



Qualification Specification

DPH-009

**BPEC Level 2 Diploma in Plumbing
Foundation**

Qualification Number – **600/9432/1**

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About BPEC

BPEC Certification Ltd was initially established in 1997 to act as an accredited certification body to oversee competence assessment of individuals working in the gas industry. It has extended its coverage and now offers a range of assessment and certification services to meet the needs of operatives working in the Building Services Sector.

In 2010 BPEC established a recognised Awarding Organisation, offering a suite of regulated qualifications. These have been developed with the input of industry and learning providers to meet the skills needs of the Building Services Engineering sector.

The Company is committed to high levels of customer service and providing support to organisations who deliver our qualifications. We are also committed to offering qualifications, assessments and learning materials, which meet the needs of employers, learners and training providers on an ongoing basis.

BPEC Certification is a not-for-profit company and any surplus funds are gift aided to the BPEC Charity. The focus of the Charity is to raise the knowledge and skills of those who work in the UK plumbing and heating industry and support associated projects, grants and awards.

Should you wish to learn more about BPEC (including our charity work) please contact:

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Or visit our website at:

www.bpec.org.uk

1. Introduction to the Qualification

1.1. Qualification Overview

Qualification Title		BPEC Level 2 Diploma in Plumbing Foundation			
Qualification Number (QN)		600/9432/1			
BPEC Qualification Code		DPH-009			
Assessment Method/s		Online MCT's, In Centre Practical Assessments			
Entry Requirements		Learners must be 16 years old or over			
GLH	588	TQT	700	Credits	70
Mandatory Units		10			
Last Registration Date		30/09/2024			
Last Certification Date		30/09/2027			

1.2. Who this Qualification is for?

This qualification is for those learners wishing to gain a knowledge of plumbing who may be thinking of entering the Plumbing/Heating/Building Services Engineering industry.

1.3. The Purpose of the Qualification

Learners will develop essential skills, knowledge, and disciplines of plumbing, allowing further progression onto either a full BPEC Level NVQ 2 Diploma in Plumbing and Heating, the BPEC Level 3 Diploma in Plumbing and Domestic Heating or the BPEC Level 3 diploma in Plumbing Foundation.

1.4. Support and Accreditation

This qualification is supported by industry and regulated by OFQUAL.

1.5. Relationship to Other Qualifications

This Level 2 qualification is part of a suite of three (3) diploma qualifications in plumbing foundation and, as such, allows successful learners to progress to Level 3 of the suite of qualifications.

Successful completion of the qualification also allows progression onto Phase 2 of the Level 3 Diploma in Plumbing and Domestic Heating, giving exemption from Phase 1 and part of Phase 2 of the Qualification.

1.6. Qualification Limitations

The holder of this qualification is NOT recognised as a plumber. However, successful completion the qualification presents the learner with specific pathways into further learning within the plumbing and heating industry.

2. Qualification Structure

This is a Level 2 qualification of 70 credits and 588 guided learning hours consisting of 10 mandatory units. ALL units must be achieved to achieve the overall qualification.

Successful completion of this qualification provides learners with the basic knowledge and skills required for progression to the Level 3 Diploma in Plumbing Foundation. The qualification and unit details are shown below:

Unit Ref.	Unit Type	Unit Title	Level	Credit Value	TQT	GLH
J/602/2479	K/P	Understand and carry out safe working practices in building services engineering	2	10	700	88
J/602/2482	K	Understand how to communicate with others within Building Services Engineering	2	3		28
D/602/2486	K	Understand how to apply environmental protection measures within BSE	2	4		38
J/602/2496	K	Understand how to apply scientific principles within MES	2	7		66
D/602/2682	K/P	Understand and carry out site preparation, and pipework fabrication techniques for domestic plumbing and heating systems	2	10		88
H/602/2697	K/P	Understand and apply domestic cold water system installation and maintenance techniques	2	8		62
F/602/2884	K/P	Understand and apply domestic hot water system installation and maintenance techniques	2	8		62
Y/602/2888	K/P	Understand and apply domestic central heating system installation and maintenance techniques	2	10		82
F/602/2917	K/P	Understand and apply domestic rainwater system installation and maintenance techniques	2	4		30
J/602/2921	K/P	Understand and apply domestic above ground drainage system installation and maintenance techniques	2	6		44
Totals			---	70	700	588

3. The Learners

3.1. Qualifications that the Learner must have completed before taking the Qualification

None that are applicable

3.2. Knowledge, skills or understanding that the Learner is required to have before taking the qualification

a) Specific

None that are applicable

b) General

The centre should:

- Undertake initial assessment of each Learner to ensure that they have the minimum levels of numeracy and literacy to comply with the health and safety aspects of the qualification and the completion of the Learning Outcomes and assessments.
- Establish if the Learner has any specific training needs
- Identify any support and guidance the Learner may require when working towards the qualification.

3.3. The Units the Learner must have completed before the Qualification will be awarded

Learners will need to complete all 10 mandatory Units.

3.4. Any other requirements which a Learner must have satisfied before the Learner will be assessed or before the Qualification is awarded

None identified

3.5. Qualification achievement

The Qualification will be awarded when all necessary Units have been completed.

4. Delivery requirements

4.1. Centre Recognition

Centres wishing to deliver this qualification will need to gain Centre Recognition and Qualification Approval (see 5.2). For full details of the recognition process please contact:

BPEC Certification

1-2 Mallard Way

Pride Park

Derby

DE24 8GX

Tel: 01332 376000

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4.2. Qualification Approval

- Centres wishing to deliver this Qualification who are already recognised (see 5.1) should complete and submit a Qualification Approval Form to BPEC Certification Ltd.
- Before submission, centres should ensure that they can meet the delivery requirements.
- Centres who are approved to deliver this qualification and wish to extend delivery to satellite sites must seek approval for each additional site.

4.3. Physical Resources

- General – Centres must provide a safe environment for Learners and staff with appropriate policies and procedures in place which are adhered to.
- Teaching Provision – Centres must provide adequate facilities and equipment to allow the effective teaching of the qualification including any practical provision.
- Assessments/Exam Provision – Centres must provide facilities and equipment which allow assessments and exams to be conducted in accordance with the assessment criteria/guidance and exam procedures.

4.4. Assessor/Trainer Requirements

Assessors must:

- Hold, or be working towards TAQA (A1/A2 – D32/33 updated) standards and continue to practice to these standards and possess CPD evidence of personally maintaining these standards, or
- Have other suitable equivalent assessor qualifications endorsed by BPEC.
- ‘Candidate assessors’ who are working towards their assessor qualifications must always be supervised by a qualified assessor. They should have a clear action plan for achieving the assessor qualification(s), (assessor approval will be withdrawn if the assessor qualification/units have not been attained within a period of 18 months).

4.4.1. Assessor occupational competence

For the purposes of this qualification, occupational competence will be deemed to have been demonstrated by the verifiable evidence of all the following:

- A relevant level 3 plumbing qualification:
 - If older qualifications are held – such as city & guilds craft or advanced craft certificates – the assessor must be able to evidence through CPD activity a thorough knowledge of the qualification standards and requirements
 - If other MES-related NVQ/SVQ qualifications are held – such as domestic gas (wet central heating), heating and ventilation installation (domestic), domestic heating – the assessor must be able to evidence plumbing competence through CPD activity
- A relevant, current CPD record including relevant qualifications
- A verifiable CV of industry experience and current knowledge of industry practice and techniques relevant to the occupational area in which they assess
- A thorough knowledge and understanding of the qualification standards and requirements.

4.4.2. Assessor continuing professional development

The occupational competence of assessors must be updated on a regular basis and be periodically confirmed via continuing professional development (CPD) via the Assessment Centre. Evidence of CPD will be sought by the External Quality Assurer (EQA) for all approved Assessors at the Centre.

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 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.

4.5. IQA occupational competence

For the purposes of this qualification, occupational competence will be deemed to have been demonstrated by the verifiable evidence of one of the following:

- A Level 3 NVQ in Plumbing
- A related building services qualification with proven technical expertise
- A related building services qualification with access to plumbing technical expertise when undertaking IQA activities.

4.6. External Quality Assurers (EQAs)

EQAs must:

- Hold or be working towards TAQA (V2 or D36 updated)
- Hold a Level 3 NVQ in plumbing or a related building services engineering qualification.

5. Support Materials

5.1. Qualification Specification

This Qualification Specification provides details of all Units, Learning Outcomes, Assessment Criteria and specific advice regarding the assessment process.

5.2. Learner Knowledge Assessment Packs

An Underpinning Knowledge Learner Work Pack is available FOC for this Qualification for all Learners registered on the Qualification.

5.3. Textbooks

BPEC Qualification Textbooks are available from BPEC direct. Alternatively, free text book units specifically for this qualification can be downloaded from the BPEC website.

6. Unit Details

J/602/2479 - Understand and carry out safe working practices in building services engineering

Unit level	2	<i>This combination unit provides learning in the essential health & safety job knowledge required to work safely in the Building Services Engineering Industries. The essential job knowledge covered relates to work on new-build construction sites (dwellings and industrial/commercial buildings) and refurbishment work in occupied and unoccupied properties (dwellings and industrial / commercial buildings).</i>
GLH	88	
Unit		
J/602/2479 - Understand and carry out safe working practices in building services engineering		
Learning Outcomes		Assessment Criteria
LO1	Know the health and safety legislation that applies to the building services industry	1.1 – 1.5
LO2	Know how to recognise and respond to hazardous situations while working in the buildingservices industry	2.1 – 2.9
LO3	Know the safe personal protection measures while working in the building services industry	3.1 – 3.2
LO4	Be able to apply manual handling techniques	4.1 – 4.2
LO5	Know how to respond to accidents that occur while working in the building services industry	5.1 – 5.4
LO6	Know the procedures for electrical safety when working in the building services industry	6.1 – 6.6
LO7	Be able to apply basic electrical safety measures in the building services industry	7.1 – 7.3
LO8	Know the methods of working safely with heat producing equipment in the building services industry	8.1 – 8.7
LO9	Be able to safely work with gas heating equipment in the building services industry	9.1 – 9.3
LO10	Know the methods of safely using access equipment in the building services industry	10.1 – 10.5
LO11	Be able to safely use access equipment in the building services industry	11.1 – 11.2
LO12	Know the methods of working safely in excavations and confined spaces in the building services industry	12.1 – 12.5

Learning Outcome 1	
Know the Health and Safety legislation that applies to the building services industry	
Assessment Criteria	
1.1	State the aims of Health and Safety legislation in protecting the workforce and members of the public. a) General legislation b) Construction specific legislation c) Building services specific legislation

Learning Outcome 1	
Know the Health and Safety legislation that applies to the building services industry	
Assessment Criteria (continued)	
1.2	Identify the responsibilities of members of the construction team under health & safety legislation. <ul style="list-style-type: none"> a) Employers (including employer representatives) b) Designers c) Main contractors d) Sub-contractors e) Employees f) Self-employed (labour only) g) Clients (customers)
1.3	State the legal status of health and safety guidance materials. <ul style="list-style-type: none"> a) Acts of Parliament b) Regulations c) Approved Codes of Practice d) HSE Guidance Notes
1.4	State the role of enforcing authorities under health & safety legislation. <ul style="list-style-type: none"> a) Health & Safety Executive b) Local Authority
1.5	Identify the powers of inspectors under health & safety legislation. <ul style="list-style-type: none"> a) Improvement notice b) Prohibition notice c) Powers of prosecution d) Role in providing advice and guidance

Learning Outcome 2	
Know how to recognise and respond to hazardous situations while working in the building services industry	
Assessment Criteria	
2.1	Identify the types of general site hazards that may be encountered while at work. Site/work area cleanliness: <ul style="list-style-type: none"> a) Tripping hazards b) Slipping hazards Using equipment: <ul style="list-style-type: none"> c) Inadequate or lack of personal protective equipment d) Defective (unsafe) equipment Personal conduct: <ul style="list-style-type: none"> e) Manual handling f) Working at heights
2.2	State the potential dangers to the workforce and members of the public when work is carried out. <ul style="list-style-type: none"> a) On construction sites (all property types) b) In industrial commercial premises (occupied and unoccupied refurbishment) c) In dwellings (occupied and unoccupied refurbishment)

