industries as defined by ConstructionSkills, SummitSkills and Semta, the Sector Skills Councils. The qualification contributes to the development of skilled labour in the sector. The Higher Level Apprenticeships give learners opportunities to earn while they learn, with learning taking place at college and in the workplace. Being a member of a

team, or learning to use initiative in real-life situations, will be part of the personal and professional development associated with the programme.

What are the potential job roles for those working towards this qualification?

- Site Supervisor
- Site Manager
- Construction Team Leader
- Assistant Project Manager
- Assistant Engineer
- Building Services Engineer working on sites/projects
- Manufacturing Production Manager.

What progression opportunities are available to learners who achieve this qualification?

This qualification allows learners to demonstrate competence in engineering environmental technologies at a level required by the construction, building services engineering or manufacturing engineering industry. Learners can progress to related competence and knowledge qualifications and to other occupational areas such as team leading and management.

Learners can progress to related qualifications at Level 5. In the construction and building services engineering sectors, these include the Edexcel Level 5 NVQ Diploma in Construction Management (Sustainability) (QCF), the Edexcel BTEC Level 5 HND Diploma in Construction and the Built Environment and the Edexcel BTEC Level 5 HND Diploma in Construction and the Built Environment (Building Services Engineering). In the manufacturing engineering sector, these include the Edexcel BTEC Level 5 HND Diploma in Manufacturing Engineering (QCF).

Learners can also progress to appropriate degree programmes.

Further information is available in *Annexe A*.

What is the qualification structure for the Pearson Edexcel Level 4 NVQ Diploma in Engineering Environmental Technologies (QCF)?

Individual units can be found in the *Units* section.

The learner will need to meet the requirements outlined in the table below before Edexcel can award the qualification.

Minimum number of credits that must be achieved	130
Minimum number of credits at, or above, Level 4 that must be achieved	68

A minimum of 130 credits is required overall for completion of this qualification, which must include a minimum of 68 credits at, or above, Level 4. The mandatory core units for this qualification are made up of 13 credits.

Learners must select one of three pathways: **Construction and the Built Environment, Building Services Engineering** or **Manufacturing Engineering**. Learners must complete all of the mandatory units from their chosen pathway. They must select the remaining credits from the optional units group in their chosen pathway.

Unit	Unit reference number	Mandatory core units Learners must complete both units for a total of 13 credits	Level	Credit	Guided learning hours
1	H/600/9609	Ensure Compliance with Legal, Regulatory, Ethical and Social Requirements	4	5	25
2	T/504/7523	Managing the Development of Self and Others	4	8	20

Unit	Unit reference number	Construction and Built Environment pathway: Mandatory pathway units Learners must complete all 5 units for a total of 50 credits	Level	Credit	Guided learning hours
3	T/504/7576	Planning Construction Work Processes and Efficient Use of Resources in Construction and the Built Environment	4	13	70
4	A/504/7577	Monitoring Construction and Installation Operations and Resources to Minimise Energy and Waste in Construction and the Built Environment	4	11	60
5	F/504/7578	Monitoring Supplies of Resources to Meet Project Sustainability Requirements in Construction and the Built Environment	4	10	50
6	H/600/7486	Maintaining Systems for Health, Safety, Welfare and Environmental Protection in the Workplace	3	8	30
7	Y/504/1088	Developing Working Relationships in Construction and the Built Environment	5	8	30

Unit	Unit reference number	Construction and Built Environment pathway: Optional units Learners must take their remaining credits from this group (a minimum of 67 credits)	Level	Credit	Guided learning hours
8	J/504/7582	Confirming Project Energy Efficiency and Carbon Minimisation Requirements and Measures in Construction and the Built Environment	4	14	80
9	L/504/7583	Implementing Resource Efficient Procurement Processes in Construction and the Built Environment	4	12	60
10	R/504/7584	Implementing Project Information and Communication Systems and Procedures in Construction and the Built Environment	4	12	50
11	Y/504/7585	Co-ordinating Work Operations and Resources to Meet Project Requirements in Construction and the Built Environment	4	13	50
12	D/504/7586	Co-ordinating the Logistics for Work to Existing Occupied Properties in Construction and the Built Environment	4	11	50
13	H/504/7587	Monitoring the Assembly Processes to Achieve Prescribed Performance Standards in Construction and the Built Environment	4	12	50
14	M/504/7589	Monitoring Project Quality, Progress and Cost in Construction and the Built Environment	4	14	90
15	H/600/9674	Plan, Allocate and Monitor Work in Own Area of Responsibility	4	5	25

Unit	Unit reference number	Building Services Engineering pathway: Mandatory pathway units Learners must complete all 4 units for a total of 28 credits	Level	Credit	Guided learning hours
16	T/504/7528	Managing Health and Safety in the Building Services Engineering Work Location	4	9	30
17	T/504/7531	Managing Building Services Engineering Projects in the Work Location	4	7	25
18	M/600/9712	Manage the Environmental Impact of Work Activities	4	5	10
19	A/504/7529	Managing the Effectiveness of a Building Services Engineering Workforce	4	7	22
Unit	Unit reference number	Building Services Engineering pathway: Optional units Learners must take their remaining credits from this group (a minimum of 89 credits)	Level	Credit	Guided learning hours
20	M/504/7530	Developing Estimates and Submitting Tenders for Building Services Engineering Projects	4	6	10
21	F/504/7533	Managing Contract Procedures for Building Services Engineering Projects	4	7	25
22	R/504/7536	Developing and Testing Building Services Engineering Project Design Solutions	4	9	30
23	D/504/7538	Preparing and Advising on Building Services Engineering Project Design Recommendations	4	6	20
24	H/504/7539	Preparing and Agreeing Detailed Building Services Engineering Project Designs	4	8	30

Unit	Unit reference number	Building Services Engineering pathway: Optional units CONTINUED Learners must take their remaining credits from this group (a minimum of 89 credits)	Level	Credit	Guided learning hours
25	M/504/7625	Planning Work Methods, Resources and Systems to Meet Building Services Engineering Project Work Requirements	4	12	35
26	Y/504/7540	Implementing Works to Meet Building Services Engineering Project Requirements	4	6	25
27	K/504/7543	Commissioning Building Services Engineering Systems After Installation	4	7	25
28	M/504/7544	Controlling Building Services Engineering Project Income and Expenditure	4	8	30
29	T/600/9632	Promote Equality of Opportunity, Diversity and Inclusion Across an Organisation	5	6	30
30	A/600/9616	Establish Risk Management Processes for an Organisation	5	6	30
31	D/504/1111	Designing Sustainable Building Services Engineering Systems	5	12	30
32	M/504/1114	Analysing and Monitoring Building Services Engineering Controls	5	12	40

Unit	Unit reference number	Manufacturing Engineering pathway: Mandatory pathway units Learners must complete all 5 units for a total of 52 credits	Level	Credit	Guided learning hours
33	H/600/7486	Maintaining Systems for Health, Safety, Welfare and Environmental Protection in the Workplace	3	8	30
34	J/600/9750	Plan and Manage a Project	4	8	30
35	K/504/7591	Managing the Environmental Impact of Work Activities in Manufacturing Engineering	4	12	36
36	H/504/7590	Developing Working Relationships	4	8	30
37	M/504/1016	Develop a New Product Manufacturing Process Design Strategy	4	16	56
Unit	Unit reference number	Manufacturing Engineering pathway: Optional units Learners must take their remaining credits from this group (a minimum of 65 credits)	Level	Credit	Guided learning hours
38	K/502/9172	Undertake Engineering Research	4	15	45
39	M/502/9173	Establish an Engineering Design Brief	4	15	45
40	L/502/9178	Schedule Activities for Engineering Methods and Procedures	4	15	45
41	H/600/9738	Manage a Tendering Process	4	4	20
42	L/600/9703	Develop and Implement a Risk Assessment Plan in Own Area of Responsibility	4	6	20
43	Y/600/9798	Prepare for and Support Quality Audits	4	4	20
44	D/502/9170	Identify Engineering Design Requirements of Clients	4	15	45
45	H/502/9171	Produce Engineering Specifications	4	15	45
46	T/502/9174	Create Engineering Designs	4	15	45

Unit	Unit reference number	Manufacturing Engineering pathway: Optional units CONTINUED Learners must take their remaining credits from this group (a minimum of 65 credits)	Level	Credit	Guided learning hours
47	J/502/9180	Implement Engineering Processes	4	15	45
48	M/600/5319	Analysing and Selecting Parts for Improvement	3	18	58
49	M/600/5336	Creating Standard Operating Procedures (SOP)	3	12	42
50	R/600/5331	Carrying Out Capability Studies	3	18	58
51	T/600/5483	Leading an Analysis and Selection of Parts for Improvement	4	14	32
52	F/600/5888	Leading the Creation of Standard Operating Procedures (SOP)	4	8	25
53	L/600/5957	Leading the Carrying Out of Capability Studies	4	14	32
54	D/600/5896	Leading the Application of Six Sigma Methodology to a Project	4	14	32
55	K/600/5447	Leading the Creation of Flexible Production and Manpower Systems	4	7	25
56	R/600/5698	Leading Policy Deployment Activities (Hoshin Kanri, Quality Operating Systems, Business Plan Deployment)	4	9	25
57	A/600/5713	Leading Value Management (Value Engineering and Value Analysis) Activities	4	11	32
58	J/600/5875	Applying Quality Function Deployment (QFD)	4	9	25
59	M/600/5305	Applying Six Sigma Methodology to a Project	3	18	62

How is the qualification graded and assessed?

The overall grade for the qualification is a 'pass'. To achieve a pass for the full qualification, a learner must achieve all the required units within the specified qualification structure.

To pass a unit a learner must:

- achieve **all** the specified learning outcomes
- satisfy **all** the assessment criteria by providing sufficient and valid evidence for each criterion
- show that the evidence is their own.

The qualifications are designed to be assessed:

- in the workplace or
- in conditions resembling the workplace, as specified in the assessment requirements/strategy for the sector.

Assessment requirements/strategy

The assessment strategy for each pathway of this qualification can be found in *Annexes D1– D3*.

Assessment for the **Construction and Built Environment pathway** must be in line with the ConstructionSkills assessment strategy in Annexe D1.

Assessment for the **Building Services Engineering pathway** must be in line with the SummitSkills assessment strategy in Annexe D2.

Assessment for the **Manufacturing Engineering pathway** must be in line with the Semta assessment strategy in Annexe D3.

These assessment strategies have been developed by ConstructionSkills, SummitSkills and Semta respectively in partnership with employers, training providers, awarding organisations and the regulatory authorities. The *Assessment requirements/evidence requirements* section within each unit in this specification identifies the assessment strategy which is relevant to that particular unit.

Each assessment strategy includes details on:

- the requirements for assessment in the workplace and the circumstances where simulation is permitted
- the criteria for defining a realistic working environment, where it is permitted
- the roles and occupational competence of assessors, expert witnesses, internal verifiers and standards verifiers
- quality control of assessment
- evidence requirements.

Learners may provide evidence of occupational competence from:

- **current practice** where evidence is generated from a current job role
- a **programme of development** where evidence comes from assessment opportunities built into a learning/training programme whether at or away from the workplace
- the **Recognition of Prior Learning (RPL)** where a learner can demonstrate that they can meet the assessment criteria within a unit

through knowledge, understanding or skills they already possess without undertaking a course of development. They must submit sufficient, reliable and valid evidence for assessment, internal and standards verification purposes. RPL is acceptable for accrediting a unit, several units or a whole qualification

- a **combination** of these.

It is important that the evidence provided to satisfy the unit and learning outcomes' assessment criteria is:

Valid	relevant to the standards for which competence is claimed
Authentic	produced by the learner
Current	sufficiently recent to create confidence that the same skill, understanding or knowledge persist at the time of the claim
Reliable	indicates that the learner can consistently perform at this level
Sufficient	fully meets the requirements of the standards.

Types of evidence (to be read in conjunction with the assessment strategies in Annexes D1, D2 and D3)

To successfully achieve a unit the learner must gather evidence which shows that they have met the required standard specified by the assessment criteria. Evidence can take a variety of different forms including the examples below. Centres should refer to the assessment strategy for information about which of the following are permissible.

- direct observation of the learner's performance by their assessor (O)
- outcomes from oral or written questioning (Q&A)
- products of the learner's work (P)
- personal statements and/or reflective accounts (RA)
- outcomes from simulation, where permitted by the assessment strategy (S)
- professional discussion (PD)
- assignment, project/case studies (A)
- authentic statements/witness testimony (WT)
- expert witness testimony (EPW)
- evidence of Recognition of Prior Learning (RPL).

The abbreviations may be used for cross-referencing purposes.

Learners can use one piece of evidence to prove their knowledge, skills and understanding across different assessment criteria and/or across different units. It is, therefore, not necessary for learners to have each assessment criterion assessed separately. Learners should be encouraged to cross-reference their evidence to the relevant assessment criteria.

Evidence must be made available to the assessor, internal verifier and Edexcel standards verifier. A range of recording documents is available on the Edexcel website www.edexcel.com. Alternatively, centres may develop their own.

Centre recognition and approval

Centre recognition

Centres that have not previously offered Edexcel accredited qualifications need to apply for and be granted centre recognition and approval as part of the process for approval to offer individual qualifications. New centres must complete both a centre recognition and approval application and a qualification approval application.

Existing centres will be given 'automatic approval' for a new qualification if they are already approved for a qualification that is being replaced by the new qualification and the conditions for automatic approval are met.

Centres already holding Edexcel approval and which have a history of good external quality assurance outcomes are able to gain qualification approval for a different level or different sector via Edexcel online.

Approvals agreement

All centres are required to enter into an approvals agreement which is a formal commitment by the head or principal of a centre to meet all the requirements of the specification and any linked codes or regulations. Edexcel will act to protect the integrity of the awarding of qualifications, if centres do not comply with the agreement. This could result in the suspension of certification or withdrawal of approval.

Quality assurance

Detailed information on Edexcel's quality assurance processes is given in *Annexe B*.

What resources are required?

This qualification is designed to support learners working in the engineering environmental technologies sector. Physical resources need to support both the delivery of the qualifications and the assessment of the learning outcomes and must be of industry standard. Full account must be taken by a centre and staff involved in the delivery of a qualification of Health and Safety requirements. Where provision is made by the Sector Skills Council or Standards Setting Body for assessment to be undertaken in a Realistic Working Environment (RWE), the RWE must provide conditions the same as the normal day-to-day working environment, with a similar range of demands, pressures and requirements for cost-effective working. Centres must meet any specific resource requirements outlined in *Annexes D1, D2 and D3*, which contain the relevant assessment strategies. Staff assessing learners must meet the requirements within the overarching assessment strategy for the sector.

Unit format

Each unit in this specification contains the following sections.

Unit title:					The unit title is accredited on the QCF and this form of words will appear on the learner's Notification of Performance (NOP).
Unit code:					This is the unit owner's reference number for the specified unit.
Unit reference number:					This code is a unique reference number for the unit.
QCF level:					All units and qualifications within the QCF have a level assigned to them, which represents the level of achievement. There are nine levels of achievement, from Entry level to level 8. The level of the unit has been informed by the QCF level descriptors and, where appropriate, the NOS and/or other sector/professional.
Credit value:					All units have a credit value. The minimum credit value is one, and credits can only be awarded in whole numbers. Learners will be awarded credits when they achieve the unit.
Guided learning hours:					A notional measure of the substance of a qualification. It includes an estimate of the time that might be allocated to direct teaching or instruction, together with other structured learning time, such as directed assignments, assessments on the job or supported individual study and practice. It excludes learner-initiated private study.
Unit summary:					This provides a summary of the purpose of the unit.
Assessment requirements/evidence requirements:					The assessment/evidence requirements are determined by the SSC. Learners must provide evidence for each of the requirements stated in this section.
Assessment methodology:					This provides a summary of the assessment methodology to be used for the unit.
Learning outcomes:	Assessment criteria:	Evidence type:	Portfolio reference:	Date:	
			The learner should use this box to indicate where the evidence can be obtained eg portfolio page number.	The learner should give the date when the evidence has been provided.	
Learning outcomes state exactly what a learner should know, understand or be able to do as a result of completing a unit.		The assessment criteria of a unit specify the standard a learner is expected to meet to demonstrate that a learning outcome, or a set of learning outcomes, has been achieved.		Learners must reference the type of evidence they have and where it is available for quality assurance purposes. The learner can enter the relevant key and a reference. Alternatively, the learner and/or centre can devise their own referencing system.	

Units

Unit 1: Ensure Compliance with Legal, Regulatory, Ethical and Social Requirements

Unit reference number: H/600/9609

QCF level: 4

Credit value: 5

Guided learning hours: 25

Unit summary

This unit helps learners to maintain compliance with legal, regulatory, ethical and social requirements relating to their own areas of responsibility.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to monitor the operational compliance of procedures in meeting legal, regulatory, ethical and social requirements	1.1 Monitor the operational compliance of procedures in meeting legal, regulatory, ethical and social requirements			
2 Be able to make recommendations on areas of non-compliance with procedures for legal, regulatory, ethical and social requirements relating to own area of responsibility	2.1 Identify areas of non-compliance with legal, regulatory, ethical and social procedures 2.2 Examine reasons for non-compliance with procedures 2.3 Make recommendations for corrections to ensure compliance with procedures			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 2: Managing the Development of Self and Others

Unit reference number: T/504/7523

QCF level: 4

Credit value: 8

Guided learning hours: 20

Unit summary

This unit enables learners to plan and implement their own personal development. Learners will formulate aims and objectives for personal development, create a personal development plan, evaluate the effectiveness of development activities and record evidence of competence gained. They will then revisit their initial aims and objectives and update them for the future. Learners will also have the opportunity to manage the personal development of colleagues.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment methodology

This unit must be assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to plan own personal development	1.1 Formulate aims and objectives for carrying out personal development 1.2 Assess current skills against organisational standards for current or projected future role 1.3 Define personal development needs 1.4 Create a development plan for achieving needs in line with organisational requirements			
2 Be able to implement own personal development	2.1 Carry out activities aimed at achieving identified development needs 2.2 Record and evaluate the effectiveness of development activities 2.3 Record evidence of competence gained that confirms achievement of identified development needs 2.4 Evaluate personal development aims and objectives and update to suit changing circumstances			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Be able to manage personal development of colleagues</p>	<p>3.1 Agree personal development aims and objectives with colleagues, in line with organisational requirements</p> <p>3.2 Review personal development plans produced by colleagues, suggesting improvements as appropriate</p> <p>3.3 Record colleagues' engagement in personal development activities in line with organisational policy</p> <p>3.4 Discuss the effectiveness of development activities with colleagues</p> <p>3.5 Record evidence of competence gained by colleagues that confirms achievement of identified development needs</p> <p>3.6 Agree updates to colleagues' personal development aims and objectives to suit changing circumstances and organisational requirements</p>			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 3: Planning Construction Work Processes and Efficient Use of Resources in Construction and the Built Environment

Unit reference number: T/504/7576

QCF level: 4

Credit value: 13

Guided learning hours: 70

Unit summary

In this unit learners will develop an understanding of work planning in organisations and use this to produce schedules of planned activities. Learners will develop systems for monitoring works programmes and use this to improve future production and planning.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- Assess:
 - types and quantity/scale of resources and production methods
 - alternatives that may meet the required criteria
 - feedback/evidence from previous use
 - viability of innovative resource/method claims
 - need for more information
 - benefits and disadvantages
- Project information and data:
 - contract documents
 - bills of quantities
 - specifications
 - drawings

- digital models and graphical and non-graphical electronic data files
- health and safety plans
- programmes
- Resources:
 - construction materials, products and systems
 - building services installations
 - construction plant and equipment
 - site facilities and ancillary site services
 - contractors, sub-contractors and workforce
- Work methods:
 - planning, sequencing and integration of work operations
 - location, organisation and storage of resources
 - supply chain management
 - management of information (digital models, documents, drawings & graphical and non-graphical electronic data files)
 - construction and installation techniques, including new materials and technologies
 - temporary works
 - prefabrication, standardisation and off-site manufacture (volumetric pods, panelised hybrid)
 - degree of inter-connectedness between building components (e.g. bathroom & kitchen pods)
 - buildability and on-site activity (remove inefficiency - design out waste, materials recovery and reuse)
 - working conditions (health, safety and welfare)
 - materials recovery/re-use and waste and recycling management
 - access
 - security
 - attendance and service support
 - handling operations
 - transportation, traffic generation and management
 - plant, equipment and people capability
 - skills needs including certification, accreditation and training
 - costs and availability of labour – ease with which local trades could undertake repairs/alterations, or the need to employ manufacturer-approved contractors
 - demolition and decommissioning
- Technical factors:
 - site, location and surrounding environment
 - compliance with legal and regulatory constraints and industry recognised standards
 - specified technical performance standards
 - available and projected technology
 - supply sources
 - certification & accreditation of products & build systems
 - quality
 - cost
 - life cycle assessment and costing (raw material extraction, transport, manufacture, use and disposal)
 - low carbon and embodied carbon
 - alternative energy sources

- energy usage and efficiency
- environmental impact
- sustainability
- fire protection
- maintenance and use
- costs and availability of replacement parts (including any bespoke components and ease of installation)
- protection of archaeological and historically valuable resources
- advice of experts, including experienced craftspeople and suppliers
- Project criteria:
 - client and user needs
 - facility/asset management requirements
 - contract requirements in terms of time, quantity and quality
 - community benefits, including skills and training
 - third party obligations
- Activity content:
 - resource quantities
 - activities and work methods
 - timescales
 - sequencing and dependency
- External factors:
 - other related programmes
 - supply availability and lead times
 - contingencies
 - special working conditions
 - impact on occupiers and near neighbours
 - seasonal weather conditions
 - site conditions
- Programmes and schedules:
 - bar charts;
 - critical path;
 - method statements
- System for monitoring and recording:
 - manual
 - electronic.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and

Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to assess work resources and work methods	<p>1.1 Assess the available project information and data to establish required resources and work methods for a given scheme</p> <p>1.2 Plan work methods which will optimise the use of resources and which meet project criteria and statutory requirements</p> <p>1.3 Agree the selected resources and work methods with decision makers</p>			
2 Be able to manage health and safety at building services engineering work locations	<p>2.1 Explain the methods used to scrutinise the available project information and data to establish required resources and work methods</p> <p>2.2 Evaluate the required resources against project technical factors for specified areas of work</p> <p>2.3 Appraise a range of work methods which will optimise the use of resources and which meet project criteria and statutory requirements</p> <p>2.4 Justify the preferred work methods with decision makers against financial, technical and organisational criteria</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Be able to produce method statements and programmes</p>	<p>3.1 Produce specific method statements based on preferred work methods</p> <p>3.2 Assess the activities against the requirements of significant external factors</p> <p>3.3 Produce a logical schedule of inter-related activities to enable a resource-efficient work programme to be prepared</p> <p>3.4 Produce method statements for planned activities that efficiently control workflow, the use of resources, time and waste</p> <p>3.5 Produce work programmes that efficiently control workflow, the use of resources, time and waste</p>			
<p>4 Understand how to produce method statements and programmes</p>	<p>4.1 Evaluate selected work methods and resources for their activity content to enable a method statement to be prepared</p> <p>4.2 Explain how to assess the activities against the requirements of significant external factors</p> <p>4.3 Explain how to identify inter-related activities to enable a resource-efficient work programme to be prepared</p> <p>4.4 Explain how to produce method statements for planned activities that efficiently control workflow, the use of resources, time and waste</p> <p>4.5 Explain the procedures for producing work programmes that efficiently control workflow, the use of resources, time and waste</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
5 Be able to monitor programmes and resources	5.1 Implement a system for monitoring and recording the works programme and the use of resources, time and waste 5.2 Agree any necessary alterations to the works programme and the use of resources, time and waste which will meet changed circumstances, or offer efficiency benefits 5.3 Use the results of monitoring to improve future production, planning and the use of resources, time and waste			
6 Understand how to monitor programmes and resources	6.1 Explain how to implement a system for monitoring and recording the works programme and the use of resources, time and waste 6.2 Examine the process for agreeing any necessary alterations to the works programme and the use of resources, time and waste which will meet changed circumstances, or offer efficiency benefits 6.3 Explain how the results of monitoring can be used to improve future production, planning and the use of resources, time and waste			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 4: Monitoring Construction and Installation Operations and Resources to Minimise Energy and Waste in Construction and the Built Environment

Unit reference number: A/504/7577

QCF level: 4

Credit value: 11

Guided learning hours: 60

Unit summary

In this unit learners will develop an understanding of monitoring construction and installation operations in order to implement energy and waste minimisation solutions. The learner will explore new technologies, systems, methods, operational and decommissioning issues that drive the energy efficiency agenda.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- Information:
 - survey reports
 - design
 - contractual
 - statutory consents
 - contractors pre-planning information
 - Health and Safety Plan
 - method statements
 - programmes
 - about competent people
 - sub contractors

- Energy:
 - energy sources and infrastructure
 - energy consumption
 - low carbon targets
 - use of renewable resources
 - energy reduction programmes
 - heat recovery and re-use
 - energy efficient technologies
 - energy efficient practices
- Waste:
 - segregation
 - reduction
 - reuse
 - recycle
 - recover
- Construction and installation operations:
 - structure
 - elements of the building fabric
 - materials
 - finishes
 - furnishings
 - power and light
 - heating and ventilation
 - telecommunications
 - movement of goods and people
 - special services and equipment
 - external works
 - landscaping
- Resources:
 - people
 - plant and equipment
 - materials and components
 - sub-contractors
 - information
 - work area and facilities
 - storage.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and

Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to assess energy and waste minimisation solutions	<p>1.1 Obtain production information from the project plan</p> <p>1.2 Analyse planned construction and installation operations and resources to establish energy and waste factors</p> <p>1.3 Evaluate the energy and waste minimisation in construction and installation operations</p> <p>1.4 Analyse the minimisation solutions with authoritative sources</p> <p>1.5 Calculate the effectiveness of different methods and solutions to achieve the most environmentally sustainable results</p> <p>1.6 Evaluate potential issues posed by new construction and installation operations</p>			
2 Understand how to assess energy and waste minimisation solutions	<p>2.1 Justify identified energy and waste factors against specific contract obligations</p> <p>2.2 Recommend improvements for energy and waste minimisation in construction and installation operations and resources</p> <p>2.3 Evaluate the effectiveness of different methods and solutions to achieve environmentally sustainable criteria</p> <p>2.4 Explain organisational protocol for dealing with potential issues posed by new construction and installation operations</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Be able to implement energy and waste minimisation solutions</p>	<p>3.1 Explain agreed methods and solutions for energy use and waste minimisation solution to contractual parties</p> <p>3.2 Plan arrangements for guidance, training and co-ordination on new construction and installation operations</p> <p>3.3 Implement construction and installation operations and resources to minimise energy and waste whilst ensuring compliance with contract and regulatory requirements</p>			
<p>4 Understand how to implement energy and waste minimisation solutions</p>	<p>4.1 Explain organisational archiving arrangements to capture minimisation solutions</p> <p>4.2 Explain how to make arrangements for guidance, training and co-ordination on new construction and installation operations</p> <p>4.3 Evaluate systems for monitoring construction and installation operations and resources to minimise energy and waste suggesting possible improvements</p>			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 5: Monitoring Supplies of Resources to Meet Project Sustainability Requirements in Construction and the Built Environment

Unit reference number: F/504/7578

QCF level: 4

Credit value: 10

Guided learning hours: 50

Unit summary

In this unit learners will develop an understanding of monitoring supplies of resources to meet project sustainability requirements. They will learn about developing project resource acquisition plans and how to maintain supplies of resources to meet project requirements

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- Resources:
 - raw materials
 - manufactured materials
 - components
 - systems
 - prefabricated components (e.g. volumetric pods, panelised hybrid, timber framed)
 - people
 - construction plant & equipment
- Supply requirements:
 - price
 - quantity
 - quality

- availability
- schedule of delivery
- lead time
- life expectancy
- maintenance and servicing
- supplier support
- storage and handling facilities
- energy use and carbon minimisation (including sourcing and transportation)
- impact on occupiers and near neighbours
- environmental issues (including sustainability)
- health and safety issues
- transportation
- deterioration and damage
- loss and theft
- after sales-service
- payment terms
- elimination of waste
- recycling and reuse of materials
- off-site manufacture, on site assembly
- diagnostic testing
- Acquisition Plan:
 - price
 - quantity
 - quality/specification
 - schedule of delivery
 - payment terms
 - location
- Records:
 - manual and electronic records of deliveries/acquisitions
 - manual and electronic records of current resource/stock position
- Actions:
 - evaluate performance of suppliers
 - improving performance of suppliers
 - agreeing changes with suppliers
 - arranging alternative sources of supply
 - improving use/turnover of stock
 - monitoring project changes that may affect resource supplies.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to develop project resource acquisition plans	<p>1.1 Analyse operational plans, quantities, and design information to establish projected required resources and their supply requirements</p> <p>1.2 Analyse what opportunities there are for standardising resources supplies to create efficiencies in usage, cost and environmental impact and sustainability</p> <p>1.3 Develop an acquisition plan for resources required from agreed suppliers</p> <p>1.4 Ensure that orders are prepared which meet the acquisition plan and supply requirements</p>			
2 Understand how to develop project resource acquisition plans	<p>2.1 Explain how user feedback can be used to establish projected required resources and their supply requirements</p> <p>2.2 Appraise opportunities for standardising resources supplies to create efficiencies in usage, cost and environmental impact and sustainability</p> <p>2.3 Explain how to develop an accurate acquisition plan for resources required from agreed suppliers</p> <p>2.4 Evaluate how the organisation ensures that orders are prepared which meet the acquisition plan and supply requirements</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Be able to maintain supplies of resources to meet project requirements</p>	<p>3.1 Implement systems for monitoring and evaluating the acquisition plan which will identify any problems with meeting supply requirements</p> <p>3.2 Monitor records of resources supply to identify over or under provision</p> <p>3.3 Analyse any variations in the required supply requirements and their causes</p> <p>3.4 Agree actions to address problems with resource provision and variations in supply requirements to minimise disruption to the project programme and meet contract requirements</p> <p>3.5 Conduct negotiations and meetings with suppliers and users of resources in a manner which maintains their goodwill and trust</p>			
<p>4 Understand how to maintain supplies of resources to meet project requirements</p>	<p>4.1 Discuss how effective the systems for monitoring and evaluating the acquisition plan which will identify any problems with meeting supply requirements</p> <p>4.2 Explain how effective the monitoring of records of resources supply has been in identifying over or under provision</p> <p>4.3 Explain how information about variations in the required supply requirements and their causes is utilised by the organisation</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.4 Explain how the organisation addresses problems with resource provision and variations in supply requirements to minimise disruption to the project programme and meet contract requirements 4.5 Explain how to conduct negotiations and meetings with suppliers and users of resources in a manner which maintains their goodwill and trust			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 6: **Maintaining Systems for Health, Safety, Welfare and Environmental Protection in the Workplace**

Unit reference number: H/600/7486

QCF level: 3

Credit value: 8

Guided learning hours: 30

Unit summary

The aim of this unit is to illustrate the skills, knowledge and understanding required to confirm competence in maintaining systems for health, safety, welfare and environmental protection in the workplace within the relevant sector of industry.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment methodology

This unit must be assessed in a work environment and in accordance with:

- the Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of maintaining systems for health, safety, welfare and environmental protection to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Encourage a culture of health, safety, welfare and environmental awareness	<p>1.1 Develop initiatives which encourage a health, safety, welfare culture and consideration for the environment</p> <p>1.2 Explain the various methods that can encourage a culture of health, safety, welfare and consideration for the environment</p>			
2 Identify and recommend opportunities for improving health, safety and welfare for people on site or for specific operations	<p>2.1 Make recommendations following reviews that could improve health, safety or welfare on site or for specific operations</p> <p>2.2 Explain how to identify opportunities that will improve health, safety and welfare for people on site or for specific operations</p> <p>2.3 Describe the various methods to recommend improvements to health, safety and welfare systems</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Ensure the workforce and visitors to the site or specific operations are inducted and check the competence of those they are responsible for</p>	<p>3.1 Implement a system of checks to ensure that the workforce and visitors are inducted</p> <p>3.2 Explain the various methods of ensuring that the workforce and visitors to the site or specific operational area are inducted and give reasons why this is important</p> <p>3.3 Carry out checks to ensure that workers they are responsible for are competent for the relative tasks</p> <p>3.4 Explain the various methods of ensuring that workers they are responsible for are competent for the relative tasks and give reasons why this is important</p>			
<p>4 Maintain accurate and appropriate statutory notices and hazard warnings</p>	<p>4.1 Ensure relevant statutory notices and hazard warnings are clear, legible and concise</p> <p>4.2 Describe ways of maintaining statutory notices and hazard warnings</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>5 Ensure the serviceability of health, safety, welfare and environmental protection equipment and resources in order to comply with current legislation</p>	<p>5.1 Carry out maintenance checks on at least five of the following health, safety, welfare and environmental protection equipment and resources:</p> <ul style="list-style-type: none"> - protective equipment - protective clothing - first aid facilities and arrangements - welfare facilities - storage and security of materials and equipment - accident and incident reporting systems - fire fighting equipment - provision of health, safety and welfare <p>5.2 Explain the various methods of conducting and recording maintenance checks on health, safety, welfare and environmental protection equipment and resources that meet the project, organisational and statutory requirements</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>6 Implement systems which meet organisational and statutory requirements for the identification of hazards and reduction of risks; reporting accidents and emergencies and preventing recurrence</p>	<p>6.1 Develop and action a system that identifies hazards and reduces risk</p> <p>6.2 Explain the various methods of implementing systems that meet organisational and statutory requirements and which identifies hazards and reduces risks</p> <p>6.3 Develop and action a system that reports accidents and emergencies and is able to prevent recurrence</p> <p>6.4 Explain the various methods of implementing systems that meets organisational and statutory requirements for reporting accidents and emergencies, and operates to prevent recurrence</p> <p>6.5 Give reasons for implementing an effective system to identify hazards, reduce risks and report accidents</p>			
<p>7 Check health, safety, welfare and environmental protection systems regularly in accordance with organisational and statutory requirements</p>	<p>7.1 Conduct regular checks to ensure compliance with the following organisational and statutory requirements:</p> <ul style="list-style-type: none"> - construction specific health, safety, welfare and environmental legislation - recognised industry codes of practice - organisational procedures <p>7.2 Explain the methods of checking health, safety, welfare and environmental protection systems</p> <p>7.3 Explain the methods of ensuring that health, safety, welfare and environmental protection complies with organisational and statutory requirements</p>			

Learning outcomes	Assessment criteria		Evidence type	Portfolio reference	Date
8 Identify and report any special site or operational conditions which do not comply with organisational and statutory requirements	8.1	Review and evaluate sites or operations to identify special conditions and report conditions which do not comply with current legislation			
	8.2	Explain the methods of identifying and reporting special site conditions that do not meet organisational and statutory requirements			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 7: Developing Working Relationships in Construction and the Built Environment