Learning Outcome 2	
Know how to recognise and respond to hazardous situations while working in the building services industry	
Assessment Criteria (continued)	
2.3	<p>Identify the methods that can be used to prevent accidents or dangerous situations occurring during work activities. Working practices (use and understanding of):</p> <ul style="list-style-type: none"> a) Method statements b) Permit to work systems c) Risk assessments d) Safety notices (use and understanding of): e) Mandatory signs f) Prohibition signs g) Hazard signs h) Firefighting signs i) Safe condition signs j) Combination signs
2.4	<p>Identify how hazardous substance legislation classifies substances and the direct precautions to be taken while working with those substances.</p> <ul style="list-style-type: none"> a) Toxic b) Harmful c) Corrosive d) Irritant e) Oxidising f) Extremely flammable
2.5	<p>Identify the general precautions necessary for working with commonly encountered substances.</p> <ul style="list-style-type: none"> a) Lead - solid and fume b) Solvents and lubricants c) Fluxes d) Jointing compounds e) Sealants f) Gases – LPG, oxy-acetylene, and carbon dioxide g) Cleaning agents
2.6	State the range of common building materials and services components that may contain asbestos
2.7	<p>Identify the types of asbestos that may be encountered in the workplace:</p> <ul style="list-style-type: none"> a) White asbestos (Chrysotile) b) Brown or grey asbestos (Amosite) c) Blue asbestos (Crocidolite) d) Asbestos cement materials
2.8	<p>State the procedures that must be used to safely work with asbestos cement based materials.</p> <ul style="list-style-type: none"> a) Flue, soil, rainwater pipes and gutters b) Tanks and cisterns c) Artex d) Small gaskets and seals

Learning Outcome 2	
Know how to recognise and respond to hazardous situations while working in the building services industry	
Assessment Criteria (continued)	
2.9	Identify the actions to be taken when asbestos is encountered while undertaking work activities. <ul style="list-style-type: none"> a) Protection of the workforce and members of the public. b) Licensing requirements for asbestos removal organisations c) Safe disposal requirements

Learning Outcome 3	
Know the safe personal protection measures while working in the building services industry	
Assessment Criteria	
3.1	State the purpose of, and application of protective equipment. <ul style="list-style-type: none"> a) Clothing protection including high visibility b) Eye protection c) Hand protection d) Head protection e) Foot protection f) Hearing protection g) Respiratory protection
3.2	Identify the procedures for manually handling heavy and bulky items. <ul style="list-style-type: none"> a) Assessment of a safe load that a person can lift b) Application of safe kinetic lifting technique c) Use of simple mechanical lifting aids – sack trolley d) Application and use of mechanical lifting aids on large construction sites

Learning Outcome 4	
Be able to apply manual handling techniques	
Assessment Criteria	
4.1	Perform manual handling of heavy and bulky items <ul style="list-style-type: none"> a) Plan the lift b) Safely move the load c) Assist in a two-person lift
4.2	Manually handle loads using mechanical lifting aids

Learning Outcome 5	
Know how to respond to accidents that occur while working in the building services industry	
Assessment Criteria	
5.1	Identify the requirements for first aid provision while working: <ul style="list-style-type: none"> a) In small occupied properties b) On construction sites (new-build and refurbishment)
5.2	Identify the actions that should be taken when an accident or emergency is discovered. <ul style="list-style-type: none"> a) Raising the alarm b) The role of the emergency services and contact methods c) Typical emergency evacuation procedures

Learning Outcome 5	
Know how to respond to accidents that occur while working in the building services industry	
Assessment Criteria (continued)	
5.3	State the procedures for dealing with minor injuries that can occur while working. a) Cuts b) Minor burns c) Objects in the eye d) Exposure to fumes
5.4	State the procedures for dealing with major injuries that can occur while working. a) Statutory requirements for the reporting of accidents/serious occurrences b) The use of company accident books c) The details to be recorded on a simple accident/incident report form

Learning Outcome 6	
Know the procedures for electrical safety when working in the building services industry	
Assessment Criteria	
6.1	Identify the common electrical dangers encountered on construction sites and in private dwellings a) Faulty electrical equipment b) Signs of damaged or worn electrical cables – power tools and property hard wiring system c) Trailing cables d) Proximity of cables to services pipework e) Buried/hidden cables f) Inadequate over-current protection devices
6.2	Identify the methods of safely using electrical tools and equipment on site. a) Battery powered supplies b) 110-volt supplies c) 230-volt supplies
6.3	Identify how to conduct a visual inspection of a power tool for safe condition before use. a) Checking for a valid PAT test b) Inspection for general condition
6.4	State the procedure that should be applied for tools and equipment that fail safety checks.
6.5	State the electrical industry safe isolation procedure that should be applied to building services equipment before carrying out work on them.
6.6	State the use of temporary continuity bonding when working on pipework components.

Learning Outcome 7	
Be able to apply basic electrical safety measures in the building services industry	
Assessment Criteria	
7.1	Demonstrate the electrical industry safe isolation procedure to safely isolate an item of fixed mechanical or electrical plant or equipment.
7.2	Carry out a visual safety inspection of power tools before use and report on their condition.
7.3	Demonstrate the application of temporary continuity bonding when cutting into a fixed metallic pipework system.

Learning Outcome 8	
Know the methods of working safely with heat producing equipment in the building services industry	
Assessment Criteria	
8.1	Identify the various types of gases used in pipe and sheet jointing processes <ul style="list-style-type: none"> a) Bottle colours b) Properties of the gases used c) Uses within the industry
8.2	Identify how bottled gases and equipment should be safely transported and stored.
8.3	Identify the various types of heat producing equipment and how to check them for safety. <ul style="list-style-type: none"> a) Hoses b) Colours used c) Thread directions d) Flashback arrestors e) Control valves f) Gauges g) Blowpipes h) Direct connecting combined units (aeration in the nozzle)
8.4	Identify how gas heating equipment is safely assembled and used <ul style="list-style-type: none"> a) Bottle location and position b) Equipment assembly sequence c) Leak detection procedures d) Safe purging procedure e) Safe lighting and extinguishing procedure f) Actions in the event of leakage
8.5	Identify the three elements of the fire triangle and how combustion takes place.
8.6	State the dangers of working with heat producing equipment and how to prevent fires occurring.
8.7	State the method for fighting small localised fires that can occur in the workplace. <ul style="list-style-type: none"> a) When to avoid tackling fires b) Types of extinguisher c) Selection of extinguisher by fire type d) Method of use

Learning Outcome 9	
Be able to safely work with gas heating equipment in the building services industry.	
Assessment Criteria	
9.1	Perform a safety check of gas heating equipment <ul style="list-style-type: none"> a) Transportation of gas bottles to the work area b) Assess components and equipment for safety
9.2	Perform the safe assembly of gas heating equipment for use <ul style="list-style-type: none"> a) Hose and blowpipe or combined unit attachment b) Leak detection procedures c) Purging procedures d) Lighting and extinguishing procedures
9.3	Demonstrate the use of a fire extinguisher in extinguishing a small solid fuel fire.

Learning Outcome 10	
Know the methods of safely using access equipment in the building services industry	
Assessment Criteria	
10.1	Identify the situations where it may be necessary to work at height.
10.2	Identify the types of equipment used to permit work at heights in the building services industry. <ul style="list-style-type: none"> a) Step ladders b) Ladders c) Mobile mini towers/scaffolds d) Roof ladders and crawling boards e) Mobile tower scaffolds f) Fixed scaffolds and edge protection g) Mobile elevated work platforms including scissor lifts and cherry pickers
10.3	Identify how to select suitable equipment for carrying out work at heights based on the work being carried out.
10.4	State the range of safety checks to be carried out on access equipment before it is used. <ul style="list-style-type: none"> a) Step ladders b) Ladders c) Mobile mini towers/scaffolds d) Roof ladders and crawling boards e) Mobile tower scaffolds f) Fixed scaffolds and edge protection
10.5	State the method of assembly and use of access equipment. <ul style="list-style-type: none"> a) Step ladders b) Ladders c) Mobile mini towers/scaffolds d) Roof ladders and crawling boards e) Mobile tower scaffolds f) Fixed scaffolds and edge protection

Learning Outcome 11	
Be able to safely use access equipment in the building services industry.	
Assessment Criteria	
11.1	Demonstrate the safe method of assembly and use of: <ul style="list-style-type: none"> a) Step Ladders b) Ladders
11.2	Demonstrate the safe method of assembly and use of mobile tower scaffolds.

Learning Outcome 12	
Know the methods of working safely in excavations and confined spaces in the building services industry.	
Assessment Criteria	
12.1	Identify the situations in which it may be necessary to work in excavations.
12.2	State how excavations should be prepared for safe working. <ul style="list-style-type: none"> a) Safe access into the excavation b) Trench support systems

Learning Outcome 12	
Know the methods of working safely in excavations and confined spaces in the building services industry.	
Assessment Criteria (continued)	
12.3	State the measures that need to be applied to prevent persons or equipment falling into excavations. <ul style="list-style-type: none"> a) Use of warning signs b) Use of barriers for pedestrians c) Vehicle proximity to excavation edges
12.4	Identify where work in confined spaces may be required.
12.5	State the potential dangers when working in confined spaces. <ul style="list-style-type: none"> a) Drainage systems b) Plant rooms c) Main service duct-rooms d) In tanks, cylinders, boilers or cisterns e) Under suspended timber floors f) In roof spaces

J/602/2482 - Understand how to communicate with others within Building Services Engineering

Unit level	2	<i>This knowledge unit provides learning in the development and continued maintenance of effective working relationships in the building services industry associated with work in dwellings, industrial and commercial premises and for private and contract type clients.</i>	
GLH	28		
Unit			
J/602/2482 - Understand how to communicate with others within Building Services Engineering			
Learning Outcomes			Assessment Criteria
LO1	Know the members of the construction team and their role within the building services industry		1.1 – 1.3
LO2	Know how to apply information sources in the building services industry		2.1 – 2.4
LO3	Know how to communicate with others in the building services industry		3.1 – 3.4

Learning Outcome 1	
Know the members of the construction team and their role within the building services industry	
Assessment Criteria	
1.1	Identify the key roles of the site management team. a) Architect b) Project manager/Clerk of Works c) Structural engineer d) Surveyor e) Building services engineer f) Quantity surveyor g) Buyer h) Estimator i) Contracts manager j) Construction manager
1.2	Identify the key roles of the individuals that report to the site management team: a) Sub-contractors b) Site supervisor c) Trade supervisor d) Trades e) Bricklayer f) Joiner g) Plasterer h) Tiler i) Electrician j) H&V fitter k) Gas fitter l) Decorator m) Ground workers

Learning Outcome 1	
Know the members of the construction team and their role within the building services industry	
Assessment Criteria (continued)	
1.3	Identify the key roles of site visitors <ul style="list-style-type: none"> a) Building control inspector b) Water inspector c) HSE inspector d) Electrical services inspector

Learning Outcome 2	
Know how to apply information sources in the building services industry	
Assessment Criteria	
2.1	Identify the types of statutory legislation and guidance information that applies to working in the industry: <ul style="list-style-type: none"> a) Legislation b) Data protection c) Equal opportunities d) Health & safety e) Employment f) Regulations g) British standards h) Codes of practice i) Manufacturer guidance j) Installation instructions k) Service & maintenance instructions l) User instructions
2.2	Identify the purpose of information that is used in the workplace: <ul style="list-style-type: none"> a) Job specifications b) Plans/drawings c) Work programmes d) Delivery notes e) Time sheets f) Policy documentation – health & safety, environmental, customer service
2.3	Identify the purpose of information given to customers: <ul style="list-style-type: none"> a) Quotations b) Estimates c) Invoices/statements d) Statutory cancellation rights e) Handover information

Learning Outcome 2	
Know how to apply information sources in the building services industry	
Assessment Criteria (continued)	
2.4	<p>State the importance of company policies and procedures that affect working relationships:</p> <ul style="list-style-type: none"> a) Company working policies/procedures b) Behaviour c) Timekeeping d) Dress code e) Contract of employment f) Limits to personal authority g) Apprentices h) Level 2 qualified staff i) Level 3 qualified staff j) Supervisor and management responsibilities

Learning Outcome 3	
Know how to communicate with others in the building services industry.	
Assessment Criteria	
3.1	<p>Identify suitable communication methods for use in work situations:</p> <ul style="list-style-type: none"> a) Oral communication b) Written communication c) Email d) Fax e) Letter
3.2	<p>Define methods of effective communication for people with:</p> <ul style="list-style-type: none"> a) Physical disabilities b) Learning difficulties c) Language differences d) Dialects e) Accents f) Foreign and second language issues
3.3	<p>State the actions to take to deal with conflicts between:</p> <ul style="list-style-type: none"> a) Customers and operatives b) Co-workers c) Supervisors and operatives
3.4	<p>State the effects that poor communication may have on an organisation:</p> <ul style="list-style-type: none"> a) Between operatives b) Between operatives and management c) Company to customer

D/602/2486 – Understand how to apply environmental protection measures within BSE