Unit reference number: Y/504/1088

QCF level: 5

Credit value: 8

Guided learning hours: 30

Unit summary

This unit is about understanding and being able to develop and maintain working relationships with colleagues. The unit builds on this understanding to enable learners to formulate their personal development needs and create and review their own personal development plan.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand how to develop working relationships	<p>1.1 Discuss how to develop and maintain working relationships which promote goodwill and trust</p> <p>1.2 Explain how to instruct people about work activities in an appropriate level of detail and with an appropriate degree of urgency</p> <p>1.3 Explain how to provide guidance and help to people about work activities with sensitivity and encourage questions, requests for clarification and comments</p> <p>1.4 Discuss how to resolve conflicts and differences of opinion in ways which minimise offence and maintain goodwill, trust and respect</p>			
2 Be able to develop working relationships	<p>2.1 Demonstrate the development of working relationships which promote goodwill and trust</p> <p>2.2 Demonstrate methods for instructing people about work activities in an appropriate level of detail and with an appropriate degree of urgency</p> <p>2.3 Follow organisational guidelines to offer help to people about work activities with sensitivity, encouraging questions, requests for clarification and comments</p> <p>2.4 Determine and apply methods for resolving conflicts and differences of opinion in ways which minimise offence and maintain goodwill, trust and respect</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Be able to undertake personal development in the occupational practice area</p>	<p>3.1 Formulate aims and objectives for carrying out personal development</p> <p>3.2 Create a development plan for achieving needs in line with organisational requirements</p> <p>3.3 Carry out activities aimed at achieving identified development needs</p> <p>3.4 Record and evaluate the effectiveness of development activities</p> <p>3.5 Record evidence of competence gained that confirms achievement of identified development needs</p> <p>3.6 Evaluate personal development aims and objectives and update to suit changing circumstances</p>			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 8: **Confirming Project Energy Efficiency and Carbon Minimisation Requirements and Measures in Construction and the Built Environment**

Unit reference number: J/504/7582

QCF level: 4

Credit value: 14

Guided learning hours: 80

Unit summary

In this unit learners will gain an understanding of how to confirm energy efficiency and carbon minimisation factors for developments in order to assess energy efficiency and carbon minimisation measures.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- Energy efficiency and carbon minimisation:
 - low energy consumption
 - low carbon targets
- Energy goals and priorities:
 - energy sources and infrastructure
 - energy consumption
 - low carbon targets
 - use of renewable resources
 - use of non-renewable resources
 - energy reduction programmes
 - heat recovery and re-use
 - energy efficient technologies
 - energy efficient practices

- Developments:
 - new build
 - adaptation
 - alteration
 - refurbishment/upgrading
 - conservation
 - demolition/decommission
- Factors:
 - energy availability
 - energy distribution mechanisms efficiency and costs
 - energy delivery mechanisms efficiency and costs
 - energy controls efficiency and costs
 - environmental impact and sustainability level of energy demand
 - installation
 - maintenance
 - cost (including whole life costs/return on investment)
 - time
 - energy and low carbon standards and strategies
 - risk and opportunity
 - development phases (design, procurement, construction & installation, operation, maintenance, demolition/decommissioning)
 - short, medium and long-term implications
 - patterns of use
 - user preference
- Assess:
 - compliance with legislation, regulations and standards
 - advantages/disadvantages
 - quantify viability
 - views of experts and project stakeholders
- Measures:
 - energy reduction programmes
 - heat recovery and re-use
 - energy efficient technologies
 - energy efficient practices
 - waste management and reduction
 - recycling
 - communications/implementation campaigns
 - information from occupiers on what they need and what works for them
 - improvements/upgrades
 - in-use monitoring targeting, reporting and performance data (use of half hourly data, use of sub meters, computer based data logging and energy management systems, energy data manipulation software systems)
 - building energy assessment
 - smart metering
 - user focused controls
 - improved sensors
 - building management systems
 - validation and compliance of energy efficiency
 - district heating and cooling.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to confirm energy efficiency and carbon minimisation factors for developments	<p>1.1 Confirm energy efficiency and carbon minimisation goals and priorities for potential developments, for both current and future use</p> <p>1.2 Confirm legislation, regulations and standards relevant to energy efficiency and carbon minimisation for potential developments</p> <p>1.3 Prioritise the factors that need to be considered in choosing the optimum energy efficiency and carbon minimisation measures for developments</p>			
2 Understand how to confirm energy efficiency and carbon minimisation factors for developments	<p>2.1 Explain how to confirm energy efficiency and carbon minimisation goals and priorities for potential developments, for both current and future use</p> <p>2.2 Review and interpret legislation, regulations and standards relevant to energy efficiency and carbon minimisation for potential developments</p> <p>2.3 Explain how to prioritise the factors that need to be considered in choosing the optimum energy efficiency and carbon minimisation measures for developments</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Be able to assess energy efficiency and carbon minimisation measures	3.1 Assess alternative energy efficiency and carbon minimisation measures for developments against the relevant factors 3.2 Assess potential products and production methods to prioritise energy efficiency and carbon minimisation goals and priorities 3.3 Report findings to decision makers in order that optimum energy efficiency and carbon minimisation measures can be selected			
4 Understand how to assess energy efficiency and carbon minimisation measures	4.1 Explain how to quantify the viability of energy efficiency and carbon minimisation measures for developments against the relevant factors 4.2 Justify the criteria used to assess potential products and production methods to establish which best meet confirmed energy efficiency and carbon minimisation goals and priorities 4.3 Explain organisational methods used to report findings to decision makers in order that optimum energy efficiency and carbon minimisation measures can be selected			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 9: Implementing Resource Efficient Procurement Processes in Construction and the Built Environment

Unit reference number: L/504/7583

QCF level: 4

Credit value: 12

Guided learning hours: 60

Unit summary

In this unit learners will develop an understanding of how to develop a procurement programme. They will also learn how to shortlist potential tenderers and implement operate procurement processes.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- Resources:
 - information (including models, documents, drawings, electronic, graphical and non-graphical data files)
 - labour, plant and equipment
 - materials, components and systems
 - services
- Procurement:
 - sub/works/trade contractors
 - suppliers
 - consultants
- Programme:
 - estimate
 - open competitive tender
 - two stage tender

- selected list tender
 - design and build
- Key considerations:
 - contractual requirements
 - organisational procedures
 - working arrangements
 - staging of payments
 - schedule of deliveries
 - obligations to third parties
 - statutory and regulatory requirements, obligations and approvals
 - quality requirements
 - cost including whole life cost
 - project programme
 - critical path for procuring/using resources
 - waste minimisation
 - energy/carbon reduction and use
- Shortlisting criteria:
 - quality, cost and time delivery record
 - perceived added value (including reputation of potential contractors)
 - acceptability of known sub-contracting arrangements
 - acceptability to client
 - financial resources
 - references from previous clients and bankers
 - health, safety and welfare requirements
 - competence of people
 - Building Information Modelling capability
 - systems compatibility
 - resources (human, materials, facilities)
 - maintenance and after-sales service
 - insurance
 - environmental policy and management
 - innovation
 - local economic benefit
- Assess:
 - documentary
 - references
 - interview
 - workplace evidence
- Information:
 - invitation to tender
 - form of tender
 - returns procedure
 - project documentation (e.g. surveys, drawings, schedules, specifications, bills of quantities)
 - graphical and non-graphical electronic data files
 - health, safety and welfare requirements
 - environmental policy
 - scope of services
 - terms and conditions
 - schedules of rates
 - evaluation criteria and procedures.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to develop a procurement programme	<p>1.1 Prioritise the areas of work for which resources will need to be procured and their potential sources</p> <p>1.2 Develop a detailed procurement programme in an appropriate format which accounts for key considerations</p> <p>1.3 Monitor the procurement programme to achieve key considerations</p>			
2 Understand how to develop a procurement programme	<p>2.1 Explain methods for developing a detailed procurement programme</p> <p>2.2 Explain research methods used to procure resources</p> <p>2.3 Evaluate potential modifications to the procurement programme as a result of monitoring</p>			
3 Be able to shortlist potential tenderers	<p>3.1 Implement an agreed type of procurement process with potential tenderers which meets the contract specification</p> <p>3.2 Agree with decision makers shortlisting criteria which are suitable to weight and rate performance for the type of work required</p> <p>3.3 Assess potential tenderers for shortlisting against the selection criteria</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
4 Understand how to shortlist potential tenderers	4.1 Explain procurement processes to select potential tenderers 4.2 Compare selection criteria methods for specified work stages 4.3 Explain the organisation's selection criteria for assessing potential tenderers for shortlisting			
5 Be able to operate procurement processes	5.1 Develop procurement information for issue to tenderers which meet statutory regulations, codes of practice and the organisation's policies 5.2 Respond to queries from tenderers with any clarified additional information which they need 5.3 Keep accurate records of procurement information issued, feedback and any queries from tenderers			
6 Understand how to operate procurement processes	6.1 Evaluate procurement information to tenderers which meet statutory regulations, codes of practice and the organisation's policies 6.2 Explain how to respond to queries from tenderers 6.3 Evaluate the organisation's systems for storing procurement information issued, feedback and any queries from tenderers			
7 Be able to assess tenders	7.1 Review received tenders in line with key considerations 7.2 Recommend to decision makers the tender which best meets the key considerations 7.3 Confirm formal acceptance of the agreed successful tender, subject to contract			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
8 Understand how to assess tenders	8.1 Explain the key considerations used to assess received tenders 8.2 Explain how the organisation deals with unsuccessful tenderers 8.3 Explain the steps involved in confirming formal acceptance of the agreed successful tender, subject to contract			

Learner name: _____ Date: _____
 Learner signature: _____ Date: _____
 Assessor signature: _____ Date: _____
 Internal verifier signature: _____ Date: _____
 (if sampled)

Unit 10: Implementing Project Information and Communication Systems and Procedures in Construction and the Built Environment

Unit reference number: R/504/7584

QCF level: 4

Credit value: 12

Guided learning hours: 50

Unit summary

In this unit learners will develop an understanding of setting up project information and communication systems and processes. They will also learn about monitoring project information and communication systems and processes.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- Project information:
 - contract documents
 - bills of quantities
 - specifications
 - drawings
 - digital models and graphical and non-graphical electronic data files
 - health and safety plans
 - programmes
- Needs:
 - site management
 - site/head office interface
 - contract administration

- health and safety
- team working relationships
- design information management
- Common Data Environment (CDE)
- Building Information Modelling
- control of resources
- project feedback
- People's roles and responsibilities:
 - individual job descriptions
 - organisation charts
 - contractual arrangements
 - team
 - skills, training and development
- Systems:
 - communications (oral, written, graphic, electronic)
 - reporting
 - recording
 - information management
 - information retrieval
 - resources supply, allocation and use.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to set up project information and communication systems and processes	<p>1.1 Review project information to identify the organisational and communication needs for the project</p> <p>1.2 Produce accurate and unambiguous information about the project, its organisational structure and people's roles and responsibilities</p> <p>1.3 Implement organisational and communication systems which interface with the client and supply chain</p> <p>1.4 Devise systems which enable clear and effective project management, and administrative and operational control</p>			
2 Understand project information and communication systems and processes	<p>2.1 Examine organisational and communication systems that have connectivity with the project team</p> <p>2.2 Analyse the organisational and communication needs for the project</p> <p>2.3 Explain project information flows relating to various organisational structures and people's roles and responsibilities</p> <p>2.4 Justify how the systems enable clear and effective project management, and administrative and operational control</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Be able to monitor project information and communication systems and processes	3.1 Monitor organisational and communication systems regularly for effectiveness against project needs 3.2 Manage organisational methods for investigating breakdowns in organisational and communication systems 3.3 Set up systems protocols for recording and providing feedback on the ways in which resources are utilised			
4 Understand how to monitor project information and communication systems and processes	4.1 Explain how to monitor organisational and communication systems regularly for effectiveness against project needs 4.2 Assess methods used to identify any breakdowns in organisational and communication systems 4.3 Analyse the effectiveness of organisational feedback systems in the allocation and use of resources			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 11: Co-ordinating Work Operations and Resources to Meet Project Requirements in Construction and the Built Environment

Unit reference number: Y/504/7585

QCF level: 4

Credit value: 13

Guided learning hours: 50

Unit summary

In this unit learners will learn how to co-ordinate work operations and resources to meet project requirements. Examination of project information will result in an effective site layout, efficient production sequence and effective control of the work stages.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- Information:
 - survey reports
 - design
 - contractual
 - statutory consents
 - contractor's pre-planning information
 - Health and Safety Plan
 - method statements
 - programmes
 - sub contractors
- Site layout:
 - storage and material handling
 - temporary accommodation

- work areas
- plant
- temporary services
- access/egress
- site safety
- welfare facilities
- security
- customer and public care
- continuing use by occupiers
- waste management
- pollution control
- provision for pre-fabricated components and systems
- statutory notices
- information about the project
- Factors which might compromise:
 - statutory regulations and limitations
 - codes of practice
 - health, safety and welfare
 - hazards
 - occupiers
 - near neighbours
 - public access
 - site conditions
 - environmental considerations
 - vehicular access/egress
 - security/trespass
 - heritage status and protection of archaeological, architectural, cultural and historically valuable resources
- Proposed works:
 - new build
 - infrastructure
 - demolition
 - extension
 - alteration
 - refurbishment
 - conservation
 - retrofit
 - temporary works
 - installation
- Resources:
 - people
 - plant and equipment
 - materials and components
 - sub-contractors
 - information
 - work area and facilities
 - storage
- Project requirements:
 - create a continuous work flow within the project programme
 - maintain quality of work
 - maintain budgetary controls
 - maintain dimensional accuracy and tolerances
 - manage waste (reduce, reuse, recycle, recover)

- ensuring statutory compliance
- accreditation of personnel
- supply chain management and co-ordination
- management of information
- customer care.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to co-ordinate site preparation	<p>1.1 Assemble and review information used in the preparation of the project plan and update it for production planning purposes</p> <p>1.2 Organise the site layout for operational purposes in order to minimise disruption, movement, handling and waste</p> <p>1.3 Agree plans to meet any identified factors which might compromise the proposed works</p> <p>1.4 Make arrangements for the acquisition and organisation of production resources</p>			
2 Understand how to co-ordinate site preparation	<p>2.1 Explain how to ensure that information used in the preparation of the project plan is updated for production planning purposes</p> <p>2.2 Justify how the site layout minimises disruption, movement, handling and waste</p> <p>2.3 Evaluate agreed plans for site preparation</p> <p>2.4 Explain how to make organisational arrangements for the acquisition and organisation of production resources</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Be able to co-ordinate workforce preparation	3.1 Develop an agreed programme, methods and information with the people who will be doing the work to achieve integrated work operations 3.2 Monitor the accreditation and skills of the available workforce and any gaps or required development needs 3.3 Make arrangements for any necessary guidance, training and coordination resulting from potential issues posed by new technologies			
4 Understand how to co-ordinate workforce preparation	4.1 Evaluate the extent to which the agreed programme, methods and information achieves integrated work operations 4.2 Explain how the organisation establishes the development needs of the workforce 4.3 Assess the organisational arrangements for delivering guidance, training and coordination resulting from potential issues posed by new technologies			
5 Be able to co-ordinate site operations	5.1 Control work operations to meet project requirements 5.2 Organise attendance for sub-contractors in accordance with contractual agreements 5.3 Coordinate the efficient deployment of the required resources to meet the project requirements and timescales 5.4 Control the site, work operations and resources to comply with contract obligations			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
6 Understand how to co-ordinate site operations	<p>6.1 Assess the methods used to control work operations to meet project requirements</p> <p>6.2 Evaluate the extent to which the deployment of the required resources meets the project requirements and timescales</p> <p>6.3 Explain the methods used to control the site, work operations and resources so that conditions are safe, the site is tidy and creates a favourable image of the organisation, its products and services and the project</p>			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 12: Coordinating the Logistics for Work to Existing Occupied Properties in Construction and the Built Environment

Unit reference number: D/504/7586

QCF level: 4

Credit value: 11

Guided learning hours: 50

Unit summary

In this unit learners will learn how to plan and organise work to occupied properties.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- Project information:
 - conditions of contract
 - bills of quantities
 - specifications
 - information (digital models, documents, drawings, graphical and non-graphical electronic data files)
 - health and safety plans
 - timescales
 - contractual risks, obligations and scope of works
 - contractors pre-planning information
 - method statements
 - programmes
 - survey reports
 - design
 - statutory consents
 - sub-contractors

- Work:
 - infrastructure
 - demolition
 - extension
 - alteration
 - refurbishment
 - conservation
 - retrofit
 - temporary works
 - installation
- Permissions:
 - client
 - site owners and occupiers
 - adjoining owners and occupiers
 - notifiable authorities
 - facility/asset managers
- Special considerations:
 - occupier access and on-going use
 - near neighbours
 - public access
 - site conditions
 - environmental considerations
 - vehicular access
 - health, safety and welfare
 - parts of the existing property requiring protection
 - security/trespass
 - 'live' conditions
- Site work arrangements:
 - storage
 - temporary accommodation
 - work areas
 - material use planning and work flow
 - co-ordination of sub-contractors
 - plant
 - temporary services
 - access/egress
 - security
 - continuing use by occupiers
 - waste management
 - pollution control
 - provision for pre-fabricated components and systems
- Resources:
 - people
 - plant and equipment
 - materials and components
 - contractors
 - sub-contractors
 - information
 - work area and facilities
 - storage.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to plan work to occupied properties	<p>1.1 Assemble and review information used in the preparation of the project plan and update it for production planning purposes</p> <p>1.2 Liaise with people and organisations who will be affected by the work in order to gain permissions and facilitate the work operations</p> <p>1.3 Record any special considerations affecting the work</p> <p>1.4 Agree work procedures and practices to allow for special considerations affecting the work with occupiers and decision makers</p>			
2 Understand how to plan work to occupied properties	<p>2.1 Explain how information used in the preparation of the project plan is verified, current, archived and updated</p> <p>2.2 Explain how to liaise with people and organisations who will be affected by the work in order to gain permissions and facilitate the work operations</p> <p>2.3 Explain how to record any special considerations affecting the work</p> <p>2.4 Evaluate the effect of special considerations on planned work</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Be able to organise work to existing occupied properties	3.1 Plan the site work arrangements for efficient working whilst minimising disruption 3.2 Make arrangements for the acquisition and organisation of production resources to achieve efficient work flow 3.3 Give adequate notice, as required in the contract, to all the people who will be affected by the work programme 3.4 Make arrangements for occupier care and provide information about work operations			
4 Understand how to organise work to existing occupied properties	4.1 Analyse the extent to which site work arrangements for efficient working minimise disruption 4.2 Justify the extent to which the organisation of production resources has led to the achievement of efficient work flow 4.3 Explain the contractual obligations to give adequate notice, to organisations and people, who will be affected by the work programme 4.4 Explain how to make arrangements for occupier care and provide information about work operations			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 13: Monitoring the Assembly Processes to Achieve Prescribed Performance Standards in Construction and the Built Environment

Unit reference number: H/504/7587

QCF level: 4

Credit value: 12

Guided learning hours: 50

Unit summary

In this unit learners will learn how to review assembly processes and coordinate work assembly operations and resources to meet technical factors, issues posed by new technologies and compliance with contract and regulatory requirements.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- Information:
 - conditions of contract
 - bills of quantities
 - specifications
 - information (digital models, documents, drawings, graphical and non-graphical electronic data files)
 - health and safety plans
 - timescales
 - contractual risks, obligations and scope of works
 - contractors pre-planning information
 - method statements
 - programmes

- survey reports
- design
- statutory consents
- sub contractors
- individual competence requirements
- Parts:
 - structure
 - elements of the building fabric
 - materials
 - finishes
 - furnishings
 - power and light
 - heating and ventilation
 - telecommunications
 - movement of goods and people
 - special services and equipment
 - external works
 - landscaping
- Work:
 - infrastructure
 - demolition
 - extension
 - alteration
 - refurbishment
 - conservation
 - retrofit
 - temporary works
 - installation
- Technical Factors:
 - materials and component performance standards and fitness for purpose (form, performance, appearance, availability, sustainability, efficiency of use, component life, durability)
 - available and projected technology (including renewable energy performance, quality, operation and maintenance requirements)
 - building physics (energy performance of structures, insulation, fire protection) materials form, performance, appearance, availability, sustainability, efficiency of use building services integration and control resources
 - standards and codes of practice
- Issues posed by new technologies:
 - the logistics of assembling labour and materials for the execution of the works
 - ensuring compliance
 - achieve high levels of quality control and precision
 - accreditation requirements for workers and systems
 - integration and interaction between different materials, components, systems and finishes what is required to achieve highly thermally efficient and airtight fabric
 - how to spot the most likely problems, e.g. identify thermal bridging.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to review assembly processes	<p>1.1 Evaluate information used in the preparation of the project plan and update it for production planning purposes</p> <p>1.2 Identify those parts of the work operations that interact with each other and potentially require greater care in assembly to achieve prescribed performance standard</p> <p>1.3 Review relevant technical factors and their implications to the assembly processes with experts and decision makers</p>			
2 Understand how to review assembly processes	<p>2.1 Explain how information used in the preparation of the project plan is verified, monitored and updated</p> <p>2.2 Explain how the construction process is carried out with interacting parts of the work operations</p> <p>2.3 Explain how to review relevant technical factors and their implications that need to be taken into account in assembly processes with experts and decision makers</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Be able to co-ordinate assembly processes	3.1 Make arrangements for any necessary guidance, training and co-ordination resulting from issues posed by new technologies 3.2 Communicate agreed methods to be used in assembly processes to take account of technical factors and issues posed by new technologies 3.3 Coordinate work assembly operations and resources to meet technical factors and issues posed by new technologies and compliance with contract and regulatory requirements			
4 Understand how to co-ordinate assembly processes	4.1 Evaluate the effectiveness of guidance, training and co-ordination in overcoming issues posed by new technologies 4.2 Explain how the communication of agreed methods to be used in assembly processes addresses issues such as technical factors and issues posed by new technologies 4.3 Evaluate the extent to which work assembly operations and resources are compliant with contract and regulatory requirements			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 14: Monitoring Project Quality, Progress and Cost in Construction and the Built Environment

Unit reference number: M/504/7589

QCF level: 4

Credit value: 14

Guided learning hours: 90

Unit summary

In this unit learners will develop an understanding of monitoring project quality, progress and cost against project requirements.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work based assessor should be used to witness and sign evidence for the learner.

Scope of knowledge and understanding

The assessment evidence should relate to the occupational area being assessed:

- **Systems for monitoring the quality:**
 - responsibilities for maintaining quality
 - inspection records
 - checking against specified design requirements
 - comparison with standard documentation
 - checking manufacturers' documentation
 - checking delivery notes
 - sampling and mock-ups
 - testing
 - site inspection reports
 - contractors' reports
 - meetings
 - dimension checks
 - supply chain management
- **Work:**
 - materials and components and their use

- methods of construction
 - completed elements
- Quality standards and guidance:
 - project specifications
 - legal and statutory requirements
 - British Standards
 - international Standards
 - Codes of Practice
 - certification and accreditation of products, systems & personnel
 - organisation standards
 - trade advisory guidance and best practice
 - dimensional control criteria
 - energy, carbon and waste reduction
- Corrective action:
 - ask for unacceptable work to be corrected
 - refer to decision makers on quality standards
 - agree alternative solutions
- Systems to monitor project progress:
 - visual inspection
 - resource records
 - site inspection reports
 - contractors' reports
 - certified payments
 - written, graphical and electronic records of actual work against programmed work
 - site meetings
 - organisational procedures
 - management reports
 - benchmarks
 - comparison with project programmes
 - supply chain management
- Programmes:
 - gantt charts
 - critical path
 - action lists
 - method statements
 - project expenditure forecasts
- Restorative action:
 - restore progress to minimise increases in time and cost
 - agree revised programme or completion dates
 - secure additional resources
 - alter planned work
 - initiate contract claim
- Deviations:
 - resource shortages
 - design problems and constraints
 - industrial disputes
 - lack of essential construction information
 - construction errors
 - inclement weather
 - physical constraints
 - legal
 - environmental

- contract variations
 - force majeure
- Project quantities and cost control systems:
 - contractual procedures and meetings
 - operational procedures and meetings
 - electronic recording
- Quantities and cost data:
 - materials and quantities
 - plant
 - people
 - sub-contractors
 - dayworks
 - variations
 - indirect costs
 - final accounts
 - periodic valuations
 - retention sums
 - forecasts of expenditure
 - performance information
 - contract programme and progress
- Action which will restore costs to budget:
 - agree cost charges
 - agree quality charges
 - agree programme charges
- Cost efficiencies:
 - waste reduction and management
 - project management
 - resource management and logistics
 - applications of new technologies and materials
 - energy management
 - water
 - recycling/reusing materials
 - alternative sources and types of materials
 - plant and labour which meet project requirements
 - variations in quality
 - standardisation
 - value engineering
 - lean construction principles
 - design out waste
 - lean manufacturing principles
 - off-site construction.

For more information see the ConstructionSkills assessment strategy in *Annexe D1*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre devised documentation should be used to record this information.

This unit must be assessed in a work environment and in accordance with:

- The Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units (Annexe D1) and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's competence.

Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to monitor work against agreed specified quality standards	<p>1.1 Implement systems for monitoring the quality of work in accordance with specified quality standards and guidance</p> <p>1.2 Manage corrective action on sub-standard work to achieve the specified quality standards and guidance</p> <p>1.3 Recommend improvements to decision makers from feedback received on quality standards and guidance</p>			
2 Understand how to monitor work against agreed specified quality standards	<p>2.1 Evaluate the effectiveness of systems implemented for monitoring the quality of work against specified quality standards and guidance</p> <p>2.2 Interpret quality standards and guidance from available information</p> <p>2.3 Evaluate feedback received on quality standards and guidance</p>			
3 Be able to monitor project progress against agreed programmes	<p>3.1 Implement systems to monitor project progress against the agreed programmes</p> <p>3.2 Manage restorative action when deviations occur in work operations</p> <p>3.3 Recommend improvements to decision makers from feedback received on project programmes</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
4 Understand how to monitor project progress against agreed programmes	4.1 Explain how to implement systems to monitor project progress against the agreed programmes 4.2 Explain how to implement restorative action when any deviations from planned progress occur, or may occur which could disrupt the programme 4.3 Analyse feedback received on project programmes			
5 Be able to monitor project quantities and costs against agreed budgets	5.1 Implement appropriate project quantities and cost control systems which are able to provide early warning of problems against agreed quantities and cost data 5.2 Implement agreed action which will restore costs to budget if any variations in quantities and cost data occur 5.3 Recommend opportunities for cost efficiencies to decision makers from feedback on project quantities and cost data			
6 Understand how to monitor project quantities and costs against agreed budgets	6.1 Evaluate the effectiveness of implemented project quantities and cost control systems in providing early warning of problems against agreed quantities and cost data 6.2 Explain how to implement agreed action which will restore costs to budget if any variations in quantities and cost data occur 6.3 Analyse feedback on project quantities and cost data			

Learner name: _____
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Unit 15: Plan, Allocate and Monitor Work in Own Area of Responsibility

Unit reference number: H/600/9674

QCF level: 4

Credit value: 5

Guided learning hours: 25

Unit summary

This unit helps learners to plan, allocate and monitor work in own area of responsibility, and make any necessary changes to original work plans.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Assessment must be carried out in a way that is consistent with the requirements outlined in the ConstructionSkills assessment strategy in *Annexe D1*.

To pass the unit, learners must meet all of the assessment criteria.

Assessment methodology

This unit is assessed using evidence from the workplace, ie observable performance, physical products of work (such as reports, plans, correspondence etc), witness testimony, discussion and questioning etc. Simulation is not allowed.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to produce a work plan for own area of responsibility	<p>1.1 Explain the context in which work is to be undertaken</p> <p>1.2 Identify the skills base and the resources available</p> <p>1.3 Examine priorities and success criteria needed for the team</p> <p>1.4 Produce a work plan for own area of responsibility</p>			
2 Be able to allocate and agree responsibilities with team members	<p>2.1 Identify team members' responsibilities for identified work activities</p> <p>2.2 Agree responsibilities and SMART (Specific, Measurable, Achievable, Realistic and Time-bound) objectives with team members</p>			
3 Be able to monitor the progress and quality of work in own area of responsibility and provide feedback	<p>3.1 Identify ways to monitor progress and quality of work</p> <p>3.2 Monitor and evaluate progress against agreed standards and provide feedback to team members</p>			
4 Be able to review and amend plans of work for own area of responsibility and communicate changes	<p>4.1 Review and amend work plan where changes are needed</p> <p>4.2 Communicate changes to team members</p>			

Learner name: _____ Date: _____
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(if sampled)

Unit 16: Managing Health and Safety in the Building Services Engineering Work Location

Unit reference number: T/504/7528

QCF level: 4

Credit value: 9

Guided learning hours: 30

Unit summary

This unit is designed for learners who are responsible for managing the health and safety of building services engineering projects in the work location by maintaining, monitoring and reviewing processes and procedures to ensure a safe and healthy working environment is maintained. It involves ensuring that health and safety on building services engineering work sites is compliant in terms of current legislative requirements for site administration, organisation, planning and on-going risk assessment.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Be able to establish health and safety requirements for building services engineering projects</p>	<p>1.1 Explain the importance of ensuring safe systems of work in building services engineering projects</p> <p>1.2 Plan the establishment of a safe system of work which:</p> <ul style="list-style-type: none"> - meets the requirements of Health and Safety legislation - is in accordance with organisational requirements - complies with the method statement and risk assessments - takes account of specific project or work location requirements <p>1.3 Plan for the placement of statutory notices and signs as appropriate to the work location and the expected hazards and risks</p> <p>1.4 Arrange for suitable personal protective equipment and safety equipment to be available in sufficient quantities</p> <p>1.5 Explain how the welfare facilities to be provided are suitable and in accordance with appropriate legislative requirements</p> <p>1.6 Implement suitable systems to enable:</p> <ul style="list-style-type: none"> - the identification and rectification of hazards - the reporting of accidents and emergencies 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.7 Explain the importance of construction design and management (CDM) regulations in ensuring safe systems of work</p>			
<p>2 Be able to manage health and safety at building services engineering work locations</p>	<p>2.1 Define clearly the scope and management responsibilities for health, safety and welfare in relation to the work activity</p> <p>2.2 Manage communications with project personnel, to cover:</p> <ul style="list-style-type: none"> - the importance of co-ordinating with other relevant trade representatives - where safety equipment is kept and when to use it - emergency and evacuation procedures - relevant regulations <p>2.3 Manage procedures for appointing appropriately qualified first aiders</p> <p>2.4 Manage procedures to ensure that personnel are provided with clear and accurate information about first aid provision</p> <p>2.5 Identify potential hazards that arise from work activities and manage risk assessments</p> <p>2.6 Develop methods for resolving health and safety issues when conflicts arise regarding risk assessment and communicating this to other personnel</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Be able to monitor on-going health and safety at building services engineering work locations	3.1 Monitor that access equipment is installed and used in accordance with instructions and regulations 3.2 Record special site conditions and any instances of non-compliance that are identified 3.3 Explain how non-compliance issues are dealt with 3.4 Monitor the work of operatives within scope of responsibility to ensure work is being completed safely and correctly			
4 Be able to review health and safety arrangements at building services engineering work locations	4.1 Explain the circumstances under which it may be necessary to carry out a review of health and safety 4.2 Identify appropriate sources of information to assist with the review 4.3 Review all areas of potential risk (both new and previously identified) in line with industry standards and organisational procedures 4.4 Report review outcomes at site meetings and to other relevant persons 4.5 Compile information used in the review and retain for use in future projects			
5 Be able to implement changes to health and safety arrangements in building services engineering work locations	5.1 Implement adjustments and improvements in line with the review 5.2 Report effectiveness of implemented adjustments and improvements to relevant persons			

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Unit 17: Managing Building Services Engineering Projects in the Work Location

Unit reference number: T/504/7531

QCF level: 4

Credit value: 7

Guided learning hours: 25

Unit summary

This unit is designed for learners who are responsible for managing the planning and progress of building services engineering projects. It involves managing the physical resource requirements; progress against milestones and deadlines; and health and safety requirements throughout the sequential phases of building services engineering projects, from pre-planning and start up, through to the end of the project.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Be able to plan resources for building services engineering projects</p>	<p>1.1 Explain pre-site planning and the importance of ensuring that pre-site planning is completed</p> <p>1.2 Explain the scope, purpose and requirements of a building services engineering project specification</p> <p>1.3 Plan human resource requirements in line with the project specifications:</p> <ul style="list-style-type: none"> - to calculate the number of personnel required - to confirm competence of personnel required - to identify where external specialists may need to be engaged <p>1.4 Plan physical resource requirements in line with project specifications</p>			
<p>2 Be able to plan work activities for building services engineering projects</p>	<p>2.1 Explain the importance of planning clear sequences and schedules for building services engineering project work activities</p> <p>2.2 Evaluate organisational methods for communicating work activities to individuals and organisations</p> <p>2.3 Prepare risk assessments and method statements in line with project specifications and approved procedures and practices</p> <p>2.4 Plan a schedule of work activities in line approved procedures and practices</p> <ul style="list-style-type: none"> - to meet the project specification - to meet health and safety requirements 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Be able to manage project start up	3.1 Establish operational requirements for maintaining health and safety during the project 3.2 Allocate work activities to competent building services engineering operatives in line with the project specification 3.3 Agree project roles and responsibilities with building services engineering operatives 3.4 Explain how to ensure that all required resources are available to start the project 3.5 Initiate work activities in line with the project specification 3.6 Initiate work activities in line with established operational requirements for health and safety			
4 Be able to manage project work activities	4.1 Evaluate the organisational systems and methods used to manage project progress 4.2 Apply organisational systems and methods to monitor the progress of activities against: <ul style="list-style-type: none"> - the project milestones and deadlines - the project's agreed costs - the quality assurance requirements of the project 4.3 Explain the procedure for seeking agreement on variations to the project specification 4.4 Make necessary revisions to the project specification within approved procedures and practices			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.5 Manage problems with on-project work activities in line with organisational systems and methods 4.6 Evaluate organisational systems and methods for dealing with problems 4.7 Assess work progress and the project specification to determine the most appropriate point for commissioning to be undertaken			
5 Be able to manage end-of-project processes	5.1 Explain the importance of following guidelines for the preparation and handover of relevant end-of-project documentation 5.2 Follow guidelines to complete the preparation and handover of relevant end-of-project documentation 5.3 Manage the removal of plant and equipment at the end of the project in line with organisational procedures 5.4 Explain the importance/significance of hand-over documentation and procedures			

Learner name: _____ Date: _____

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(if sampled)

Unit 18: Manage the Environmental Impact of Work Activities

Unit reference number: M/600/9712

QCF level: 4

Credit value: 5

Guided learning hours: 10

Unit summary

This unit will ensure that learners understand how, and are able to assess the environmental impact of their work and operate in such a way as to reduce the impact on the environment.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1	Understand the legal requirements and environmental policies that impact on own area of responsibility	1.1 Explain the legal requirements that impact on own area of responsibility 1.2 Explain the environmental policies that impact on own area of responsibility		
2	Understand the impact of work activities on the environment and how this can be minimised	2.1 Explain what specialist advice is available to manage the environmental impact of work activities 2.2 Explain how to assess the impact of work activities and resources on the environment 2.3 Explain how to minimise the environmental impact of work activities		
3	Understand the environmental impact of work activities in own area of responsibility	3.1 Assess the environmental impact of work activities and resource use 3.2 Produce a report on the environmental impact of work activities and resource use, with recommendations for improvement		
4	Be able to organise work activities and resource use to minimise environmental impact	4.1 Adapt the use of resources in own area of responsibility to reduce environmental impact 4.2 Organise activities in own area of responsibility to reduce environmental impact		
5	Be able to promote ongoing improvement in environmental performance	5.1 Establish means by which individuals can identify and report opportunities for improving environmental performance 5.2 Communicate environmental benefits resulting from changes to work activities		

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Unit 19: Managing the Effectiveness of a Building Services Engineering Workforce

Unit reference number: A/504/7529

QCF level: 4

Credit value: 7

Guided learning hours: 22

Unit summary

This unit is designed for learners who are responsible for managing, scheduling and monitoring the work of the project workforce and also about providing feedback to them on their performance. It involves allocating work, setting out plans and methods of working, agreeing personal development objectives with the workforce and monitoring their progress towards them.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand how to manage workforce performance	<p>1.1 Explain how members of the workforce can be involved in agreeing their own objectives and work plans</p> <p>1.2 Explain why it is important for individuals to assess their own and their team's performance against agreed objectives</p> <p>1.3 Evaluate the organisational strategy used to monitor the performance of the workforce</p> <p>1.4 Explain the benefits of maximising the skills/competencies of the workforce</p>			
2 Be able to allocate work to teams and individuals on building services engineering projects	<p>2.1 Devise work plans with relevant persons that demonstrate:</p> <ul style="list-style-type: none"> - the scope of individual responsibilities and reporting lines - the deadlines and standards that are expected to be met - the persons for whom individuals will be responsible - client requirements <p>2.2 Communicate the plans in a format that meets the needs of individual recipients</p> <p>2.3 Explain the responsibilities of individuals and teams, together with the limits of their authority when allocating work</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.4 Explain risk assessment and method statement documentation to the workforce</p> <p>2.5 Monitor team and individual understanding of agreed tasks at regular intervals</p>			
<p>3 Be able to manage the personal development of members of the workforce</p>	<p>3.1 Plan appraisal meetings with individuals to discuss and plan their own personal development objectives in relation to both themselves and the project</p> <p>3.2 Document opportunities provided for individuals to assess their own performance against agreed objectives in relation to both themselves and the project</p> <p>3.3 Advise members on how to achieve personal development objectives in relation to both themselves and the project</p> <p>3.4 Revise and agree new objectives and work plans with individuals at regular intervals</p>			
<p>4 Be able to manage the performance of the workforce</p>	<p>4.1 Monitor the performance of the project workforce in accordance with organisational strategy and project specification</p> <p>4.2 Compile information to inform the monitoring of individual performance</p> <p>4.3 Give feedback on individual performance in line with monitoring records</p> <p>4.4 Provide feedback to the workforce on overall project performance</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
5 Understand how to manage problems that occur within the workforce	5.1 Explain the process for conflict resolution within the organisation 5.2 Evaluate organisational systems and procedures for dealing with workplace problems 5.3 Suggest improvements to organisational systems			
6 Be able to use feedback from the workforce to continuously improve performance	6.1 Collect constructive suggestions from the project workforce to improve future performance of both individuals and the project team 6.2 Identify opportunities to improve productivity and the transfer of information 6.3 Provide constructive feedback using a manner most likely to maintain and improve performance 6.4 Evaluate team and individual response to feedback, and agree future performance objectives in relation to both themselves and the project			

Learner name: _____ Date: _____

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(if sampled)

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand tendering processes	<p>1.1 Explain the legal requirements of a tendering process</p> <p>1.2 Evaluate organisational tendering policies and processes</p> <p>1.3 Explain how to seek specialist support for the tendering process</p>			
2 Be able to determine information to be included in tender documentation	<p>2.1 Interpret client information to identify the following project requirements:</p> <ul style="list-style-type: none"> - work sequence - plant requirements - labour requirements - material requirements <p>2.2 Apply organisational procedures to estimate the quantities of plant, labour and materials that are required</p> <p>2.3 Assess the potential cost of plant, labour and materials that are required</p> <p>2.4 Determine the estimated cost for each activity in accordance with the requirements of the project</p> <p>2.5 Follow organisational guidelines to incorporate risk assessments and method statements into the tender documentation</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Be able to plan the preparation of tender documentation for building services engineering projects in accordance with organisational procedures</p>	<p>3.1 Plan the preparation of the tender documentation in line with invitation to tender document</p> <p>3.2 Analyse organisational resources in line with tender requirements to assess availability</p> <p>3.3 Follow organisational guidelines to assess the status and financial viability of the potential client</p> <p>3.4 Follow organisational guidelines to assess the status and financial viability of any potential suppliers</p>			
<p>4 Present authorised tender documentation for building services engineering projects</p>	<p>4.1 Calculate total estimated costs in line with approved organisational procedures</p> <p>4.2 Determine that the information contained within the completed estimate is accurate</p> <p>4.3 Explain appropriate actions to take if there are potential problems with tender information</p> <p>4.4 Present documentation to relevant persons for authorisation, adjudication and sign-off as a formal tender</p> <p>4.5 Present formal tender documentation to client organisations</p> <p>4.6 Produce commercially confidential information in protected documentary formats to ensure it is only available to authorised persons</p> <p>4.7 Collect and store all relevant information used in the tender for possible future use and reference</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
5 Be able to monitor the progress of tender submissions	5.1 Monitor the progress of the tender submission in line with organisational requirements 5.2 Check with the client if further information is required 5.3 Request feedback in situations where the tender is unsuccessful 5.4 Report feedback from unsuccessful tenders to relevant persons 5.5 Critically evaluate the tendering process to identify possible areas for improvement			

Learner name: _____ Date: _____

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(if sampled)

Unit 21: Managing Contract Procedures for Building Services Engineering Projects

Unit reference number: F/504/7533

QCF level: 4

Credit value: 7

Guided learning hours: 25

Unit summary

This unit is designed for learners who are responsible for managing contractual procedures on building services engineering projects. It involves: engaging suppliers of materials, plant and labour; monitoring progress against contractual commitments; ensuring contractual conditions are adhered to; maintaining positive industrial relations with employees, sub and external contractors; liaising with the client on project progress and addressing any issues that arise.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand how to manage contract delivery	<p>1.1 Critically evaluate the contractual implications of variations, their likely effect on programme activities, timings and sequences</p> <p>1.2 Explain possible problems in complying with the terms of contractual obligations in terms of:</p> <ul style="list-style-type: none"> - timescales - suppliers - workforce <p>1.3 Devise suitable solutions to resolve any potential problems with the delivery of the contract</p>			
2 Be able to plan the delivery of building services engineering contracts	<p>2.1 Assess client priorities, project requirements and financial constraints of contract</p> <p>2.2 Plan human resources to ensure that the project workforce is sufficient to comply with the requirements of the contract</p> <p>2.3 Determine that appropriate insurance cover is selected to cover the scope of work activities as stipulated in the contract</p>			
3 Be able to manage the contractual relationship with suppliers of materials, plant, equipment and labour	<p>3.1 Agree contractual arrangements with external suppliers of materials, plant and labour</p> <p>3.2 Manage the relationship with external suppliers to ensure compliance with the terms of the contractual agreement</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.3 Evaluate organisational systems to resolve differences with external suppliers in relation to the contract			
4 Be able to monitor the progress of the project against contractual obligations	4.1 Monitor progress information with relevant persons to ensure that contractual obligations are being met relating to: <ul style="list-style-type: none"> - time constraints - progress on site - achieving deadlines - variations 4.2 Ensure that the client is adhering to all their contractual obligations			
5 Be able to manage human resources relating to contract delivery	4.3 Monitor on-going compliance with relevant contractual and health and safety legislation			
	4.4 Liaise with relevant person(s) to ensure that required project documentation (including health and safety information) is available			
	5.1 Determine the employment status of those working on the project			
	5.2 Explain to employees whether they are employed by the contracting organisation or the client			
	5.3 Determine that the workforce is competent to undertake the required work and can provide formal evidence of the same			
	5.4 Manage the workforce to ensure that the organisation as a whole is working within the stipulated contract terms			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	5.5 Promote positive working relations in accordance with organisational policy between: <ul style="list-style-type: none"> - own organisation - client - employees - sub-contractors - suppliers 			

Learner name: _____

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Unit 22: Developing and Testing Building Services Engineering Project Design Solutions

Unit reference number: R/504/7536

QCF level: 4

Credit value: 9

Guided learning hours: 30

Unit summary

This unit is designed for learners who are responsible for managing the development of project design solutions. It involves: obtaining and analysing information on project options and project design parameters; advising the client on the most appropriate course of action and the selection; discussing existing design principles with the project team and selecting solutions best suited to the project; refining design options and rejecting those that do not meet project requirements.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand design principles, procedures and methods	<p>1.1 Critically evaluate the different regulatory standards and documents which apply to the design of building services engineering systems</p> <p>1.2 Explain the different stages of the design process</p> <p>1.3 Explain the underpinning design principles and procedures which apply to:</p> <ul style="list-style-type: none"> - individual building services engineering systems - combined or integrated building services engineering systems <p>1.4 Summarise the different methods and formats for producing building services engineering system designs</p> <p>1.5 Summarise the different methods for communicating information on system designs to relevant persons</p>			
2 Be able to compile information required for the development of project design solutions	<p>2.1 Collect information on options and design parameters which are relevant to the development of the design brief</p> <p>2.2 Critically evaluate options and design parameters suggesting options</p> <p>2.3 Circulate option data to project team members</p> <p>2.4 Analyse the option data with the project team, drawing conclusions</p> <p>2.5 Compile information significant to the overall design, identifying any implications and constraints</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Be able to determine design options to be taken forward for further development	3.1 Create the design criteria and circulate findings to the people responsible for the development of the project 3.2 Formulate, with the client, the most appropriate way to take the design process forward 3.3 Identify existing design options which contain similar design criteria for further development by the project team			
4 Be able to produce design options for building services engineering projects	4.1 Analyse existing design options which are consistent with the brief 4.2 Identify alternative sources of information and ideas, where existing design options do not meet the requirements of the design brief 4.3 Produce design options-for consideration by the project team 4.4 Critically evaluate the design options produced with project team members, recording any feedback for future reference 4.5 Develop further, the design options which appear to have the greatest potential for success			
5 Be able to test building services engineering project design options	5.1 Manage the commissioning of appropriate tests to provide information about the design options 5.2 Monitor tests to ensure that the validity of the design options is maintained 5.3 Record test results in line with organisational requirements			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	5.4 Critically analyse the test results against the parameters of the design brief			
6 Be able present finalised building services engineering project design solutions	6.1 Reject design options which fail to meet the design parameters 6.2 Identify possible alternative design options 6.3 Recommend modifications to the brief to allow the consideration of options which have the potential to meet design implications and constraints, but fail to meet all the design brief requirements 6.4 Assess the implications of modifying the design brief 6.5 Refine design options which meet the implications and constraints of the brief 6.6 Test the refined design options to establish that they meet the design parameters 6.7 Critically evaluate the test results for the refined design options against the design parameters 6.8 Present feasible design options to enable individuals and organisations to select the most appropriate			

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Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to plan the presentation of project design recommendations	<p>1.1 Justify the most appropriate presentational methods and techniques to enable clear communication of design options</p> <p>1.2 Agree with the project team, the purpose of the presentation and the presentational methods to be used</p> <p>1.3 Agree with the client, the purpose of the presentation and the presentational methods to be used</p> <p>1.4 Create a clear and accurate presentation which supports the design options and can be used to facilitate further discussion</p>			
2 Be able to present project design recommendations	<p>2.1 Communicate recommendations, proposals and design options clearly and objectively</p> <p>2.2 Present information in a way which promotes the goodwill and trust of individuals and organisations</p> <p>2.3 Explain changes to the agreed criteria in cases where the design proposal or design options do not meet all of the conditions of the brief</p> <p>2.4 Invite individuals and organisations to ask for clarification and to make comments at appropriate stages in the presentation</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Understand how to manage the process of modifying a design recommendation</p>	<p>3.1 Define, agree and record amendments and variations which are required by the client</p> <p>3.2 Critically analyse elements of design options which meet the requirements of the original design brief and any subsequent modifications</p> <p>3.3 Explain how to accommodate changes in the project that are not reflected in any formal variations to the design brief</p> <p>3.4 Determine the amount of additional work required to produce a revised project design and communicate this to individuals and organisations</p>			
<p>4 Be able to manage communications relating to the selection of a project design recommendation</p>	<p>4.1 Critically evaluate how well design concept proposals match the:</p> <ul style="list-style-type: none"> - objective criteria in the design brief - implications and constraints in the brief - client's aesthetic requirements - appropriate regulatory requirements <p>4.2 Explain the designer's creative interpretation of the brief and the overall design concept to individuals and organisations</p> <p>4.3 Report the implications and constraints of accepting, modifying or rejecting design proposals to individuals and organisations</p> <p>4.4 Communicate additional advice, research and consultancy required to produce a revised project design to individuals and organisations</p>			

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Unit 24: Preparing and Agreeing Detailed Building Services Engineering Project Designs

Unit reference number: H/504/7539

QCF level: 4

Credit value: 8

Guided learning hours: 30

Unit summary

This unit is designed for learners who are responsible for preparing and agreeing detailed building services engineering project designs. It involves: investigating and identifying important aspects of the design brief; agreeing resource requirements with clients and where critical activities are within the project; selecting resources which balance cost and quality; identifying and prioritising factors which impact upon design solutions; resolving any conflicts which arise within the design process; calculating, analysing and testing the effectiveness of design solutions; recording and presenting information to stakeholders.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Be able to apply methods and techniques to prepare detailed designs for building services engineering projects</p>	<p>1.1 Explain the term detailed design and how the requirements for detailed designs fit in with the overall project design</p> <p>1.2 Agree the purposes of detailed design information with individuals and organisations</p> <p>1.3 Identify the parts of the overall project that require detailed design</p> <p>1.4 Determine parts of the project design which interact with each other</p> <p>1.5 Produce procedures that maintain consistency between detailed design solutions and the overall design concept</p> <p>1.6 Demonstrate investigative techniques which can be applied when:</p> <ul style="list-style-type: none"> - calculating - testing - developing - specifying detailed design solutions and associated information <p>1.7 Demonstrate detailed design solutions that are consistent with industry best practice and comply with relevant regulatory codes and practices</p> <p>1.8 Evaluate appropriate methods for presenting designs to relevant people</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>2 Be able to plan work activities for the development of detailed design solutions</p>	<p>2.1 Determine the relative importance of work activities which are contained in the design brief</p> <p>2.2 Liaise with stakeholders to prioritise the most important work activities</p> <p>2.3 Evaluate work activities that are relevant to the completion of the design</p> <p>2.4 Identify, and recommend solutions to, any potential problems in work activities that may effect the completion of the design</p> <p>2.5 Determine resources to meet the identified work activities which balance cost and quality</p> <p>2.6 Assess the relevance of existing design solutions which contain similar work activities</p> <p>2.7 Implement work activities which best meet the requirements of the design brief</p>			
<p>3 Understand methods for investigating detailed building services engineering system design solutions</p>	<p>3.1 Assess the significance of any implications and constraints which may affect the detailed design solution</p> <p>3.2 Critically analyse resources which may influence the detailed design to decide which are the most important for the design solution</p> <p>3.3 Explain how to resolve any conflicts between the different resource factors which may impact on detailed designs</p> <p>3.4 Calculate the relative effectiveness of different design solutions</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
4 Be able to consolidate detailed building services engineering system design solutions	3.5 Analyse and test detailed design solutions against all relevant resources 4.1 Conduct investigations to confirm the suitability of the selected detailed design solutions 4.2 Record data from investigations and circulate to relevant persons 4.3 Present selected preferred designs to individuals and organisations 4.4 Record detailed design solutions which have not been selected and retain for possible use in future projects			
5 Be able to agree a design solution	5.1 Explain what information is required to be passed on to relevant persons in order to agree a detailed design 5.2 Explain the features and benefits of the recommended detailed design solution 5.3 Justify the selection of the recommended detailed design solution 5.4 Compare the recommended detailed design with the requirements of the detailed design brief 5.5 Agree how much the recommended detailed design solution will cost and how long it will take to implement 5.6 Demonstrate how to negotiate agreement on a detailed design solution which is acceptable to all relevant persons			

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Unit 25: Planning Work Methods, Resources and Systems to Meet Building Services Engineering Project Work Requirements

Unit reference number: M/504/7625

QCF level: 4

Credit value: 12

Guided learning hours: 35

Unit summary

This unit is designed for learners who are responsible for managing the planning of work activities, systems and resources to meet building services engineering project requirements. It involves assessing project data; calculating resource requirements; optimising the use of resources; identifying reliable and quality people to form a project team; plotting the critical path and managing the consequences of variations to the project. It is also about preparing and promoting the use of method statements; developing systems for monitoring and evaluating project outcomes; producing specifications for individual and organisational responsibilities and communicating those responsibilities.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand the principles and applications of work methods for building services engineering projects	<p>Critically evaluate different methods and procedures that can be used for planning out building services engineering projects</p> <p>Explain what is meant by a critical path and how this is worked out</p> <p>Critically evaluate different methods and procedures that can be used for monitoring work progress.</p> <p>Assess the merits of different methods and techniques for completing building services engineering work activities</p> <p>1.5 Explain how a method statement is used to communicate specified work methods to the workforce</p>			
2 Be able to evaluate work methods for building services engineering projects	<p>2.1 Analyse the available project data in line with approved practices to enable decisions on work activities to be made</p> <p>2.2 Obtain information from alternative sources in cases where the available project data is insufficient</p> <p>2.3 Identify work methods to:</p> <ul style="list-style-type: none"> - make the best use of resources - meet approved procedures and practices 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.4 Evaluate work methods against relevant technical and project data 2.5 Select work methods which best meet the required project criteria			
3 Be able to interpret the selected work method to produce a method statement	3.1 Analyse the selected work method for its activity content and recommend it to relevant persons 3.2 Explain the purpose and characteristics of a method statement 3.3 Produce a method statement which is accurate, clear, concise and acceptable to all relevant persons			
4 Be able to plan work activities and resources for building services engineering projects	4.1 Identify required work activities 4.2 Calculate the resources required for the project from available information 4.3 Follow guidelines for obtaining clarification and advice where required resources are not available 4.4 Analyse work activities against project data and the requirements of any external factors 4.5 Determine work activities which influence each other and sequence them logically to make the best use of the resources available 4.6 Calculate how long each activity will take 4.7 Produce detailed plans and programmes for work activities in accordance with approved procedures and organisational requirements			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
5 Be able to amend work programmes	5.1 Devise alterations to work programmes which will meet changed circumstances or offer cost and time benefits 5.2 Calculate any possible savings accurately and justify them to decision makers 5.3 Communicate changes in the work programme to members of the project team			
6 Be able to monitor the on-going progress of work activities	6.1 Formulate a system for monitoring work activities in accordance with organisational procedures 6.2 Implement the system for monitoring work activities 6.3 Use information from the monitoring of work activities to improve future planning			
7 Be able to manage the selection and formation of a project working team	7.1 Identify the individuals and organisations that are required 7.2 Determine significant factors which will affect the engagement of individuals and organisations: - number required - availability - timescales - budget limits 7.3 Evaluate the quality and reliability of individuals and organisations 7.4 Discuss and agree contractual arrangements for team membership in a manner that helps to foster effective working relationships			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>7.5 Apply approved procedures and practices to obtain the services of individuals and organisations</p> <p>7.6 Produce appropriate contractual documents and terms of appointment for individuals and organisations</p>			
<p>8 Be able to establish and maintain project organisational systems</p>	<p>8.1 Identify the organisational needs for the project</p> <p>8.2 Develop organisational systems which are compatible with approved procedures and practices</p> <p>8.3 Produce accurate and unambiguous information about people's roles and responsibilities within an organisational structure</p> <p>8.4 Circulate information on organisational systems to individuals and organisations</p> <p>8.5 Determine methods of recording and retrieving information which are appropriate to the needs of the project</p> <p>8.6 Devise systems for recording the ways in which resources are allocated and used</p> <p>8.7 Monitor the recording systems regularly to check effectiveness</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
9 Be able to establish and maintain project communication systems	9.1 Identify the communication needs for the project 9.2 Circulate information on communication systems to individuals and organisations 9.3 Determine methods of communicating information which are appropriate to the needs of the project 9.4 Monitor communication methods regularly to check effectiveness 9.5 Investigate breakdowns in communication, and take action to rectify 9.6 Establish systems for providing feedback on the ways in which resources are allocated and used			

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Unit 26: Implementing Works to Meet Building Services Engineering Project Requirements

Unit reference number: Y/504/7540

QCF level: 4

Credit value: 6

Guided learning hours: 25

Unit summary

This unit is designed for learners who are responsible for implementing works to meet building services engineering project requirements. It involves managing control of project work activities by ensuring that methods and procedures are implemented, that QA systems are applied and that there is compliance with relevant regulations and guidelines; controlling resources and issuing instructions to ensure that activities are carried out effectively, in line with required methods and procedures.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand how to complete pre-site planning for building services engineering projects	<p>1.1 Compile appropriate project information before work starts</p> <p>1.2 Identify any special requirements which apply to the project including factors which might compromise the proposed works</p> <p>1.3 Critically evaluate any factors which may affect the proposed works accurately, and pass on the information to relevant persons</p> <p>1.4 Explain why it is important to provide accurate details about the proposed work to the utility and emergency services</p>			
2 Be able to complete pre-site planning for building services engineering projects	<p>2.1 Determine appropriate access points for the site which are the most convenient for works traffic and minimise disruption</p> <p>2.2 Plan the site layout to meet operational requirements and communicate this to relevant persons</p> <p>2.3 Plan for the storage of materials and components so that materials handling and movement is efficient and wastage is minimised</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.4 Plan for the use of materials and components so that materials handling and movement is efficient and wastage is minimised</p> <p>2.5 Review relevant information used in the preparation of the project plan, clarifying any information which is unclear</p>			
<p>3 Be able to establish a safe and regulatory compliant worksite</p>	<p>3.1 Explain the arrangements that are required to ensure adequate site safety and security before and during the undertaking of work activities</p> <p>3.2 Undertake work to establish a safe and secure worksite in accordance with statutory regulation and codes of practice</p> <p>3.3 Determine the placement of notices which provide accurate information to the public and which conform to statutory requirements</p> <p>3.4 Manage safe handling and disposal of waste materials and products in accordance with workplace procedures and current, relevant environmental legislation.</p>			
<p>4 Be able to plan for the engagement of human resources</p>	<p>4.1 Explain the requirements for providing adequate notice, as required in the contract, to all members of the workforce and building users about when the work will start, how long it will take and when it will finish</p> <p>4.2 Determine the competence of the workforce in line with contractual and organisational requirements</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
5 Be able to implement work activities	4.3 Plan a programme and agree work methods with people who will be completing work activities 4.4 Organise engagement and attendance of sub-contractors in accordance with contractual agreements 5.1 Plan the delivery of sufficient resources to meet project requirements and timescales 5.2 Explain how to maintain the site and work resources to ensure that conditions are safe and the site is tidy 5.3 Apply approved control measures for the safe and secure storage of resources 5.4 Explain why maintaining a safe and well ordered site will have a positive effect on the image of the organisation, its products and its services 5.5 Explain how to adapt plans in order to meet special requirements and contingencies with the minimum of disruption 5.6 Monitor the implementation of consequent actions which result from the adaptation of work plans			

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Unit 27: Commissioning Building Services Engineering Systems After Installation

Unit reference number: K/504/7543

QCF level: 4

Credit value: 7

Guided learning hours: 25

Unit summary

This unit is designed for learners who are responsible for managing the commissioning of building services engineering systems. It involves identifying the customer's requirements for building services engineering system configuration; planning the resources required for the commissioning procedures; completing accurate records of the installation and commissioning procedures including any variations to the original specification; commissioning and transferring control of the installation back to the customer; and ensuring the customer is satisfied with the work carried out.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Be able to manage the configuration of building services engineering systems</p>	<p>1.1 Explain the importance of correctly configuring building services engineering systems after installation</p> <p>1.2 Plan the most appropriate way to configure building services engineering systems to meet client requirements</p> <p>1.3 Determine the resources required to undertake the configuration and obtain as required</p> <p>1.4 Apply the correct configuration methods and procedures in line with approved procedures and practices</p> <p>1.5 Resolve any problems with the configuration</p> <p>1.6 Verify that the configuration complies with all relevant approved procedures and achieves the client's requirements</p> <p>1.7 Record information on the configuration using appropriate documentary systems</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>2 Understand how to undertake the commissioning of building services engineering systems</p>	<p>2.1 Explain the principle requirements for commissioning building services engineering systems</p> <p>2.2 Explain why system condition and site conditions need to be considered before commissioning is undertaken</p> <p>2.3 Explain how to resolve problems that occur during building services engineering systems commissioning</p>			
<p>3 Be able to manage the commissioning of building services engineering systems</p>	<p>3.1 Determine the methods and procedures for commissioning building services engineering systems</p> <p>3.2 Plan the commissioning of building services engineering systems including consideration of:</p> <ul style="list-style-type: none"> - required materials - required equipment - engagement of specialist personnel <p>3.3 Manage the implementation of commissioning activities in accordance with approved procedures and practices</p> <p>3.4 Critically analyse the results of the commissioning</p> <p>3.5 Determine whether commissioned building services systems meet:</p> <ul style="list-style-type: none"> - the required specification - compliance with appropriate regulatory standard 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>4 Be able to handover commissioned building services engineering systems</p>	<p>3.6 Record commissioning information and data using appropriate documentary systems</p> <p>4.1 Explain why it is important to complete a structured handover of commissioned building services systems</p> <p>4.2 Determine that the building services systems are ready for handover in compliance with all relevant approved procedures and practices</p> <p>4.3 Provide accurate information to relevant people on the commissioned building services systems</p> <p>4.4 Explain any variations from the agreed specifications and requirements</p> <p>4.5 Use agreed transfer procedures to obtain client acceptance of the commissioned building services systems</p> <p>4.6 Check that all relevant documentation on system commissioning is correctly completed and recorded in accordance with organisational procedures</p>			

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Unit 28: Controlling Building Services Engineering Project Income and Expenditure

Unit reference number: M/504/7544

QCF level: 4

Credit value: 8

Guided learning hours: 30

Unit summary

This unit is designed for learners who are responsible for controlling building services engineering project income and expenditure. It involves: controlling project income and expenditure; gathering information about information and expenditure in the past and considering current trends, developments and factors likely to affect future income and expenditure; controlling income and expenditure against project budgets; advising members of the project team how they can help control costs; identifying where there are significant variations between actual costs and the project budget, and where there is a need to take prompt corrective action; keeping complete records of income and expenditure in relation to building services engineering projects.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand how to manage budgets for building services engineering projects	<p>1.1 Explain the organisational procedures for allocating responsibility for budgetary control of building services engineering projects</p> <p>1.2 Explain how to manage overall budgetary control by:</p> <ul style="list-style-type: none"> - monitoring income and expenditure - producing guidance documents - circulating required information to relevant persons <p>1.3 Justify methods for presenting financial information to relevant persons</p> <p>1.4 Explain the requirements for requesting and authorising budget changes and variations</p> <p>1.5 Explain how to resolve queries and discrepancies over allocated budgets</p>			
2 Be able to manage budgets for building services engineering projects	<p>2.1 Demonstrate budgetary control for building services engineering projects in accordance with financial plans and limits of own authority</p> <p>2.2 Provide relevant persons with reports on:</p> <ul style="list-style-type: none"> - budgets - cash flow calculations <p>2.3 Determine project expenditure and budget variations in accordance with organisational procedures and limits of own authority</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Be able to recover and record income that is due</p>	<p>3.1 Explain how to recover outstanding debts and retentions in a manner which maintains the goodwill and trust of the client</p> <p>3.2 Explain the principles for completing the costing of building services engineering projects</p> <p>3.3 Apply approved project costing methods for recording and verifying expenditure</p> <p>3.4 Determine how payments for work on building services engineering contracts will be made</p> <p>3.5 Demonstrate methods for:</p> <ul style="list-style-type: none"> - storing records and receipts to support payments due - recording and retaining complete and accurate records of payments due - calculating the total income due under the contract <p>3.6 Produce clear and accurate financial records for circulation to relevant persons</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>4 Be able to update budget and cash flow against variances and contingencies</p>	<p>4.1 Monitor allocated budgets in order to identify fluctuations in financial performance</p> <p>4.2 Critically analyse estimated cash flow calculations against actual income and expenditure</p> <p>4.3 Report findings of cash flow calculation analysis to relevant stakeholders</p> <p>4.4 Assess the feasibility of actions recommended by the project team against allocated budgets and cash flow calculations</p> <p>4.5 Formulate ways of dealing with variations and contingencies so as to enable continued project progress</p> <p>4.6 Produce budget and cash flow amendments in accordance with organisational requirements and limits of own authority</p> <p>4.7 Communicate budget and cash flow amendments to relevant persons</p> <p>4.8 Report to relevant persons about changes which will require a major restructuring of allocated budgets and cash flow calculations</p> <p>4.9 Critically evaluate the reasons for variances and contingencies to help prevent them from happening again</p>			

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Unit 29: Promote Equality of Opportunity, Diversity and Inclusion Across an Organisation

Unit reference number: T/600/9632

QCF level: 5

Credit value: 6

Guided learning hours: 30

Unit summary

This unit helps learners to promote and implement changes to equality, diversity and inclusion policies and procedures in their own organisation.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Be able to understand the benefits of an inclusive and diverse workforce	1.1 Examine the benefits of an inclusive and diverse workforce			
2 Be able to understand organisation's responsibilities under equality legislation and relevant codes of practice	2.1 Explain how legislation, equality, diversity, inclusion and relevant codes of practice apply to own organisation			
3 Be able to benchmark equality diversity and inclusion	3.1 Explain how to benchmark to equality, diversity and inclusion in own organisation			
4 Be able to communicate equality, diversity and inclusion policy and procedures.	4.1 Communicate written equality, diversity and inclusion policies and procedures to all relevant stakeholders			
5 Be able to review effectiveness of equality, diversity and inclusion issues	5.1 Analyse effectiveness of policies and procedures for equality, diversity and inclusion issues 5.2 Implement any change to the policy and procedures			

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Unit 30: Establish Risk Management Processes for an Organisation

Unit reference number: A/600/9616

QCF level: 5

Credit value: 6

Guided learning hours: 30

Unit summary

This unit will ensure that learners can establish and communicate a risk management process within an organisation.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidenced data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

For more information see the SummitSkills assessment strategy in *Annexe D2*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Simulation is not allowed.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand risk management within own area of responsibility	1.1 Explain the types of risk that can impact on an organisation 1.2 Review the knowledge and awareness of risks within the organisation			
2 Be able to establish a risk management process for an organisation	2.1 Identify the risks that impact on an organisation 2.2 Identify criteria to enable evaluation of the impact of identified risks 2.3 Establish processes to manage risk within an organisation			
3 Be able to allocate resources to enable risk management activities to take place	3.1 Plan resources across an organisation for risk management activity			
4 Be able to communicate risk management processes across an organisation	4.1 Communicate risk management processes and policy across an organisation			

Learner name: _____ Date: _____

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Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand sustainable building services engineering systems	<p>1.1 Evaluate client needs, objectives, business case and possible constraints for a client design brief</p> <p>1.2 Evaluate the feasibility of utilising sustainable BSE systems appropriate to the design brief</p>			
2 Be able to design sustainable building services engineering systems	<p>2.1 Prepare a feasibility study and assessment of BSE system options from a design brief</p> <p>2.2 Determine the design parameters for the system in line with the feasibility study</p> <p>2.3 Plan the concept design including outline proposals for sustainable building services engineering system, outline specification and preliminary cost details in line with the design brief</p> <p>2.4 Develop the concept design for a sustainable building services engineering system, update outline specifications and cost details</p> <p>2.5 Perform accurate design calculations to size mechanical and/or electrical BSE plant and equipment, using both software packages and manual techniques, in accordance with the concept design</p> <p>2.6 Create the technical design, incorporating BSE plant, materials and equipment for the project</p> <p>2.7 Select and justify appropriate mechanical and/or electrical BSE plant, materials and equipment for the project in accordance with the technical design</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3	<p>Be able to produce sustainable building services engineering specifications</p> <p>2.8 Explain how current legislative requirements, good practice and construction safety have been incorporated into the design, including `duties on designers` from CDM regulations</p> <p>2.9 Evaluate the degree of sustainability included in the design system</p> <p>2.10 Contribute to design team meetings</p> <p>3.1 Create specifications in accordance with the system design to meet current legislation standards in terms of energy efficiency and/or water use</p> <p>3.2 Create specification documentation in sufficient detail to enable a tender or tenders to be obtained</p> <p>3.3 Evaluate the stages from feasibility study to the production of the specification identifying strengths and any areas for improvement</p>			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand the parameters employed in effective building services engineering control systems	<p>1.1 Compare the control parameters of selected BSE control systems</p> <p>1.2 Evaluate control requirements to optimise operation and energy efficiency</p> <p>1.3 Assess the status of BSE plant operational characteristics and match this to selected control systems</p>			
2 Be able to monitor building services engineering control systems	<p>2.1 Use industry standard software solutions to devise an optimal programme of data analysis and monitoring of BSE control systems</p> <p>2.2 Manage data analysis and monitoring of BSE control systems in accordance with the devised programme</p> <p>2.3 Report the results of data analysis and monitoring in line with organisational procedures</p>			
3 Be able to rectify fault conditions on building services engineering control systems	<p>3.1 Carry out diagnostic routines on BSE control systems to identify and rectify fault conditions</p> <p>3.2 Determine the validity of the results provided by the diagnostic routines in BSE control systems against stipulated parameters and identify any areas for improvement</p> <p>3.3 Determine the corrective processes required to rectify identified fault conditions and schedule deadlines for their implementation and completion</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.4 Provide documentation to monitor fault diagnosis and implementation of remedial action based upon the data provided by BSE control systems			
4. Be able to optimise the performance of building services engineering installations	4.1 Use BSE control systems to provide performance reports 4.2 Use BSE control systems to modify and optimise BSE installations to enhance performance 4.3 Compile planned preventative maintenance scheduling programmes using the data provided by BSE control performance reports 4.4 Devise energy management strategies using the reports and data obtained from BSE control systems			

Learner name: _____ Date: _____

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Internal verifier signature: _____ Date: _____
(if sampled)

Unit 33: Maintaining Systems for Health, Safety, Welfare and Environmental Protection in the Workplace

Unit reference number: H/600/7486

QCF level: 3

Credit value: 8

Guided learning hours: 30

Unit summary

The aim of this unit is to illustrate the skills, knowledge and understanding required to confirm competence in maintaining systems for health, safety, welfare and environmental protection in the workplace within the relevant sector of industry.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Learners will collect work-based evidence data and complete a portfolio which must be mapped against the assessment criteria within this unit. Learners will need to develop methodologies in recording and evidencing against the assessment criteria, using page numbers and annotating the portfolio with relevant criteria. The work-based assessor should be used to witness and sign evidence for the learner.

Assessment methodology

This unit must be assessed in a work environment and in accordance with:

- the Additional Requirements for Qualifications using the title NVQ in QCF
- the ConstructionSkills' Consolidated Assessment Strategy for Construction and the Built Environment – Craft, Supervisory, Technical, Managerial and Professional Units and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Assessors for this unit must use a combination of the following assessment methods:

- observation of normal work activities within the workplace that clearly confirms the required skills
- questioning the learner on knowledge criteria that clearly confirms the required understanding
- review other forms of evidence that can clearly confirm industry required skills, knowledge and understanding.