Unit level	2	<i>The knowledge unit provides learning in a range of basic measures associated with protection of the environment. Areas covered include the effective use of material resources, minimising wastage. The legislation surrounding the effective use of energy and water resources including an introduction to the use of environmental emerging technologies is also covered in the unit.</i>	
GLH	38		
Unit			
D/602/2486- Understand how to apply environmental protection measures within BSE			
Learning Outcomes			Assessment Criteria
LO1	Know the energy conservation legislation that applies to the building services industry		1.1 – 1.2
LO2	Know the applications of energy sources used in the building services industry		2.1 – 2.5
LO3	Know the importance of energy conservation when commissioning building services systems		3.1 – 3.2
LO4	Know the methods of reducing waste and conserving energy while working in the building services industry		4.1 – 4.3
LO5	Know how to safely dispose of materials used in the building services industry		5.1 – 5.5
LO6	Know the methods of conserving and reducing wastage of water within the building services industry		6.1 – 6.6

Learning Outcome 1	
Know the energy conservation legislation that applies to the building services industry.	
Assessment Criteria	
1.1	State the aims of energy conservation legislation: <ul style="list-style-type: none"> a) General legislation b) Construction specific legislation c) Building services specific legislation
1.2	Identify the responsibilities of members of the construction team under energy conservation legislation: <ul style="list-style-type: none"> a) Clients (customers) b) Designers c) Employers d) Employees

Learning Outcome 2	
Know the applications of energy sources used in the building services industry.	
Assessment Criteria	
2.1	Identify the types of energy used in properties: <ul style="list-style-type: none"> a) High carbon b) Natural Gas / LPG c) Fuel oils d) Solid fuels (coal and peat) e) Electricity (from non-renewable sources) f) Hydrogen fuel cells g) Heat pumps h) Combined heat & power (CHP) i) Combined cooling, heat & power (CCHP) j) Low carbon k) Solar thermal l) Solid fuel (biomass) m) Zero Carbon n) Electricity – wind o) Electricity – tidal p) Hydroelectric q) Solar photovoltaic
2.2	Identify the basic operating principles of installations containing environmental energy sources. <ul style="list-style-type: none"> a) Solar thermal b) Solid fuel (biomass) c) Heat pumps (water, air and ground source) d) Combined heat & power (CHP) e) Combined cooling, heat & power (CCHP) f) Wind turbine g) Solar photovoltaic
2.3	Identify organisations which give guidance and advice on energy saving and conservation techniques.
2.4	Identify how to use energy rating tables and their effect on component selection.
2.5	State where to find information on alternative energy sources.

Learning Outcome 3	
Know the importance of energy conservation when commissioning building services systems.	
Assessment Criteria	
3.1	State the role of the commissioning process in conserving energy usage.
3.2	State the actions to be covered during the system handover procedure to the customer that will contribute to conserving energy usage.

Learning Outcome 4	
Know the methods of reducing waste and conserving energy while working in the building services industry.	
Assessment Criteria	
4.1	Identify the working practices that can be employed to conserve energy and protect the environment.
4.2	State the methods used for reducing material wastage: <ul style="list-style-type: none"> a) Planning work activities b) Accurate measurement and cutting
4.3	Identify the methods of conserving material usage: <ul style="list-style-type: none"> a) Reducing material over ordering b) Minimising damage to stored materials c) Prevention of loss/theft

Learning Outcome 5	
Know how to safely dispose of materials used in the building services industry.	
Assessment Criteria	
5.1	Identify the statutory legislation for waste management on construction sites
5.2	State the methods of safely disposing of waste materials: <ul style="list-style-type: none"> a) Licensed waste disposal b) Waste carriers license c) Recycling d) Specialist disposal – asbestos and other forms of hazardous waste
5.3	Specify the approved processes for recycling materials: <ul style="list-style-type: none"> a) Metals b) Plastics c) Wood/cardboard
5.4	Identify the disposal requirements of potentially hazardous materials: <ul style="list-style-type: none"> a) Asbestos b) Electrical and electronic equipment c) Refrigerants (fluorinated gases)
5.5	Identify what action to take if work activities endanger the environment.

Learning Outcome 6	
Know the methods of conserving and reducing wastage of water within the building services industry.	
Assessment Criteria	
6.1	Identify the statutory legislation for water wastage and misuse
6.2	State the methods used for reducing material wastage: <ul style="list-style-type: none"> Planning work activities Accurate measurement and cutting

Learning Outcome 6	
Know the methods of conserving and reducing wastage of water within the building services industry.	
Assessment Criteria (continued)	
6.3	Identify the methods of conserving material usage: Reducing material over ordering Minimising damage to stored materials Prevention of loss/theft
6.4	Identify the methods available for capturing surface water and recycling used water.
6.5	Identify the uses of captured and recycled water in properties.
6.6	State the basic working principles of captured and recycled water systems: Rain water harvesting Grey water systems

J/602/2496 - Understand how to apply scientific principles within MES

Unit level	2	<i>This knowledge unit provides learning in the essential scientific principles that underpin the installation, commissioning and maintenance requirements of systems and components in the Mechanical Engineering Services Industries. The unit also provides learning in a range of basic calculation methodologies underpinning system and component design.</i>
GLH	66	
Unit		
J/602/2496 - Understand how to apply scientific principles within MES		
Learning Outcomes		Assessment Criteria
LO1	Know the standard units of measurement used in the mechanical services industry	1.1 – 1.2
LO2	Know the properties of materials used in the mechanical services industry	2.1 – 2.8
LO3	Know the relationship between energy, heat and power in the mechanical services industry	3.1 – 3.6
LO4	Know the principles of force and pressure and their application in the mechanical services industry	4.1 – 4.5
LO5	Know simple mechanical principles and their application in the mechanical services industry	5.1 – 5.2
LO6	Know the principles of electricity as they relate to the mechanical services industry	6.1 – 6.4

Learning Outcome 1		
Know the standard units of measurement used in the mechanical services industry.		
Assessment Criteria		
1.1	State the application and use of internationally recognised (SI) units of measurement. <ul style="list-style-type: none"> a) Metre (length) m b) Kilogram (mass) kg c) Second (time) s d) Kelvin (temperature) OK 	
1.2	State the application and use of SI derived units <ul style="list-style-type: none"> a) Area (m²) b) Volume (m³) <ul style="list-style-type: none"> a. Litres (L) c) Density (kg/m³) d) Velocity (m/s) 	

Learning Outcome 2		
Know the properties of materials used in the mechanical services industry		
Assessment Criteria		
2.1	Calculate the relative densities of common materials. <ul style="list-style-type: none"> a) Relative density to air b) Relative density to water 	

Learning Outcome 2	
Know the properties of materials used in the mechanical services industry	
Assessment Criteria (continued)	
2.2	<p>State the principle applications of solid materials used in the mechanical services industry.</p> <ul style="list-style-type: none"> a) Metals b) Pure metals c) Ferrous metals d) Alloys including solders e) Plastics f) Thermo plastics g) Thermo-setting plastics h) Fireclays/ceramics
2.3	<p>Identify the detailed properties of solid materials.</p> <ul style="list-style-type: none"> a) Strength – tensile and compressive b) Hardness c) Ductility d) Malleability e) Conductivity – heat and electricity
2.4	<p>State the reasons why solid materials breakdown.</p> <ul style="list-style-type: none"> a) Atmospheric corrosion b) Oxidisation of metals c) UV damage to plastics d) Heat damage to plastics e) Electrolytic corrosion f) Electromotive series g) Dissimilar metals in the presence of an electrolyte (water) h) Erosion corrosion i) Methods of preventing corrosion
2.5	<p>State the principle applications and basic properties of liquids used in the mechanical services industry.</p> <ul style="list-style-type: none"> a) Water b) Refrigerant c) Anti-freeze/glycol mixes d) Fuel oils e) Lubricants/greases
2.6	<p>Identify the detailed properties of water:</p> <ul style="list-style-type: none"> a) Boiling/freezing point b) Change of state and molecular changes c) Volume and pressure increases d) Density at differing temperatures e) To steam/super-heated steam f) Capillarity g) Acidity/alkalinity (pH value) h) Water hardness i) Soft j) Temporary hard k) Permanently hard

Learning Outcome 2	
Know the properties of materials used in the mechanical services industry	
Assessment Criteria (continued)	
2.7	State the principal applications of gases used in the mechanical services industry. <ul style="list-style-type: none"> a) Air & steam b) LPG c) Natural gas d) Carbon dioxide e) Refrigerant gases
2.8	Identify the detailed properties of gases. <ul style="list-style-type: none"> a) Pressure exerted by a gas b) Volume occupied by a gas c) Temperature of gases found within the industry d) Gas Laws e) Charles's law f) Boyle's law g) Heat pump/refrigeration cycle

Learning Outcome 3	
Know the relationship between energy, heat and power in the mechanical services industry.	
Assessment Criteria	
3.1	Identify the relationship between the Celsius and Kelvin temperature scales. <ul style="list-style-type: none"> a) Units of temperature measurement b) Temperature measurement devices used
3.2	Identify the terminology associated with a change of state. <ul style="list-style-type: none"> a) Melting b) Freezing c) Boiling d) Evaporating e) Condensing
3.3	Identify the terms latent and sensible heat as they apply to liquids and gases.
3.4	Identify the methods of heat transfer <ul style="list-style-type: none"> a) Conduction in solids b) Convection in liquids and gases c) Radiation between two bodies
3.5	State how units of energy and heat are related and derived. <ul style="list-style-type: none"> a) Energy – Joules (J) b) Specific heat capacity (kJ/kg/°C) c) Power – Watts (W)
3.6	State how to carry out simple heat, energy and power calculations. <ul style="list-style-type: none"> a) Simple temperature calculations b) Quantity of heat energy required to raise the temperature of a substance c) The amount of power required to heat a substance

Learning Outcome 4	
Know the principles of force and pressure and their application in the mechanical services industry.	
Assessment Criteria	
4.1	<p>State how units of force and pressure are derived from SI units.</p> <ul style="list-style-type: none"> a) Acceleration (m/s^2) b) Force due to gravity c) Force - Newton (N) d) Pressure (N/m^2) e) Atmospheric pressure f) Principles of the siphon g) Flow rate (m^3/s)
4.2	<p>State the application and use of units of measurement of pressure and flow rate.</p> <ul style="list-style-type: none"> a) Pressure b) Bar / millibar c) kPa d) Psi e) Metre head f) Flow rate g) m^3/s h) l/s i) kg/s
4.3	<p>State how to carry out simple force and pressure calculations.</p> <ul style="list-style-type: none"> a) Simple force calculations b) Pressure head c) Simple pressure calculations d) Static pressure e) Dynamic pressure
4.4	<p>Identify the relationship between velocity, pressure and flow rate in systems.</p> <ul style="list-style-type: none"> a) Effects of increasing/reducing pressure on velocity and flow rate b) Effects of increasing/reducing pipe size on velocity and flow rate at constant pressure
4.5	<p>Identify the reasons why pipework restricts the flow of liquids and gases.</p> <ul style="list-style-type: none"> a) Changes of direction, bends and tees b) Pipe size c) Pipe reductions d) Roughness of material surface e) Constrictions such as valves

Learning Outcome 5	
Know simple mechanical principles and their application in the mechanical services industry.	
Assessment Criteria	
5.1	State the principles behind simple machines. a) Mechanical advantage b) Velocity ratio c) Levers d) Wheel and axle e) Pulleys f) Screws
5.2	Identify the principles of basic mechanics. a) Theory of moments b) Action & reaction c) Centre of gravity d) Equilibrium

Learning Outcome 6	
Know the principles of electricity as they relate to the mechanical services industry.	
Assessment Criteria	
6.1	State the basic principles of electron flow theory. a) Measurements of electrical flow b) Material conductivity and resistance c) Direct and alternating current
6.2	State the purpose and application of simple units of electrical measurement for use in the a) mechanical services industry. b) Current (Amps) c) Voltage (Volts) d) Resistance (Ohms) e) Power (Watts)
6.3	State how to carry out simple electrical calculations. a) Ohm's law b) Power consumption of electrical circuits c) Basic over-current protection device size d) Voltage, current and resistance in series and parallel circuits
6.4	Identify the requirements for earthing of electrical circuits.

D/602/2682 - Understand and carry out site preparation, and pipework fabrication techniques for domestic plumbing and heating systems

Unit level	2	<i>This combination unit provides learning in a range of basic pipework competences that underpin work on plumbing and heating systems. The unit also provides an introduction to the range of work activities carried out in plumbing and heating as well as methods of checking that pipework and plumbing and heating components are leak free.</i>
GLH	88	
Unit		
D/602/2682 - Understand and carry out site preparation, and pipework fabrication techniques for domestic plumbing and heating systems		
Learning Outcomes		Assessment Criteria
LO1	Know the types of hand and power tools used for domestic plumbing and heating work.	1.1 – 1.3
LO2	Know the types of domestic plumbing and heating pipe work and their jointing principles	2.1 – 2.6
LO3	Know the general site preparation techniques for plumbing and heating work.	3.1 – 3.8
LO4	Be able to apply general site preparation techniques for domestic plumbing and heating work.	4.1 – 4.4
LO5	Know how to use clips and brackets to support domestic plumbing and heating pipework and components.	5.1 – 5.4
LO6	Be able to apply fixings and brackets to domestic plumbing and heating pipe work and components.	6.1 – 6.2
LO7	Know the installation requirements of domestic plumbing and heating pipe work.	7.1 – 7.2
LO8	Be able to install domestic plumbing and heating pipe work.	8.1 – 8.3
LO9	Know the inspection and soundness testing requirements of domestic plumbing and heating pipework.	9.1 – 9.2
LO10	Be able to inspect and soundness test domestic plumbing and heating pipework.	10.1 – 10.2

Learning Outcome 1	
Know the types of hand and power tools used for domestic plumbing and heating work.	
Assessment Criteria	
1.1	State the purpose of hand and power tools used to carry out work on plumbing and heating systems.
1.2	Identify the different types of hand and power tools used to carry out work on plumbing and heating systems.

Learning Outcome 1	
Know the types of hand and power tools used for domestic plumbing and heating work.	
Assessment Criteria (continued)	
1.3	<p>State how to safely use and maintain hand and power tools to carry out work on plumbing and heating systems.</p> <ul style="list-style-type: none"> a) Screwdrivers b) Hammers c) Chisels d) Grips e) Wrenches f) Spanners g) Spirit Levels h) Manual pipe threaders i) Pipe cutters j) Hand saws k) Pliers l) Bending tools m) Power drills n) Drill bits o) Circular saws p) Jig saws q) Portable pipe threading machines r) Hydraulic machine benders s) Portable pipe freezing kits

Learning Outcome 2	
Know the types of domestic plumbing and heating pipe work and their jointing principles	
Assessment Criteria	
2.1	<p>Identify pipe work materials used in domestic plumbing and heating work.</p> <ul style="list-style-type: none"> a) Copper <ul style="list-style-type: none"> i. R220 soft coils ii. R250 half hard lengths iii. R290 hard lengths b) Low Carbon steel (LCS) <ul style="list-style-type: none"> i. Medium grade c) Plastic pipework (hot, cold and heating) <ul style="list-style-type: none"> i. Polyethylene (MDPE) ii. Polybutylene d) Plastic pipework (sanitary) <ul style="list-style-type: none"> i. PVC-u ii. Polypropylene iii. MUPVC iv. ABS

Learning Outcome 2	
Know the types of domestic plumbing and heating pipe work and their jointing principles	
Assessment Criteria (continued)	
2.2	<p>State the range of typical pipe material sizes available for use in dwellings.</p> <ul style="list-style-type: none"> a) Copper b) Low carbon steel c) MDPE d) Polybutylene e) PVC-u f) Polypropylene g) MUPVC h) ABS
2.3	<p>State the acceptable methods of jointing new hot and cold water pipe to existing lead pipe work.</p>
2.4	<p>Identify the general fitting types used in dwellings.</p> <ul style="list-style-type: none"> a) Couplers b) Elbows and bends c) Equal tees d) Reducing tees e) Reducers f) Tap connectors g) Flexible connectors h) Manifolds i) Specialist fittings such as tank connectors
2.5	<p>State the methods of jointing pipe work used in dwellings.</p> <ul style="list-style-type: none"> a) Copper pipe <ul style="list-style-type: none"> 1. Solder ring 2. End feed 3. Compression (type A and B) 4. Push-fit 5. Press-fit b) Low Carbon steel (LCS) pipe <ul style="list-style-type: none"> 1. Threaded 2. Compression e.g. Viking c) Plastic pipe (hot, cold and heating) <ul style="list-style-type: none"> 1. Push-fit 2. Compression 3. Proprietary (between lead and MDPE) d) Plastic pipe (sanitary) <ul style="list-style-type: none"> 1. Ring seal 2. Solvent weld 3. Compression

Learning Outcome 2	
Know the types of domestic plumbing and heating pipe work and their jointing principles	
Assessment Criteria (continued)	
2.6	<p>State the methods of bending pipe work used in dwellings.</p> <ul style="list-style-type: none"> a) Copper spring bending <ul style="list-style-type: none"> ○ 90° bends ○ Sets and offsets bends b) Copper machine bending <ul style="list-style-type: none"> ○ 90° bends ○ Sets and offset bends ○ Passover bends c) LCS hydraulic machine bending <ul style="list-style-type: none"> ○ 90° bends ○ Sets and offset bends ○ Passover bends d) Plastic (hot, cold and heating) <ul style="list-style-type: none"> ○ Cabling technique

Learning Outcome 3	
Know the general site preparation techniques for plumbing and heating work.	
Assessment Criteria	
3.1	<p>Define the typical range of activities to be carried out when working on plumbing and heating systems.</p> <ul style="list-style-type: none"> a) Preparing work sites b) Designing and selecting materials and equipment c) Installing systems and components d) Maintaining and dealing with faults on systems and components e) Decommissioning systems and components – temporary and permanent f) Soundness testing systems and components g) Commissioning systems and components
3.2	State what information should be passed on to the customer when carrying out work on domestic pipe work systems
3.3	Identify how to check for pre-existing damage to the building fabric or customer property before the work commences.
3.4	<p>Identify how to protect the building fabric or customer property before the work commences.</p> <ul style="list-style-type: none"> a) Use of dust sheets b) Protection from flame damage c) Use of walking boards – lawns/flower beds d) Application of packaging to protect components during partially completed works e) Circumstances in which furniture, breakable items and carpets need to be removed from the work area f) Circumstances in which damage to vehicles may occur

Learning Outcome 3	
Know the general site preparation techniques for plumbing and heating work.	
Assessment Criteria	
3.5	Identify the method of storing tools, equipment and materials when working in new buildings and existing dwellings. <ul style="list-style-type: none"> a) Prevention of theft b) Avoiding loss and wastage c) Minimising damage
3.6	Identify the range of hand and power tools required to complete work on domestic pipework systems.
3.7	State the checks to be carried out on tools and equipment to ensure that they work correctly and are correctly calibrated.
3.8	State the work methods for preparing building construction features for installation work. <ul style="list-style-type: none"> a) Holes in masonry surfaces – hammer and chisel, large power drill b) Making good to masonry surfaces c) Lifting and replacing timber flooring materials d) Notching timber floor joists e) Drilling holes – timber floor joists f) Cutting chases – wall and floor surfaces

Learning Outcome 4	
Be able to apply general site preparation techniques for domestic plumbing and heating work.	
Assessment Criteria	
4.1	Check the safety of the work location in order for the work to safely proceed. <ul style="list-style-type: none"> a) Safe access and exit b) Immediate work location e.g. tripping hazards c) Appropriate risk assessments/ method statements are available and worked to
4.2	Wear Personal Protective Equipment relevant to the installation, decommissioning or maintenance task being carried out.
4.3	Select the hand and power tools required to complete work on domestic pipe work systems.
4.4	Check that tools and equipment selected for work on the installation of domestic pipe work systems are safe to use and are correctly calibrated.

Learning Outcome 5	
Know how to use clips and brackets to support domestic plumbing and heating pipework and components.	
Assessment Criteria	
5.1	State how to measure and mark out for fixings to pipe work and plumbing and heating components.

Learning Outcome 5	
Know how to use clips and brackets to support domestic plumbing and heating pipework and components.	
Assessment Criteria (continued)	
5.2	Identify the range of general fixing devices. <ul style="list-style-type: none"> a) Nails b) For timber c) For masonry d) Screws e) Slotted head f) Phillips head g) Pozidrive h) Plastic plugs i) Heavy duty fixings j) Coach bolts k) Rawlbolts
5.3	Identify the range of specialist fixing devices. <ul style="list-style-type: none"> a) Cavity fixings b) Drive in fixings
5.4	Identify clip and bracket types for domestic plumbing and heating work. <ul style="list-style-type: none"> a) Copper pipe work – hot, cold and central heating b) LCS pipe work – central heating c) Plastic pipe work – hot, cold, central heating and sanitation pipe work

Learning Outcome 6	
Be able to apply fixings and brackets to domestic plumbing and heating pipe work and components.	
Assessment Criteria	
6.1	Measure and mark out for fixings to pipe work and plumbing and heating components.
6.2	Fix pipe work clips and brackets at recommended spacing intervals. <ul style="list-style-type: none"> a) Copper pipe work b) LCS pipe work c) Plastic pipe work

Learning Outcome 7	
Know the installation requirements of domestic plumbing and heating pipe work.	
Assessment Criteria	
7.1	Identify the methods of installing domestic plumbing and heating pipe work. <ul style="list-style-type: none"> a) Prefabrication of pipe work b) Installing pipe work in-situ c) Use of sleeves d) Fire stopping to pipe work
7.2	Identify how to select pipe work materials and fittings from instructions including plans and drawings. <ul style="list-style-type: none"> a) Copper pipe work – hot, cold and central heating b) LCS pipe work – central heating c) Plastic pipe work – hot, cold, central heating and sanitation

Learning Outcome 8	
Be able to install domestic plumbing and heating pipe work.	
Assessment Criteria	
8.1	Accurately measure, mark and cut pipe work materials for bending and jointing. <ul style="list-style-type: none"> a) Copper pipework – hot, cold and central heating b) LCS pipework – central heating c) Plastic pipework – hot, cold, central heating and sanitation pipework
8.2	Bend domestic pipework to clear obstacles. <ul style="list-style-type: none"> a) Copper machine bending b) 90° bends c) Sets and offset bends d) Passover bends e) LCS Hydraulic machine bending f) 90° bends g) Sets and offset bends h) Passover bends i) Plastic (hot, cold and heating) j) Cabling technique
8.3	Position and fix domestic pipework to specifications. <ul style="list-style-type: none"> a) Copper pipework – hot, cold and central heating b) LCS pipework – central heating c) Plastic pipework – hot, cold, central heating and sanitation pipework

Learning Outcome 9	
Know the inspection and soundness testing requirements of domestic plumbing and heating pipework.	
Assessment Criteria	
9.1	Identify the requirements of, and carry out a visual inspection of, pipework to confirm that it is ready to be filled with water.
9.2	State how to carry out a soundness test on domestic plumbing and heating pipework. <ul style="list-style-type: none"> a) Metallic pipework b) Plastic pipework

Learning Outcome 10	
Be able to inspect and soundness test domestic plumbing and heating pipework.	
Assessment Criteria	
10.1	Fill pipework with water at normal operating pressure and check for leakage
10.2	Perform a soundness test on domestic plumbing and heating pipework. <ul style="list-style-type: none"> a) Metallic pipework b) Plastic pipework

H/602/2697 - Understand and apply domestic cold water system installation and maintenance techniques

Unit level	2	<i>This combination unit provides learning in the installation, maintenance, decommissioning and soundness testing of a basic range of cold water system/component types in dwellings and industrial/commercial properties (of similar size and scope to domestic dwellings). The unit covers systems in buildings up to 3 storeys in height with pipework up to 28mm diameter. The scope of the system is from the boundary stop valve into the property feeding the water outlets.</i>	
GLH	62		
Unit			
H/602/2697 - Understand and apply domestic cold water system installation and maintenance techniques			
Learning Outcomes			Assessment Criteria
LO1	Know the cold water supply route to dwellings		1.1 – 1.5
LO2	Know the types of cold water system and their layout requirements		2.1 – 2.9
LO3	Know the site preparation techniques for cold water systems and components		3.1 – 3.5
LO4	Be able to apply site preparation techniques for cold water systems and components		4.1 – 4.6
LO5	Know the installation requirements of cold water systems and components		5.1 – 5.10
LO6	Be able to install cold water systems and components		6.1 – 6.9
LO7	Know the service and maintenance requirements of cold water systems and components		7.1 – 7.4
LO8	Be able to service and maintain cold water systems and components		8.1 – 8.4
LO9	Know the decommissioning requirements of cold water systems and components		9.1 – 9.5
LO10	Be able to decommission cold water systems and components		10.1 – 10.3
LO11	Know the inspection and soundness testing requirements of cold water systems and components		11.1 – 11.5
LO12	Be able to inspect and soundness test cold water systems and components		12.1 – 12.4

Learning Outcome 1	
Know the cold water supply route to dwellings	
Assessment Criteria	
1.1	State the key stages in the rainwater cycle.
1.2	Identify the various water supply sources and the typical properties of water from those sources: a) Surface sources – lakes, reservoirs, rivers and streams b) Underground sources – deep and shallow wells, artesian wells, bore-holes, springs
1.3	State the two main types of water supply to dwellings: a) Supply from a water undertaker's main b) Supply from a private source
1.4	Identify the mains water treatment process and typical mains water distribution system from treatment works to property.
1.5	Identify the uses of cold water supplied to dwellings. a) Wholesome water for domestic purposes - drinking, washing, food production b) Recycled water – WC flushing, water for outdoor use, clothes washing