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of maintaining systems for health, safety, welfare and environmental protection to be effective and reliable when confirming a learner's competence.
Workplace evidence of skills cannot be simulated.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Encourage a culture of health, safety, welfare and environmental awareness	<p>1.1 Develop initiatives which encourage a health, safety, welfare culture and consideration for the environment</p> <p>1.2 Explain the various methods that can encourage a culture of health, safety, welfare and consideration for the environment</p>			
2 Identify and recommend opportunities for improving health, safety and welfare for people on site or for specific operations	<p>2.1 Make recommendations following reviews that could improve health, safety or welfare on site or for specific operations</p> <p>2.2 Explain how to identify opportunities that will improve health, safety and welfare for people on site or for specific operations</p> <p>2.3 Describe the various methods to recommend improvements to health, safety and welfare systems</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Ensure the workforce and visitors to the site or specific operations are inducted and check the competence of those they are responsible for</p>	<p>3.1 Implement a system of checks to ensure that the workforce and visitors are inducted</p> <p>3.2 Explain the various methods of ensuring that the workforce and visitors to the site or specific operational area are inducted and give reasons why this is important</p> <p>3.3 Carry out checks to ensure that workers they are responsible for are competent for the relative tasks</p> <p>3.4 Explain the various methods of ensuring that workers they are responsible for are competent for the relative tasks and give reasons why this is important</p>			
<p>4 Maintain accurate and appropriate statutory notices and hazard warnings</p>	<p>4.1 Ensure relevant statutory notices and hazard warnings are clear, legible and concise</p> <p>4.2 Describe ways of maintaining statutory notices and hazard warnings</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>5 Ensure the serviceability of health, safety, welfare and environmental protection equipment and resources in order to comply with current legislation</p>	<p>5.1 Carry out maintenance checks on at least five of the following health, safety, welfare and environmental protection equipment and resources:</p> <ul style="list-style-type: none"> - protective equipment - protective clothing - first aid facilities and arrangements - welfare facilities - storage and security of materials and equipment - accident and incident reporting systems - fire fighting equipment - provision of health, safety and welfare <p>5.2 Explain the various methods of conducting and recording maintenance checks on health, safety, welfare and environmental protection equipment and resources that meet the project, organisational and statutory requirements</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>6 Implement systems which meet organisational and statutory requirements for the identification of hazards and reduction of risks; reporting accidents and emergencies and preventing recurrence</p>	<p>6.1 Develop and action a system that identifies hazards and reduces risk</p> <p>6.2 Explain the various methods of implementing systems that meet organisational and statutory requirements and which identifies hazards and reduces risks</p> <p>6.3 Develop and action a system that reports accidents and emergencies and is able to prevent recurrence</p> <p>6.4 Explain the various methods of implementing systems that meets organisational and statutory requirements for reporting accidents and emergencies, and operates to prevent recurrence</p> <p>6.5 Give reasons for implementing an effective system to identify hazards, reduce risks and report accidents</p>			
<p>7 Check health, safety, welfare and environmental protection systems regularly in accordance with organisational and statutory requirements</p>	<p>7.1 Conduct regular checks to ensure compliance with the following organisational and statutory requirements:</p> <ul style="list-style-type: none"> - construction specific health, safety, welfare and environmental legislation - recognised industry codes of practice - organisational procedures <p>7.2 Explain the methods of checking health, safety, welfare and environmental protection systems</p> <p>7.3 Explain the methods of ensuring that health, safety, welfare and environmental protection complies with organisational and statutory requirements</p>			

Learning outcomes	Assessment criteria		Evidence type	Portfolio reference	Date
8 Identify and report any special site or operational conditions which do not comply with organisational and statutory requirements	8.1	Review and evaluate sites or operations to identify special conditions and report conditions which do not comply with current legislation			
	8.2	Explain the methods of identifying and reporting special site conditions that do not meet organisational and statutory requirements			

Learner name: _____ Date: _____

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Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 34: Plan and Manage a Project

Unit reference number: J/600/9750

QCF level: 4

Credit value: 8

Guided learning hours: 30

Unit summary

This unit helps learners to clarify the scope and objectives of a project, develop a project plan and consult and agree the plan with others.

The project must be related to an environmental engineered product, service or process

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

Note that **the project evidence must be related to an environmental engineered product, service or process**

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1	Understand the principles, processes, tools and techniques of project management	1.1 Describe the roles and responsibilities of a project manager 1.2 Explain how to apply principles, processes, tools and techniques of project management		
2	Be able to agree the scope and objectives of a project	2.1 Agree SMART (Specific, Measurable, Achievable, Realistic, and Time-bound) objectives and scope of the project with project sponsor(s) and stakeholders		
3	Be able to identify the budget in order to develop a project plan	3.1 Identify budget and time-scales in order to develop the project plan with stakeholders 3.2 Consult with stakeholders to negotiate the project plan 3.3 Identify potential risks and contingencies 3.4 Establish criteria and processes for evaluating the project on completion		
4	Be able to implement a project plan	4.1 Allocate roles and responsibilities to project team members 4.2 Provide resources identified in the project plan 4.3 Brief project team members on the project plan and their roles and responsibilities 4.4 Implement a project plan using project management tools and techniques		

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
5 Be able to manage a project to its conclusion	5.1 Apply a range of project management tools and techniques to monitor, control and review progress 5.2 Provide support to project team members			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 35: **Managing the Environmental Impact of Work Activities in Manufacturing Engineering**

Unit reference number: K/504/7591

QCF level: 4

Credit value: 12

Guided learning hours: 36

Unit summary

The unit is for those who are responsible for managing work activities and resources in the manufacturing engineering sector in order to minimise the negative impact, and maximise the positive impact, they may have on the environment. **It involves identifying sustainable systems, processes and materials; organising work activities and the use of resources efficiently, understanding their impact on the environment and finding ways to reduce their negative and increase their positive impact.**

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand the legal requirements that impact the manufacturing engineering sector	<p>1.1 Explain the legal requirements that impact on own area of responsibility</p> <p>1.2 Explain the environmental policies that impact on own area of responsibility</p> <p>1.3 Explain the legislation governing the safe use and disposal of hazardous materials and non-hazardous waste</p>			
2 Understand the impact of work activities on the environment	<p>2.1 Explain the environmental impacts and risks of work activities within own area of responsibility</p> <p>2.2 Assess the impact of work activities and resources on the environment</p> <p>2.3 Explain how to minimise the environmental impact of work activities</p> <p>2.4 Distinguish between materials and products that are classed as hazardous to the environment</p> <p>2.5 Explain the relevant organisational procedures for the handling and disposal of materials and products that are classed as hazardous to the environment</p> <p>2.6 Evaluate organisational methods for dealing with recyclable products</p> <p>2.7 Explain how to get specialist advice on managing the environmental impact of work activities</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Understand the selection of sustainable engineering systems	3.1 Evaluate the feasibility of various sustainable engineering systems appropriate to the project including renewable technologies 3.2 Justify the selected sustainable engineering systems demonstrating how they meet current energy efficient standards, targets and legislation			
4 Be able to determine the environmental impact of manufacturing engineering work activities	4.1 Evaluate the environmental impact of work activities and resource use, with recommendations for improvement 4.2 Evaluate materials, products or equipment that could potentially cause damage to the environment			
5 Be able to organise work activities to minimise environmental impact	5.1 Plan work activities to minimise the negative and maximise the positive impact on the environment 5.2 Organise work activities in own area of responsibility to reduce environmental impact, so that they are: <ul style="list-style-type: none"> - efficient and effective - comply with legal requirements and environmental policies 5.3 Manage safe handling, storage and disposal of hazardous materials and products in accordance with workplace procedures and current, relevant legislation			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
6 Be able to promote ongoing improvement in environmental performance	6.1 Establish means by which individuals can identify and report opportunities for improving environmental performance 6.2 Communicate environmental benefits resulting from changes to work activities			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 36: Developing Working Relationships

Unit reference number: H/504/7590

QCF level: 4

Credit value: 8

Guided learning hours: 30

Unit summary

This unit enables learners to demonstrate the development and maintenance of effective working relationships with colleagues and other stakeholders, who could include employers, customers, contractors and suppliers of products and services. Learners will communicate appropriately, resolve conflicts and differences of opinion, and keep colleagues and other stakeholders informed in line with organisational policy.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

Assessors for this unit must have verifiable, current industry experience and a sufficient depth of occupational expertise and knowledge of controlling project progress against agreed quality standards to be effective and reliable when confirming a learner's **competence**. Workplace evidence of skills cannot be simulated. For more information see the Semta assessment strategy in *Annexe D3*.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand how to develop working relationships	<p>1.1 Explain organisational structure and responsibilities relating to own role and the roles of colleagues and other stakeholders</p> <p>1.2 Discuss how to develop working relationships that promote goodwill and trust</p> <p>1.3 Explain ways of communicating appropriately with colleagues and other stakeholders about work activities</p> <p>1.4 Discuss how to resolve conflicts and differences of opinion in ways that minimise offence and promote goodwill, trust and respect</p> <p>1.5 Explain how to take account of equality and diversity issues when developing working relationships with colleagues and other stakeholders</p>			
2 Be able to develop working relationships	<p>2.1 Demonstrate the development of working relationships that promote goodwill and trust</p> <p>2.2 Demonstrate appropriate communication with colleagues and other stakeholders about work activities</p> <p>2.3 Determine and apply methods for resolving conflicts and differences of opinion in ways that minimise offence and promote goodwill, trust and respect</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>3 Be able to maintain working relationships</p>	<p>3.1 Demonstrate regard for the priorities, expectations and authority of colleagues and other stakeholders in own decisions and actions</p> <p>3.2 Exchange information and resources with colleagues and other stakeholders to promote effective working</p> <p>3.3 Keep colleagues and other stakeholders informed of the progress of agreed actions in line with organisational policy</p> <p>3.4 Resolve identified conflicts of interest and disagreements in ways that minimise damage to current work activities</p> <p>3.5 Provide feedback to colleagues on their performance to help them identify areas for improvement</p> <p>3.6 Obtain feedback from colleagues on own performance, using this to identify areas for improvement</p>			

Learner name: _____ Date: _____

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Internal verifier signature: _____ Date: _____
(if sampled)

Unit 37: **Develop a New Product Manufacturing Process Design Strategy**

Unit reference number: M/504/1016

QCF level: 4

Credit value: 16

Guided learning hours: 56

Unit summary

This unit enables learners to demonstrate the development of a new product manufacturing process design strategy, to include activities, procedures, responsibilities, testing, identification of potential problems and contingency planning. Learners will also be aware of health and safety requirements, relevant regulations and legislation and appropriate lean techniques.

The strategy must incorporate an awareness of the environment when designing activities, procedures, responsibilities, testing, identification of potential problems and contingency planning.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

Evidence must show an awareness of the environment when designing activities, procedures, responsibilities, testing, identification of potential problems and contingency planning.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Develop a new product manufacturing process design strategy</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations/directives and guidelines</p> <p>1.2 Carry out all of the following activities in developing a process design strategy:</p> <ul style="list-style-type: none"> - establish a means of storing process documentation and version control (configuration management) - establish criteria for testing and validation of process design - establish criteria for the process design (equipment, tooling, etc) - identify the activities that make up the process design - establish the responsibility to each activity - identify the resources required - identify potential critical problems and effective contingency plans accordingly - develop a schedule for the process design - ensure that the strategy takes into account regulations/directives and guidelines 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<ul style="list-style-type: none"> - communicate information to the appropriate people and to the quality management system <p>1.3 Identify the process activities that need to be undertaken</p> <p>1.4 Establish the activities that will make up the process design, including all of the following:</p> <ul style="list-style-type: none"> - confirmation of requirements - review of reference materials - review historical records for past failures/poor performance <p>1.5 Establish the appropriate procedures to be used during the process design, from all of the following:</p> <ul style="list-style-type: none"> - disseminating information - obtaining resources - reviewing designs (product, process) - change management - configuration management - resource procurement <p>1.6 Establish the responsibilities for developing specific aspects of the manufacturing process</p> <p>1.7 Review and evaluate historical records from similar process activities</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.8 Identify any potentially critical problems and establish effective contingency plans</p> <p>1.9 Evaluate appropriate lean techniques for inclusion in the process design</p> <p>To include three of the following:</p> <ul style="list-style-type: none"> - single-piece flow - JIT - Kanban - Poke Yoke - cellular manufacture - Takt time - design for flexible manning - bottleneck/constraint management 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.10 Ensure that the process design complies with all relevant regulations and guidelines To include one from the following:</p> <ul style="list-style-type: none"> - international - national - manufacturer specific - company policy and procedures - industry specific - statutory bodies <p>1.11 Make recommendations where improvements to existing or new manufacturing processes should be used</p> <p>1.12 Present and record the results of the exercise to the appropriate people, according to agreed procedures</p> <p>1.13 Communicate the results of the manufacturing process design exercise, and record it in the relevant company information systems by the following methods:</p> <ul style="list-style-type: none"> - verbal communication <p>Plus one of the following:</p> <ul style="list-style-type: none"> - electronic mail - computer-based presentation - report 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>2 Know how to develop a new product manufacturing process design strategy</p>	<p>2.1 Describe the importance of working safely at all times, and of complying with health and safety and other relevant regulations/directives and guidelines, in the department/organisation where the new product development and introduction (NPDI) work is being undertaken</p> <p>2.2 Explain how to identify and minimise potential risks to health and safety that could occur during implementation of the NPDI programme</p> <p>2.3 Describe the manufacturing processes, skills and people required for the design of the current product range</p> <p>2.4 Describe the organisational procedures and information systems for storing process design data and configuration management</p> <p>2.5 Describe the organisational activities required for the process design</p> <p>2.6 Describe the importance of establishing and recording responsibilities</p> <p>2.7 Describe the various procedures that can be used in the process design</p> <p>2.8 Describe the factors that should be taken into account for disseminating information</p> <p>2.9 Describe the types of problem that could occur during the process design</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.10 Describe the principles and application of lean manufacturing techniques to the workplace</p> <p>2.11 Explain why it is important to have contingency plans</p> <p>2.12 Explain what should be included in contingency plans</p> <p>2.13 Explain how to prioritise and schedule manufacturing design activities</p> <p>2.14 Explain how to obtain information on resources</p> <p>2.15 Explain how to determine what resources are necessary</p> <p>2.16 Explain how to determine the availability of resources</p> <p>2.17 Describe the regulations and guidelines that are relevant</p> <p>2.18 Explain how to obtain and interpret information on regulations and guidelines</p> <p>2.19 Describe the limits of their own authority, and to whom they should report if they have problems that they cannot resolve</p>			

Learner name: _____

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Learner signature: _____

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Assessor signature: _____

Date: _____

Internal verifier signature: _____
(if sampled)

Date: _____

Unit 38: Undertake Engineering Research

Unit reference number: K/502/9172

QCF level: 4

Credit value: 15

Guided learning hours: 45

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to undertake research of engineering products or processes, in accordance with approved procedures. The learner will be required to carry out specific research, in accordance with established research principles. In addition, they will be required to monitor, analyse and disseminate the research results to the appropriate people.

The learner's responsibilities will require them to comply with organisational policy and procedures for carrying out successful research, and to report any problems that they cannot personally resolve to the relevant authority. They will be expected to work unsupervised, either on their own or as part of a team, which they may lead or direct, taking full responsibility for their actions and, possibly, for the work of colleagues or subordinates.

The learner's underpinning knowledge will provide a good understanding of general and discipline-specific engineering principles and processes, and they will also be fully conversant with organisational procedures and systems. They will understand engineering research principles and process, data analysis methods, patent, copyright and intellectual property issues, project planning and research design methodology, in sufficient depth to enable them to carry out the research activities to the required standard.

The learner will be fully aware of any health, safety and environmental requirements, and the appropriate legislative and regulatory frameworks applicable to their area of responsibility. They will be required to ensure that safe working practices are maintained throughout, and will understand the responsibility they owe to themselves and others in the workplace.

The research activity must be related to environmental engineered products or processes.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must be from an environmental engineering situation/workplace.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Undertake engineering research</p>	<p>1.1 Apply the research methods into the engineering products or processes according to established research principles</p> <p>1.2 Carry out all of the following activities while undertaking the engineering research:</p> <ul style="list-style-type: none"> - obtain the aims and objectives from the research proposal - ensure that all facilities and resources are available - carry out and monitor the research activities - record the results of the research, using the appropriate formats - resolve or recommend appropriate actions to problems, as they occur - disseminate information on the research activities to the appropriate people 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.3 Carry out the research, taking into account all of the following:</p> <ul style="list-style-type: none"> - aims and objectives - potential benefits and risks - methodology - design constraints - resource requirements - schedule - budget available - legislative considerations - risk analysis - timescales <p>1.4 Implement the research using the necessary resources, including three of the following:</p> <ul style="list-style-type: none"> - materials - manpower - equipment - monitoring equipment/system - finances - facilities - hardware and/or software - location/site facilities - contracts 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.5 Ensure that the correct amount of accurate data is collected as specified in the research methodology</p> <p>1.6 Ensure that the research results are recorded and collated accurately in the appropriate formats</p> <p>1.7 Ensure that the research results are analysed using valid methods</p> <p>1.8 Monitor and record the research process, using two of the following methods:</p> <ul style="list-style-type: none"> - audio and/or video recording - sampling - manual data collection - comparative analysis - observation - computer-aided data collection - mechanical or electronic sensing <p>1.9 Monitor the progress of the research against plans and budgets</p> <p>1.10 Identify any problems with the research as soon as practicable and determine the appropriate actions to take</p> <p>1.11 Disseminate relevant information on the research to the appropriate people according to agreed procedures</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.12 Record and communicate details of the research to the appropriate people, using:</p> <ul style="list-style-type: none"> - a verbal report plus one from the following: <ul style="list-style-type: none"> - electronic mail - computer-based presentation - written or typed report - specific company form <p>1.13 Ensure that the research methodology complies with all relevant regulations, standards and guidelines such as:</p> <ul style="list-style-type: none"> - organisational guidelines and codes of practice - equipment manufacturer's operating specification/range - health, safety and environmental requirements - recognised compliance agency/body's standards - customer standards and requirements - BS and/or ISO standards 			
<p>2 Know how to undertake engineering research</p>	<p>2.1 Describe the specific health and safety issues that relate to the areas being researched</p> <p>2.2 Explain how to obtain the research proposal from company systems/records</p> <p>2.3 Describe the research methods that should be used</p> <p>2.4 Explain how to select the most appropriate research method</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.5 Explain how to monitor and record the results of the research</p> <p>2.6 Describe the amount and types of data that should be collected for different types of research</p> <p>2.7 Describe the formats that should be used for recording data</p> <p>2.8 Describe the methods available for analysing the results of the research</p> <p>2.9 Explain how to select the most appropriate method(s) for analysing the research data</p> <p>2.10 Explain how to obtain details of the plans and budgets available for the research</p> <p>2.11 Explain how to obtain the resources specified in the research proposal</p> <p>2.12 Describe the types of problem that could occur during the research</p> <p>2.13 Describe the actions that should be taken to deal with different types of problem</p> <p>2.14 Explain who requires information on the research, and the procedures for informing them</p> <p>2.15 Describe the extent of their own authority and to whom they should report if they have problems that they cannot resolve</p>			

Learner name: _____ Date: _____
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Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 39: Establish an Engineering Design Brief

Unit reference number: M/502/9173

QCF level: 4

Credit value: 15

Guided learning hours: 45

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to establish a design brief for engineering products or processes, in accordance with approved procedures. The learner will be required to gather information from a number of sources to develop the design brief, while establishing the application, function and constraints. They will also be required to discuss and communicate the proposals with the client and all other relevant people.

The learner's responsibilities will require them to comply with organisational policy and procedures for ensuring the successful production of the design brief, and to report any problems that they cannot personally resolve to the relevant authority. They will be expected to work unsupervised, either on their own or as part of a team, which they may lead or direct, taking full responsibility for their actions and, possibly, for the work of colleagues or subordinates.

The learner's underpinning knowledge will provide a good understanding of general and discipline-specific engineering principles and processes. They will be fully conversant with organisational procedures and systems. They will understand engineering design principles, patent, copyright and intellectual property issues, and will know about project planning and resource management techniques, in adequate depth to provide a sound basis for carrying out the activities to the required standard.

The learner will be fully aware of any health, safety and environmental requirements, and the appropriate legislative and regulatory frameworks applicable to their area of responsibility. They will be required to ensure that safe working practices are maintained throughout, and will understand the responsibility they owe to themselves and others in the workplace.

The engineering design brief must be related to environmental engineered products or processes.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must relate to environmental engineered products or processes.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Establish an engineering design brief</p>	<p>1.1 Obtain the correct details of the specification for the engineering product or process</p> <p>1.2 Carry out all of the following activities to establish the design brief:</p> <ul style="list-style-type: none"> - identify with the client the reasons or application for the design, and establish any constraints which may affect it - review the critical operational/functional requirements and quality criteria of the design - clarify with relevant people any aspects of the design that are ambiguous - produce the proposed design brief, and discuss any changes needed to suit the operational/functional requirements with the relevant people - ensure that the design brief meets relevant regulations and guidelines - record the design brief in the appropriate information system and communicate it to the relevant people 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.3 Obtain the design requirements from one of the following types of client:</p> <ul style="list-style-type: none"> - external – existing client - external – potential client - internal – existing organisational requirement - internal – new organisational opportunity <p>1.4 Establish information for the development of the design brief from two of the following sources:</p> <ul style="list-style-type: none"> - existing designs - research - tests or trials - client - suppliers - general or specialised media - specialists/experts - engineering department - user groups <p>1.5 Identify clearly any design constraints</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.6 Establish the design brief constraints, considering four of the following:</p> <ul style="list-style-type: none"> - customer acceptability - time availability - cost of resources - capacity - departmental - legal - international/national standards - copyright - environmental - logistical - safety - commercial/prestige <p>1.7 Incorporate all necessary details into the design brief</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.8 Incorporate specifications for three of the following in the design brief:</p> <ul style="list-style-type: none"> - aesthetics - characteristics - functions - materials - performance - cost - technology - components - durability <p>1.9 Produce a design brief that effectively encapsulates the requirements of the client</p> <p>1.10 Ensure that the design brief complies with all relevant regulations and guidelines</p> <p>1.11 Clarify and agree the design brief with the client</p> <p>1.12 Confirm that all participants in the design process are aware of the design brief</p> <p>1.13 Record the design brief in the appropriate information systems</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.14 Record and communicate design briefs to the appropriate people, using:</p> <ul style="list-style-type: none"> - a verbal report <p>plus one from the following:</p> <ul style="list-style-type: none"> - electronic mail - written or typed report - computer-based presentation - specific company document <p>1.15 Ensure that the design briefs comply with all relevant regulations, standards and guidelines such as:</p> <ul style="list-style-type: none"> - organisational guidelines and codes of practice - equipment manufacturer's operating specification/range - health, safety and environmental requirements - recognised compliance agency/body's standards - customer standards and requirements - BS and/or ISO standards 			
<p>2 Know how to establish an engineering design brief</p>	<p>2.1 Describe the specific health and safety requirements that apply to the product or process to be designed</p> <p>2.2 Explain how to obtain details of the specification of the product or process to be designed</p> <p>2.3 Describe the types of design constraint that should be considered</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.4 Describe the different types of design brief that could be required</p> <p>2.5 Describe the types of information and level of detail that should be included in a design brief</p> <p>2.6 Describe the regulations and guidelines that are relevant</p> <p>2.7 Explain how to obtain information on regulations and guidelines</p> <p>2.8 Explain when a client should be consulted on a design brief</p> <p>2.9 Explain who should be informed and consulted on the various aspects of a design brief</p> <p>2.10 Describe the company systems for recording design information</p> <p>2.11 Describe the importance of using the company information systems</p> <p>2.12 Describe the extent of their own authority and to whom they should report if they have problems that they cannot resolve</p>			

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Unit 40: Schedule Activities for Engineering Methods and Procedures

Unit reference number: L/502/9178

QCF level: 4

Credit value: 15

Guided learning hours: 45

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to schedule engineering activities, in accordance with approved procedures. The range of engineering activities could include installation, production, operation, maintenance or others, such as performance measurement or monitoring. The learner will be expected to identify relevant methods, processes, procedures and resources, and to issue engineering schedules. They will also be able to demonstrate how to deal with any scheduling difficulties that arise.

The learner's responsibilities will require them to comply with organisational policy and procedures for the successful implementation of engineering activities, and to report any problems that they cannot personally resolve to the relevant authority. They will be expected to work unsupervised, either on their own or as part of a team, which they may lead or direct, taking full responsibility for their actions, and possibly for the work of colleagues or subordinates.

The learner's underpinning knowledge will provide a good understanding of general and discipline-specific engineering principles and processes. They will be fully conversant with organisational procedures and systems. They will understand scheduling, resource management, and project planning and management, in adequate depth to provide a sound basis for carrying out the activities to the required standard.

They will be fully aware of any health, safety and environmental requirements, and the appropriate legislative and regulatory frameworks applicable to their area of responsibility. They will be required to ensure that safe working practices are maintained throughout, and will understand the responsibility they owe to themselves and others in the workplace.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental requirements to the engineering schedule.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Schedule activities for engineering methods and procedures</p>	<p>1.1 Carry out all of the following when scheduling operational activities:</p> <ul style="list-style-type: none"> - refer to any existing schedules that may be appropriate - determine the engineering activities to be scheduled - identify applicable engineering methods, processes and procedures (including any specific sequencing requirements) - identify and schedule time and resources - review the schedule, and develop contingency plans to eliminate any difficulties - ensure that the schedule complies with all relevant regulations, standards and guidelines - communicate the schedule to all relevant people <p>1.2 Confirm the activities and resources that are required to achieve the engineering methods and procedures</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.3 Obtain data for engineering activities from three of the following:</p> <ul style="list-style-type: none"> - management/directors - client - quality engineering - safety engineering - design office - plant engineering - suppliers - production engineering - industrial engineering - process engineering - purchasing - company information system <p>1.4 Identify the most suitable sequence of activities</p> <p>1.5 Establish requirements for one of the following:</p> <ul style="list-style-type: none"> - equipment capability measurement - equipment performance measurement - people performance monitoring 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.6 Schedule engineering activities for one of the following:</p> <ul style="list-style-type: none"> - production related (such as processing materials, fabrication, finishing, assembly, joining) - installation related (such as commissioning/decommissioning, site preparation, equipment installation) - operations related (such as movement of materials, quality systems and audit, scheduled safety audits and risk assessments) - maintenance related (such as planned preventive maintenance (PPM), part or sub-assembly exchange, breakdown response maintenance records systems, line setting) <p>1.7 Schedule the time and resources available for undertaking the activities</p> <p>1.8 Ensure that schedules are capable of meeting all relevant requirements</p> <p>1.9 Prepare and review schedules of resources, including all of the following:</p> <ul style="list-style-type: none"> - people - skills required - equipment - facilities - materials - finance 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.10 Incorporate new schedules into the engineering process with minimal disruption</p> <p>1.11 Identify potential difficulties and produce appropriate contingency plans</p> <p>1.12 Confirm that schedules meet requirements, or produce a contingency plan, including one of the following:</p> <ul style="list-style-type: none"> - agree revised requirements with management/client - change timescales in agreement with management/clients - reschedule - obtain additional/alternative resources - recommend a change to the process - other specific <p>1.13 Ensure that schedules comply with all relevant regulations, standards and guidelines such as:</p> <ul style="list-style-type: none"> - organisational guidelines and codes of practice - equipment manufacturer’s operating specification - health, safety and environmental requirements - recognised compliance agency/body’s standards - customer standards and requirements - BS and/or ISO standards 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.14 Specify clearly the schedules and record them in the appropriate information systems</p> <p>1.15 Report and communicate schedules to the appropriate people, using:</p> <ul style="list-style-type: none"> - verbal report plus one from the following: <ul style="list-style-type: none"> - electronic mail - written or typed report - computer-based presentation - specific company document 			
<p>2 Know how to schedule activities for engineering methods and procedures</p>	<p>2.1 Describe the health and safety and environmental requirements applicable to the engineering schedule</p> <p>2.2 Explain how to interpret engineering schedules</p> <p>2.3 Explain how to obtain information on the processes to be scheduled</p> <p>2.4 Describe the different types of engineering activities, methods and processes</p> <p>2.5 Explain how different engineering activities relate to each other</p> <p>2.6 Explain how to determine the time and resources required for different types of engineering activity</p> <p>2.7 Describe the factors that should be accounted for when scheduling time and resources</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.8 Describe the potential disruption that can be caused through the implementation of new engineering schedules</p> <p>2.9 Describe the methods and techniques for dealing with engineering difficulties</p> <p>2.10 Describe the approved techniques for the scheduling of engineering activities</p> <p>2.11 Explain how to develop contingency plans</p> <p>2.12 Describe the company systems for recording information</p> <p>2.13 Describe the importance of using the company information recording systems</p> <p>2.14 Describe the reporting procedures, documentation, and their application</p> <p>2.15 Explain who to inform of actions taken, and by what means</p> <p>2.16 Explain how to obtain and interpret legislative and regulatory documentation</p> <p>2.17 Explain how to obtain and interpret company policy and procedures</p> <p>2.18 Describe the extent of their own authority and to whom they should report if they have problems that they cannot resolve</p>			

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Unit 41: Manage a Tendering Process

Unit reference number: H/600/9738

QCF level: 4

Credit value: 4

Guided learning hours: 20

Unit summary

This unit will ensure that learners are able to manage a tendering process during the construction phase of a project. This includes developing product or service specifications and tender guidelines, evaluating tenders and selecting a supplier to deliver the required products or services.

The product or service specifications must demonstrate an awareness of environment considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental considerations to the tendering process.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand tendering processes	<p>1.1 Explain the legal requirements of a tendering process</p> <p>1.2 Explain organisational tendering policies and processes</p> <p>1.3 Explain how to seek specialist support for the tendering process</p>			
2 Be able to draw up a specification for required products or services	<p>2.1 Consult with colleagues to identify and agree requirements for products or services</p> <p>2.2 Draw up a specification that describes the products or services required</p>			
3 Be able to create an invitation to tender document	<p>3.1 Create an invitation to tender document outlining required specifications and organisational tendering processes</p> <p>3.2 Communicate the invitation to tender to prospective suppliers</p>			
4 Understand how to respond fairly to pre-tender queries	<p>4.1 Explain how to respond to pre-tender queries in ways that ensure all prospective suppliers have the same information</p>			
5 Be able to evaluate received tenders	<p>5.1 Establish criteria with which to evaluate received tenders</p> <p>5.2 Receive, record and open tenders in line with stated tendering process</p> <p>5.3 Seek clarification from prospective suppliers where necessary</p> <p>5.4 Evaluate tenders against established criteria</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
6 Be able to select a supplier and provide post-tender feedback	6.1 Offer a contract to the chosen supplier 6.2 Inform unsuccessful suppliers of the outcome and provide feedback			

Learner name: _____ Date: _____

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Unit 42: Develop and Implement a Risk Assessment Plan in Own Area of Responsibility

Unit reference number: L/600/9703

QCF level: 4

Credit value: 6

Guided learning hours: 20

Unit summary

This unit helps learners promote, monitor and review health and safety in own area of responsibility leading to the development and implementation of a risk assessment plan.

The risk assessment plan must demonstrate an awareness of environment considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental considerations to the risk assessment plan.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand the legal requirements and personal responsibilities for health and safety within an organisation	<p>1.1 State the legal requirements that apply to own role in relation to health and safety</p> <p>1.2 Consult with specialist advisor(s) on health and safety policy and procedures</p> <p>1.3 Explain an organisation's health and safety responsibilities</p> <p>1.4 Describe health and safety responsibilities in own area of responsibility</p>			
2 Be able to promote the importance of health and safety practices	<p>2.1 Communicate an organisation's written health and safety policy to individuals within own area of responsibility</p> <p>2.2 Allocate sufficient resources to deal with health and safety issues in own area of responsibility</p>			
3 Be able to ensure that hazards and risks are identified and managed in own area of responsibility	<p>3.1 Consult with colleagues on health and safety hazards and risks in own area of responsibility</p> <p>3.2 Assess health and safety hazards and risks in own area of responsibility</p> <p>3.3 Identify hazards and risks that require action to be taken to ensure compliance with legal and organisational requirements</p> <p>3.4 Develop and implement a plan in own area of responsibility</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
4 Be able to monitor and review health and safety performance and policy in own area of responsibility	4.1 Establish procedures that monitor health and safety performance in own area of responsibility 4.2 Review the health and safety performance of own area of responsibility 4.3 Review the health and safety policy in own area of responsibility			

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Unit 43: Prepare For and Support Quality Audits

Unit reference number: Y/600/9798

QCF level: 4

Credit value: 4

Guided learning hours: 20

Unit summary

The unit will ensure that learners understand the quality standards and are able to participate in a quality audit and take corrective action.

The quality audit must demonstrate an awareness of environment considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental considerations to the quality audit process.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Understand the quality standards and procedures that apply to own area of responsibility	1.1 Describe the quality standards and procedures that apply to own area of responsibility			
2 Be able to monitor work in own area of responsibility against quality standards and procedures	2.1 Select and apply methods for monitoring work			
3 Be able to prepare for a quality audit in own area of responsibility	3.1 Prepare and organise records and documentation for the quality auditor			
	3.2 Review previous quality audits and ensure agreed recommendations have been implemented			
4 Be able to discuss quality audit findings with the auditor	4.1 Discuss with the auditor the results of the audit and identify any areas for improvement			
	4.2 Agree corrective actions to remedy any identified issues, and set a date for their implementation			
5 Be able to complete agreed actions following a quality audit	5.1 Take corrective action based on quality audit findings			

Learner name: _____ Date: _____
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(if sampled)

Unit 44: Identify Engineering Design Requirements of Clients

Unit reference number: D/502/9170

QCF level: 4

Credit value: 15

Guided learning hours: 45

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to establish design requirements for clients, in accordance with approved procedures. The learner will be required to consult with the client in order to obtain details of their requirements, and to present the results of such consultation to the relevant people, in the appropriate way.

The learner's responsibilities will require them to comply with organisational policy and procedures for ensuring the successful identification of design requirements, and to report any problems that they cannot personally resolve to the relevant authority. They will be expected to work unsupervised, either on their own or as part of a team, which they may lead or direct, taking full responsibility for their actions and, possibly, for the work of colleagues or subordinates.

The learner's underpinning knowledge will provide a good understanding of their work, and will provide an informed approach to identifying engineering design requirements. They will understand the client consulting process, and its application, and will know about general and design-specific engineering principles and processes, in adequate depth to provide a sound basis for carrying out the activities to the required standard. They will have a good knowledge of their organisation's procedures and systems, and will be able to identify patents, copyright and intellectual property issues. They will also be able to identify and apply appropriate specifications, details and formats to the client proposal.

The learner will be fully aware of any health, safety and environmental requirements, and the appropriate legislative and regulatory frameworks applicable to their area of responsibility. They will be required to ensure that safe working practices are maintained throughout, and will understand the responsibility they owe to themselves and others in the workplace.

The design requirements must demonstrate an awareness of environment considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental design requirements.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Identify engineering design requirements of clients</p>	<p>1.1 Establish who is the client for the engineering products or processes</p> <p>1.2 Establish the client from one of the following:</p> <ul style="list-style-type: none"> - external – existing client - external – potential client - internal – existing organisational requirement - internal – new organisational opportunity <p>1.3 Obtain accurate information on the requirements of the client</p> <p>1.4 Agree with the client a product or process to be designed, from one of the following areas or activities:</p> <ul style="list-style-type: none"> - research - design - production - installation - maintenance - engineering operations - commissioning - configuration - decommissioning <p>1.5 Confirm the client's objectives for the engineering products or processes</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.6 Obtain accurate information to establish the design objectives, including six of the following:</p> <ul style="list-style-type: none"> - function - performance - aesthetics - materials - resources - delivery schedule - usability - interfacing - budget - volume - timing - other (specify) <p>1.7 Ensure that engineering design requirements comply with all relevant regulations, standards and guidelines such as:</p> <ul style="list-style-type: none"> - organisational guidelines and codes of practice - equipment manufacturer's operating specification/range - health, safety and environmental requirements - recognised compliance agency/body's standards - customer standards and requirements - BS and/or ISO standards 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.8 Identify any unique or specific features that need particular consideration</p> <p>1.9 Determine the feasibility of achieving the client's requirements</p> <p>1.10 Confirm the requirements and other relevant issues with the client</p> <p>1.11 Prepare a brief for the client, containing all of the following:</p> <ul style="list-style-type: none"> - confirmation of objectives - high level functionality - feasibility of achieving requirements - description of proposed implementation (including any special features) - detail of specific issues for customer consideration (such as product safety, health and safety, impending regulation changes, emerging technologies, etc) - project review process <p>1.12 Record all relevant information in the appropriate information systems for future use</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.13 Record and communicate requirements to the appropriate people, using:</p> <ul style="list-style-type: none"> - a verbal report <p>plus one from the following:</p> <ul style="list-style-type: none"> - electronic mail - written or typed report - computer-based presentation - specific company document 			
<p>2 Know how to identify engineering design requirements of clients</p>	<p>2.1 Describe the health, safety and environmental issues relating to the design of engineering products and processes</p> <p>2.2 Explain how to obtain and interpret legislative and regulatory documentation</p> <p>2.3 Describe the clients that they normally work with, and how they fit into the supply chain</p> <p>2.4 Explain how to obtain information from a client, and how to assess whether it is accurate</p> <p>2.5 Explain whom they should deal with in the client's organisation</p> <p>2.6 Describe the procedures for contacting the client's organisation</p> <p>2.7 Describe the types of information required for establishing design requirements</p> <p>2.8 Describe the extent and limit of their own organisation's capabilities for producing various designs</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.9 Describe the types of design feature that should be considered unique or specific, and why it is important to give these particular consideration</p> <p>2.10 Describe the factors that affect the feasibility of achieving a client's requirements</p> <p>2.11 Explain how to assess the feasibility of achieving the client's requirements</p> <p>2.12 Explain how to prepare a brief confirming the requirements of the client, and why it is important to do so</p> <p>2.13 Describe the various ways of presenting the brief to the client, and the importance of selecting the most appropriate method of presentation</p> <p>2.14 Describe the organisational process or procedure for recording the design requirements</p> <p>2.15 Describe the importance of using company information systems for recording design requirements</p> <p>2.16 Describe the extent of their own responsibility, and their level of authority when dealing with clients</p> <p>2.17 Explain whom they should report to if they have problems that they cannot resolve</p>			

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Unit 45: Produce Engineering Specifications

Unit reference number: H/502/9171

QCF level: 4

Credit value: 15

Guided learning hours: 45

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to produce engineering specifications based on client requirements, in accordance with approved procedures. The learner will be required to determine the feasibility of meeting the client requirements, and to notify the client of any changes that may be required. In addition, they will be expected to communicate the specifications and the rationale behind them to the appropriate people.