Learning Outcome 2	
Know the types of cold water system and their layout requirements.	
Assessment Criteria	
2.1	State the cold water system pipe work features between the water undertaker's main and the main internal stop valve in dwellings: <ul style="list-style-type: none"> a) Connection methods to the main b) Communication pipe c) Service pipe d) Main external stop valve and meter housing including surface mounted meter boxes (Groundbreaker) e) Depth of external service pipe work below ground level f) Correct methods of entry of the service pipe work to a property
2.2	Identify the type of cold water system from layout diagrams.
2.3	State the factors which affect the selection of cold water systems for dwellings. <ul style="list-style-type: none"> a) Direct cold water system b) Supplying a storage cistern c) Supplying a combination boiler d) Indirect cold water system
2.4	State the typical pipe sizes used in cold water systems in dwellings <ul style="list-style-type: none"> a) Supply pipe b) Distributing pipe c) Service pipe
2.5	State the factors that can lead to backflow from cold water outlets and equipment in dwellings.
2.6	Identify the standard backflow prevention devices that are used in cold water systems in dwellings supplying water to appliances: <ul style="list-style-type: none"> a) Baths b) WCs c) Over the rim bidets d) Wash hand basins e) Sinks f) Mixer taps g) Outside taps h) Shower mixer valves/ instantaneous showers i) Refrigerators, washing machines and dishwashers

Learning Outcome 2	
Know the types of cold water system and their layout requirements.	
Assessment Criteria (continued)	
2.7	<p>Identify the working principles of cold water system components.</p> <ul style="list-style-type: none"> a) Stop valves b) Servicing valves c) Drain valves d) Float operated valves e) Terminal fittings f) Pillar taps g) Bib taps h) Mixer taps i) Ceramic disc taps j) Shower mixer valves k) Gravity l) Mains fed m) Water softeners n) Water filters o) Water conditioners p) Water meters q) Backflow prevention devices r) Simple air gap arrangements s) Double and single check valves t) Cold water storage cisterns u) Combined feed and expansion cisterns v) WC/ urinal flushing cisterns
2.8	<p>State the system layout features for protected plastic storage cisterns.</p> <ul style="list-style-type: none"> a) Typical cistern sizes for small dwellings b) Warning pipe (overflow) arrangements c) Inlet/ outlet position d) Position of float operated valve e) Position of cistern vent f) Position of open vent pipe connection g) Requirement for a rigid close fitting lid h) Service valve requirements i) Cistern base support requirements
2.9	State the methods of linking cold water storage cisterns for use in dwellings.

Learning Outcome 3	
Know the site preparation techniques for cold water systems and components	
Assessment Criteria	
3.1	<p>Identify the sources of information required when undertaking work on cold water systems.</p> <ul style="list-style-type: none"> a) Statutory regulations b) Industry standards c) Manufacturer technical instructions
3.2	Identify the preparatory work required to be undertaken to the building fabric in order to install, decommission or maintain cold water systems and components.

Learning Outcome 3	
Know the site preparation techniques for cold water systems and components	
Assessment Criteria (continued)	
3.3	Identify the protection measures required to the building fabric or customer property, during and on completion of work on cold water systems and components.
3.4	Identify the pipe work materials and fittings required to complete work on cold water systems <ul style="list-style-type: none"> a) External water service pipe work b) Internal water supply pipe work
3.5	State the range of hand and power tools required to complete work on cold water systems and components.

Learning Outcome 4	
Be able to apply site preparation techniques for cold water systems and components.	
Assessment Criteria	
4.1	Check the safety of the work location in order for the work to safely proceed <ul style="list-style-type: none"> a) Safe access and exit b) Immediate work location e.g. tripping hazards c) Appropriate risk assessments/ method statements are available
4.2	Wear Personal Protective Equipment appropriate to the installation, decommissioning or maintenance task being carried out.
4.3	Apply protection measures to the building fabric or customer property, during and on completion of work on cold water systems and components.
4.4	Select the pipe work materials and fittings required to complete work on cold water systems ensuring that they are not damaged.
4.5	Select the hand and power tools required to complete work on cold water systems and components.
4.6	Carry out preparatory work in order to install cold water systems and components.

Learning Outcome 5	
Know the installation requirements of cold water systems and components	
Assessment Criteria	
5.1	State how to take readings of the incoming water supply pressure and flow rate.
5.2	Identify suitable methods of connecting cold water system supply pipe work to incoming service pipe work: <ul style="list-style-type: none"> a) Medium density polyethylene (MDPE) b) Copper c) Lead

Learning Outcome 5	
Know the installation requirements of cold water systems and components	
Assessment Criteria (continued)	
5.3	State the positioning requirements of components in cold water systems <ul style="list-style-type: none"> a) Supply stop valves b) Drain valves c) Water meters d) Water conditioning devices e) Service valves f) Backflow prevention devices
5.4	Identify how to measure, mark out and drill plastic storage cisterns to receive pipe work connections.
5.5	Identify how to make pipe work connections to storage cisterns.
5.6	State the positioning and fixing requirements for cold water system pipe work and components <ul style="list-style-type: none"> a) In suspended timber floors b) In solid floors c) Embedded in walls d) In areas of the building subject to frost e) That may be exposed to warming
5.7	State how to select clips and brackets appropriate to the cold water system pipe work and the industry recommended spacing's. <ul style="list-style-type: none"> a) Horizontally mounted pipe work b) Vertically mounted pipe work
5.8	Identify how to position, fix and connect new cold water pipe work to outlets. <ul style="list-style-type: none"> a) Bath tap or shower mixer valve b) Wash hand basin tap c) Sink tap d) Combination boiler e) WC flushing cistern f) Cold water storage cistern
5.9	Identify suitable methods of making new pipe work connections into existing cold water system pipe work. <ul style="list-style-type: none"> a) Copper b) Plastic c) Lead d) Galvanised steel
5.10	Identify the insulation requirements of cold water system components. <ul style="list-style-type: none"> a) Pipe work sections b) Storage cisterns

Learning Outcome 6	
Be able to install cold water systems and components.	
Assessment Criteria	
6.1	Use test instruments to take readings of the incoming water supply pressure and flow rate
6.2	Connect cold water supply pipe work to incoming service pipe work. a) MDPE to copper coupler b) Supply stop and drain valve
6.3	Joint cold water pipework components in copper with capillary soldered and compression fittings.
6.4	Measure, mark out and drill plastic storage cisterns to receive pipework connections.
6.5	Make pipework connections to storage cisterns.
6.6	Make pipework fixings to copper pipework.
6.7	Position, fix and connect new cold water pipework to outlets. a) Bath tap or shower mixer valve b) Wash hand basin tap c) Sink tap d) Combination boiler e) WC flushing cistern f) Cold water storage cistern
6.8	Apply insulation to cold water system components a) Pipework sections b) Storage cisterns
6.9	Demonstrate that cold water systems or components cannot be brought into operation by the end user before the work has been fully completed.

Learning Outcome 7	
Know the service and maintenance requirements of cold water systems and components	
Assessment Criteria	
7.1	Identify how to use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of cold water system components.
7.2	Identify how to carry out routine checks on cold water system components as part of a periodic maintenance programme. a) Visual inspection of pipework for leakage and adequate support b) Effective operation of terminal fittings c) Effective operation of float operated valves d) Effective operation of stop and service valves e) Condition of protected cold water storage cistern

Learning Outcome 7	
Know the service and maintenance requirements of cold water systems and components	
Assessment Criteria (continued)	
7.3	State the procedures for dealing with defects in cold water components and pipework. <ul style="list-style-type: none"> a) Cistern failure b) Incorrect support to cold water system pipework and storage cisterns c) Excessive noise in pipework systems d) Leakage of internal cold water system pipework and fittings e) Leakage or ineffective operation of: f) Terminal fittings g) Float operated valves h) Stop and service valves
7.4	Identify the types of information to be provided on a maintenance record for cold water systems.

8.1	Use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of cold water system components.
8.2	Carry out routine checks on cold water system components as part of a periodic maintenance programme. <ul style="list-style-type: none"> a) Visual inspection of pipework for leakage and adequate support b) Effective operation of terminal fittings c) Effective operation of float operated valves d) Effective operation of stop and service valves e) Condition of protected cold water storage cistern
8.3	Carry out repairs to defects in cold water system components. <ul style="list-style-type: none"> a) Leakage of cold water system pipework and fittings – repair to water-filled pipework b) Leakage or ineffective operation of c) Terminal fittings d) Float operated valves e) Stop and service valves
8.4	Complete the required details contained in a simple maintenance record for a cold water system.

Learning Outcome 9	
Know the decommissioning requirements of cold water systems and components.	
Assessment Criteria	
9.1	Identify the working methods that reduce the time periods during which cold water systems need to be isolated.
9.2	State the information that needs to be provided to other persons before decommissioning work takes place.

Learning Outcome 9	
Know the decommissioning requirements of cold water systems and components.	
Assessment Criteria (continued)	
9.3	State how to temporarily decommission cold water system components and connecting pipe work systems.
9.4	Identify the work sequences for permanently decommissioning cold water system components.
9.5	Identify the methods used during the decommissioning process to prevent the end-user from operating cold water system components. <ul style="list-style-type: none"> a) Isolation of stop/ servicing valves b) Temporary capping of pipe work sections c) Use of warning notices and signs

Learning Outcome 10	
Be able to decommission cold water systems and components	
Assessment Criteria	
10.1	Advise appropriate persons before cold water system components or pipework are isolated in order to undertake work.
10.2	Carry out temporary decommissioning of cold water system components and connecting pipe work systems.
10.3	Check to ensure that the decommissioning procedures carried out prevent the end-user from operating cold water system components.

Learning Outcome 11	
Know the inspection and soundness testing requirements of cold water systems and components.	
Assessment Criteria	
11.1	State the checks to be carried out during a visual inspection of a cold water system to confirm that it is ready to be filled with water.
11.2	State how to fill cold water pipe work with water at normal operating pressure and check for leakage.
11.3	Identify how to carry out a soundness test to industry requirements on cold water systems pipe work and components.
11.4	State the flushing procedure for cold water systems and components.
11.5	Identify the actions that must be taken when inspection and testing reveals defects in cold water systems. <ul style="list-style-type: none"> a) Dealing with systems that do not meet correct installation requirements b) Remedial work associated with defective pipe work bracketing c) Remedial work associated with leakage from pipe work systems

Learning Outcome 12	
Be able to inspect and soundness test cold water systems and components.	
Assessment Criteria	
12.1	Carry out a visual inspection of a cold water system to confirm that it is ready to be filled with water.
12.2	Fill cold water pipe work with water at normal operating pressure and check for leakage.
12.3	Perform a soundness test to industry requirements on cold water systems pipe work and components.
12.4	Flush the system with wholesome water on completion of soundness testing.

F/602/2884 - Understand and apply domestic hot water system installation and maintenance techniques

Unit level	2	<i>This combination unit provides learning in the installation, maintenance, decommissioning and soundness testing of a basic range of hot water system/component types in dwellings and industrial/commercial properties (of similar size and scope to domestic dwellings). The unit covers systems in building up to 3 storeys in height with pipework up to 28mm diameter.</i>
GLH	62	
Unit		
F/602/2884 - Understand and apply domestic hot water system installation and maintenance techniques		
Learning Outcomes		Assessment Criteria
LO1	Know the types of hot water system and their layout requirements	1.1 – 1.14
LO2	Know the site preparation techniques for hot water systems and components	2.1 – 2.5
LO3	Be able to apply site preparation techniques for hot water systems and components	3.1 – 3.6
LO4	Know the installation requirements of hot water systems and components	4.1 – 4.11
LO5	Be able to install hot water systems and components	5.1 – 5.9
LO6	Know the service and maintenance requirements of hot water systems and components	6.1 – 6.4
LO7	Be able to service and maintain hot water systems and components	7.1 – 7.4
LO8	Know the decommissioning requirements of hot water systems and components	8.1 – 8.5
LO9	Be able to decommission hot water systems and components	9.1 – 9.3
LO10	Know the inspection and soundness testing requirements of hot water systems and components	10.1 – 10.5
LO11	Be able to inspect and soundness test hot water systems and components	11.1 – 11.4

Learning Outcome 1	
Know the types of hot water system and their layout requirements.	
Assessment Criteria	
1.1	Identify the type of hot water system from layout diagrams. <ul style="list-style-type: none"> a) Direct system b) Conventional boiler (small hot water only boiler) c) Immersion heater including low energy tariff types d) Indirect system e) Fed by combined hot water and heating boiler f) Single point of use vented heaters g) Instantaneous hot water heaters h) Multipoint heaters i) Combination boilers
1.2	State the factors that need to be considered when the type of hot water system is selected for use in a building. <ul style="list-style-type: none"> a) Quantity and usage of hot water required b) Distance of outlet from hot water source c) Need for a secondary recirculation system

Learning Outcome 1	
Know the types of hot water system and their layout requirements.	
Assessment Criteria (continued)	
1.3	<p>Identify the working principles of hot water system components.</p> <ul style="list-style-type: none"> a) Stop valves b) Fullway gate valves c) Servicing valves d) Drain valves e) Float operated valves f) Terminal fittings g) Bib taps h) Pillar taps i) Mixer taps j) Ceramic disc taps k) Backflow prevention devices l) Simple air gaps m) Single check valves n) Cold water feed cisterns o) Directly heated storage cylinders p) Indirectly heated storage cylinders q) Single feed r) Double feed s) Combination t) Showers u) Gravity mixer v) Mains fed mixer w) Electric instantaneous x) Thermostatic mixing valves y) Instantaneous water heater z) Mains fed multipoint heater aa) Mains fed combination boiler bb) Single point of use vented heaters
1.4	<p>State the typical pipe sizes used in centralised open vented hot water systems in dwellings.</p> <ul style="list-style-type: none"> a) Primary circuit b) Secondary circuit
1.5	<p>State the system layout features for the open vent and cold feed pipes of primary and secondary open vented hot water circuits.</p>
1.6	<p>State the connection requirements for feed and expansion cisterns into open vented primary hot water circuits.</p>
1.7	<p>State the system layout features for plastic feed and expansion cisterns.</p> <ul style="list-style-type: none"> a) Typical cistern sizes for small dwellings b) Warning pipe (overflow) arrangements c) Inlet/ outlet position d) Position of float operated valve e) Position of cistern vent f) Service valve requirements g) Cistern base support requirements

Learning Outcome 1	
Know the types of hot water system and their layout requirements.	
Assessment Criteria (continued)	
1.8	Identify the type and typical sizes of open vented storage cylinder used in hot water systems in dwellings. a) Direct b) Single feed direct c) Double feed indirect d) Double feed indirect super duty recovery e) combination
1.9	State the system layout features for hot water heaters. a) Mains fed instantaneous multipoint water heaters including combination boilers b) Localised (point of use) open vented hot water heaters
1.10	Identify the working principles. State the typical pipe sizes used with mains fed instantaneous hot water heaters and open vented point of use water heaters in dwellings.
1.11	Identify the need for temperature control of hot water systems. a) Thermostats b) Overheat thermostats c) Temperature relief valves
1.12	State the factors that can lead to backflow from hot water outlets and equipment in dwellings.
1.13	Identify the standard backflow prevention devices that are used in hot water systems in dwellings supplying water to appliances. a) Baths b) Over the rim bidets c) Wash hand basins d) Sinks e) Mixer taps f) Showers
1.14	State the system layout features for the installation of hot water components. a) Gravity fed showers b) Mains fed showers c) Instantaneous electric showers d) Thermostatic mixing valves

Learning Outcome 2	
Know the site preparation techniques for hot water systems and components.	
Assessment Criteria	
2.1	Identify the sources of information required when undertaking work on hot water systems. a) Statutory regulations b) Industry standards c) Manufacturer technical instructions
2.2	Identify the preparatory work required to be undertaken to the building fabric in order to install, decommission or maintain hot water systems and components.
2.3	Identify the protection measures required to the building fabric or customer property, during and on completion of work on hot water systems and components.

Learning Outcome 2	
Know the site preparation techniques for hot water systems and components.	
Assessment Criteria (continued)	
2.4	Identify the pipework materials and fittings required to complete work on hot water systems
2.5	State the range of hand and power tools required to complete work on hot water systems and components.

Learning Outcome 3	
Be able to apply site preparation techniques for hot water systems and components.	
Assessment Criteria	
3.1	Check the safety of the work location in order for the work to safely proceed. a) Safe access and exit b) Immediate work location e.g. tripping hazards c) Appropriate risk assessments/ method statements are available
3.2	Wear Personal Protective Equipment appropriate to the installation, decommissioning or maintenance task being carried out.
3.3	Apply protection measures to the building fabric or customer property, during and on completion of work on hot water systems and components.
3.4	Select the pipework materials and fittings required to complete work on hot water systems ensuring that they are not damaged.
3.5	Select the hand and power tools required to complete work on hot water systems and components.

Learning Outcome 4	
Know the installation requirements of hot water systems and components.	
Assessment Criteria	
4.1	State how to take readings of hot water supply pressure and flow rate.
4.2	State the positioning and fixing requirements of hot water pipework and components. a) In suspended timber floors b) In solid floors c) Embedded in walls d) In areas of the building subject to frost
4.3	Identify how expansion and contraction may be catered for in hot water pipework containing: a) Plastics b) Copper
4.4	State how to select clips and brackets appropriate to the hot water system pipework and the industry recommended spacing's. a) Horizontally mounted pipework b) Vertically mounted pipework

Learning Outcome 4	
Know the installation requirements of hot water systems and components.	
Assessment Criteria (continued)	
4.5	State the positioning requirements of components in hot water systems. <ul style="list-style-type: none"> a) Heaters/storage cylinders b) Cisterns – hot water feed cisterns and feed and expansion cisterns c) Drain valves d) Service valves e) Thermostatic mixing valves f) Showers – gravity fed mixer, mains fed mixer and instantaneous electric
4.6	Identify how to measure, mark out and drill plastic storage cisterns to receive pipework connections.
4.7	Identify how to make pipework connections to storage cisterns.
4.8	Identify how to make pipework connections to open vented hot water storage cylinders.
4.9	State how to position, fix and connect new hot water pipework to outlets and supply sources. <ul style="list-style-type: none"> a) Bath tap or shower mixer valve b) Wash hand basin tap c) Sink tap d) Combination boiler e) Cold water storage cistern f) Hot water storage cylinder g) Thermostatic mixing valve
4.10	Identify suitable methods of making new pipework connections into existing hot water system pipework. <ul style="list-style-type: none"> a) Plastic b) Copper
4.11	Identify the insulation requirements of hot water system components <ul style="list-style-type: none"> a) Pipe work b) Cisterns c) Storage vessels

Learning Outcome 5	
Be able to install hot water systems and components.	
Assessment Criteria	
5.1	Use test instruments to take readings of the hot water supply pressure and flow rate from existing hot water outlets.
5.2	Make pipework fixings to copper and plastic pipework.
5.3	Joint hot water pipework components. <ul style="list-style-type: none"> a) Copper – capillary soldered and compression b) Plastic-push fit
5.4	Measure, mark out and drill plastic storage cisterns to receive pipework connections.
5.5	Make pipework connections to storage cisterns.
5.6	Make pipework connections to open vented hot water storage cylinders.

Learning Outcome 5	
Be able to install hot water systems and components.	
Assessment Criteria (continued)	
5.7	Position, fix and connect new hot water pipework to outlets <ul style="list-style-type: none"> a) Bath tap or shower mixer valve b) Wash hand basin tap c) Sink tap d) Combination boiler e) Cold water storage cistern f) Hot water storage cylinder g) Thermostatic mixing valve
5.8	Apply insulation to hot water system pipework.
5.9	Demonstrate that hot water components and pipework systems cannot be brought into operation by the end user before the work has been fully completed.

Learning Outcome 6	
Know the service and maintenance requirements of hot water systems and components.	
Assessment Criteria	
6.1	Identify how to use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of system components.
6.2	Identify how to carry out routine checks on hot water components and pipework as part of a periodic maintenance programme. <ul style="list-style-type: none"> a) Visual inspection of pipework for leakage, adequate support and insulation b) Effective operation of terminal fittings c) Effective operation of float operated valves d) Effective operation of service valves e) Condition of hot water cylinder/heater and storage cisterns f) Effective operation of thermostatic control devices
6.3	State the procedures for dealing with defects in hot water components and pipework. <ul style="list-style-type: none"> a) Incorrect support to hot water system pipework and storage cisterns b) Excessive noise in pipework systems c) Leakage of hot water system pipework and fittings d) Cistern failure e) Hot water storage cylinder/ heater failure f) Leakage or ineffective operation of: g) Terminal fittings h) Float operated valves i) Mixer showers j) Thermostatic mixing valves
6.4	Identify the types of information to be provided on a maintenance record for hot water systems.

Learning Outcome 7	
Be able to service and maintain hot water systems and components.	
Assessment Criteria	
7.1	Use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of system components.
7.2	Carry out routine checks on hot water components and pipework as part of a periodic maintenance programme. <ul style="list-style-type: none"> a) Visual inspection of pipework for leakage, adequate support and insulation b) Effective operation of terminal fittings c) Effective operation of float operated valves d) Effective operation of service valves e) Condition of hot water cylinder/heater and storage cisterns f) Effective operation of thermostatic control devices
7.3	Carry out repairs to defects in hot water system components <ul style="list-style-type: none"> a) Leakage of hot water system pipework and fittings – repair to water-filled pipework b) Leakage or ineffective operation of: <ul style="list-style-type: none"> c) Terminal fittings d) Float operated valves e) Stop and service valves
7.4	Complete the required details contained in a simple maintenance record for a hot water system.

Learning Outcome 8	
Know the decommissioning requirements of hot water systems and components.	
Assessment Criteria	
8.1	Identify the working methods that reduce the time periods during which hot water systems need to be isolated.
8.2	State the information that needs to be provided to other persons before decommissioning work takes place.
8.3	State how to temporarily decommission hot water system components and connecting pipework systems.
8.4	Identify the work sequences for permanently decommissioning hot water components and pipework systems.
8.5	Identify the methods used during the decommissioning process to prevent the end-user from operating hot water system components. <ul style="list-style-type: none"> a) Temporary capping of pipework sections b) Use of warning notices and signs

Learning Outcome 9	
Be able to decommission hot water systems and components.	
Assessment Criteria	
9.1	Advise appropriate persons before hot water components or pipework are isolated in order to undertake work.

Learning Outcome 9	
Be able to decommission hot water systems and components.	
Assessment Criteria (continued)	
9.2	Carry out temporary decommissioning of cold water system components and connecting pipework systems.
9.3	Check to ensure that the decommissioning procedures carried out prevent the end-user from operating the hot water system components.

Learning Outcome 10	
Know the inspection and soundness testing requirements of hot water systems and components.	
Assessment Criteria	
10.1	State the checks to be carried out during a visual inspection of a hot water system to confirm that it is ready to be filled with water.
10.2	State how to fill hot water pipework with water at normal operating pressure and check for leakage.
10.3	Identify how to carry out a soundness test to industry requirements on hot water systems pipework and components.
10.4	State the flushing procedure for hot water systems and components.
10.5	Identify the actions that must be taken when inspection and testing reveals defects in hot water systems. <ul style="list-style-type: none"> a) Dealing with systems that do not meet correct installation requirements b) Remedial work associated with defective pipework bracketing c) Remedial work associated with leakage from pipework systems

Learning Outcome 11	
Be able to inspect and soundness test hot water systems and components	
Assessment Criteria	
11.1	Carry out a visual inspection of a hot water system to confirm that it is ready to be filled with water.
11.2	Fill hot water pipework with water at normal operating pressure and check for leakage.
11.3	Perform a soundness test to industry requirements on hot water systems pipework and components.
11.4	Flush the system with wholesome water on completion of soundness testing.

Y/602/2888 - Understand and apply domestic central heating system installation and maintenance techniques

Unit level	2	<i>This combination unit provides basic learning in the installation, maintenance, decommissioning and soundness testing of a basic range of wet central heating system/component types in dwellings and industrial/commercial properties (of similar size and scope to domestic dwellings). The unit covers systems in buildings up to 3 storeys in height and with systems up to a maximum of 40kW heat output and pipework up to 32mm diameter.</i>	
GLH	82		
Unit			
Y/602/2888 - Understand and apply domestic central heating system installation and maintenance techniques			
Learning Outcomes			Assessment Criteria
LO1	Know the uses of central heating systems in dwellings		1.1 – 1.4
LO2	Know the types of central heating system and their layout requirements		2.1 – 2.10
LO3	Know the site preparation techniques for central heating systems and components		3.1 – 3.5
LO4	Be able to apply site preparation techniques for central heating systems and components		4.1 – 4.6
LO5	Know the installation requirements of central heating systems and components		5.1 – 5.10
LO6	Be able to install central heating systems and components		6.1 – 6.6
LO7	Know the service and maintenance requirements of central heating systems and components		7.1 – 7.4
LO8	Be able to service and maintain central heating systems and components		8.1 – 8.4
LO9	Know the decommissioning requirements of central heating systems and components		9.1 – 9.6
LO10	Be able to decommission central heating systems and components		10.1 – 10.3
LO11	Know the inspection and soundness testing requirements of central heating systems and components		11.1 – 11.4
LO12	Be able to inspect and soundness test central heating systems and components		12.1 – 12.3

Learning Outcome 1	
Know the uses of central heating systems in dwellings	
Assessment Criteria	
1.1	State the purpose of central heating systems used in dwellings.
1.2	Identify the different types of space heating systems used in dwellings. a) Full central heating b) Background heating c) Selective heating d) Two and one pipe systems
1.3	Plan the work to be undertaken to comply with industry standards and manufacturer's guidelines taking into account risk assessment, location, ventilation
1.4	Confirm that the gas supply meets the industry requirements for the installation