The learner's responsibilities will require them to comply with organisational policy and procedures for ensuring the successful production of specifications, and to report any problems that they cannot personally resolve to the relevant authority. They will be expected to work unsupervised, either on their own or as part of a team, which they may lead or direct, taking full responsibility for their actions and, possibly, for the work of colleagues or subordinates.

The learner's underpinning knowledge will provide a good understanding of their work, and will provide an informed approach to producing engineering specifications. They will have a thorough understanding of general and design-specific engineering principles and processes. They will also know about patents, copyright and intellectual property issues, and will be fully conversant with the company procedures, systems of operation and standard specification formats, in adequate depth to provide a sound basis for carrying out their activities to the required standard.

The learner will be fully aware of any health, safety and environmental requirements, and the appropriate legislative and regulatory frameworks applicable to their area of responsibility. They will be required to ensure that safe working practices are maintained throughout, and will understand the responsibility they owe to themselves and others in the workplace.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The engineering specification must demonstrate an awareness of environment considerations.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Produce engineering specifications	<p>1.1 Obtain the design requirements from the company information system, or from one of the following types of client:</p> <ul style="list-style-type: none"> - external – existing client - external – potential client - internal – existing organisational requirement - internal – new organisational opportunity <p>1.2 Produce a specification for the engineering product or process that meets the requirements of the client</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.3 Prepare specifications incorporating client requirements, to include six of the following:</p> <ul style="list-style-type: none"> - function - performance - aesthetics - materials - resources - budget - volume - timing - usability - interfacing - manufacturer's specifications - monitoring/servicing frequency - specific/special facilities or equipment - delivery schedule - other specific <p>1.4 Incorporate all necessary details into the specification</p> <p>1.5 Ensure that the specification is capable of being implemented</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.6 Ensure that specifications comply with all relevant regulations, standards and guidelines such as:</p> <ul style="list-style-type: none"> - organisational guidelines and codes of practice - equipment manufacturer's operating specification/range - health, safety and environmental requirements - recognised compliance agency/body's standards - customer standards and requirements - BS and/or ISO standards <p>1.7 Consult with the client on all of the following:</p> <ul style="list-style-type: none"> - evidence that the specifications are capable of being achieved - acceptability of specification formats and supporting documentation - any suggested changes to requirements, and why they are necessary - the regulations and guidelines considered in the specification, and their implications <p>1.8 Agree the specification with the client at appropriate points in the design process</p>			

	<p>1.9 Provide a suitable rationale for any requirements that cannot be achieved or any changes to the specification</p> <p>1.10 Produce the specification in the agreed formats with the necessary supporting documents</p> <p>1.11 Record the specification in the appropriate information systems</p> <p>1.12 Record and communicate specifications to the appropriate people, using:</p> <ul style="list-style-type: none"> - a verbal report <p>plus one from the following:</p> <ul style="list-style-type: none"> - electronic mail - written or typed report - computer-based presentation - specific company document 		
<p>2 Know how to produce engineering specifications</p>	<p>2.1 Describe the different types of specification that are required by various clients</p> <p>2.2 Describe the types of detail that should be included in a specification</p> <p>2.3 Describe the appropriate level of detail that is required in a specification</p> <p>2.4 Explain how to assess whether the specification is capable of being achieved</p> <p>2.5 Explain how to consult with a client on a specification, and when it is most appropriate to do so</p> <p>2.6 Describe the types of change to a specification that could be necessary</p>		

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.7 Explain how to identify alternatives when it is necessary to make changes to specifications</p> <p>2.8 Describe the different formats used for specifications, and their acceptability to the client</p> <p>2.9 Describe the regulations and guidelines that are relevant to different types of specification</p> <p>2.10 Explain how to obtain and interpret information on regulations and guidelines</p> <p>2.11 Describe the company systems for recording information</p> <p>2.12 Describe the importance of using the company information systems</p> <p>2.13 Describe the extent of their own responsibility and to whom they should report if they have problems that they cannot resolve</p>			

Learner name: _____ Date: _____

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Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 46: Create Engineering Designs

Unit reference number: T/502/9174

QCF level: 4

Credit value: 15

Guided learning hours: 45

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to create engineering designs, in accordance with approved procedures. The learner will be required to obtain the information from a design brief, and to create a design to meet the design brief objectives. In addition, they will be expected to communicate and report any changes or difficulties to the appropriate people.

The learner's responsibilities will require them to comply with organisational policy and procedures for ensuring the successful creation of designs, and to report any problems that they cannot personally resolve to the relevant authority. They will be expected to work unsupervised, either on their own or as part of a team, which they may lead or direct, taking full responsibility for their actions, and possibly for the work of colleagues or subordinates.

The learner's underpinning knowledge will provide a good understanding of general and discipline-specific engineering principles and processes. They will be fully conversant with organisational procedures and systems, and will understand patents, copyright and intellectual property issues. They will be able to present their designs to the client and to other interested people, using appropriate methods and formats.

The learner will be fully aware of any health, safety and environmental requirements, and the appropriate legislative and regulatory frameworks applicable to their area of responsibility. They will be required to ensure that safe working practices are maintained throughout, and will understand the responsibility they owe to themselves and others in the workplace.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental engineering design requirements.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Create engineering designs</p>	<p>1.1 Create designs that meet the client's requirements as specified in the design brief for the engineering product or process</p> <p>1.2 Carry out all of the following activities when creating the designs:</p> <ul style="list-style-type: none"> - obtain and review existing information with reference to the specified design requirements - prepare outline ideas for the designs, and agree them with interested parties - carry out the design process, utilising the appropriate technology - document all facets of the design activity - communicate the outcomes of the design process to the appropriate people - deliver the designs in the appropriate format <p>1.3 Apply current and new engineering processes to achieve the design brief</p> <p>1.4 Carry out the design process, taking into account all of the following:</p> <ul style="list-style-type: none"> - client requirements - design brief - design constraints - legal/copyright considerations - legislative requirements 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.5 Create a suitable range of designs for the client to consider</p> <p>1.6 Create designs which take into consideration all of the following:</p> <ul style="list-style-type: none"> - financial constraints - aesthetics - characteristics - functional requirements - appropriate materials - performance - corporate identity - sustainability - technology - product features - components to be used - manufacturing methods <p>1.7 Obtain suitable advice and guidance to assist in the design work</p> <p>1.8 Present the designs in suitable formats and with sufficient information to allow the client to assess them</p> <p>1.9 Identify any variations from the design brief and provide a suitable rationale for them</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.10 Ensure that engineering designs comply with all relevant regulations, standards and guidelines such as:</p> <ul style="list-style-type: none"> - organisational guidelines and codes of practice - equipment manufacturer's operating specification/range - health, safety and environmental requirements - recognised compliance agency/body's standards - customer standards and requirements - BS and/or ISO standards <p>1.11 Ensure that the designs are protected</p> <p>1.12 Record and communicate details of the engineering designs to the appropriate people, using:</p> <ul style="list-style-type: none"> - a verbal report <p>plus one from the following:</p> <ul style="list-style-type: none"> - electronic mail - written or typed report - computer-based presentation - specific company document 			
<p>2 Know how to create engineering designs</p>	<p>2.1 Explain how and where to obtain the design brief</p> <p>2.2 Describe the different types of design brief that could be required</p> <p>2.3 Explain how to address any necessary variations from the design brief</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.4 Describe the types and level of detail that should be included in a design brief</p> <p>2.5 Describe the methods for achieving different types of design</p> <p>2.6 Describe the engineering processes that could be used in designs</p> <p>2.7 Describe the design formats that are most suitable to meet the client's needs</p> <p>2.8 Describe the number of different designs that are necessary to provide a client with a choice</p> <p>2.9 Describe the sources of advice and guidance on designs</p> <p>2.10 Explain how to present designs to the client</p> <p>2.11 Describe the potential risks to a design, and how can it be protected</p> <p>2.12 Describe the regulations and guidelines that are relevant, and any implications they have on the design</p> <p>2.13 Explain how to obtain information on regulations and guidelines</p> <p>2.14 Describe the extent of their own authority and to whom they should report if they have problems that they cannot resolve</p>			

Learner name: _____
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(if sampled)

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Unit 47: Implement Engineering Processes

Unit reference number: J/502/9180

QCF level: 4

Credit value: 15

Guided learning hours: 45

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to implement engineering processes, in accordance with approved organisational procedures. The range of engineering processes could include installation, production, operation, maintenance or other activities, such as performance measurement or monitoring. The learner will be required to apply appropriate methods to confirm that conditions are suitable for the implementation of engineering processes, and to ensure that clear instructions are given to the relevant people. During the implementation of the engineering processes, they will be required to ensure that quality assurance and engineering support systems are operating correctly, and that the necessary resources are available.

The learner's responsibilities will require them to comply with organisational policy and procedures for ensuring the successful implementation of the engineering processes, and to report any problems that they cannot personally resolve to the relevant authority. They will be expected to work unsupervised, either on their own or as part of a team, which they may lead or direct, taking full responsibility for their actions, and possibly for the work of colleagues or subordinates.

The learner's underpinning knowledge will provide a good understanding of general and discipline-specific engineering principles and processes. They will also be fully conversant with organisational procedures and systems. They will understand the engineering processes being implemented, and will know about quality assurance and resource management, in adequate depth to provide a sound basis for carrying out the activities to the required standard.

The learner will be fully aware of any health, safety and environmental requirements, and the appropriate legislative and regulatory frameworks applicable to their area of responsibility. They will be required to ensure that safe working practices are maintained throughout, and will understand the responsibility they owe to themselves and others in the workplace.

The implementation must demonstrate an awareness of environment requirements.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental implementation requirements.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Implement engineering processes</p>	<p>1.1 Confirm that conditions are suitable to implement engineering methods and procedures</p> <p>1.2 Confirm conditions for all of the following:</p> <ul style="list-style-type: none"> - appropriate authorisation is obtained - availability of resources - preparation of products - preparation of site - health and safety - environmental <p>1.3 Implement an engineering process for one of the following:</p> <ul style="list-style-type: none"> - production processes (such as processing materials, fabrication, finishing, assembly, joining) - installation processes (such as commissioning/decommissioning, site preparation, equipment installation) - operational processes (such as movement of materials, quality systems and audit, scheduled safety audits and risk assessments) - maintenance processes (such as planned preventive maintenance (PPM), part or sub-assembly exchange, breakdown response maintenance records systems, line setting) 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.4 Provide clear and accurate instructions to all the relevant people</p> <p>1.5 Provide instructions for one of the following:</p> <ul style="list-style-type: none"> - equipment capability measurement - equipment performance measurement - people performance - computer-based records systems for engineering processes <p>1.6 Obtain accurate information on the activities being undertaken</p> <p>1.7 Obtain operational information from two of the following:</p> <ul style="list-style-type: none"> - design office - quality engineering - plant engineering - operations office - process engineering - production engineering - industrial engineering - company information systems - other (specify) <p>1.8 Ensure that quality assurance systems are correctly implemented</p> <p>1.9 Ensure that engineering support systems are operating correctly</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.10 Control the use of resources to achieve the most effective results</p> <p>1.11 Ensure that all support and control systems operate effectively for:</p> <ul style="list-style-type: none"> - quality assurance systems plus one from: <ul style="list-style-type: none"> - transport - logistics - procurement - supervision - utilities - resource supply (such as materials, equipment and people) <p>1.12 Identify opportunities to improve the engineering methods and procedures</p> <p>1.13 Implement engineering processes that comply with all relevant regulations, standards and guidelines such as:</p> <ul style="list-style-type: none"> - organisational guidelines and codes of practice - equipment manufacturer's operating specification - health, safety and environmental requirements - recognised compliance agency/body's standards - customer standards and requirements - BS and/or ISO standards 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.14 Implement engineering processes that include all of the following:</p> <ul style="list-style-type: none"> - a record of the implementation process on appropriate company media - an evaluation of the effectiveness of the implementation process - any deviations from specifications of the implemented activity - recommendations for improvements to the implemented activity - plans to monitor and evaluate the effect(s) of any improvements made to the implemented process <p>1.15 Ensure that the implementation of engineering methods and procedures complies with all relevant regulations and guidelines</p> <p>1.16 Report and communicate methods and procedures for the engineering process, using:</p> <ul style="list-style-type: none"> - verbal report <p>plus one from the following:</p> <ul style="list-style-type: none"> - electronic mail - written or typed report - specific company form 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>2 Know how to implement engineering processes</p>	<p>2.1 Describe the methods and procedures that could be used for different types of engineering process</p> <p>2.2 Describe the conditions that are suitable and not suitable for different types of engineering process</p> <p>2.3 Explain how to obtain details of the engineering processes being implemented</p> <p>2.4 Describe the activities that are required for different engineering methods</p> <p>2.5 Describe the quality assurance systems that are being used</p> <p>2.6 Describe the engineering support systems that are operating</p> <p>2.7 Describe the procedures for obtaining information on resources</p> <p>2.8 Explain how to determine the necessary resources</p> <p>2.9 Explain how to determine the availability and suitability of resources</p> <p>2.10 Describe what type of impact the implementation could have on the organisation</p> <p>2.11 Explain who requires instructions on the engineering process(es) being implemented</p> <p>2.12 Describe the different and most appropriate ways of instructing people on the engineering process(es)</p> <p>2.13 Describe the types of recommendation that could emerge from evaluation of the implemented engineering process</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.14 Describe the regulations and guidelines that are relevant 2.15 Explain how to obtain and interpret information on regulations and guidelines 2.16 Describe the extent of their own authority and to whom they should report if they have problems that they cannot resolve			

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 Assessor signature: _____ Date: _____
 Internal verifier signature: _____ Date: _____
 (if sampled)

Unit 48: **Analysing and Selecting Parts for Improvement**

Unit reference number: M/600/5319

QCF level: 3

Credit value: 18

Guided learning hours: 58

Unit summary

This unit is a generic unit which covers the skills and knowledge needed to prove the competences required for analysing and selecting parts for improvement and is intended for use in any context. It involves applying the principles and processes of analysing and selecting parts for improvements within the chosen area/product range. The learner will be expected to co-ordinate and analyse information to identify and produce part families, using criteria such as part shape, part size, materials used to manufacture the part, and the manufacturing process used.

The learner will also be required to carry out an analysis within the chosen area/product range, typically focusing on customer schedules (volume), cost of producing the part, profit for each part as a percentage, manufacturing lead time, quality (scrap and non-conformance percentage) and the process/manufacturing route.

The analysis and selection must demonstrate an awareness of environment considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental considerations in the analysis and selection process.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Analyse and select parts for improvement</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Obtain all the information, documentation and equipment required to carry out the activity</p> <p>1.3 Co-ordinate and analyse information to identify and confirm the representative parts for improvement within the chosen area/product range</p> <p>1.4 Carry out an analysis against three of the following criteria:</p> <ul style="list-style-type: none"> - customer schedules (volume) - cost of producing the part - profit for each part, as a percentage - manufacturing lead time - quality (scrap and non-conformance percentage) - process/manufacturing route <p>1.5 Evaluate and group the identified parts into appropriate part families</p> <p>1.6 Produce part families, using all the following criteria:</p> <ul style="list-style-type: none"> - part shape - part size - materials used to manufacture the part - manufacturing process 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.7 Produce and confirm a finalised list of the representative parts for the chosen area/product range</p>			
<p>2 Know how to analyse and select parts for improvement</p>	<p>2.1 Describe the health and safety requirements of the work area in which they are conducting the activity</p> <p>2.2 Describe the information required to conduct the activity, and where and from whom authority can be found</p> <p>2.3 Describe the principles and process of analysis (such as, pie charts, bar charts (Pareto analysis))</p> <p>2.4 Describe the techniques used to communicate the information and results gained by this process</p> <p>2.5 Explain how to create and present bar graphs/histograms</p> <p>2.6 Explain how to differentiate between lead time and cycle time</p> <p>2.7 Explain how the bill of materials (BOM) structure is configured for each of the representative parts</p> <p>2.8 Explain how to identify the origin/source of the parts within the chosen area</p> <p>2.9 Explain how to evaluate the information, in order to select the representative parts for the chosen area</p> <p>2.10 Describe the application of problem solving and root cause analysis</p> <p>2.11 Describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve</p>			

Learner name: _____ Date: _____
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(if sampled)

Unit 49: Creating Standard Operating Procedures (SOP)

Unit reference number: M/600/5336

QCF level: 3

Credit value: 12

Guided learning hours: 42

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to create standard operating procedures (SOP) for work activities. This will involve co-ordinating, analysing and documenting the information gathered from the method used when performing the operation/process. The learner will confirm what preparations are required from start to finish, the quality and safety standards to be maintained, and the drawings, tooling, fixtures, gauges, and other items that are used during the operation or process. The learner will need to highlight 'key points' in the document, using drawings, photographs and/or sketches, as appropriate.

The learner will be required to ensure that those involved in performing the operation or process have the opportunity to contribute, and agree the method identified.

The learner will also be required to produce standard operating procedures for a range of activities, such as cleaning of equipment, maintenance of equipment, health and safety practices and procedures, process procedures, manufacturing operations and quality improvements.

The standard operating procedures must demonstrate an awareness of environment requirements.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate standard operating procedures that show an awareness of environmental requirements.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Create standard operating procedures (SOP)</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Produce a standard operating procedure for one of the following:</p> <ul style="list-style-type: none"> - cleaning of equipment - maintenance of equipment - health, safety and environmental practices and procedures - process procedures - manufacturing operations - quality improvements - improvements to customer satisfaction <p>1.3 Produce standard operating procedures that include all of the following:</p> <ul style="list-style-type: none"> - operation/process to be performed - part/product number and part/product description/operation reference - operation/process number - preparation activities prior to starting the operation/process - description of the full operation/process, broken down into appropriate tasks/activities 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<ul style="list-style-type: none"> - quality standards, health and safety requirements, environmental issues/requirements - tooling/fixtures/gauges/equipment required - sketches/photographs/drawings that assist completion of the operation/process - date of first issue - originator of the document - latest revision date <p>1.4 Co-ordinate and analyse the gathering of information of the current operation or process to identify the optimum and safest method</p> <p>1.5 Confirm what tools, equipment, fixtures, documentation and standards are required</p> <p>1.6 Ensure that all operators performing the operation or process have the opportunity to contribute, and agree the method identified</p> <p>1.7 Produce standard operating procedures in an agreed format and monitor their use against the operation or process requirements</p> <p>1.8 Produce standard operating procedures that minimise all of the following:</p> <ul style="list-style-type: none"> - time - effort - waste 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.9 Supply standard operating procedures at their point of use, and store copies and master copies in accordance with company requirements</p> <p>1.10 Revise standard operating procedures, as appropriate, to ensure their effectiveness in the workplace</p> <p>1.11 Confirm that the method defined will meet quality, productivity, health, safety and environmental requirements</p>			
<p>2 Know how to create standard operating procedures (SOP)</p>	<p>2.1 Describe the health and safety requirements of the area for which they are creating standard operating procedures (SOP)</p> <p>2.2 Describe the various formats used in creating SOP</p> <p>2.3 Explain where to find the SOP document format to be used in their business</p> <p>2.4 Describe the information that will be required to create a SOP</p> <p>2.5 Explain how SOP are structured, and the importance of their use</p> <p>2.6 Describe the methods of communicating/facilitating to ensure that all the required information for the SOP is captured</p> <p>2.7 Describe the operation/process to be captured in the SOP</p> <p>2.8 Explain why SOP are the basis for quality and continuous improvement</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.9 Describe the eight wastes (over-production, inventory, transport, over-processing, waiting time, operator motion, bad quality, failure to exploit human potential) and how to eliminate them</p> <p>2.10 Explain how to simplify work done, eliminating waste and potential for human error</p> <p>2.11 Describe Takt time, and the relationship with achieving flow in a process</p> <p>2.12 Describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve</p>			

Learner name: _____ Date: _____

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(if sampled)

Unit 50: Carrying Out Capability Studies

Unit reference number: R/600/5331

QCF level: 3

Credit value: 18

Guided learning hours: 58

Unit summary

This unit is a generic unit which covers the skills and knowledge needed to prove the competences required for carrying out capability studies and is intended for use in any context. It involves obtaining all the necessary data in order to carry out the study analysis, and determining the appropriate sample size using statistically based techniques. From the study, the learner will be required to produce statistical information, which will include calculating mean, mode, median, standard deviation, range, variance, and the capability indices C_p and C_{pk} for the process. The learner will also need to calculate the sigma score (Z) from the C_{pk} , and the parts per million outside upper and lower specification limits for the processes studied, for both the long and short term.

The learner will be expected to analyse the information gained, and to identify activities which will improve the process capability. The learner will also need to present their findings in a process capability report, highlighting the improvements to be made and the actions to be taken.

The capability study must demonstrate an awareness of environment considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental considerations.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Carry out capability studies</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Carry out a capability study, which covers both:</p> <ul style="list-style-type: none"> - the short term - the long term <p>1.3 Obtain all the necessary data in order to carry out the capability study analysis</p> <p>1.4 Determine the appropriate sample size, using statistically based techniques</p> <p>1.5 Determine whether rational sub-grouping is appropriate</p> <p>1.6 Carry out the process capability study and produce relevant statistics</p> <p>1.7 Calculate the following statistics:</p> <ul style="list-style-type: none"> - mean - median - mode - standard deviation - range - variance 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.8 Calculate the following from the above statistics:</p> <ul style="list-style-type: none"> - the capability indices Cp and Cpk for the process - the sigma score (Z) from the Cpk - the parts per million outside upper and lower specification limits for the processes studied <p>1.9 Produce a histogram to represent the Cp and Cpk graphically</p> <p>1.10 Analyse the information gained and identify activities to improve the process capability</p> <p>1.11 Produce a process capability report, highlighting the improvements to be made and the actions to be taken</p>			
<p>2 Know how to carry out capability studies</p>	<p>2.1 Describe the health and safety requirements of the area in which they are carrying out the capability studies</p> <p>2.2 Explain why we need to assess process capability, and how this affects a Six Sigma project</p> <p>2.3 Describe the meaning of the term 'sigma score' (Z)</p> <p>2.4 Explain how to calculate the sigma score (Z) and use this to estimate the percentage outside of specification</p> <p>2.5 Explain Cp and Cpk, and how they are calculated</p> <p>2.6 Explain how to calculate long-term capability from short term data</p> <p>2.7 Describe the number of samples needed for a statistically valid short-term capability study</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.8 Describe the meaning of a 'population' and a 'sample' 2.9 Explain how to select appropriate sample sizes 2.10 Explain how to calculate parts per million 2.11 Explain how to calculate mean, median, mode, standard deviation, range, and variance 2.12 Explain how to perform rational sub-grouping 2.13 Describe the extent of their own authority within the project, and to whom they should report in the event of problems that they cannot resolve			

Learner name: _____ Date: _____
 Learner signature: _____ Date: _____
 Assessor signature: _____ Date: _____
 Internal verifier signature: _____ Date: _____
 (*if sampled*)

Unit 51: Leading an Analysis and Selection of Parts for Improvement

Unit reference number: T/600/5483

QCF level: 4

Credit value: 14

Guided learning hours: 32

Unit summary

This unit covers the skills and knowledge needed to prove the competences required for leading an analysis and selection of parts for improvement. It involves coordinating the principles and processes of analysing and selecting parts for improvements within the chosen area/product range. The learner will be expected to coordinate and analyse information to identify and produce part families, using criteria such as part shape, part size, materials used to manufacture the part, and the manufacturing process used.

The analysis and selection must demonstrate an awareness of environment considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

Unit specific additional assessment requirements:

The word lead is used throughout this unit. This means that although the outcomes of this unit may be carried out and achieved as part of a team, it is necessary for the learner to demonstrate a level of overriding management and direction of the activities as a whole. This may be in the form of coordinating multiple activities, using company strategies and objectives to determine activity focus and managing projects involving improvement initiatives. The learner will have a leading role in controlling activity focus and planning.

Specific quantifiable and auditable personal contributions in the achievement of this unit are also required to fulfil this unit.

Competence in all the areas covered by the standard is required.

The learner's ability to combine the performance statements specified when applying the principles and processes of this unit must be demonstrated.

The unit's assessment evidence must demonstrate an awareness of environmental considerations in the analysis and selection process.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Lead an analysis and selection of parts for improvement</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Lead the activities within their area of responsibility to include all of the following:</p> <ul style="list-style-type: none"> - set out and communicate the purpose of the improvement activities - involve the team in planning how the improvement activity will be achieved - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective - provide advice and support the team to achieve both team and individual improvement objectives - motivate the team to present their own improvement ideas - encourage the team and/or individuals to take the lead where appropriate - agree the implementation of the improvement ideas - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate) - monitor the progress of improvement activities 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<ul style="list-style-type: none"> - deal with any organisational problems identified during the improvement activity <p>1.3 Coordinate the collecting of all the information, documentation and equipment required to carry out the activity</p> <p>1.4 Coordinate and lead an analysis of information to identify and confirm the representative parts for improvement within the chosen area/product range</p> <p>1.5 Lead an analysis against three of the following criteria:</p> <ul style="list-style-type: none"> - customer schedules (volume) - cost of producing the part - profit for each part, as a percentage - manufacturing lead time - quality (scrap and non-conformance percentage) - process/manufacturing route <p>1.6 Approve an evaluation and grouping of the identified parts into appropriate part families</p> <p>1.7 Lead the production of part families, using all the following criteria:</p> <ul style="list-style-type: none"> - part shape - part size - materials used to manufacture the part - manufacturing process 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.8 Lead the production of and confirm a finalised list of the representative parts for the chosen area/product range</p>			
<p>2 Know how to lead an analysis and selection of parts for improvement</p>	<p>2.1 Describe the health and safety requirements of the work area in which you are leading the activity</p> <p>2.2 Explain how to plan the resources and time needed to carry out the agreed activity</p> <p>2.3 Describe the information required to conduct the activity, and where and from whom authority can be found</p> <p>2.4 Describe the principles and process of analysis (such as, pie charts, bar charts (Pareto analysis))</p> <p>2.5 Describe the techniques used to communicate the information and results gained by this process</p> <p>2.6 Explain how to create and present bar graphs/histograms</p> <p>2.7 Explain how to differentiate between lead time and cycle time</p> <p>2.8 Explain how the bill of materials (bom) structure is configured for each of the representative parts</p> <p>2.9 Explain how to identify the origin/source of the parts within the chosen area</p> <p>2.10 Explain how to evaluate the information, in order to select the representative parts for the chosen area</p> <p>2.11 Explain the application of problem solving and root cause analysis</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.12 Describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 52: **Leading the Creation of Standard Operating Procedures (SOP)**

Unit reference number: F/600/5888

QCF level: 4

Credit value: 8

Guided learning hours: 25

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to lead the creation of standard operating procedures (SOP) for work activities. This will involve leading the documenting of the information gathered from the method used when performing the operation/process. The learner will lead the preparations required from start to finish, advise on the quality and safety standards to be maintained and agree on the drawings, tooling, fixtures, gauges, and other items that are used during the operation or process. The learner will need to agree the key points in the document and advise on the use of drawings, photographs and/or sketches, as appropriate.

The standard operating procedures must demonstrate an awareness of environmental requirements.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

Unit specific additional assessment requirements:

The word lead is used throughout this unit. This means that although the outcomes of this unit may be carried out and achieved as part of a team, it is necessary for the learner to demonstrate a level of overriding management and direction of the activities as a whole. This may be in the form of coordinating multiple activities, using company strategies and objectives to determine activity focus and managing projects involving improvement initiatives. The learner will have a leading role in controlling activity focus and planning.

Specific quantifiable and auditable personal contributions in the achievement of this unit are also required to fulfil this unit.

Competence in all the areas covered by the standard is required.

The learner's ability to combine the performance statements specified when applying the principles and processes of this unit must be demonstrated.

The unit's assessment evidence must demonstrate standard operating procedures that show an awareness of environmental requirements.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Lead the creation of standard operating procedures (SOP)</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Lead the activities within their area of responsibility to include all of the following:</p> <ul style="list-style-type: none"> - set out and communicate the purpose of the improvement activities - involve the team in planning how the improvement activity will be achieved - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective - provide advice and support the team to achieve both team and individual improvement objectives - motivate the team to present their own improvement ideas - encourage the team and/or individuals to take the lead where appropriate - agree the implementation of the improvement ideas - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate) - monitor the progress of improvement activities 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>- deal with any organisational problems identified during the improvement activity</p> <p>1.3 Lead the production of a standard operating procedure for two of the following:</p> <ul style="list-style-type: none"> - cleaning of equipment - maintenance of equipment - health, safety and environmental practices and procedures - process procedures - manufacturing operations - quality improvements - improvements to customer satisfaction <p>1.4 Lead the production of standard operating procedures that include all of the following:</p> <ul style="list-style-type: none"> - operation/process to be performed - part/product number and part/product description/operation reference - operation/process number - preparation activities prior to starting the operation/process - description of the full operation/process, broken down into appropriate tasks/activities - quality standards, health and safety requirements, environmental issues/requirements - tooling/fixtures/gauges/equipment required 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<ul style="list-style-type: none"> - sketches/photographs/drawings that assist completion of the operation/process - date of first issue - originator of the document - latest revision date <p>1.5 Lead the gathering of information of the current operation or process to identify the optimum and safest method</p> <p>1.6 Agree what tools, equipment, fixtures, documentation and standards are required</p> <p>1.7 Ensure that all team members performing the operation or process have the opportunity to contribute and agree the method identified</p> <p>1.8 Lead the production of standard operating procedures in an agreed format and monitor their accuracy against the operation or process requirements</p> <p>1.9 Lead the production of standard operating procedures that minimise all of the following:</p> <ul style="list-style-type: none"> - time - effort - waste <p>1.10 Arrange for the supply of standard operating procedures at their point of use and the storage of copies and master copies in accordance with company requirements</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.11 Lead the revision of standard operating procedures, as appropriate, to ensure their effectiveness in the workplace</p> <p>1.12 Establish confirmation that the method defined will meet quality, productivity, health, safety and environmental requirements</p>			
<p>2 Know how to lead the creation of standard operating procedures (SOP)</p>	<p>2.1 Describe the health and safety requirements of the area for which they are leading the creation of standard operating procedures (SOP)</p> <p>2.2 Explain how to plan the resources and time needed to carry out the agreed activity</p> <p>2.3 Describe the various formats used in creating SOP</p> <p>2.4 Explain where to find the sop document format to be used in their business</p> <p>2.5 Describe the information that will be required to create a SOP</p> <p>2.6 Explain how SOP are structured and the importance of their use</p> <p>2.7 Explain methods of communicating/facilitating to ensure that all the required information for the SOP is captured</p> <p>2.8 Describe the operation/process to be captured in the SOP</p> <p>2.9 Explain why SOP are the basis for quality and continuous improvement</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.10 Describe the eight wastes (over-production, inventory, transport, over-processing, waiting time, operator motion, bad quality, failure to exploit human potential) and how to eliminate them</p> <p>2.11 Explain how to simplify work done, eliminating waste and potential for human error</p> <p>2.12 Explain Takt time and the relationship with achieving flow in a process</p> <p>2.13 Describe the extent of their own authority and to whom they should report in the event of problems that they cannot resolve</p>			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 53: **Leading the Carrying Out of Capability Studies**

Unit reference number: L/600/5957

QCF level: 4

Credit value: 14

Guided learning hours: 32

Unit summary

This unit covers the skills and knowledge needed to prove the competences required for leading the carrying out of capability studies. It involves obtaining and approving all the necessary data needed to carry out the study analysis, and agreeing the appropriate sample size using statistical based techniques. From the study, the learner will be required to lead the production of statistical information. This will include calculations for mean, mode, median, standard deviation, range, variance, and the capability indices C_p and C_{pk} for the process. The learner will also need to approve calculations for the sigma score (Z) from the C_{pk} and the parts per million outside upper and lower specification limits for the processes studied for both the long and short term.

The capability study must demonstrate an awareness of environmental considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

Unit specific additional assessment requirements:

The word lead is used throughout this unit. This means that although the outcomes of this unit may be carried out and achieved as part of a team, it is necessary for the learner to demonstrate a level of overriding management and direction of the activities as a whole. This may be in the form of coordinating multiple activities, using company strategies and objectives to determine activity focus and managing projects involving improvement initiatives. The learner will have a leading role in controlling activity focus and planning.

Specific quantifiable and auditable personal contributions in the achievement of this unit are also required to fulfil this unit.

Competence in all the areas covered by the standard is required.

The learner's ability to combine the performance statements specified when applying the principles and processes of this unit must be demonstrated.

The unit's assessment evidence must demonstrate an awareness of environmental considerations.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Lead the carrying out of capability studies</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Lead the activities within their area of responsibility to include all of the following:</p> <ul style="list-style-type: none"> - set out and communicate the purpose of the improvement activities - involve the team in planning how the improvement activity will be achieved - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective - provide advice and support the team to achieve both team and individual improvement objectives - motivate the team to present their own improvement ideas - encourage the team and/or individuals to take the lead where appropriate - agree the implementation of the improvement ideas - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate) - monitor the progress of improvement activities 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<ul style="list-style-type: none"> - deal with any organisational problems identified during the improvement activity <p>1.3 Lead a capability study, which covers both:</p> <ul style="list-style-type: none"> - the short term - the long term <p>1.4 Obtain and approve all the necessary data needed to carry out the capability study analysis</p> <p>1.5 Agree the appropriate sample size using statistical based techniques</p> <p>1.6 Determine whether rational sub-grouping is appropriate</p> <p>1.7 Lead the process capability study and confirm relevant statistics</p> <p>1.8 Confirm the calculation of the following statistics:</p> <ul style="list-style-type: none"> - mean - median - mode - standard deviation - range - variance <p>1.9 Confirm the calculation of the following from the above statistics:</p> <ul style="list-style-type: none"> - the capability indices Cp and Cpk for the process - the sigma score (Z) from the Cpk 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<ul style="list-style-type: none"> - the parts per million outside upper and lower specification limits for the processes studied <p>1.10 Lead the production of a histogram to represent the Cp and Cpk graphically</p> <p>1.11 Obtain and approve the information gained and agree activities to improve the process capability</p> <p>1.12 Lead the production of and approve a process capability report highlighting the improvements to be made and the actions to be taken</p>			
<p>2 Know how to lead the carrying out of capability studies</p>	<p>2.1 Describe the health and safety requirements of the area in which they are leading the capability studies</p> <p>2.2 Explain how to plan the resources and time needed to carry out the agreed activity</p> <p>2.3 Explain why we need to assess process capability and how this affects a Six Sigma project</p> <p>2.4 Explain what is meant by the term Sigma Score (Z)</p> <p>2.5 Explain how to calculate the Sigma Score (Z) and use this to estimate the percentage outside of specification</p> <p>2.6 Explain what Cp and Cpk are and how are they calculated</p> <p>2.7 Explain how to calculate long term capability from short-term data</p> <p>2.8 Explain how many samples are needed for a statistically valid short term capability study</p> <p>2.9 Explain what a population is and what a sample is</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.10 Explain how to select appropriate sample sizes 2.11 Explain how to calculate parts per million 2.12 Explain how to calculate mean, median, mode, standard deviation, range, and variance 2.13 Explain how to perform rational sub-grouping 2.14 Describe the extent of their own authority within the project and whom they should report to, in the event of problems that they cannot resolve			

Learner name: _____ Date: _____
 Learner signature: _____ Date: _____
 Assessor signature: _____ Date: _____
 Internal verifier signature: _____ Date: _____
 (*if sampled*)

Unit 54: **Leading the Application of Six Sigma Methodology to a Project**

Unit reference number: D/600/5896

QCF level: 4

Credit value: 14

Guided learning hours: 32

Unit summary

This unit covers the skills and knowledge needed to prove the competences required for leading the application of a structured Six Sigma methodology to a project. It involves leading the identification of the Six Sigma organisational infrastructure, roles and responsibilities and business-specific metrics that will apply. These will include financial, quality and process aspects of the project. The learner will be expected to agree areas where the Six Sigma tools, techniques and activities can be applied, in order to demonstrate those factors that are critical to the customer, business and process.

The application of the Six Sigma methodology must demonstrate an awareness of environmental considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

Unit specific additional assessment requirements:

The word lead is used throughout this unit. This means that although the outcomes of this unit may be carried out and achieved as part of a team, it is necessary for the learner to demonstrate a level of overriding management and direction of the activities as a whole. This may be in the form of coordinating multiple activities, using company strategies and objectives to determine activity focus and managing projects involving improvement initiatives. The learner will have a leading role in controlling activity focus and planning.

Specific quantifiable and auditable personal contributions in the achievement of this unit are also required to fulfil this unit.

Competence in all the areas covered by the standard is required.

The learner's ability to combine the performance statements specified when applying the principles and processes of this unit must be demonstrated.

The unit's assessment evidence must demonstrate an awareness of environmental considerations.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Lead the application of Six Sigma methodology to a project</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Lead the activities within their area of responsibility to include all of the following:</p> <ul style="list-style-type: none"> - set out and communicate the purpose of the improvement activities - involve the team in planning how the improvement activity will be achieved - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective - provide advice and support the team to achieve both team and individual improvement objectives - motivate the team to present their own improvement ideas - encourage the team and/or individuals to take the lead where appropriate - agree the implementation of the improvement ideas - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate) - monitor the progress of improvement activities 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>- deal with any organisational problems identified during the improvement activity</p> <p>1.3 Lead the application of the structured Six Sigma methodology and approach to the selected project</p> <p>1.4 Lead and participate in Six Sigma projects which cover two the following:</p> <ul style="list-style-type: none"> - manufacturing - quality level - administration <p>1.5 Lead the utilisation of the five phases of Six Sigma within the project:</p> <ul style="list-style-type: none"> - define - measure - analyse - improve - control <p>1.6 Approve the Six Sigma organisational infrastructure, roles and responsibilities and business-specific metrics that would apply</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.7 Lead the production of a diagram (family tree) of the Six Sigma organisational infrastructure and the roles of:</p> <ul style="list-style-type: none"> - Champion - Mentor - Yellow Belt - Green Belt - Black Belt - Master Black Belt <p>1.8 Lead the production of a metric chart for the Six Sigma projects undertaken:</p> <ul style="list-style-type: none"> - financial - quality - process <p>1.9 Agree areas where the Six Sigma tools, techniques and activities can be applied and direct the need to measure those factors that are critical to quality characteristic (CTQC) for the customer, business and process</p> <p>1.10 Identify the critical to quality characteristic (CTQC) of the projects, to include:</p> <ul style="list-style-type: none"> - cost - quality - delivery <p>1.11 Contribute to the identification of the cost of poor quality, by agreeing the defects per million opportunities (DPMO)</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.12 Establish defects per million opportunities to the sigma score and determine the gap to Six Sigma performance</p>			
<p>2 Know how to lead the application of Six Sigma methodology to a project</p>	<p>2.1 Describe the Six Sigma methodology and how it is applied to a project</p> <p>2.2 Explain how to plan the resources and time needed to carry out the agreed activity</p> <p>2.3 Describe the Six Sigma infrastructure and philosophy</p> <p>2.4 Describe the benefits that will arise from a Six Sigma project</p> <p>2.5 Describe the `parts per million opportunities' goal of six sigma</p> <p>2.6 Describe the calculation of defects per million opportunities (DPMO)</p> <p>2.7 Describe the five phases of Six Sigma that are applied to a project</p> <p>2.8 Explain how to define a critical to quality characteristic (CTQC)</p> <p>2.9 Explain how non-value added activity can serve as a roadblock for achieving Zero Defect</p> <p>2.10 Explain how to define an `opportunity for defect'</p> <p>2.11 Describe the roles and responsibilities of the key players in the Six Sigma process (Champion, Mentor, Master Black Belt, Black Belt, Green Belt and Yellow Belt)</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.12 Describe the relationship between key process input variables (KPIV) and key process output variables (KPOV) (using the equation $Y=f(x)$)</p> <p>2.13 Describe the extent of their own authority and to whom they should report in the event of problems that they cannot resolve</p>			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 55: **Leading the Creation of Flexible Production and Manpower Systems**

Unit reference number: K/600/5447

QCF level: 4

Credit value: 7

Guided learning hours: 25

Unit summary

This unit covers the skills and knowledge needed to prove the competences required for leading the creation of flexible business systems. It involves leading the application of the principles and processes of creating flexible production and manpower systems to the chosen activity. This will include obtaining and approving the schedule and batch size for the parts in the work area, and leading the creation of level schedules for those parts. The activities will require the learner to identify and evaluate improvement opportunities, and waste which needs to be removed, in order to achieve Takt time and flow processing. The learner will also be required to direct the production of a visual representation for identifying which resources do not meet the Takt time requirements. This would typically cover areas such as standard work in progress, consignment stocks, part routers, physical control signals, number of people required and their flexibility, and the rules and disciplines of the pull system.

The creation of flexible production and manpower systems must incorporate environmental considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

Unit specific additional assessment requirements:

The word lead is used throughout this unit. This means that although the outcomes of this unit may be carried out and achieved as part of a team, it is necessary for the learner to demonstrate a level of overriding management and direction of the activities as a whole. This may be in the form of coordinating multiple activities, using company strategies and objectives to determine activity focus and managing projects involving improvement initiatives. The learner will have a leading role in controlling activity focus and planning.

Specific quantifiable and auditable personal contributions in the achievement of this unit are also required to fulfil this unit.

Competence in all the areas covered by the standard is required.

The learner's ability to combine the performance statements specified when applying the principles and processes of this unit must be demonstrated.

The unit's assessment evidence must demonstrate the incorporation of environmental considerations.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Lead the creation of flexible production and manpower systems</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Lead the activities within their area of responsibility to include all of the following:</p> <ul style="list-style-type: none"> - set out and communicate the purpose of the improvement activities - involve the team in planning how the improvement activity will be achieved - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective - provide advice and support the team to achieve both team and individual improvement objectives - motivate the team to present their own improvement ideas - encourage the team and/or individuals to take the lead where appropriate - agree the implementation of the improvement ideas - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate) - monitor the progress of improvement activities 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<ul style="list-style-type: none"> - deal with any organisational problems identified during the improvement activity <p>1.3 Lead the application of the principles and processes of creating flexible production and manpower systems to the chosen activity</p> <p>1.4 Lead the selection of three different parts or materials in the work area, and approve the calculations for the following:</p> <ul style="list-style-type: none"> - monitor the progress of improvement activities - workload - capacity of resource (equipment, people) - Takt time <p>1.5 Obtain and approve the schedule and batch size for the parts or materials in the work area</p> <p>1.6 Lead the creation of level schedules for the parts in the work area</p> <p>1.7 Direct the production of a visual communication of the schedule, which includes:</p> <ul style="list-style-type: none"> - workload - resource capacity - Takt time for the work area <p>1.8 Identify and evaluate improvement opportunities, and waste which needs to be removed, in order to achieve Takt time and flow processing</p> <p>1.9 Lead the production of a local workforce flexibility matrix (skills matrix)</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.10 Direct the production of a visual representation, identifying resources that do not meet the Takt time requirements</p> <p>1.11 Implement the creation of a visually controlled system, based on the demand of subsequent processes for the chosen parts or materials, which includes four of the following:</p> <ul style="list-style-type: none"> - standard work in progress - safety stocks - part or material routers - physical control signals - rules and disciplines of the implemented control system <p>1.12 Implement a visually controlled system, based on the demand of subsequent processes for the chosen parts, which improves the overall process effectiveness</p>			
<p>2 Know how to lead the creation of flexible production and manpower systems</p>	<p>2.1 Describe the health and safety requirements of the work area in which they are leading the activity</p> <p>2.2 Explain how to plan the resources and time needed to carry out the agreed activity</p> <p>2.3 Describe the information required to create level schedules, load and capacity, Takt time and batch sizes</p> <p>2.4 Describe the meaning of 'level schedules' and how to create them</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.5 Explain how to create a load and capacity diagram</p> <p>2.6 Explain Takt time and how this is calculated</p> <p>2.7 Describe the application of standard work in progress</p> <p>2.8 Describe the application of visually controlled systems and signals, based on the demand of subsequent processes</p> <p>2.9 Describe the application of skills matrices</p> <p>2.10 Describe the application of consignment stocking</p> <p>2.11 Explain how to simplify working practices and reduce the human error risk</p> <p>2.12 Describe the consequences of introducing a new improved part/process/material router</p> <p>2.13 Explain problem solving and route cause analysis</p> <p>2.14 Describe the eight wastes (over-production, inventory, transport, over-processing, waiting time, operator motion, bad quality, failure to exploit human potential) and how to eliminate them</p> <p>2.15 Explain how to stabilise and then optimise equipment effectiveness</p> <p>2.16 Explain how to conduct a review of asset care/best practice effectiveness, and establish a robust routine of asset care and correct operation</p> <p>2.17 Describe the appropriate techniques that provide value to the customer (such as push-pull systems, single piece flow, just in time (JIT), Kanban, automation)</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.18 Describe the techniques used to visually communicate the work done (such as level schedules, load and capacity diagrams, revised batch sizes, and takt time)</p> <p>2.19 Explain how to lay out an effective workplace, utilising recognised techniques (such as cellular manufacturing incorporating parallel lines or U-shaped cells)</p> <p>2.20 Describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve</p>			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

The unit's assessment evidence must demonstrate the incorporation of environmental considerations in quality function deployment activities.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Lead policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Lead the activities within their area of responsibility to include all of the following:</p> <ul style="list-style-type: none"> - set out and communicate the purpose of the improvement activities - involve the team in planning how the improvement activity will be achieved - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective - provide advice and support the team to achieve both team and individual improvement objectives - motivate the team to present their own improvement ideas - encourage the team and/or individuals to take the lead where appropriate - agree the implementation of the improvement ideas - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate) - monitor the progress of improvement activities 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<ul style="list-style-type: none"> - deal with any organisational problems identified during the improvement activity 1.3 Evaluate the current policy deployment plan 1.4 Lead the policy deployment process in your local area and agree the area goals 1.5 Confirm the area goals for: <ul style="list-style-type: none"> - customers - the business in which they work 1.6 Approve improvement opportunities and conditions which, when implemented, deliver the local area policy deployment plan 1.7 Use at least four of the following criteria when approving improvement opportunities: <ul style="list-style-type: none"> - is there local commitment to deliver the improvement plan? - is the plan communicated to everyone in the business? - are all employees aware of, and engaged, in the local policy plan? - do local measures reflect policy deployment plans? - are policy review dates adhered to? - are cross-functional boundaries eliminated? - are improvement actions linked to the policy deployment plan? 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.8 Confirm quantifiable objectives and targets for all the defined improvement activities, and agree an appropriate measure and timescale for completion</p> <p>1.9 Lead the production of and approve the policy deployment plan and communicate the plan in an appropriate visual format</p> <p>1.10 Lead the production of a visual communication of the plans, which must include all of the following:</p> <ul style="list-style-type: none"> - the resources required - measures of performance - timescales for completion - review dates of each activity - assigned ownership and responsibility for each action - the order of importance of each improvement activity 			
<p>2 Know how to lead policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)</p>	<p>2.1 Describe the health and safety requirements of the work area in which they are leading the improvement activities</p> <p>2.2 Explain how to plan the resources and time needed to carry out the agreed activity</p> <p>2.3 Explain where to find the information required to develop a local policy deployment plan</p> <p>2.4 Explain how to create policy deployment plans</p> <p>2.5 Describe the techniques used to communicate the information and results obtained by this process</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.6 Explain how to differentiate between your business vision, mission and main business drivers</p> <p>2.7 Explain measures of performance in a lean business environment</p> <p>2.8 Describe the limits of your responsibility and involvement in the policy deployment planning process</p> <p>2.9 Describe the types of improvement activity that will drive the implementation of the business plan (eg management tools and techniques which contribute to quality, cost, delivery and responsiveness)</p> <p>2.10 Describe the meaning and application of the Deming cycle (plan, do, check, act)</p> <p>2.11 Describe the application of gap analysis (current situation versus desired situation)</p> <p>2.12 Describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve</p>			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 57: **Leading Value Management (Value Engineering and Value Analysis) Activities**

Unit reference number: A/600/5713

QCF level: 4

Credit value: 11

Guided learning hours: 32

Unit summary

This unit covers the skills and knowledge needed to prove the competences required for leading value management (value engineering and value analysis) activities. It involves leading the application of the principles and processes of value management (VM) to the chosen product or process. The learner will be expected to confirm what the customer requires from the product or the process, and to approve quantifiable objectives and targets to achieve this. The learner will need to lead the analysis of the functions of the process, agree costs of each of these functions, and confirm the added and non-value added activities within the process. The learner will also be expected to approve the most appropriate alternatives, lead a risk assessment of the alternatives, prioritise and rank the alternatives, and confirm the expected benefits. The learner will need to lead the development of these alternatives into detailed proposals that will improve the value of the product or process, and provide costing recommendations for management approval.

The value management proposals must incorporate environmental considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

Unit specific additional assessment requirements:

The word lead is used throughout this unit. This means that although the outcomes of this unit may be carried out and achieved as part of a team, it is necessary for the learner to demonstrate a level of overriding management and direction of the activities as a whole. This may be in the form of coordinating multiple activities, using company strategies and objectives to determine activity focus and managing projects involving improvement initiatives. The learner will have a leading role in controlling activity focus and planning.

Specific quantifiable and auditable personal contributions in the achievement of this unit are also required to fulfil this unit.

Competence in all the areas covered by the standard is required.

The learner's ability to combine the performance statements specified when applying the principles and processes of this unit must be demonstrated.

The unit's assessment evidence must demonstrate the incorporation of environmental considerations in value management proposals.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Lead value management (value engineering and value analysis) activities</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Lead the activities within their area of responsibility to include all of the following:</p> <ul style="list-style-type: none"> - set out and communicate the purpose of the improvement activities - involve the team in planning how the improvement activity will be achieved - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective - provide advice and support the team to achieve both team and individual improvement objectives - motivate the team to present their own improvement ideas - encourage the team and/or individuals to take the lead where appropriate - agree the implementation of the improvement ideas - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate) - monitor the progress of improvement activities - deal with any organisational problems identified during the improvement activity 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.3 Lead the application of the principles and processes of value management (VM) to the chosen product or process</p> <p>1.4 Confirm what the customer requires from the product or the process and approve quantifiable objectives and targets for the value management activity</p> <p>1.5 Lead the analysis of the functions of the product or process being studied and agree allocated costs to those functions</p> <p>1.6 Lead the production of a total cost model and supply a chain map for the product or process, which shows how cost are related to function</p> <p>1.7 Confirm the non-value added activity within the product or process, and approve alternatives</p> <p>1.8 Lead the development of these alternatives into detailed proposals that will improve the value of the product or process</p> <p>1.9 Lead the production of detailed proposals of the findings of the value management activities which:</p> <ul style="list-style-type: none"> - identify the non-value added activities and indicate alternatives - prioritise and rank the alternatives - include a risk assessment of the alternatives - identify the most appropriate alternatives - provide costing recommendations for management approval - identify expected benefits 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>2 Know how to lead value management (value engineering and value analysis) activities</p>	<p>1.10 Approve the new value-added process and manage the plan within agreed timescales</p> <p>2.1 Describe the health and safety requirements of the work area in which they are leading the value management activities</p> <p>2.2 Explain how to plan the resources and time needed to carry out the agreed activity</p> <p>2.3 Explain how to select a product or process on which to carry out the value management activity</p> <p>2.4 Explain how to structure and run a value management activity</p> <p>2.5 Explain how to set quantifiable objectives and targets for the value management activity</p> <p>2.6 Explain how to carry out a function analysis</p> <p>2.7 Describe the performance related tools used to qualify customer wants and needs</p> <p>2.8 Describe the `cost of function` equation, and how to calculate the cost of function</p> <p>2.9 Explain FAST diagramming and value trees</p> <p>2.10 Explain decision making and creativity techniques (brainstorming)</p> <p>2.11 Explain how value management relates to the overall business strategy and competitive positioning</p> <p>2.12 Explain how to produce a total cost model and supply chain map for the product or process</p> <p>2.13 Explain what constitutes value adding and non-value adding activities</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.14 Explain how to identify what a customer requires from a product or process 2.15 Explain how to prioritise and rank the alternatives 2.16 Explain how to complete a risk assessment of the alternatives 2.17 Explain how to prepare the findings into proposals 2.18 Explain how to monitor and track proposals to implementation 2.19 Describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve			

Learner name: _____ Date: _____
 Learner signature: _____ Date: _____
 Assessor signature: _____ Date: _____
 Internal verifier signature: _____ Date: _____
 (if sampled)

Unit 58: Applying Quality Function Deployment (QFD)

Unit reference number: J/600/5875

QCF level: 4

Credit value: 9

Guided learning hours: 25

Unit summary

This unit covers the skills and knowledge needed to prove the competences required for applying quality function deployment (QFD). It involves identifying the customer requirement of a product or process and obtaining all the required information necessary to perform the QFD project study. Typically, these would cover the needs and expectations of the customer and the functions and features required by the customer. The learner will be required to produce a matrix for the quality function deployment activity, which identifies the four phases (eg pre-planning, design deployment, process and production planning and managing deployment). The learner will need to analyse the information gathered (such as score matrices for relationships, technical requirements, correlations, planning and specifications) and draw conclusions as to the appropriate course of action. The learner will be expected to record the results of the analysis in the appropriate format to enable a report to be compiled, outlining the findings of the activity and the recommended solutions.

The quality function deployment project must incorporate environmental considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate the incorporation of environmental considerations in policy deployment activities.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Apply quality function deployment (QFD)</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Identify the customer requirement of a product or process using quality function deployment</p> <p>1.3 Obtain all the required information necessary to perform the quality function deployment study</p> <p>1.4 Produce a matrix for a quality function deployment project which identifies the four phases as follows:</p> <ul style="list-style-type: none"> - pre-planning - design deployment - process and production planning - managing deployment <p>1.5 Determine the customer requirements within the project in terms of:</p> <ul style="list-style-type: none"> - needs and expectations - functions - features <p>1.6 Carry out the quality function deployment project</p> <p>1.7 Identify within the quality function deployment project the:</p> <ul style="list-style-type: none"> - necessary inputs and how to acquire them - the outputs from each of the four phases and their execution - customer rankings - substitute quality characteristics 			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Know how to apply quality function deployment (QFD)	<p>1.8 Analyse the information gathered and draw conclusions as to the appropriate course of action</p> <p>1.9 Record the results of the analysis in the appropriate format</p> <p>1.10 Produce and score matrices for three of the following:</p> <ul style="list-style-type: none"> - relationships - technical requirements - correlations - planning - specifications <p>1.11 Produce a report outlining the findings and the recommended solutions</p>			
	<p>2.1 Describe the health and safety requirements of the area in which they are carrying out the quality function deployment activity</p> <p>2.2 Describe the advantages of using quality function deployment</p> <p>2.3 Describe the 'quality lever' and how quality function deployment fits this model</p> <p>2.4 Describe the terms 'house of quality' and 'voice of the customer'</p> <p>2.5 Explain how quality function deployment relates to potential failure modes and affects analysis, design of experiments, value analysis, control plans, Pugh concept diagrams</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.6 Explain how to carry out a quality function deployment activity and the tools and techniques used</p> <p>2.7 Describe the four phases of quality function deployment (pre-planning, design deployment, process and production planning, managing deployment)</p> <p>2.8 Explain how to identify the necessary inputs and outputs for each of the phases</p> <p>2.9 Explain what the customer's requirements are within the project, in terms of needs and expectations, features and functions</p> <p>2.10 Explain how to produce matrices for relationships, specifications, technical requirements and planning</p> <p>2.11 Explain how to score the matrices within the quality function deployment</p> <p>2.12 Describe the extent of their own authority within the project and whom they should report to, in the event of problems they cannot resolve</p>			

Learner name: _____ Date: _____

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(if sampled)

Unit 59: Applying Six Sigma Methodology to a Project

Unit reference number: M/600/5305

QCF level: 3

Credit value: 18

Guided learning hours: 62

Unit summary

This unit covers the skills and knowledge needed to prove the competences required for applying a structured Six Sigma methodology to a project. It involves identifying the Six Sigma organisational infrastructure, roles and responsibilities and business-specific metrics that will apply. These will include financial, quality and process aspects of the project. The learner will be expected to identify areas where the Six Sigma tools, techniques and activities can be applied, in order to demonstrate those factors that are critical to the customer, business and process.

Contribution to the identification of the cost of poor quality by identifying the defects per million opportunities (DPMO) is a major part of this unit.

The application of the Six Sigma methodology must demonstrate an awareness of environmental considerations.

See *Annexe G* for details of NOS mappings.

See *Annexe F* for details of PLTS mappings.

Assessment requirements/evidence requirements

This unit must be assessed in a work environment and must be assessed in accordance with the Semta assessment strategy. Detailed information is given in *Annexe D3*.

The unit's assessment evidence must demonstrate an awareness of environmental considerations.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the evidence can be dated and initialled against each assessment criterion. Alternatively, centre-devised documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>1 Apply Six Sigma methodology to a project</p>	<p>1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines</p> <p>1.2 Apply the structured Six Sigma methodology and approach to the selected project</p> <p>1.3 Identify and participate in Six Sigma projects which cover two the following:</p> <ul style="list-style-type: none"> - manufacturing - quality level - administration <p>1.4 Utilise the five phases of Six Sigma within the project:</p> <ul style="list-style-type: none"> - define - measure - analyse - improve - control <p>1.5 Identify the Six Sigma organisational infrastructure, roles and responsibilities and business-specific metrics that would apply</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.6 Produce a diagram (family tree) of the Six Sigma organisational infrastructure and the roles of:</p> <ul style="list-style-type: none"> - Champion - Mentor - Yellow Belt - Green Belt - Black Belt - Master Black Belt <p>1.7 Contribute to producing a metric chart for the Six Sigma projects undertaken, to include</p> <ul style="list-style-type: none"> - financial - quality - process <p>1.8 Identify areas where the Six Sigma tools, techniques and activities can be applied, and demonstrate the need to measure those factors that are critical to quality characteristic (CTQC) for the customer, business and process</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>1.9 Identify the critical to quality characteristic (CTQC) of the projects, to include:</p> <ul style="list-style-type: none"> - cost - quality - delivery <p>1.10 Contribute to the identification of the cost of poor quality, by identifying the defects per million opportunities (DPMO)</p> <p>1.11 Relate defects per million opportunities to the sigma score, and identify the gap to Six Sigma performance</p>			
<p>2 Know how to apply Six Sigma methodology to a project</p>	<p>2.1 Describe the Six Sigma methodology, and how it is applied to a project</p> <p>2.2 Describe the Six Sigma infrastructure and philosophy</p> <p>2.3 Describe the benefits that will arise from a Six Sigma project</p> <p>2.4 Describe the 'parts per million opportunities' goal of Six Sigma</p> <p>2.5 Describe the calculation of defects per million opportunities (DPMO)</p> <p>2.6 Describe the five phases of Six Sigma that are applied to a project</p>			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	<p>2.7 Explain how to define a critical to quality characteristic (CTQC)</p> <p>2.8 Explain how non-value added activity can serve as a roadblock for achieving zero defect</p> <p>2.9 Explain how to define an 'opportunity for defect'</p> <p>2.10 Describe the roles and responsibilities of the key players in the Six Sigma process (Champion, Mentor, Master Black Belt, Black Belt, Green Belt and Yellow Belt)</p> <p>2.11 Describe the relationship between key process input variables (KPIV) and key process output variables (KPOV) (using the equation $Y=f(x)$)</p> <p>2.12 Describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve</p>			

Learner name: _____ Date: _____

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(if sampled)

Further information

Our customer service numbers are:

BTEC and NVQ	0844 576 0045
GCSE	0844 576 0027
The Diploma	0844 576 0028
DiDA	0844 372 2186
Administration and systems	0844 463 2535

Calls may be recorded for training purposes.

Useful publications

Related information and publications include:

- *Edexcel NVQs, SVQs and Competence-based Qualifications Delivery Requirements and Quality Assurance Guidance* published annually
- *Centre Handbook for Edexcel QCF NVQs and Competence-based Qualifications* published annually
- Functional skills publications – specifications, tutor support materials and question papers
- *Regulatory Arrangements for the Qualification and Credit Framework* (published by Ofqual, August 2008)
- the current Edexcel publications catalogue and update catalogue.

Edexcel publications concerning the Quality Assurance System and the internal and standards verification of vocationally related programmes can be found on the Edexcel website.

NB: Some of our publications are priced. There is also a charge for postage and packing. Please check the cost when you order.

How to obtain National Occupational Standards

To obtain the National Occupational Standards go to www.ukstandards.co.uk

Professional development and training

Edexcel supports UK and international customers with training related to NVQ and BTEC qualifications. This support is available through a choice of training options offered in our published training directory or through customised training at your centre.

The support we offer focuses on a range of issues including:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing student-centred learning and teaching approaches
- building functional skills into your programme
- building effective and efficient quality assurance systems.

The national programme of training we offer can be viewed on our website (www.edexcel.com/training). You can request customised training through the website or by contacting one of our advisers in the Training from Edexcel team via Customer Services to discuss your training needs.

The training we provide:

- is active
- is designed to be supportive and thought provoking
- builds on best practice
- may be suitable for those seeking evidence for their continuing professional development.

Annexe A: Progression pathways

The Edexcel qualification framework for the construction sector

For details of Edexcel's building services engineering and manufacturing engineering qualifications, please refer to our website, www.edexcel.com.

Level	General qualifications	Diplomas	BTEC vocationally-related qualifications	BTEC specialist qualification / professional	NVQ/competence
8					
7					
6					Please go to www.edexcel.com
5			Edexcel BTEC Level 5 HND Diploma in Construction		Please go to www.edexcel.com
4			Edexcel BTEC Level 4 HNC Diploma in Construction		Please go to www.edexcel.com
3		Edexcel Level 3 Diploma in Construction and the Built Environment	Edexcel BTEC Level 3 Certificate, Subsidiary Diploma, Diploma and Extended Diploma in Construction and the Built Environment	Edexcel BTEC Level 3 Award, Extended Certificate and Diploma in Construction and the Built Environment	Please go to www.edexcel.com

Level	General qualifications	Diplomas	BTEC vocationally-related qualifications	BTEC specialist qualification / professional	NVQ/competence
2		Edexcel Level 2 Diploma in Construction and the Built Environment	Edexcel BTEC Level 2 Certificate, Extended Certificate and Diploma in Construction	Edexcel BTEC Level 2 Award, Certificate and Extended Certificate in Construction and the Built Environment (Craft) and Construction and the Built Environment (Technician)	Please go to www.edexcel.com
1		Edexcel Level 1 Diploma in Construction and the Built Environment	Edexcel BTEC Level 1 Award, Certificate, Diploma in Construction (QCF)	Edexcel BTEC Level 1 Award, Certificate, Extended Certificate in Construction and the Built Environment	Please go to www.edexcel.com
Entry			Edexcel Entry Level BTEC Award in Construction (Entry 3) (QCF)		

Annexe B: Quality assurance

Key principles of quality assurance

- A centre delivering Edexcel qualifications must be an Edexcel recognised and approved centre and must have approval for the individual qualifications that it is offering.
- The centre agrees, as part of gaining recognition and centre approval, to abide by specific terms and conditions relating to the effective delivery and quality assurance of assessment. The centre must abide by these conditions throughout the period of delivery.
- Edexcel makes available to centres a range of materials and opportunities to exemplify the processes required for effective assessment and to provide examples of effective standards. Approved centres must use the guidance on assessment to ensure that staff who are delivering Edexcel accredited qualifications are applying consistent standards.
- An approved centre must follow agreed protocols for: standardisation of assessors; planning, monitoring and recording of assessment processes; internal verification and recording of internal verification processes and dealing with special circumstances, appeals and malpractice.

Quality assurance processes

The approach to quality assured assessment is made through a partnership between a recognised and approved centre and Edexcel. Edexcel is committed to ensuring that it follows best practice and employs appropriate technology to support quality assurance processes where practicable. The specific arrangements for working with centres will vary. Edexcel seeks to ensure that the quality-assurance processes it uses do not inflict undue bureaucratic processes on centres, and works to support them in providing robust internal quality-assurance processes.

The learning outcomes and assessment criteria in each unit within this specification set out the standard to be achieved by each learner in order to gain each unit and through satisfying the rules of combination the whole qualification. Edexcel operates a quality-assurance process, designed to ensure that these standards are maintained by all assessors and verifiers.

For the purposes of quality assurance, all individual qualifications and units are considered as a whole. Centres offering these qualifications must be committed to ensuring the quality of the units and qualifications they offer, through effective standardisation of assessors and internal verification of assessor decisions. Centre quality assurance and assessment processes are monitored by Edexcel.

The Edexcel quality-assurance processes will involve:

- gaining centre recognition and approval – if a centre is not currently approved to offer Edexcel qualifications - and qualification approval through satisfying the Edexcel approved centre criteria
- two visits annually by occupationally competent and qualified Edexcel Standards Verifiers for sampling of internal verification and assessor decisions for the occupational sector. The minimum frequency of Standards Verifiers' visits to centres is usually two per year (a total of two days per year). The exact frequency and duration of Standards Verifier visits must reflect a centre's performance, taking account of the number:
 - of assessment sites
 - and throughput of candidates
 - and turnover of assessors
 - and turnover of internal verifiers.
- the provision of support, advice and guidance towards the achievement of National Occupational Standards.

Centres are required to declare their commitment to ensuring quality and to providing appropriate opportunities for learners that lead to valid and accurate assessment outcomes.

Annexe C: Centre certification and registration

Edexcel Standards Verifiers will provide support, advice and guidance to centres to achieve Direct Claims Status (DCS). Edexcel will maintain the integrity of Edexcel QCF NVQs, SVQs and competence qualifications through ensuring that the awarding of these qualifications is secure. Where there are quality issues identified in the delivery of programmes, Edexcel will exercise the right to:

- direct centres to take action
- limit or suspend certification
- suspend registration.

The approach of Edexcel in such circumstances is to work with the centre to overcome the problems identified. If additional training is required, Edexcel will aim to secure the appropriate expertise to provide this.

What are the access arrangements and special considerations for the qualifications in this specification?

Centres are required to recruit learners to Edexcel qualifications with integrity. Appropriate steps should be taken to assess each applicant's potential and a professional judgement should be made about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult Edexcel's policy on learners with particular requirements. Edexcel's policy on access arrangements and special considerations for Edexcel qualifications aims to enhance access to the qualifications for learners with disabilities and other difficulties (as defined by the 1995 Disability Discrimination Act and the amendments to the Act) without compromising the assessment of skills, knowledge, understanding or competence. Please refer to *Access Arrangements and Special Considerations for BTEC and Edexcel NVQ Qualifications* for further details. www.edexcel.com.

Annexe D1: ConstructionSkills assessment strategy for Construction and Built Environment pathway



Consolidated Assessment Strategy for Construction and the Built Environment - Craft, Supervisory, Technical, Managerial and Professional Units and Qualifications with NVQ in the Qualification and Credit Framework (QCF) title and SVQs.

Introduction

This assessment strategy provides principles and guidance to awarding organisations so the assessment of units and qualifications with NVQ in the Qualifications and Credit Framework (QCF) title and SVQs is valid, effective and consistent and has credibility across the Construction and Built Environment sector. This is a consolidated ConstructionSkills Assessment Strategy covering construction and the built environment – craft, supervisory, technical, managerial and professional NVQ and SVQ units and qualifications. This assessment strategy is one of the strands of the ConstructionSkills' Construction Qualification Strategy.

These principles are in addition to the requirements that awarding organisations must meet for the delivery of NVQ and SVQ units and qualifications as required by the qualification regulators' documentation.

This consolidated assessment strategy provides the overarching principles as systems may vary from one awarding organisation to another. Awarding organisations must consistently put these principles into practice.

Annex A provides guidance to help awarding organisations incorporate relevant parts of these principle requirements in their documentation.

Annex B provides a list of sub annexes relevant to specific NVQ or SVQ qualifications and units; these sub annexes contain additional information for awarding organisations where National Working Groups or Awarding Body Fora have identified the need for specific clarification. Clarification may be about the terminology of the content of the unit (ref. section 2.1), or specific occupational expertise requirements for assessors and verifiers (ref. section 4).

Awarding organisations must make this Strategy and the relevant annexes available to assessors, verifiers and candidates.

Principles

1. External quality control of assessment

- 1.1 Awarding organisations must use risk management for external quality control of assessment. They must evaluate all external verification reports and other data relating to assessment centres. Awarding organisations must address any risks relating to quality control, considering the sector assessment strategy requirements for:
- workplace evidence
 - the use of simulation
 - the occupational competence of assessors and verifiers.
- 1.2 The monitoring and standardisation of assessment decisions must be achieved by robust and strong internal and external verification systems meeting the requirements of the qualification regulators' documentation.
- 1.3 Awarding organisations must be members of the sector's Built Environment Awarding Body Forum, which includes the qualification regulators. They will be expected to provide feedback on National Occupational Standards (NOS), NVQ or SVQ units and qualifications, including aspects informing incremental change.
- 1.4 The Forum will, in respect of this strategy:
- build on the good relationships with awarding organisations
 - provide opportunities to identify and address particular issues of external quality control
 - contribute to improving quality and consistency
 - support awarding organisations to monitor assessment centres' performance to identify areas and levels of risk
 - provide information and statistics about take up and completion, as well as trends and developments that can be used by ConstructionSkills and awarding organisations to identify any problem areas and agree remedial action
 - discuss matters concerning quality assurance, as well as providing the opportunity to identify issues arising from implementation of NOS and related vocational qualifications
 - inform the continuous improvement of NOS and awards derived from them
 - identify and share best practices to build a whole industry approach to pursue excellence in education and work-based learning and assessment process to achieve competence.
- 1.5 Awarding organisations and their partners, assessment centres, verifiers and assessors must maintain robust and transparent operational arrangements. They must preserve independence in assessment, certification and quality assurance processes. Awarding organisations must ensure clear separation of their NVQ/SVQ assessment responsibilities from their industry, training, membership, certification, accreditation and commercial interests and resolve any conflicts of interest.