Learning Outcome 2	
Know the types of central heating system and their layout requirements	
Assessment Criteria	
2.1	<p>Identify the working principles of central heating systems.</p> <ul style="list-style-type: none"> a) Pumped heating only system b) Pumped with gravity hot water c) Fully pumped with 2 x two port valves d) Fully pumped with a mid-position valve e) Combination boiler with pumped heating
2.2	<p>Identify the type of central heating system from layout diagrams.</p> <ul style="list-style-type: none"> a) Open vented b) Pumped heating only c) Pumped with gravity hot water including heat sink circuits d) Fully pumped with 2 x port valves e) Fully pumped with a mid-position valve f) Sealed system g) Pumped heating only h) Fully pumped with 2 x port valves i) Fully pumped with a mid-position valve j) Combination boiler with pumped heating k) System boiler with pumped heating
2.3	<p>State the system layout features for filling and venting systems.</p> <ul style="list-style-type: none"> a) Open vented systems b) Feed and expansion cistern position c) Pump position d) Cold feed and open vent pipe connection e) Methods of releasing air from the system f) Sealed systems g) Expansion vessel position h) Pressure gauge, pressure relief valve and filling loop position i) Pump position j) Methods of releasing air from the system
2.4	<p>State the layout features for the systems that include micro and minibore pipe work.</p>
2.5	<p>State the general operating principles of oil fired heat producing appliances.</p> <ul style="list-style-type: none"> a) Open fire with high output back boilers b) Room heaters c) Cookers d) Independent boilers
2.6	<p>State the general operating principles of oil fired heat producing appliances.</p> <ul style="list-style-type: none"> a) Pressure jet b) Traditional boilers c) Condensing boilers d) Combination boilers e) Freestanding boilers f) Wall mounted boilers g) Open flued boilers h) Room sealed boiler i) Vaporising j) Open flued cookers

Learning Outcome 2	
Know the types of central heating system and their layout requirements	
Assessment Criteria (continued)	
2.7	<p>State the general operating principles of gas fired heat producing appliances.</p> <ul style="list-style-type: none"> a) Open flued boilers b) Room sealed boilers c) Traditional boilers d) Condensing boilers e) Combination boilers f) System boilers g) Freestanding boilers h) Wall mounted boilers i) Fan assisted boilers
2.8	<p>State the operating principles of heat emitters.</p> <ul style="list-style-type: none"> a) Panel radiators b) Column radiators c) Low surface temperature radiators d) Fan convectors e) Wall mounted f) Kick space g) Towel warmers h) Towel warmers with integral panel radiators
2.9	<p>State the operating principles of central heating control components.</p> <ul style="list-style-type: none"> a) Radiator valves – thermostatic and manual valves b) Automatic air vents c) Motorised valves – two port and three port mid position and diverter d) Hot water storage cylinders e) Feed and expansion cisterns f) Circulating pumps g) Automatic bypass valves h) Thermo-mechanical cylinder control valves i) Anti-gravity valves j) Drain valves k) Timing devices – clocks and programmers l) Room thermostats m) Cylinder thermostats and overheat protection devices n) Frost and pipe combined thermostats
2.10	<p>State the operating principles of devices used in central heating systems to minimise the build-up of sediment.</p>

Learning Outcome 3	
Know the site preparation techniques for central heating systems and components	
Assessment Criteria	
3.1	<p>Identify the sources of information required when undertaking work on central heating systems.</p> <ul style="list-style-type: none"> a) Statutory regulations b) Industry standards c) Manufacturer technical instructions

Learning Outcome 3	
Know the site preparation techniques for central heating systems and components	
Assessment Criteria (continued)	
3.2	Identify the preparatory work required to be carried out to the building fabric in order to install, decommission or maintain central heating systems.
3.3	Identify the protection measures required to the building fabric or customer property, during and on completion of work on central heating systems and components.
3.4	Identify the pipework materials and fittings required to complete work on central heating systems ensuring that they are not damaged.
3.5	State the range of hand and power tools required to complete work on central heating systems.

Learning Outcome 4	
Be able to apply site preparation techniques for central heating systems and components	
Assessment Criteria	
4.1	Check the safety of the work location in order for the work to safely proceed. a) Safe access and exit b) Immediate work location e.g. tripping hazards c) Appropriate risk assessments/ method statements are available
4.2	Wear Personal Protective Equipment relevant to the installation, decommissioning or maintenance task being carried out.
4.3	Apply protection measures to the building fabric or customer property, during and on completion of work on central heating systems and components.
4.4	Select the pipework materials and fittings required to complete work on central heating systems ensuring that they are not damaged
4.5	Select the hand and power tools required to complete work on central heating systems.
4.6	Carry out preparatory work in order to install central heating systems.

Learning Outcome 5	
Know the installation requirements of central heating systems and components	
Assessment Criteria	
5.1	State the procedures required to assemble valves to radiators and mount radiators on wall surfaces.
5.2	State the positioning and fixing requirements of central heating pipework and components. a) In suspended timber floors b) In solid floors c) Embedded in walls d) In all areas of the building subject to frost

Learning Outcome 5	
Know the installation requirements of central heating systems and components	
Assessment Criteria (continued)	
5.3	Identify how expansion and contraction may be catered for in central heating pipework containing. <ul style="list-style-type: none"> a) Plastics b) Cooper
5.4	State how to select clips and brackets appropriate to the hot water system pipework and the industry recommended spacing's. <ul style="list-style-type: none"> a) Horizontally mounted pipework b) Vertically mounted pipework
5.5	Identify how to select joints for use in central heating system pipework. <ul style="list-style-type: none"> a) LCS threaded joints b) Plastic- pushfit joints c) Capillary solder joints d) Compression joints
5.6	State the positioning and fixing requirements of components in central heating systems. <ul style="list-style-type: none"> a) Radiator valves – thermostatic and manual valves b) Automatic air vents c) Hot water storage cylinders d) Feed and expansion cisterns e) Motorised valves – two port and three port mid position and diverter f) Circulating pumps g) Automatic bypass valves h) Thermo mechanical cylinder control valve i) Anti-gravity valve j) Drain valves k) Timing devices – clocks and programmers l) Room thermostats m) Cylinder thermostats and overheat protection devices n) Frost and pipe combined thermostat
5.7	Identify suitable methods for making new central heating pipework connections to components. <ul style="list-style-type: none"> a) Boilers b) Central heating control system components c) Heat emitters d) Hot water storage cylinders e) Feed and expansion cisterns
5.8	State how to position, fix and connect new central heating pipework to components. <ul style="list-style-type: none"> a) Panel radiators b) Boilers c) Control components d) Hot water storage cylinders e) Filling and venting components

Learning Outcome 5	
Know the installation requirements of central heating systems and components	
Assessment Criteria (continued)	
5.9	Identify suitable methods for making new central heating pipework connections into existing central heating circuits. <ul style="list-style-type: none"> a) Within a one or two pipe copper system b) Within a one or two pipe low carbon steel system c) To a microbore or minibore system
5.10	Identify the insulation requirements of central heating system components <ul style="list-style-type: none"> a) Pipework b) Cisterns

Learning Outcome 6	
Be able to install central heating systems and components	
Assessment Criteria	
6.1	Assemble heat emitter components.
6.2	Make pipework fixings to copper and low carbon steel central heating system pipework.
6.3	Joint central heating pipework systems. <ul style="list-style-type: none"> a) LCS threaded joints b) Capillary solder joints c) Compression joints
6.4	Position, fix and connect new central heating pipework to components Heat emitters. <ul style="list-style-type: none"> a) Boilers b) Control components c) Hot water storage cylinders d) Filling and venting components
6.5	Apply insulation to central heating system pipework.
6.6	Demonstrate that central heating components and pipework systems cannot be brought into operation by the end user before the work has been fully completed.

Learning Outcome 7	
Know the service and maintenance requirements of central heating systems and components	
Assessment Criteria	
7.1	Identify how to use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of system components.
7.2	Identify how to carry out routine checks on central heating components and pipework systems as part of a periodic maintenance programme. <ul style="list-style-type: none"> a) Visual inspection of pipework for leakage and adequate support b) Poor circulation in heat emitters c) Poor flow rate through heating systems d) Venting of gas build up within heat emitters e) Operation of control components f) Effective operation of thermostats g) Operation/ adjustment – system filling and venting components

Learning Outcome 7	
Know the service and maintenance requirements of central heating systems and components	
Assessment Criteria (continued)	
7.3	State the procedures for dealing with defects in central heating components and pipework. <ul style="list-style-type: none"> a) Failure of control components b) Leakage in system pipework c) Leakage from heat emitters d) Replacement of control valves e) Replacement of heat emitters f) Replacement of hot water storage cylinders
7.4	Identify the types of information to be provided on a maintenance record for central heating systems.

Learning Outcome 8	
Be able to service and maintain central heating systems and components	
Assessment Criteria	
8.1	Use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of system components.
8.2	Carry out routine checks on central heating components and pipework systems as part of a periodic maintenance programme. <ul style="list-style-type: none"> a) Visual inspection of pipework for leakage and adequate support b) Venting of gas build up within heat emitters c) Operation of control components d) Effective operation of thermostats e) Operation/ adjustment – system filling and venting components
8.3	Carry out repairs to defects in central heating system components. <ul style="list-style-type: none"> a) Replacement of a radiator valve on a heat emitter b) Replacement of a radiator in an existing system
8.4	Complete the required details contained in a simple maintenance record for a central heating system.

Learning Outcome 9	
Know the decommissioning requirements of central heating systems and components	
Assessment Criteria	
9.1	Identify working methods that reduce the periods during which central heating systems are not available to building users.
9.2	State the information that needs to be provided to other persons before decommissioning work takes place.
9.3	State how to temporarily decommission central heating and connecting pipework systems
9.4	Identify the work sequences for permanently decommissioning central heating and pipework systems.

Learning Outcome 9	
Know the decommissioning requirements of central heating systems and components	
Assessment Criteria (continued)	
9.5	Identify the procedures for safely draining and disposing of central heating system contents
9.6	Identify the methods used during the decommissioning process to prevent the end-user from operating the appliance or system. <ul style="list-style-type: none"> a) Isolation of the fuel/electricity supply to the system b) Temporary capping of pipework sections c) Use of warning notices and signs

Learning Outcome 10	
Be able to decommission central heating systems and components.	
Assessment Criteria	
10.1	Advise appropriate persons before central heating components or pipework are isolated in order to undertake work.
10.2	Carry out temporary decommissioning of central heating system components and connecting pipework systems.
10.3	Check to ensure that the decommissioning procedures carried out prevent the end-user from operating the appliance or system. <ul style="list-style-type: none"> a) Isolation of the fuel/electricity supply to the system b) Temporary capping of pipework sections c) Use of warning notices and signs

Learning Outcome 11	
Know the inspection and soundness testing requirements of central heating systems and components	
Assessment Criteria	
11.1	State the checks to be carried out during a visual inspection of a central heating system to confirm that it is ready to be filled with water.
11.2	State how to fill central heating systems with water at normal operating pressure and check for leakage.
11.3	Identify how to carry out a soundness test to industry requirements on central heating systems pipework and components.
11.4	Identify the actions that must be taken when inspection and testing reveals defects in central heating systems. <ul style="list-style-type: none"> a) Dealing with systems that do not meet correct installation requirements b) Remedial work associated with defective pipework bracketing c) Remedial work associated with defective control valves d) Remedial work associated with leakage from pipework systems

Learning Outcome 12	
Be able to inspect and soundness test central heating systems and components	
Assessment Criteria	
12.1	Carry out a visual inspection of a central heating system to confirm that it is ready to be filled with water.
12.2	Fill central heating systems with water at normal operating pressure and check for leakage
12.3	Perform a soundness test to industry requirements on central heating systems pipework and components.