- 1.6 Where e-assessment is used, it must meet the requirements of the qualification regulators' documentation.

2 Aspects to be assessed through performance in the workplace

- 2.1 Direct evidence produced through normal performance in the workplace is the primary source for meeting the requirements. This includes naturally occurring documentary evidence (hard copy and electronic), direct observation of activities and witness testimony as relevant. ConstructionSkills' National Working Groups will specify any exceptions to this position (see section 3).
- 2.2 Workplace evidence must be supported by the required evidence of knowledge and understanding. This evidence may be identified by:
- questioning the candidate
 - recognised industry education and training programme assessment or professional interview assessment that has been matched to NOS requirements
 - performance evidence.
- 2.3 A holistic approach towards the collection of evidence should be encouraged. The focus should be on assessing activities generated by the whole work experience rather than focusing on specific tasks. This would show how evidence requirements could be met across the qualification to make the most efficient use of evidence. Annex A suggests standard evidence notes for awarding organisations.

3 How simulated working conditions may be used to assess competence

- 3.1 Simulations (designed situations for producing artificially generated evidence) may only be used where candidates are prevented from gathering direct evidence normally from the workplace because:
- there are hazards
 - it is difficult to distinguish individual performance in team situations
 - circumstances occur infrequently or long term results are involved
 - confidentiality is important
 - there are organisational constraints.
- 3.2 Any instances where simulation is considered to be acceptable as an alternative (to direct workplace evidence) as a means of generating evidence, will be determined by the relevant ConstructionSkills National Working Group and stated in the unit. Annex A suggests standard evidence notes for awarding organisations.
- 3.3 The ConstructionSkills National Working Group will determine and specify in the required realistic working environment and context to be adopted. This could include appropriate:
- tools, equipment and instruments
 - materials
 - types of contingencies

- standards and quality specifications
 - real timescales
 - quantities of work
 - physical conditions
 - relationships with people
 - types of interaction
 - communication methods and media
 - information and data.
- 3.4 Where simulated evidence is stated as acceptable in the unit, the circumstances and requirements for the simulation needs to be confirmed by discussions between the candidate and the assessor, which are then agreed by the internal and external verifiers.
- 3.5 Where other Standard Setting Bodies' units are imported into a ConstructionSkills suite, the evidence requirements of the originating body will be adopted and specified.

4 Occupational expertise requirements for assessors and verifiers

- 4.1 Awarding organisations must ensure that **assessors**:
- 4.1.1 have sufficient, verifiable, relevant current industry experience, knowledge and understanding of the occupational working area at or above the level being assessed. This must be of sufficient depth to be effective and reliable when judging candidates' competence. Assessors' experience, knowledge and understanding could be verified by a combination of:
- curriculum vitae and employer endorsement
 - references
 - possession of a relevant NVQ/SVQ, or vocationally related qualification
 - corporate membership of a relevant professional institution
 - interview
- The verification process must be recorded and available for audit
- 4.1.2 have sufficient occupational expertise so they have up to date experience, knowledge and understanding of the particular aspects of work they are assessing. This could be verified by records of continuing professional development achievements
- 4.1.3 only assess in their acknowledged area of occupational competence
- 4.1.4 have a sound, in-depth knowledge of, and uphold the integrity of, the sector's NOS and this Assessment Strategy (this document)
- 4.1.5 are prepared to participate in training activities for their continued professional development
- 4.1.6 hold, or are working towards, a qualification as listed within Assessing and Assuring Quality of Assessment, either in the Qualifications and Credit Framework (QCF), or the Scottish Credit and Qualifications Framework (SCQF):

- Level 3 Award in Assessing Competence in the Work Environment
- Level 3 Certificate in Assessing Vocational Achievement
- SVQ (SCQF level) Assessing Competence in the Work Environment
- SVQ (SCQF level) Assessing Vocational Achievement

or hold one of the following

- A1 Assess candidates using a range of methods
- D32/33 Assess candidate performance, using differing sources of evidence

Holders of A1 and D32/33 must assess to the reviewed National Occupational Standards (NOS) for Learning and Development.

In Scotland, approval for exemptions must be obtained from the Scottish Qualifications Authority.

4.2 Awarding organisations must ensure that **internal verifiers**:

4.2.1 have sufficient, verifiable, relevant up to date experience, knowledge and understanding of the occupational working area at or above the level being verified. This must be of sufficient depth to be effective and reliable when verifying judgements about assessors' assessment processes and decisions. Internal verifiers' experience, knowledge and understanding could be verified by a combination of:

- curriculum vitae and employer endorsement
- references
- possession of a relevant NVQ/SVQ, or vocationally related qualification
- corporate membership of a relevant professional institution
- interview

The verification process must be recorded and available for audit.

4.2.2 have expertise so they have up to date experience, knowledge and understanding of the particular aspects of work they are verifying. This could be verified by records of continuing professional development achievements

4.2.3 have a sound, in-depth knowledge of, and uphold the integrity of, the NOS and this Assessment Strategy (this document)

4.2.4 are prepared to participate in training activities for their continued professional development

4.2.5 hold, or are working towards, a qualification as listed in Assessing and Assuring Quality of Assessment, either in the Qualifications and Credit Framework (QCF), or the Scottish Credit and Qualifications Framework (SCQF):

- Level 4 Award in the Internal Quality Assurance of the Assessment Process and Practice
- Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Process and Practice
- SVQ(SCQF level) in the Internal Quality Assurance of the Assessment Process and Practice

- SVQ (SCQF level) in Leading the Internal Quality Assurance of Assessment Process and Practice

or hold one of the following

- VI Conduct internal quality assurance of the assessment process
- D34 Internal verify the assessment process

Holders of V1/D34 must quality assure to the reviewed National Occupational Standards (NOS) for Learning and Development.

It is strongly recommended that within the role of Internal Quality Assurance one of the following qualifications is held.

- Level 3 Award in Assessing Competence in the Work Environment
- Level 3 Certificate in Assessing Vocational Achievement
- SVQ (SCQF level) Assessing Competence in the Work Environment
- SVQ (SCQF level) Assessing Vocational Achievement

or one of the following

- A1 Assess candidates using a range of methods
- D32/33 Assess candidate performance, using differing sources of evidence

4.3 Awarding organisations must ensure that external verifiers:

4.3.1 have sufficient, verifiable, relevant experience, knowledge and broad understanding of the occupational working area at or above the level being verified. This must be of sufficient depth to be effective and reliable when verifying judgements about internal verification and assessment processes and decisions. External verifiers' experience, knowledge and understanding could be verified by a combination of:

- curriculum vitae and employer endorsement
- references
- possession of a relevant NVQ/SVQ, or vocationally related qualification
- corporate membership of a relevant professional institution
- interview

The verification process must be recorded and available for audit

4.3.2 have sufficient expertise so they have an up to date experience, knowledge and understanding of the particular aspects of work they are verifying. This could be verified by records of continuing professional development achievements

4.3.3 have a sound, in-depth knowledge of, and uphold the integrity of, the NOS and this Assessment Strategy (this document)

4.3.4 are prepared to participate in training activities for their continued professional development

4.3.5 hold, or are working towards, a qualification as listed in Assessing and Assuring Quality of Assessment, either in the Qualifications and Credit Framework (QCF), or the Scottish Credit and Qualifications Framework (SCQF):

- Level 4 Award in the External Quality Assurance of the Assessment Process and Practice

- Level 4 Certificate in Leading the External Quality Assurance of Assessment
- SVQ (SCQF level) in the External Quality Assurance of the Assessment Process and Practice
- SVQ (SCQF) in Leading the External Quality Assurance of Assessment

or hold one of the following

- V2 Conduct external quality assurance of the assessment process
- D35 Externally verify the assessment process

Holders of V2/D35 must quality assure to the reviewed National Occupational Standards (NOS) for Learning and Development.

It is strongly recommended that within the role of External Quality Assurance one of the following qualifications is held at Level 4 and Level 3.

- Level 4 Award in the Internal Quality Assurance of the Assessment Process and Practice
- Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Process and Practice
- SVQ(SCQF level) in the Internal Quality Assurance of the Assessment Process and Practice
- SVQ (SCQF level) in Leading the Internal Quality Assurance of Assessment Process and Practice
- VI Conduct internal quality assurance of the assessment process
- D34 Internal verify the assessment process
- Level 3 Award in Assessing Competence in the Work Environment
- Level 3 Certificate in Assessing Vocational Achievement
- SVQ (SCQF level) Assessing Competence in the Work Environment
- SVQ (SCQF level) Assessing Vocational Achievement

or one of the following

- A1 Assess candidates using a range of methods
- D32/33 Assess candidate performance, using differing sources of evidence

4.4 Selection and appointment of assessors and verifiers

All applicants should be advised that they may be interviewed. Applicants' CVs should be profiled against the activities and range of the NVQ/SVQ(s) they will assess/verify to check that the applicant has the relevant current experience, knowledge and understanding of the occupational working area:

- at, or above, the level they will be assessing
- of sufficient depth to credibly verify judgements and assessments
- to uphold the integrity of the NOS and this Consolidated Assessment Strategy.

All assessors should have experience as well as, not in lieu of, qualifications. Where there seem to be gaps in a potentially suitable applicant's experience and knowledge, the applicant should be interviewed. Successful applicants' CVs, profiling, reasons for not needing to interview and interview records should be available for audit.



Annexe A

ConstructionSkills' standard evidence notes for awarding organisations

These guidance notes have been produced to ensure consistency interpreting the principles set out in sections 2 and 3 of the ConstructionSkills Assessment Strategy. The notes should help awarding organisations incorporate relevant parts of the assessment strategy principles' requirements in their documentation for construction and built environment – craft, supervisory, technical, managerial and professional NVQ/SVQs. The following general standard notes are strongly recommended for adoption by awarding organisations in their assessment specification:

Standard note 1:

"Taken as a whole, the evidence must show that the candidate consistently meets all the following performance criteria across the scope/range."

Standard note 2:

"There must be workplace evidence against each performance criterion. Where the workplace evidence does not cover the whole scope/range, knowledge evidence must be provided to cover the remaining items of scope/range for each relevant performance criterion."

Standard note 3:

"Knowledge evidence may be established from questioning the candidate, or from industry recognised industry education and training programme assessment, or professional interview assessment, that has been matched to the requirements of the National Occupational Standards. Such assessments should also have their own independent external assessment, moderation or verification. A candidate's knowledge and understanding can also be demonstrated through presented performance evidence."

Standard note 4:

Either:

"Simulations are not considered to be acceptable for producing this evidence."

OR

"Simulations are considered to be an acceptable alternative for producing evidence for the following item(s) which is/are considered to be rare/infrequent, but key/critical to demonstrating competence. The following realistic working environment and context must be adopted for the simulation: appropriate: tools, equipment and instruments; materials; types of contingencies; standards and quality specifications; real timescales; quantities of work; physical conditions; relationship with people; type of interaction; communication methods and media; information and data."*

*[*include as appropriate]*

Annex B

The following is a list of the additional information Annexes for awarding organisations where National Working Groups or Awarding Body Forums have identified the need for specific clarification for the units and qualifications with NVQ in the QCF title and SVQs.

NVQs/SVQs	Annex
Controlling Lifting Operations	B1
Plant Operations	B2



Annex B1

Additional Information to the Consolidated Assessment Strategy from the National Working Group for Controlling Lifting Operations

Part A: Clarification and guidance notes

This additional information has been produced to ensure consistency in interpreting the occupational expertise requirements for assessors as described in paragraph 4.1 of the ConstructionSkills' Consolidated Assessment Strategy. This should help awarding organisations incorporate relevant parts of the assessment strategy principles' requirements in their documentation for the Controlling Lifting Operations units and qualifications with NVQ in the QCF title and SVQs.

Additional requirements for assessors of planning and supervising lifting operations

Assessors must be competent and have an up-to-date working knowledge of the occupation and sector. Assessors must have had active involvement in lifting operations and on each endorsement for which they wish to assess. The awarding body must ensure that all assessors are competent on each endorsement for which they intend to assess.

Supplementary guidance

In order to meet contractual and regulative requirements, many sectors of industry require lift planners and supervisors to possess certification from recognised industry approved bodies. The awarding body should ideally encourage all assessors to hold appropriate registration cards or certificates to support industry initiatives for a qualified workforce.

Where lifting experience was gained within the armed forces, applicants for assessor status should ideally gain external work experience within industry, or be able to demonstrate knowledge of relevant industry working practices outside the armed forces.

Part B: Clarification on standards (NOS) content terminology

Various sectors of industry, supported by the Health and Safety Executive, requested national occupational standards for the safety critical occupations of lift planner and lift supervisor. Standards from the suite of National Occupational Standards for Construction Site Supervision and Construction Site Management were identified by the National Working Group (NWG) as conveniently defining the job roles of planner and supervisor.

Certain standards (NOS), however, use terminology particular to, or make reference to, the construction sector, limiting the scope of the standards. Clarification of NOS terminology has been produced (Annex B1, page ii), by the NWG, for awarding organisations, which provides interpretation and meaning of selected words that are used in lifting operations within other industrial sectors. Provision of this clarification further avoids a proliferation of new standards.

Awarding organisations need to ensure that candidates, employers, assessment centres, assessors and those involved in the verification process for this qualification are informed of the clarification of NOS terminology for planning and supervising lifting operations.

Clarification of NOS terminology for controlling lifting operations

'construction operations'	Includes lifting operations within other sectors of industry.
'decision-makers'	This refers to the client, customer or their representative, senior/contracts manager, project team, consultants or in VR 705 the lift planner.
'ensure notice has been given to all the people who will be affected...'	This means as dictated by the lift plan.
'lines', 'levels', 'angles'	This includes load levels, ground levels, lines for placing loads and lifting accessory angles
'near neighbours'	This can include other structures and a workforce in a different part of the project.
'organise and control the site'	The lifting activity and the immediate surrounding area
'position, align and/or level the work'	This refers to items being moved and placed and the equipment used to attach and move the loads.
'produce clear requests for plant, equipment or machinery'	This means those specified by the lift plan.
'place and maintain notices'	This means ensuring that the correct notices (for the lifting activity) are in place prior to the commencement of the lifting activity, and checked throughout the duration of the activity.
'plan how the work will be undertaken'	This means as dictated by the lift plan.
'programmes and schedules'	This refers to either components part of, or the complete lift plan.
'project'	A lifting operation that is taking place within an overall contract, project or work activity.
'project plan'	This refers to either components part of, or the complete lift plan.
'site'	A lifting operation that is taking place within an overall contract, project or work activity.
'site plan'	This refers to either components part of, or the complete lift plan.
'vehicular access'	This can comprise of all forms of transport, including waterborne and airborne craft.

Annexe B2

Additional Information to the Consolidated Assessment Strategy from the Awarding Body Forum for Plant Operations

Clarification and guidance notes

This additional information has been produced to ensure consistency in interpreting the occupational expertise requirements for assessors as described in paragraph 4.1 of the ConstructionSkills' Consolidated Assessment Strategy. This should help awarding organisations incorporate relevant parts of the assessment strategy principles' requirements in their documentation for Plant Operations units and qualifications with NVQ in the QCF title and SVQs.

Additional requirements for assessors of plant operations

Assessors must be competent and have an up-to-date working knowledge of the occupation and sector. Assessors must have had active involvement in plant operations and on each endorsement for which they wish to assess. The awarding organisation must ensure that all assessors are competent on each endorsement for which they intend to assess in accordance with requirements of the qualification regulators' guidance for England, Northern Ireland, Scotland and Wales.

Supplementary guidance

In order to meet contractual and regulative requirements, many sectors of industry require operators of plant and equipment to possess certification from recognised industry approved bodies. The awarding organisation should ideally encourage all assessors to hold appropriate registration cards or certificates to support industry initiatives for a qualified workforce.

Where plant operating experience was gained within the armed forces, applicants for assessor status should ideally gain external work experience within industry, or be able to demonstrate knowledge of relevant industry working practices outside the armed forces.

Annexe D2: SummitSkills assessment strategy for Building Services Engineering pathway

SummitSkills Consolidated Assessment Strategy for Units and Qualifications of “Occupational Competence” in the Qualifications and Credit Framework (England, Northern Ireland and Wales) for the Building Services Engineering Sector

Electrical and Electronic Servicing (Consumer Electronics; Domestic Appliances; Signal Reception)

Electrotechnical (Electrical Installation; Electrotechnical Services)

Mechanical Engineering Services (Air Conditioning; Heating & Ventilation; Plumbing/Domestic Heating; Refrigeration)

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1. Definitions of terminology used in this Assessment Strategy

Terminology	Explanation/Definition
QCF	Qualifications and Credit Frameworks for England, Northern Ireland and Wales.
“NVQ”	The term “NVQ” is used to identify a competence-based qualification.
Occupational Competence	The knowledge, understanding and skills needed by an individual to carry out a particular job role/responsibility safely and in accordance with approved industry and technical standards and working practices.
Assessment of Occupational Competence	A term specifically relating to a means of assessment of the safety-critical and technically critical aspects for the units and qualifications that are the subject of this assessment strategy. It is an independent holistic assessment of the learner’s occupational competence via an assessment process as determined by the industry and endorsed by SummitSkills and the Awarding Organisation(s). In order to undertake this stage of the qualification’s assessment procedure/requirements, evidence of a learner’s involvement, relevant experience and progressive development of occupational competence must be available before an “Assessment of Occupational Competence” is undertaken.
RoC	Rules of Combination – a combination of units, determined by SummitSkills, that are required for a learner to be awarded an identified QCF qualification.
Knowledge Unit	A unit that gives the learner the opportunity to demonstrate their knowledge and understanding of identified topics and subject areas.
Performance Unit	A unit that gives the learner the opportunity to demonstrate they have the practical skills that are in keeping with the relevant National Occupational Standards for identified activities.
Combination Unit	A unit that gives the learner the opportunity to demonstrate their understanding and application of specific knowledge, and is assessed in conditions using particularly identified “relevant practical activities” as defined in the qualification unit.
Simulation and Simulated Conditions	An environment in which simulated activities take place involving the replication of a real working environment. The criteria for which must be to supply fit-for-purpose tools, equipment, full-size components, realistic deadlines and other commercial requirements.
Real Working Environment	An environment in which real work activities take place under real working conditions in keeping with real commercial situations.

Independent Assessment Structure	The independent assessment structure must not be a part of the learner's working or training environment and will provide facilities for assessment in keeping with the industry arrangements (See Annex 3). Therefore, the learner will be independently assessed by an independent assessor in keeping with an industry determined specification.
Key safety-critical aspects	Any "technical" activity with the potential to harm/damage personnel/property if carried out incorrectly (See section 4).
Technically critical	Any activity that is fundamental to the safe and efficient operation of equipment, components and systems.
SSC	Sector Skills Council – SummitSkills is the SSC for the Building Services Engineering sector.

2. Purpose and scope of the Assessment Strategy

The purpose of this assessment strategy is to ensure that qualifications and associated units that attest to occupational competence in an identified role are;

- **Based on the relevant approved National Occupational Standards**
- **Assessed to industry endorsed assessment principles and methodologies**
- **Fit for purpose**
- **Confirm occupational competence**

The assessment of units within a qualification's structure (Rules of Combination-RoC) which are available as "stand alone units" must also be undertaken in adherence with this assessment strategy to ensure that assessment requirements and methodologies are consistently applied in accordance with the principles of the "Assessment of Occupational Competence". Units can be identified as;

- **Knowledge Units**
- **Performance Units**
- **Combinations Units**

2.1 The scope of this Assessment Strategy relates to the competence-based qualifications in the QCF with the term NVQ in the qualification title and any associated units for the principal industries in the Building Services Sector of Air Conditioning, Electrical and Electronic Servicing, Electrotechnical Installation and Services, Heating and Ventilation, Plumbing and Refrigeration. The full list of qualifications is provided in Annex 1. This Assessment Strategy outlines the principles and requirements to be applied to the assessment of knowledge, understanding, performance and/or competence for these qualifications and relevant associated units.

2.2 The qualifications identified in Annex 1 are set at "operative level" which in the context of this strategy is defined as:

Those skilled individuals at level 2 or level 3 (subject to their role) with responsibilities for the installation, maintenance, servicing and/or repair of the systems, services and equipment for climate control, communication, heating, lighting, power, security, water within the sector's principal industries of Air Conditioning and Refrigeration, Electrotechnical Installation and Services, Heating and Ventilation, Plumbing and Electrical and Electronic Servicing.

It should be noted that any additional "Occupational Competence Qualifications/Units" developed for the industries and occupations in the Building Service Engineering sector must be compliant with this assessment strategy. This includes amendments and revisions to those qualifications identified in Annex 1 and relevant associated units developed after the publication of this strategy.

2.3 This strategy is designed for qualifications and units that are delivered in accordance with the requirements of the Qualifications and Credit Frameworks for England, Northern Ireland and Wales.

3. Principles of Assessment

3.1 Given the nature of the potentially hazardous work undertaken by operatives in the key industries of the building services engineering sector (2.2), the methodology(s) of assessment that ensures the candidate is occupationally competent will be determined by the industry for which the qualification and relevant associated unit(s) is designed for.

- 3.2 Qualifications attesting to “**Occupational Competence**” will have a structure that has been determined by SummitSkills.
- 3.3 Unit and qualification assessment requirements will set out the scope of evidence required in terms of components, equipment, enclosures, services, statutory and non-statutory regulations and industry standards and systems.
- 3.4 Methods of assessment;
- 3.4.1 Knowledge Units – projects/assignments, external written assessments/tests and professional discussion.
- 3.4.2 Performance Units - practical activities in the work place or as appropriate in simulated conditions.
- 3.4.3 Combination Units – Practical activities/assignments in simulated conditions. Identified knowledge is assessed in accordance with 3.4.1 above.
- 3.5 The assessment instruments for **Knowledge Units** must be as identified in the “Additional Information” of the unit, be fit-for-purpose and be one or more of;
- 3.5.1 Knowledge tests - centrally set, centrally marked and quality assured by the Awarding Organisations who offer a unit(s) or qualification(s) identified in this strategy.
- 3.5.2 Knowledge based projects or assignments that are centrally set, centre marked and quality assured by the Awarding Organisations who offer a unit(s) or qualification(s) identified in this strategy.
- 3.5.3 Knowledge based professional discussion that is centre devised following centrally specified guidance, centre marked and quality assured by the Awarding Organisations who offer a unit(s) or qualification(s) identified in this strategy.
- 3.6 The environment in which the evidence and the quantity of evidence for **Performance Units** must be assessed, i.e. sourced from the real working environment or simulated conditions, will be detailed in the “Additional Requirements” for each Performance Unit. This could be applicable to all the Learning Outcomes in the unit or particular Learning Outcomes.
- 3.7 Evidence that is sourced from the real working environment for **Performance Units** must be naturally occurring and can be generated by;
- 3.7.1 Direct observation of performance in the workplace by a qualified assessor and/or testimony from an expert witness subject to the activity being assessed (Also see 3.6 above). This will be the primary source of evidence.
- 3.7.2 Candidate’s reflective account of performance.
- 3.7.3 Work plans and work based products e.g. diagrams, drawings, specifications, customer testimony, authorised & authenticated photographs/ images and audiovisual records of work completed.
- 3.7.4 Evidence from prior achievements that demonstrably match the requirements of the Performance Unit.

- 3.7.5 Witness testimony (See Expert Witness Annex 2 – 2.4).
- 3.8 Meeting the assessment requirements of **Performance Units** (3.7) will need initial discussions and assessment planning between the learner and Assessor, as an essential activity to identify opportunities to assess real working environment evidence, gaps that need to be filled or opportunities to recognise the prior achievement of the learner.
- 3.9 The assessment methodology for the assessment of a **Combination Unit** will be centrally-set or centre devised and centrally verified in keeping with design and assessment principles for the unit’s assessment assignment, agreed between SummitSkills and the Awarding Organisations
- 3.10 Competence must be demonstrated **consistently over a period of time and on more than one occasion**. However SummitSkills does not wish to stipulate what that period of time might be as this is a decision for the Assessor. Based on their own professional judgement Assessors must be capable of identifying when competence has been demonstrated by the learner.
- 3.11 Learners should not be put forward for an “**Assessment of Occupational Competence**” until they are **deemed ready to be assessed as competent**. This underpins the assumption that the learner has sufficient technical expertise, knowledge, skill and maturity to meet the expectancies of employers in terms of “Occupational Competence”.
- 3.12 The “**Occupational Competence**” of learners **must** be assessed in accordance with industry requirements as prescribed in Annex 3 and Annex 4 of this strategy.

4. Key Safety-Critical Aspects

Any demonstration of competence involving the key safety-critical aspects listed below must be a fundamental element of the “**Assessment of Occupational Competence**” as determined by the industry

<u>Electrical and Electronic Servicing</u>	<ul style="list-style-type: none"> ➤ Activities relating to limited scope electrical work ➤ Connection & testing of signal reception systems
<u>Mechanical Engineering Services</u>	<ul style="list-style-type: none"> ➤ Activities relating to F Gas installations/service and maintenance ➤ Pressure testing ➤ Handling of refrigerants (ODS, Ammonia, HC and CO₂) ➤ Thermal pipe joining methods – welding; brazing; soldering activities ➤ Limited scope electrical work ➤ As relevant, the installation, connection and servicing/maintenance of fuel systems and equipment – gas; oil; solid fuel ➤ As relevant, the installation, connection and servicing/maintenance of hot/cold water systems and equipment – unvented water; backflow prevention
<u>Electrotechnical</u>	<ul style="list-style-type: none"> ➤ Safe isolation ➤ Termination and connection ➤ Inspection, testing and commissioning ➤ Risk assessments and safe working practices ➤ Diagnosing and correcting faults

5. Simulation and Simulated Conditions (Performance Units)

Situations where simulation is either permissible or mandatory.

5.1. Permissible:

Simulation can take place in those rare circumstances where the opportunities to collect naturally occurring evidence are limited or absent and the learner lacks evidence for completion of the unit. However, this scenario is anticipated to be rare in relation to the qualifications and the units to which this strategy applies given the inherent flexibility of the evidence-gathering process.

5.2. Mandatory:

Simulation **must take** place for industry identified key-safety critical aspects (Section 4) of the qualification as listed in Annex 1 and their relevant associated units.

The activities that will be undertaken demonstrating competence in these areas are contained within each industries “**Assessment of Occupational Competence**” arrangement and this must NOT be undertaken before the learner has demonstrated sufficient technical expertise, knowledge, skill and maturity.

Where simulation does take place it must be in a realistic working environment and/or an independent assessment structure. (See definitions).

6. Quality Assurance of the Assessment Process:

The assessment requirements for “**Competence-Based**” qualifications and units therein identified in Annex 1 of this Assessment Strategy **must** be, in terms of process and quality assurance, compliant with;

6.1 Operating Rules for using the term NVQ in a QCF qualification title – Ofqual, August 2008

and

6.2 “Additional Requirements for QCF Qualifications that use NVQ in the title”, September 2009 – Federation of Awarding Bodies (FAB); Joint Council for Qualifications (JCQ); Alliance for Sector Skills Councils, September 2009

Knowledge units must be assessed in accordance with 3.5 above.

The requirements of Assessors, Internal and External Verifiers are detailed in **Annex 2**.

Annex 1 – QCF Qualification Titles

ELECTROTECHNICAL

- **Level 2 NVQ Diploma in Installing & Servicing Electrical and Electronic Equipment and Appliances**
 - Consumer Electronics Servicing
 - Electrical Appliances

- **Level 3 NVQ Diploma in Installing, Servicing & Commissioning Electrical and Electronic Equipment and Appliances**
 - Consumer Electronics Servicing
 - Electrical Appliances

- **Level 2 NVQ Diploma in Installing & Servicing Signal Reception Systems**

- **Level 3 NVQ Diploma in Installing, Servicing & Commissioning Signal Reception Systems**

- **Level 3 NVQ Diploma in Installing Electrotechnical Systems and Equipment**
 - Audio Visual Systems Installation
 - Buildings, Structures and the Environment
 - Structured Cabling

- **Level 3 NVQ Diploma in Electrotechnical Services**
 - Electrical Maintenance
 - Electrical Panel Building
 - Electrical Machine Rewind & Repair

- **Level 2 NVQ Certificate in Highway Electrical Systems**

- **Level 2 NVQ Diploma in Highway Electrical Systems**

- **Level 3 NVQ Diploma in Servicing Highway Electrical Systems**

- **Level 3 NVQ Diploma in Servicing and Commissioning Highway Electrical Systems**

MECHANICAL ENGINEERING SERVICES

- **Level 2 NVQ Diploma in Install, Test and Maintain Air Conditioning Systems**
- **Level 3 NVQ Diploma in Service and Maintain Air Conditioning Systems**
- **Level 3 NVQ Diploma in Installing & Commissioning Air Conditioning Systems**
- **Level 2 NVQ Diploma in Domestic Heating**
- **Level 3 NVQ Diploma in Domestic Heating**
- **Level 2 NVQ Diploma in Heating & Ventilating – Ductwork Installation**
- **Level 3 NVQ Diploma in Heating & Ventilating – Ductwork Installation**
- **Level 2 NVQ Diploma in Heating & Ventilating – Industrial & Commercial Installation**
- **Level 3 NVQ Diploma in Heating & Ventilating – Industrial & Commercial Installation**
- **Level 2 NVQ Diploma in Heating & Ventilating – Service and Maintenance (t.b.c.)**
- **Level 3 NVQ Diploma in Heating & Ventilating – Service and Maintenance (t.b.c.)**
- **Level 2 NVQ Diploma in Plumbing and Heating**
- **Level 3 NVQ Diploma in Domestic Plumbing and Heating**

- **Level 2 NVQ Diploma in Install and Maintain Refrigeration Systems**
- **Level 3 NVQ Diploma in Install and Commission Refrigeration Systems**
- **Level 3 NVQ Diploma in Servicing and Maintaining Refrigeration Systems**

ENVIRONMENTAL TECHNOLOGIES

- **Level 2 Award in Environmental Technology Awareness**
- **Level 3 Award in Installing and Commissioning Solar Thermal Hot Water Systems**
- **Level 3 Award in Installing and Maintaining Solar Thermal Hot Water Systems**
- **Level 3 Award in Installing and Commissioning Solar Photovoltaic Systems**
- **Level 3 Award in Installing and Maintaining Solar Photovoltaic Systems**
- **Level 3 Award in Installing and Commissioning Heat Pump Systems**
- **Level 3 Award in Installing and Maintaining Heat Pump Systems**
- **Level 3 Award in Installing and Commissioning Water Harvesting and Re-use Systems**
- **Level 3 Award in Installing and Maintaining Water Harvesting and Re-use Systems**

Annex 2 –The requirements of Assessors, Internal Verifiers and External Verifiers for Building Services Engineering competent-based qualifications and relevant associated units

2.1 Assessors must;

2.1.1

Be working towards or have achieved A1 or A2 Standards and continue to practice to those standards;

or

2.1.2

Have achieved D32 or D33 or TQFE/TQSE and possess CPD evidence of practicing to A1 or A2 Standards.

or

2.1.3

Have other suitable “equivalent assessor qualifications” endorsed by SummitSkills, which apply the principles of the A1/A2 Standards.

2.1.4 (Occupational Competence)

Have verifiable relevant industry experience and current knowledge of industry working practices and techniques relevant to the occupational working area. This verifiable evidence must be **at or above the level being assessed** and include one or more of the following:

- a relevant qualification (see list in Section 2.5 of this Annex)
- registration with the appropriate industry registration body at the relevant occupational level and grade.

For particular units/qualifications the verifiable evidence may need to be above the level of the unit/qualification being assessed. This requirement will be detailed in the “Additional Information” pertaining to specific units/qualifications.

Assessment of competence-based units/qualifications for electrotechnical and mechanical services occupations will require assessors **to have the relevant qualification** that certifies their competence in key technical areas pertinent to the completion of the unit/qualification. (see list in Section 2.5 of this Annex 1).

This occupational competence must include up-to-date knowledge of each industry (for which the assessment is taking place), its settings, legislative and regulatory requirements, codes of practice and guidance.

2.1.5 (Assessor Continuing Professional Development)

The occupational competence of assessors must be updated on a regular basis and be periodically reconfirmed via continuing professional development (CPD) via the assessment centres and quality assured by the Awarding Organisation.

It is the responsibility of each assessor to identify and make use of opportunities for CPD, such as industry conferences, access to trade journals, and SSC and Professional Body/Trade Association events, at least on an annual basis to enhance and upgrade their professional development and technical knowledge. It is imperative that records are kept of all such CPD opportunities/occasions and that they provide evidence of cascading such technical knowledge and industry intelligence to all relevant colleagues.

2.2 Internal Verifiers (IV)

2.2.1 (IV Role and Responsibilities)

SummitSkills considers the main focus of IVs to be the quality assurance of assessment procedures. The IV is also required to have a minimum of occupational experience evidenced by having a Building Services Engineering sector related qualification or proven sector competence/experience plus access to relevant “occupational expertise” to enable them to conduct their role as internal verifier appropriately. This evidence and access to “occupational expertise” is quality assured by the Awarding Organisation

2.2.2. Internal verifiers must:

Be working towards or have achieved the V1 Standard and continue to practice to that standard;

or

Have achieved D34 and possess CPD evidence of practicing to the V1 Standard.

and

Demonstrate an understanding of the assessment process

2.2.3 IV Continuing Professional Development

The occupational experience of IVs must be updated on a regular basis and be periodically reconfirmed via continuing professional development (CPD) via the assessment centres and quality assured by the Awarding Organisation.

It is the responsibility of each IV to identify and make use of opportunities for CPD, such as industry conferences, access to trade journals, and SSC and Professional Body/Trade Association events, at least on an annual basis to enhance and upgrade their professional development and technical knowledge.

It is imperative that records are kept of all such CPD opportunities/occasions.

2.3 External Verifiers (EV)

2.3.1 EV Role and Competence

External Verifiers must;

- be accountable to the Awarding Organisation
- be working towards or have achieved the V2 Standard and continue to practice to that standard
 - or
 - have achieved D35 and possess CPD evidence of practicing to the V2 Standard
 - and
 - demonstrate an understanding of the assessment process
- have no connections with the assessment centre, in order to maintain objectivity
- have verifiable relevant sector competence. This verifiable evidence must be **at or**

above the level being audited and include one or more of a relevant occupational qualification (Examples are listed in section 2.5 of this Annex) or be registered with the appropriate industry registration body at the relevant occupational level and grade.

- have sufficient and relevant technical/occupational understanding in the qualification(s)/unit(s) being verified
- be fully conversant with the standards and performance criteria in the units to be assessed
- be able to provide centres with advice and guidance on assessment and internal verification procedures

2.3.2 EV Continuing Professional Development

The occupational competence of EVs must be updated on a regular basis and be periodically reconfirmed via continuing professional development (CPD) and recorded by the assessment centres and quality assured by the Awarding Organisation.

It is the responsibility of each EV to identify and make use of opportunities for CPD, such as industry conferences, access to trade journals, and SSC and Professional Body/Trade Association events, at least on an annual basis to enhance and upgrade their professional development and technical knowledge.

It is imperative that records are kept of all such CPD opportunities/occasions and that they provide evidence of cascading such technical knowledge and industry intelligence to all relevant colleagues.

2.4 Expert Witnesses

Where “**Expert Witnesses**” are used in the assessment process identified above they must be;

- Sector competent individuals who can attest to the learner's performance in the workplace.
- It is not necessary for expert witnesses to hold an assessor qualification, as a qualified assessor must assess the performance evidence provided by an expert witness
- Evidence from expert witnesses must meet the tests of validity, reliability, authenticity and sufficiency
- Expert witnesses will need to demonstrate: -
 1. They have relevant current knowledge of industry working practices and techniques
 2. That they have no conflict of interest in the outcome of their evidence

2.5 Attesting to Occupational Competence for Assessors and EVs

This Assessment Strategy explains that Assessors and External Verifiers must either be able to demonstrate that they are registered and up-to-date with their registration with an appropriate approved industry registration body **or** have one or more of a relevant occupational qualification (See example list below) to ensure that they can be regarded as occupational competent in terms of assessing or verifying the relevant qualifications, and units therein, identified in Annex 1.

NVQs/SVQs at the appropriate level or their equivalents in the Qualifications and Credit Framework

Plumbing

Plumbing (Domestic) (SVQ)

Heating and Ventilating (Rectification of Systems)

Heating and Ventilating Installation (Domestic, Ductwork or Industrial & Commercial)

Refrigeration & Air Conditioning (Commercial & Industrial Air Cond. Systems)

Refrigeration & Air Conditioning (Ammonia Refrigeration Systems)

Refrigeration & Air Conditioning (Commercial & Industrial Refrigeration Systems - Non Ammonia)

Electrotechnical Services (Installation - Buildings & Structures)

Electrotechnical Services (Electrical Maintenance)

Electrotechnical Services (Installing Highway Electrical Systems)

Electrotechnical Services (Installing Structured Cabling Systems)

Electrotechnical Panel Building

Electrical Machine Repair & Rewind

Electrical and Electronic Servicing

Other certificates in competences that have been aligned, and are supplemental, where relevant, to the above:

A relevant brazing or pipe-fitting qualification

Accredited Certification Scheme (ACS)

- CCN1: General Gas Safety
- CEN1: Installation of central heating boilers
- HTR1: Installation of gas fired heaters
- CKR1: Installation of gas cookers
- WAT1: Installation of gas water heaters

BRA/CITB Brazing Assessment

City & Guilds Level 3 NVQ in Gas Emergency Service Operations

City & Guilds Level 2 NVQ in Domestic Natural Gas Installation and Maintenance

City & Guilds Level 3 NVQ in Domestic Natural Gas Installation and Maintenance

Level 2 Vocational Award in Handling Refrigerants (City & Guilds 2078)

Level 2 Vocational Award in ODS F gases (City & Guilds 2079)

Relevant OFTEC and/or HEATAS qualifications

Qualifications recognised under DCLG Competent Person Schemes

Unvented Hot Water external assessment to Building Regulations and/or Building Standards Requirements

Water Supply Regulations (1999)

Water Byelaws (2000)

NOTE: Assessors and verifiers who have relevant qualifications pre-NVQ and post-NVQ which are not competencebased must provide verifiable evidence that they are occupationally competent. This evidence must demonstrate that the assessor/verifier has up-to-date knowledge of the industry/occupation (for which the assessment is taking place), its settings, legislative and regulatory requirements, codes of practice and guidance.

Annex 3 - Industry arrangements for the “Assessment of Occupational Competence”

As explained above, the “Assessment of Occupational Competence” is an independent part of the assessment process. Each industry will have its own arrangements which will be compliant with the following requirements.

Details of these assessments will be based on “Industry Recommendations”, see chart below, and will be arranged and agreed between the Awarding Organisation for the units/qualifications in question and the particular industry/occupation using those qualifications. Each Awarding Organisation shall apply the principles specified in Annex 4 of this strategy, thus ensuring a nationally consistent approach of “Assessment of Occupational Competence” for the industry/occupation concerned.

The design, resource implications, administration and quality assurance requirements for each “Assessment of Occupational Competence” will be determined and agreed by SummitSkills, the industry and the Awarding Organisations in order that there is no disadvantage to the candidate or detriment to the industry in terms of individuals being able to demonstrate “occupational competence”.

Any of the above should be cost effective and imply no additional unreasonable burden or expenditure for Awarding Organisations.

Industry	OUTLINE content for each industry’s “Assessment of Occupational Competence”
<u>Electrical and Electronic Servicing</u>	<ul style="list-style-type: none"> ➤ Activities relating to limited scope electrical work ➤ Installation of signal reception systems and equipment
<u>Electrotechnical</u>	<ul style="list-style-type: none"> ➤ Safe isolation ➤ Risk assessments and safe working practices ➤ Inspection, testing and commissioning ➤ Diagnosing and correcting faults
<u>Heat and ventilation / Ductwork</u>	<ul style="list-style-type: none"> ➤ Activities relating to limited scope electrical work ➤ As relevant, the installation, connection and servicing/maintenance of fuel systems and equipment – gas; oil; solid fuel ➤ As relevant, the installation, connection and servicing/maintenance of hot/cold water systems and equipment – unvented water; backflow prevention ➤ As relevant, the installation, connection and servicing/maintenance of ductwork systems and equipment
<u>Refrigeration and Air Conditioning</u>	<ul style="list-style-type: none"> ➤ Activities relating to F Gas installations/service and maintenance ➤ Limited scope electrical work ➤ Thermal pipe joining methods – welding; brazing; soldering ➤ Assessment and certification as required by F Gas and Ozone Depleting Substances Regulations.

<p><u>Plumbing</u></p>	<p>➤ Activities relating to limited scope electrical work</p> <p>Domestic Plumbing & Domestic Heating</p> <p>➤ Assessment in the following competence areas must meet the minimum standards laid down by the following bodies and be capable of facilitating separate operative registration (without further assessment and training) with industry recognised bodies approved to register operatives in the listed competence area.</p> <ul style="list-style-type: none"> • Water Regulations – DEFRA (WRAS) • Unvented hot water – Building Regulations/Standards • Energy efficiency – Building Regulations/Standards (Part L1 of the Building Regulations in England & Wales) • Gas – gas registration provider • Oil – OFTEC • Solid fuel – HETAS • Electrical – defined scope Part P electricians • Emerging technologies – MTC proposals (Competent Persons Schemes) <p>Level 3 Industrial/Commercial Plumbing</p> <p>➤ Assessment in the following competence areas must meet the minimum standards laid down by the following bodies and be capable of facilitating separate operative registration (without further assessment and training) with industry recognised bodies approved to register operatives in the listed competence area.</p> <ul style="list-style-type: none"> • Water Regulations – DEFRA (WRAS) • Disinfection of water systems DEFRA (WRAS) • Unvented hot water – Building Regulations/Standards • Gas – gas registration provider
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Annex 4 – Arrangements between organisations providing the facilities for the “Assessment of Occupational Competence” and Awarding Organisations

1. Introduction

- 1.1 The “Assessment of Occupational Competence” is a part of the assessment process/requirements for the qualification structures identified in this assessment strategy (Annex 1), it is an independent activity or activities which are conducted as part of the assessment process to confirm occupational competence
- 1.2 Each industry will have its own requirements which are compatible to and reflect their particular necessities in terms of assessing occupational competence (Annex 3) in an “independent structure”. These arrangements and the assessment methodology will be agreed between SummitSkills and Awarding Organisations accordingly.
- 1.3 The **Heating & Ventilating, Plumbing and Refrigeration & Air Conditioning** industries will maximise the facilities in approved delivery/assessment centres who will provide an independent, controlled and designated assessment environment within its learning and assessment resource for the purpose of the “Assessment of Occupational Competence” for the identified qualification in question
- 1.4 The **Electrical & Electronic Servicing (Consumer Electronics; Domestic Appliances; Signal Reception)** industry will maximise the facilities in approved delivery/assessment centres who will provide an independent, controlled and designated assessment environment within its learning and assessment resource for the purpose of the “Assessment of Occupational Competence” for the qualification in question
- 1.5 The **Electrotechnical (Electrical Installation; Electrical Maintenance; Electrical Panel Building; Electric Motor Repair & Rewind)** industry will use an industry prescribed “Assessment of Occupational Competence” facilitated by organisations approved by National Electrotechnical Training (NET)¹.

NOTE 1: **NET** is an independent industry charity which represents and coordinates particular training initiatives in the electrotechnical industry. Its portfolio includes holding the intellectual copyright for the industry’s recognised and approved “Occupational Competency Assessment” – **AM2** in England, Northern Ireland and Wales. Therefore, NET has the responsibility and accountability for the quality and rigour of the industry’s “Assessment of Occupational Competence” in terms of provision, facilities, health & safety, marking regime and assessment methodology and quality assurance.

2. Purpose

- 2.1 The purpose of these Arrangements is to define the roles and responsibilities of the organisations and bodies involved with facilitating, managing and administering the “Assessment of Occupational Competence” for each industry.
- 2.2 These Arrangements only relate to the qualifications identified in Annex 1 of this assessment strategy or their revisions/replacements as determined by SummitSkills.

3. Roles and Responsibilities

3.1 Heating & Ventilating, Plumbing and Refrigeration & Air Conditioning and Electrical & Electronic Servicing qualifications:

- 3.1.1 The “Assessment of Occupational Competence” requirements will be determined by SummitSkills in partnership with industry representatives and Awarding Organisations.
- 3.1.2 The “Assessment of Occupational Competence” facilities will be provided by Awarding Organisation approved centres and comply with the requirements identified in 3.1.1
- 3.1.3 Awarding Organisation Internal Verifiers (IVs) and External Verifiers (EVs) will be responsible for quality assuring the “Assessment of Occupational Competence” facilities in accordance with the Awarding Organisation’s compliance requirements.

3.2 Electrotechnical:

For the purpose of these Arrangements organisations approved to provide the “Electrotechnical Assessment of Occupational Competence ” will be referred to as “EAOCCentres”

- 3.2.1 The “Electrotechnical Assessment of Occupational Competence” requirements will be determined and prescribed by NET.
- 3.2.2 The “Electrotechnical Assessment of Occupational Competence” facilities will be provided by “EAOCCentres” approved by NET in accordance with the NET industry endorsed Centre Approval Specification.
- 3.2.3 NET will be responsible and accountable for the quality assurance of the “Electrotechnical Assessment of Occupational Competence” facility, assessment methodology and marking regime/criteria.
- 3.2.4 NET will be responsible for quality assuring the rigour and assessment methodology associated with the “Electrotechnical Assessment of Occupational Competence” facilities and assessment requirements in accordance with the NET industry endorsed “EAOCCentres” Approval Specification.
- 3.2.5 NET will provide Awarding Organisation EVs summaries of the annual monitoring visit criteria, procedures and reports, as appropriate, for “EAOCCentres” who are approved to provide the “Electrotechnical Assessment of Occupational Competence” facility.
- 3.2.6 NET will provide Awarding Organisation IVs and EVs, as appropriate, a summary of the principles of the “Electrotechnical Assessment of Occupational Competence” marking regime and criteria in terms of its integrity, robustness and consistency”.
- 3.2.7 NET will work in partnership, as appropriate, with Awarding Organisations to address any candidate grievances related to the “Electrotechnical Assessment of Occupational Competence”.
- 3.2.8 SummitSkills and NET will be responsible for the maintenance of the “Electrotechnical Assessment of Occupational Competence” unit in the QCF.

4. Currency of these Arrangements

It is expected that the currency of these Arrangements will match with the accreditation period of the qualifications, or units therein as relevant, as identified in Annex 1. SummitSkills, in partnership with the Awarding Organisations and any relevant approval organisation(s) associated with these Arrangements will review the Arrangements bi-annually or as appropriate subject to any revisions to the qualifications identified in Annex 1.

Annexe D3: Sema assessment strategy for Manufacturing Engineering pathway

The logo for Sema, featuring the word "sema" in a white, lowercase, sans-serif font inside a blue rounded rectangle with a purple shadow effect.

Sema

Engineering

NVQ Level 2, 3 and 4

QCF Unit Assessment Strategy

Version 1. 16th March 2010

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Introduction

Semta, the Sector Skills Council for the Science Engineering Manufacturing Technologies Sector, has produced this QCF Unit Assessment Strategy to:

- assist Assessors, Internal Verifiers and External Verifiers
- encourage and promote consistent assessment of NVQ units
- promote cost effective assessment plans.

This document also provides definitions for:

- the qualifications and experience required for Assessors and Verifiers
- the assessment environment and notes on simulation/replication
- access to units.

and requirements relating to:

- carrying out assessments
- performance evidence
- assessing knowledge and understanding.

The importance and value in which employers and learners place on undertaking NVQ units will provide a key measure of Semta's success with this unit assessment strategy. Another key success factor will be Semta's partnership with the relevant Awarding Organisations.

Assessor Requirements to Demonstrate Effective Assessment Practice

Assessment must be carried out by competent Assessors who hold, or are working towards, the nationally recognised Assessor units A1 and/or A2 as appropriate to the assessment being carried out. Assessors that hold units D32 and/or D33 must demonstrate that they are applying the assessment principles and practices set down in A1 and/or A2 as appropriate to the assessment being carried out.

Assessor Technical Requirements

Assessors must be able to demonstrate that they have verifiable, relevant and sufficient technical competence to evaluate and judge performance and knowledge evidence requirements as set out in the relevant QCF unit learning outcomes and associated assessment criteria.

This will be demonstrated either by holding a relevant technical qualification or by proven industrial experience of the technical areas to be assessed. The assessor's competence must, at the very least, be at the same level as that required of the learner(s) in the units being assessed.

Assessors must also be:

Fully conversant with the Awarding Organisation's assessment recording documentation used for the QCF NVQ units against which the assessments and verification are to be carried out, other relevant documentation and system and procedures to support the QA process.

Verifier Requirements

Internal Verifiers must hold, or be working towards, the nationally recognised Internal Verifier unit V1 and would be expected to be familiar with, and preferably hold, the nationally recognised Assessor units. Internal Verifiers that hold unit D34 must demonstrate that they are applying the verification principles and practices set down in V1.

External Verifiers must hold, or be working towards, the nationally recognised External Verifier unit V2 and would be expected to be familiar with, and preferably hold, the nationally recognised Assessor units, and Internal Verifier unit. External Verifiers that hold unit D35 must demonstrate that they are applying the verification principles and practices set down in V2.

Verifiers, both Internal and External, will also be expected to be fully conversant with the terminology used in the QCF NVQ units against which the assessments and verification are to be carried out, the appropriate Regulatory Body's systems and procedures and the relevant Awarding Organisation's documentation, systems and procedures within which the assessment and verification is taking place.

Specific technical requirements for internal and external verifiers

Internal and external verifiers of this qualification must be able to demonstrate that have verifiable, sufficient and relevant industrial experience, and must have a working knowledge of the processes, techniques and procedures that are used in the relevant sector/occupation.

The tables on the following page show the recommended levels of technical competence for assessors, internal verifiers, and external verifiers.

Technical Requirements for Assessors and Verifiers

Position	Prime activity requirements	Support activity requirements	Technical requirements (see notes)
Assessor	Assessment Skills	IV Systems	Technical <i>competence</i> in the areas covered by the QCF units being assessed
Internal Verifier	Verification Skills	Assessment Knowledge	Technical <i>understanding</i> of the areas covered by the qualifications
External Verifier	Verification skills	Assessment Understanding	Technical <i>awareness</i> of the areas covered by the qualifications

Notes

1. Technical *competence* is defined here as a combination of practical skills, knowledge, and the ability to apply both of these, in familiar and new situations, within a real working environment.
2. Technical *understanding* is defined here as having a good understanding of the technical activities being assessed, together with knowledge of relevant Health and Safety implications and requirements of the assessments.
3. Technical *awareness* is defined here as a general overview of the subject area, sufficient to ensure that assessment and portfolio evidence are reliable, and that relevant Health and Safety requirements have been complied with.
4. The competence required by the assessor, internal verifier and external verifier, in the occupational area being assessed, is likely to exist at three levels as indicated by the shaded zones in the following table.

Technical Competence required by:	An ability to <i>discuss</i> the general principles of the competences being assessed	An ability to <i>describe</i> the practical aspects of the competence being assessed	An ability to <i>demonstrate</i> the practical competences being assessed
Assessor			
Internal Verifier			
External Verifier			

Assessment Environment

The evidence put forward for this unit can only be regarded valid, reliable, sufficient and authentic if achieved and obtained in the working environment and be clearly attributable to the learner. However, in certain circumstances, simulation/replication of work activities may be acceptable.

- The use of high quality, realistic simulations/replication, which impose pressures which are consistent with workplace expectations, should only be used in relation to the assessment of the following:-
 - rare or dangerous occurrences, such as those associated with health, safety and the environment issues, emergency scenarios and rare operations at work;
 - the response to faults and problems for which no opportunity has presented for the use of naturally occurring workplace evidence of learners competence;
 - aspects of working relationships and communications for which no opportunity has presented for the use of naturally occurring workplace evidence of learners competence.
- Simulations/replications will require prior approval from the specific Awarding Organisation and should be designed in relation to the following parameters:-
 - the environment in which simulations take place must be designed to match the characteristics of the working environment;
 - competencies achieved via simulation/replication must be transferable to the working environment;
 - simulations which are designed to assess competence in dealing with emergencies, accidents and incidents must be verified as complying with relevant health, safety and environmental legislation by a competent health and safety/environmental control officer before being used;
 - simulated activities should place learners under the same pressures of time, access to resources and access to information as would be expected if the activity was real;
 - simulated activities should require learners to demonstrate their competence using plant and/or equipment used in the working environment;

- simulated activities which require interaction with colleagues and contacts should require the learner to use the communication media that would be expected at the workplace;
- for health and safety reason simulations need not involve the use of genuine substances/materials. Any simulations which require the learner to handle or otherwise deal with materials substances/should ensure that the substitute take the same form as in the workplace.

Access to Assessment

There are no entry qualifications or age limits required by learners to undertake the NVQ units unless this is a legal requirement of the process or the environment. Assessment is open to any learner who has the potential to achieve the assessment criteria set out in the units.

Aids or appliances, which are designed to alleviate disability, may be used during assessment, providing they do not compromise the standard required.

Carrying Out Assessment

The NVQ units were specifically developed to cover a wide range of activities. The evidence produced for the units will, therefore, depend on the learners choice of "bulleted items" listed in the unit assessment criteria.

Where the assessment criteria gives a choice of bulleted items (for example 'any three from five'), assessors should note that learners do not need to provide evidence of the other items to complete the unit (in this example, two) items, particularly where these additional items may relate to other activities or methods that are not part of the learners normal workplace activity or area of expertise.

Performance Evidence Requirements

Performance evidence must be the main form of evidence gathered. In order to demonstrate consistent, competent performance for a unit, a minimum of 3 different examples of performance must be provided, and must be sufficient to show that the assessment criteria have been achieved to the prescribed standards. It is possible that some of the bulleted items in the assessment criteria may be covered more than once. The assessor and learner need to devise an assessment plan to ensure that performance evidence is sufficient to cover all the specified assessment criteria and which maximises the opportunities to gather evidence. Where applicable, performance evidence maybe used for more than one unit.

The most effective way of assessing competence, is through direct observation of the learner. Assessors must make sure that the evidence provided reflects the learner's competence and not just the achievement of a training programme.

Evidence that has been produced from team activities, for example, maintenance or installation activities is only valid when it clearly relates to the learners specific and individual contribution to the activity, and not to the general outcome(s).

Each example of performance evidence will often contain features that apply to more than one unit, and can be used as evidence in any unit where appropriate.

Performance evidence must be a combination of:

- outputs of the learner's work, such as items that have been manufactured, installed, maintained, designed, planned or quality assured, and documents produced as part of a work activity.

together with:

- evidence of the way the learner carried out the activities such as witness testimonies, assessor observations or authenticated learner reports, records or photographs of the work/activity carried out, etc.

Competent performance is more than just carrying out a series of individual set tasks. Many of the units contain statements that require the learner to provide evidence that proves they are capable of combining the various features and techniques. Where this is the case, separate fragments of evidence would not provide this combination of features and techniques and will not, therefore, be acceptable as demonstrating competent performance.

If there is any doubt as to what constitutes valid, authentic and reliable evidence, the internal and/or external verifier should be consulted.

Assessing knowledge and understanding

Knowledge and understanding are key components of competent performance, but it is unlikely that performance evidence alone will provide enough evidence in this area. Where the learners knowledge and understanding (and the handling of contingency situations) is not apparent from performance evidence, it must be assessed by other means and be supported by suitable evidence.

Knowledge and understanding can be demonstrated in a number of different ways. Sema expects oral questioning and practical demonstrations to be used, as these are considered the most appropriate for these units.

Assessors should ask enough questions to make sure that the learner has an appropriate level of knowledge and understanding, as required by the unit. Awarding Organisations may choose other methods, which must be supported by a suitable rationale.

Evidence of knowledge and understanding will not be required for those bulleted items in the assessment criteria that have not been selected by the learner.

The achievement of the specific knowledge and understanding requirements of the units cannot simply be inferred by the results of tests or assignments from other units, qualifications or training programmes. Where evidence is submitted from these sources, the assessor must, as with any assessment, make sure the evidence is valid, reliable, authentic, directly attributable to the learner, and meets the full knowledge and understanding requirements of the unit.

Where oral questioning is used the assessor must retain a record of the questions asked, together with the learner's answers.

Awarding Organisations may choose other methods, which must be supported by a suitable rationale.

Witness testimony

Where 'observation is used to obtain performance evidence, this must be carried out against the unit assessment criteria. Best practice would require

that such observation is carried out by a qualified Assessor. If this is not practicable, then alternative sources of evidence may be used.

For example, the observation may be carried out against the assessment criteria by someone else that is in close contact with the learner. This could be a team leader, supervisor, mentor or line manager who may be regarded as a suitable witness to the learners competency. However, the witness must be technically competent in the process or skills that they are providing testimony for, to at least the same level of expertise as that required of the learner. It will be the responsibility of the assessor to make sure that any witness testimonies accepted as evidence of the learner's competency are reliable, auditable and technically valid.

Quality Control of Assessment

General

There are two major points where an Awarding Organisation interacts with the Centre in relation to the External Quality Control of Assessment for a qualification and these are:

- Approval – when a Centre take on new qualifications, the Awarding Organisation, normally through an External Verifier (EV) ensures that the Centre is suitably equipped and prepared to deliver the new qualification
- Monitoring – throughout the ongoing delivery of the qualification the Awarding Organisation, through EV monitoring and other mechanisms must maintain and the quality and consistency of assessment of the qualification.

Approval

In granting Approval, the Awarding Organisation, normally through its External Verifiers (EV) Must ensure that the prospective Centre:

- Meets any procedural requirements specified by the Awarding Organisation
- Has sufficient and appropriate physical and staff resources
- Meets relevant health and safety and/or equality and access requirements
- Has a robust plan for the delivery, assessment and QA for the qualifications.

Awarding Organisation's may decide to visit the Centre to view the evidence provided. The Awarding Organisation must have a clear rationale for the method(s) deployed

Monitoring

The Awarding Organisation, through EV monitoring and other mechanisms must ensure:

- that a strategy is developed and deployed for the ongoing Awarding Organisation monitoring of the Centre. This strategy must be based on an active risk assessment of the Centre. In particular the strategy must identify the learner, assessor and IV sampling strategy to be deployed and the rationale behind this
- that the Centre's internal quality assurance processes are effective in learner assessment
- that sanctions are applied to a Centre where necessary and that corrective actions are taken by the Centre and monitored by the Awarding Organisation/EV
- that reviews of Awarding Organisation's external auditing arrangements are undertaken.

Awarding Organisations are required to provide to SEMTA, on request, details of the strategies, rationales and reviews detailed above.

Additional Notes:

- a) It is recognised that some Awarding Organisations provide supplementary guidance and documentation to centres to support the quality of assessment and verification practice of N/SVQs.

Annexe E: Additional requirement for qualifications that use the term 'NVQ' in a QCF qualification title

For details please go to www.ofqual.gov.uk to access the document 'Operating rules for using the term 'NVQ' in a QCF qualification title'.

Annexe F: Personal, Learning and Thinking Skills (PLTS) mappings

PLTS	Units	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		L4	L4	L4	L4	L4	L3	L5	L4												
Independent Enquirers																					
1	identify questions to answer and problems to resolve					•															
2	plan and carry out research, appreciating the consequences of decisions	•	•	•	•	•			•	•	•										
3	explore issues, events or problems from different perspectives	•					•		•												
4	analyse and evaluate information, judging its relevance and value	•	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•	•
5	consider the influence of circumstances, beliefs and feelings on decisions and events						•														
6	support conclusions, using reasoned arguments and evidence	•							•								•				•
Creative Thinkers																					
1	generate ideas and explore possibilities		•				•														•
2	ask questions to extend their thinking																				
3	connect their own and others' ideas and experiences in inventive ways		•																		
4	question their own and others' assumptions																				
5	try out alternatives or new solutions and follow ideas through																				
6	adapt ideas as circumstances change	•	•	•	•	•									•	•	•	•			
Reflective Learners																					
1	assess themselves and others, identifying opportunities and achievements		•				•														•
2	set goals with success criteria for their development and work		•				•														
3	review progress, acting on the outcomes		•				•														
4	invite feedback and deal positively with praise, setbacks and criticism		•																		
5	evaluate experiences and learning to inform future progress		•																		•

PLTS	Units	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
		L4	L5	L5	L5	L5	L3	L4													
Independent Enquirers																					
1	identify questions to answer and problems to resolve	•	•									•						•	•	•	
2	plan and carry out research, appreciating the consequences of decisions		•									•						•	•	•	
3	explore issues, events or problems from different perspectives		•	•								•	•					•	•	•	
4	analyse and evaluate information, judging its relevance and value		•	•	•				•			•						•	•	•	
5	consider the influence of circumstances, beliefs and feelings on decisions and events	•	•	•		•	•		•			•						•	•	•	
6	support conclusions, using reasoned arguments and evidence		•		•				•			•						•	•	•	
Creative Thinkers																					
1	generate ideas and explore possibilities		•											•							
2	ask questions to extend their thinking													•							
3	connect their own and others' ideas and experiences in inventive ways													•							
4	question their own and others' assumptions																				
5	try out alternatives or new solutions and follow ideas through		•																		
6	adapt ideas as circumstances change	•	•	•																	
Reflective Learners																					
1	assess themselves and others, identifying opportunities and achievements	•												•							
2	set goals with success criteria for their development and work													•	•						
3	review progress, acting on the outcomes													•				•			
4	invite feedback and deal positively with praise, setbacks and criticism																	•			
5	evaluate experiences and learning to inform future progress																	•			
6	communicate their learning in relevant ways for different audiences			•										•							

Team Workers												
1	collaborate with others to work towards common goals											
2	reach agreements, managing discussions to achieve results											
3	adapt behaviour to suit different roles and situations, including leadership roles											
4	show fairness and consideration to others											
5	take responsibility, showing confidence in themselves and their contribution											
6	provide constructive support and feedback to others											
Self-Managers												
1	seek out challenges or new responsibilities and show flexibility when priorities change											
2	work towards goals, showing initiative, commitment and perseverance											
3	organise time and resources, prioritising actions											
4	anticipate, take and manage risks											
5	deal with competing pressures, including personal and work-related demands											
6	respond positively to change, seeking advice and support when needed											
7	manage their emotions, and build and maintain relationships											
Effective Participators												
1	discuss issues of concern, seeking resolution where needed											
2	present a persuasive case for action											
3	propose practical ways forward, breaking these down into manageable steps											
4	identify improvements that would benefit others as well as themselves											
5	try to influence others, negotiating and balancing diverse views to reach workable solutions											
6	act as an advocate for views and beliefs that may differ from their own											

PLTS	Units	41 L4	42 L4	43 L4	44 L4	45 L4	46 L4	47 L4	48 L3	49 L3	50 L3	51 L4	52 L4	53 L4	54 L4	55 L4	56 L4	57 L4	58 L4	59 L3
Independent Enquirers																				
1	identify questions to answer and problems to resolve	•			•						•								•	
2	plan and carry out research, appreciating the consequences of decisions				•														•	
3	explore issues, events or problems from different perspectives				•														•	
4	analyse and evaluate information, judging its relevance and value	•			•		•		•		•								•	•
5	consider the influence of circumstances, beliefs and feelings on decisions and events				•														•	
6	support conclusions, using reasoned arguments and evidence				•						•								•	•
Creative Thinkers																				
1	generate ideas and explore possibilities				•															
2	ask questions to extend their thinking				•															
3	connect their own and others' ideas and experiences in inventive ways																			
4	question their own and others' assumptions																			
5	try out alternatives or new solutions and follow ideas through																	•		
6	adapt ideas as circumstances change									•			•						•	•
Reflective Learners																				
1	assess themselves and others, identifying opportunities and achievements											•	•	•	•	•	•	•	•	
2	set goals with success criteria for their development and work											•	•	•	•	•	•	•	•	
3	review progress, acting on the outcomes											•	•	•	•	•	•	•	•	
4	invite feedback and deal positively with praise, setbacks and criticism																			
5	evaluate experiences and learning to inform future progress																			
6	communicate their learning in relevant ways for different audiences																			

Team Workers												
1	collaborate with others to work towards common goals											
2	reach agreements, managing discussions to achieve results											
3	adapt behaviour to suit different roles and situations, including leadership roles											
4	show fairness and consideration to others											
5	take responsibility, showing confidence in themselves and their contribution											
6	provide constructive support and feedback to others											
Self-Managers												
1	seek out challenges or new responsibilities and show flexibility when priorities change											
2	work towards goals, showing initiative, commitment and perseverance											
3	organise time and resources, prioritising actions											
4	anticipate, take and manage risks											
5	deal with competing pressures, including personal and work-related demands											
6	respond positively to change, seeking advice and support when needed											
7	manage their emotions, and build and maintain relationships											
Effective Participants												
1	discuss issues of concern, seeking resolution where needed											
2	present a persuasive case for action											
3	propose practical ways forward, breaking these down into manageable steps											
4	identify improvements that would benefit others as well as themselves											
5	try to influence others, negotiating and balancing diverse views to reach workable solutions											
6	act as an advocate for views and beliefs that may differ from their own											

Annexe G: NOS mappings

Unit number	Unit reference number	Unit title	Derived from the National Occupational Standards
1	H/600/9609	Ensure Compliance with Legal, Regulatory, Ethical and Social Requirements	CFAMLB8
2	T/504/7523	Managing the Development of Self and Others	740
3	T/504/7576	Planning Construction Work Processes and Efficient Use of Resources in Construction and the Built Environment	D21.1/.3/.4
4	A/504/7577	Monitoring Construction and Installation Operations and Resources to Minimise Energy and Waste in Construction and the Built Environment	D23.6
5	F/504/7578	Monitoring Supplies of Resources to Meet Project Sustainability Requirements in Construction and the Built Environment	D.27.1/.2, 27.3
6	H/600/7486	Maintaining Systems for Health, Safety, Welfare and Environmental Protection in the Workplace	COSVR700
7	Y/504/1088	Developing Working Relationships in Construction and the Built Environment	COSVR210
8	J/504/7582	Confirming Project Energy Efficiency and Carbon Minimisation Requirements and Measures in Construction and the Built Environment	B13.2 and B62
9	L/504/7583	Implementing Resource Efficient Procurement Processes in Construction and the Built Environment	D12.1/.2/.3/.4
10	R/504/7584	Implementing Project Information and Communication Systems and Procedures in Construction and the Built Environment	D22.2

Unit number	Unit reference number	Unit title	Derived from the National Occupational Standards
11	Y/504/7585	Co-ordinating Work Operations and Resources to Meet Project Requirements in Construction and the Built Environment	D23.1/.4
12	D/504/7586	Co-ordinating the Logistics for Work to Existing Occupied Properties in Construction and the Built Environment	D23.3
13	H/504/7587	Monitoring the Assembly Processes to Achieve Prescribed Performance Standards in Construction and the Built Environment	D23.5
14	M/504/7589	Monitoring Project Quality, Progress and Cost in Construction and the Built Environment	D31.1/.3/.4
15	H/600/9674	Plan, Allocate and Monitor Work in Own Area of Responsibility	CFAMLD6
16	T/504/7528	Managing Health and Safety in the Building Services Engineering Work Location	SSTE 1
17	T/504/7531	Managing Building Services Engineering Projects in the Work Location	SSTE 4
18	M/600/9712	Manage the Environmental Impact of Work Activities	CFAMLE9
19	A/504/7529	Managing the Effectiveness of a Building Services Engineering Workforce	SSTE 2
20	M/504/7530	Developing Estimates and Submitting Tenders for Building Services Engineering Projects	SSTE 3
21	F/504/7533	Managing Contract Procedures for Building Services Engineering Projects	SSTE 5
22	R/504/7536	Developing and Testing Building Services Engineering Project Design Solutions	SSTE 6
23	D/504/7538	Preparing and Advising on Building Services Engineering Project Design Recommendations	SSTE 7

Unit number	Unit reference number	Unit title	Derived from the National Occupational Standards
24	H/504/7539	Preparing and Agreeing Detailed Building Services Engineering Project Designs	SSTE 8
25	M/504/7625	Planning Work Methods, Resources and Systems to Meet Building Services Engineering Project Work Requirements	SSTE 9
26	Y/504/7540	Implementing Works to Meet Building Services Engineering Project Requirements	SSTE 10
27	K/504/7543	Commissioning Building Services Engineering Systems After Installation	SSTE 11
28	M/504/7544	Controlling Building Services Engineering Project Income and Expenditure	SSTE 12
29	T/600/9632	Promote Equality of Opportunity, Diversity and Inclusion Across an Organisation	CFAMLB12
30	A/600/9616	Establish Risk Management Processes for an Organisation	PPLAOG75
31	D/504/1111	Designing Sustainable Building Services Engineering Systems	COSTPCBCB51.1
32	M/504/1114	Analysing and Monitoring Building Services Engineering Controls	COSTPCBCB51.1
33	H/600/7486	Maintaining Systems for Health, Safety, Welfare and Environmental Protection in the Workplace	COSVR700
34	J/600/9750	Plan and Manage a Project	CFAMLF1
35	K/504/7591	Managing the Environmental Impact of Work Activities in Manufacturing Engineering	CFAMLE9
36	H/504/7590	Developing Working Relationships	CFAMLD1
37	M/504/1016	Develop a New Product Manufacturing Process Design Strategy	SEMPD14-28
38	K/502/9172	Undertake Engineering Research	SEMENGL4-08
39	M/502/9173	Establish an Engineering Design Brief	SEMENGL4-10

Unit number	Unit reference number	Unit title	Derived from the National Occupational Standards
40	L/502/9178	Schedule Activities for Engineering Methods and Procedures	SEMENGL4-16
41	H/600/9738	Manage a Tendering Process	CFAMLE16
42	L/600/9703	Develop and Implement a Risk Assessment Plan in Own Area of Responsibility	CFAMLB10
43	Y/600/9798	Prepare for and Support Quality Audits	CFAMLF14
44	D/502/9170	Identify Engineering Design Requirements of Clients	SEMENGL4-03
45	H/502/9171	Produce Engineering Specifications	SEMENGL4-04
46	T/502/9174	Create Engineering Designs	SEMENGL4-12
47	J/502/9180	Implement Engineering Processes	SEMENGL4-18
48	M/600/5319	Analysing and Selecting Parts for Improvement	SEMBIT3-08
49	M/600/5336	Creating Standard Operating Procedures (SOP)	SEMBIT3-16
50	R/600/5331	Carrying Out Capability Studies	SEMBIT3-26
51	T/600/5483	Leading an Analysis and Selection of Parts for Improvement	SEMBIT9
52	F/600/5888	Leading the Creation of Standard Operating Procedures (SOP)	SEMBIT23
53	L/600/5957	Leading the Carrying Out of Capability Studies	SEMBIT29
54	D/600/5896	Leading the Application of Six Sigma Methodology to a Project	SEMBIT24
55	K/600/5447	Leading the Creation of Flexible Production and Manpower Systems	SEMBIT7
56	R/600/5698	Leading Policy Deployment Activities (Hoshin Kanri, Quality Operating Systems, Business Plan Deployment)	SEMBIT16
57	A/600/5713	Leading Value Management (Value Engineering and Value Analysis) Activities	SEMBIT17
58	J/600/5875	Applying Quality Function Deployment (QFD)	SEMBIT22
59	M/600/5305	Applying Six Sigma Methodology to a Project	SEMBIT3-17