F/602/2917 – Understand and apply domestic rainwater system installation and maintenance techniques

Unit level	2	<i>This combination unit provides learning in the installation and maintenance of gravity rainwater systems that are installed on dwellings and industrial/commercial properties (of similar size and scope to domestic dwellings) in buildings up to 3 storeys in height.</i>	
GLH	30		
Unit			
F/602/2917 – Understand and apply domestic rainwater system installation and maintenance techniques			
Learning Outcomes			Assessment Criteria
LO1	Know the general principles of gravity rainwater systems		1.1 – 1.5
LO2	Know the layout requirements of gravity rainwater systems		2.1 – 2.5
LO3	Know the site preparation techniques for gravity rainwater systems		3.1 – 3.6
LO4	Be able to apply site preparation techniques for gravity rainwater systems		4.1 – 4.5
LO5	Know the installation requirements of gravity rainwater systems		5.1 – 5.6
LO6	Be able to install gravity rainwater systems		6.1 – 6.4
LO7	Know the service and maintenance requirements of gravity rainwater systems		7.1 – 7.3
LO8	Be able to service and maintain gravity rainwater systems		8.1 – 8.2
LO9	Know the inspection and testing requirements of gravity rainwater systems		9.1 – 9.3
LO10	Be able to inspect and test gravity rainwater systems		10.1 – 10.2

Learning Outcome 1	
Know the general principles of gravity rainwater systems	
Assessment Criteria	
1.1	State the purpose of gravity rainwater systems used on dwellings.
1.2	Identify the working principles of gravity rainwater systems used on dwellings.
1.3	State the common gravity rainwater system component materials. <ul style="list-style-type: none"> a) PVC-U b) Extruded Aluminium c) Cast Iron
1.4	Identify the different types of gutter systems used on dwellings. <ul style="list-style-type: none"> a) Half round b) Square c) Ogee d) High capacity
1.5	Identify the different types of rainwater pipework used with gutter systems on dwellings. <ul style="list-style-type: none"> a) Round section b) Square section

Learning Outcome 2	
Know the layout requirements of gravity rainwater systems	
Assessment Criteria	
2.1	Identify the factors which are used to determine the type (size) of gutter system used on a dwelling. <ul style="list-style-type: none"> a) Rainfall intensity b) Roof area c) Running outlet position d) Gutter fall e) Changes of direction in the gutter run f) Customer preference
2.2	Identify the jointing procedures for gutter systems. <ul style="list-style-type: none"> a) PVC-U b) Extruded Aluminium c) Cast Iron
2.3	State the purpose of components used in an eaves gutter system <ul style="list-style-type: none"> a) Running outlets b) Gutter angles c) Gutter unions d) Stop ends e) Specialist unions between different gutter materials
2.4	State how building features determine gutter bracket selection for buildings. <ul style="list-style-type: none"> a) Fascia boards b) Exposed rafters (no fascia boards) c) No fascia board or exposed rafters (direct fixings to masonry surfaces)
2.5	State the purpose of components used in rainwater pipework. <ul style="list-style-type: none"> a) Offsets b) Angles c) Branches d) Hopper heads e) Shoes f) Specialist connectors to the drainage system

Learning Outcome 3	
Know the site preparation techniques for gravity rainwater systems	
Assessment Criteria	
3.1	Identify the sources of information required when carrying out work on gravity rainwater systems. <ul style="list-style-type: none"> a) Statutory regulations b) Industry standards c) Manufacturer technical instructions
3.2	Identify the preparatory work required to be carried out to the building fabric in order to install or maintain gravity rainwater systems.

Learning Outcome 3	
Know the site preparation techniques for gravity rainwater systems	
Assessment Criteria (continued)	
3.3	State the types of pre-existing damage to the existing building fabric or customer property that may be found before commencing work on gravity rainwater systems. a) Building wall surfaces b) Existing gravity rainwater system components
3.4	Identify the protection measures required to the building fabric or customer property, during work on gravity rainwater systems.
3.5	Identify the pipework materials and fittings required to complete work on gravity rainwater systems.
3.6	Identify the hand and power tools required to complete work on gravity rainwater systems.

Learning Outcome 4	
Be able to apply site preparation techniques for gravity rainwater systems	
Assessment Criteria	
4.1	Check the safety of the work location in order for the work to safely proceed. a) Safe access b) Immediate work location e.g. tripping hazards c) Appropriate risk assessments/ method statements are available
4.2	Wear Personal Protective Equipment relevant to the installation or maintenance task being carried out
4.3	Apply protection measures to the building fabric or customer property, during work on gravity rainwater systems.
4.4	Select the pipework materials and fittings required to complete work on gravity rainwater systems ensuring that they are not damaged.
4.5	Select the hand and power tools required to complete work on gravity rainwater systems.

Learning Outcome 5	
Know the installation requirements of gravity rainwater systems	
Assessment Criteria	
5.1	Identify how expansion and contraction may be catered for in PVC-u gravity rainwater systems.
5.2	State the positioning and fixing requirements of gutter system components. a) Gutter brackets – fascia, rafter and drive-in types b) Running outlets c) Gutter angles d) Gutter unions e) Stop ends f) Specialist unions between different gutter materials

Learning Outcome 5	
Know the installation requirements of gravity rainwater systems	
Assessment Criteria (continued)	
5.3	Identify how to install lengths of PVC-u gutter and make joints to gutter systems. <ul style="list-style-type: none"> a) Running outlet b) Gutter angle c) Gutter union d) Stop ends
5.4	Identify how to select brackets for rainwater pipework and space them at appropriate intervals
5.5	Identify suitable methods for making new rainwater pipework connections to the drainage system. <ul style="list-style-type: none"> a) Discharge to gully using a shoe b) Direct connection to drainage bend c) Direct connection to gulley d) Direct connection to a soakaway
5.6	Identify suitable methods for making new PVC-u pipework connections into existing rainwater pipework.

Learning Outcome 6	
Be able to install gravity rainwater systems	
Assessment Criteria	
6.1	Position and fix eaves gutter brackets at recommended spacing intervals.
6.2	Install lengths of PVC-u gutter and make joints to gutter systems. <ul style="list-style-type: none"> a) Running outlet b) Gutter angle c) Gutter union d) Stop ends
6.3	Make pipework fixings to rainwater pipework.
6.4	Install lengths of rainwater pipework and make connections <ul style="list-style-type: none"> a) To existing drainage systems b) To eaves gutter systems using offset connection

Learning Outcome 7	
Know the service and maintenance requirements of gravity rainwater systems	
Assessment Criteria	
7.1	Identify how to carry out routine checks on gravity rainwater systems as part of a periodic maintenance programme. <ul style="list-style-type: none"> a) Visual inspection of guttering and rainwater pipework for leakage and adequate support b) Visual inspection of guttering and rainwater pipework for damage

Learning Outcome 7	
Know the service and maintenance requirements of gravity rainwater systems	
Assessment Criteria (continued)	
7.2	State the procedures for dealing with defects in gravity rainwater systems. <ul style="list-style-type: none"> a) Leakage from systems b) Blockages in systems c) Improper support to PVC-u gutter systems
7.3	Identify the procedures for safely handling gravity rainwater system components that may be contaminated with foul waste.

Learning Outcome 8	
Be able to service and maintain gravity rainwater systems	
Assessment Criteria	
8.1	Carry out routine checks on gravity rainwater systems as part of a periodic maintenance programme. <ul style="list-style-type: none"> a) Visual inspection of guttering and rainwater pipework for leakage and adequate support b) Visual inspection of guttering and rainwater pipework for damage
8.2	Carry out routine maintenance procedures on gravity rainwater systems <ul style="list-style-type: none"> a) Replacement of a section of gutter b) Replacement of a gutter union

Learning Outcome 9	
Know the inspection and testing requirements of gravity rainwater systems	
Assessment Criteria	
9.1	State the checks to be carried out during a visual inspection of a gravity rainwater system to confirm that it is ready to receive rainwater.
9.2	State the test arrangements for gravity rainwater systems to check for leakage.
9.3	Identify the actions that must be taken when inspection and testing reveals defects in gravity rainwater systems. <ul style="list-style-type: none"> a) Dealing with systems that do not meet correct installation requirements b) Remedial work associated with defective gutter and pipework bracketing c) Remedial work associated with leakage from systems

Learning Outcome 10	
Be able to inspect and test gravity rainwater systems	
Assessment Criteria	
10.1	Carry out a visual inspection of a gravity rainwater system to confirm that it is ready to receive rainwater.
10.2	Test the gravity rainwater system for leakage using an appropriate source of water.

J/602/2921 - Understand and apply domestic above ground drainage system installation and maintenance techniques

Unit level	2	<i>This combination unit provides learning in the installation and maintenance of gravity rainwater systems that are installed on dwellings and industrial/commercial properties (of similar size and scope to domestic dwellings) in buildings up to 3 storeys in height.</i>	
GLH	44		
Unit			
J/602/2921 - Understand and apply domestic above ground drainage system installation and maintenance techniques			
Learning Outcomes			Assessment Criteria
LO1	Know the uses of sanitary appliances and their operating principles		1.1 – 1.3
LO2	Know the types of sanitary pipework system and system layout requirements		2.1 – 2.7
LO3	Know the site preparation techniques for sanitary appliances and connecting pipework systems		3.1 – 3.5
LO4	Be able to apply site preparation techniques for sanitary appliances and connecting pipework systems		4.1 – 4.6
LO5	Know the installation requirements of sanitary appliances and connecting pipework systems		5.1 – 5.8
LO6	Be able to install sanitary appliances and connecting pipework systems		6.1 – 6.5
LO7	Know the service and maintenance requirements of sanitary appliances and connecting pipework systems		7.1 – 7.4
LO8	Be able to service and maintain sanitary appliances and connecting pipework systems		8.1 – 8.4
LO9	Know the decommissioning requirements of sanitary appliances and connecting pipework systems		9.1 – 9.6
LO10	Be able to decommission sanitary appliances and connecting pipework systems		10.1 – 10.3
LO11	Know the inspection and soundness testing requirements of sanitary appliances and connecting pipework systems		11.1 – 11.3
LO12	Be able to inspect and soundness test sanitary appliances and connecting pipework systems		12.1 – 12.2

Learning Outcome 1	
Know the uses of sanitary appliances and their operating principles	
Assessment Criteria	
1.1	State the purpose of sanitary appliances used in dwellings.
1.2	Identify the different types of sanitary appliances used in dwellings.
1.3	Identify the working principles of sanitary appliances. <ul style="list-style-type: none"> a) Conventional WCs (not macerators) b) Baths c) Bidets d) Wash hand basins e) Showers/cubicles f) Sinks (not waste disposal units) g) Urinals

Learning Outcome 2	
Know the types of sanitary pipework system and system layout requirements.	
Assessment Criteria	
2.1	Identify the types of sanitary pipework system and state where they may be used in dwellings. <ul style="list-style-type: none"> a) Primary ventilated stack system b) Secondary ventilated stack system c) Ventilated branch discharge system
2.2	State the factors that lead to trap seal loss in sanitary pipework systems.
2.3	State the system layout features for discharge stacks (wetted portion) at the foot of the stack in buildings up to 5 storeys in height. <ul style="list-style-type: none"> a) Type of bend b) Proximity of low level connections
2.4	State the system layout features for discharge stacks (wetted portion). <ul style="list-style-type: none"> a) Soil stack sizes based on WC outlet size b) Waste stack sizes serving waste appliances only c) Use of bends in the wetted portion of the stack
2.5	State the system layout features for branch discharge pipework. <ul style="list-style-type: none"> a) Layout of unventilated and ventilated branch discharge pipework – maximum length of pipework and pipework gradient b) Sizes of branch discharge pipework for soil and waste appliances c) Use of traps and self-sealing valves in preventing noxious smells in buildings d) Methods of ventilating branch discharge pipework e) Methods of connecting multiple waste appliances to branch discharge pipework f) Methods of connecting branch discharge pipework into the main stack
2.6	State the system layout features for stack ventilation (dry portion of the stack). <ul style="list-style-type: none"> a) Proximity of vent outlet to open-able windows b) Use of air admittance valves
2.7	State the system layout features for systems and appliances located on the ground floor. <ul style="list-style-type: none"> a) Stub stack systems b) Waste appliance connections to gullies c) Waste appliance connections direct to drain d) WC connection direct to drain

Learning Outcome 3	
Know the site preparation techniques for sanitary appliances and connecting pipework systems	
Assessment Criteria	
3.1	Identify the sources of information required when carrying out work on sanitary appliances and pipework systems. <ul style="list-style-type: none"> a) Statutory regulations b) Industry standards Manufacturer technical instructions
3.2	Identify the preparatory work required to be carried out to the building fabric in order to install, decommission or maintain sanitary appliances and pipework systems.
3.3	Identify the protection measures required to the building fabric or customer property, during and on completion of work on sanitary appliances and pipework systems.

Learning Outcome 3	
Know the site preparation techniques for sanitary appliances and connecting pipework systems	
Assessment Criteria (continued)	
3.4	Identify the pipework materials and fittings required to complete work on sanitary pipework systems.
3.5	Identify the hand and power tools required to complete work on sanitary appliances and pipework systems.

Learning Outcome 4	
Be able to apply site preparation techniques for sanitary appliances and connecting pipework systems	
Assessment Criteria	
4.1	Check the safety of the work location in order for the work to safely proceed. a) Safe access and exit b) Immediate work location e.g. tripping hazards c) Appropriate risk assessments/ method statements are available
4.2	Wear Personal Protective Equipment relevant to the installation, decommissioning or maintenance task being carried out.
4.3	Apply protection measures to the building fabric or customer property, during and on completion of work on sanitary appliances and pipework systems.
4.4	Select the pipework materials and fittings required to complete work on sanitary pipework systems ensuring that they are not damaged.
4.5	Select the hand and power tools required to complete work on sanitary appliances and pipework systems.
4.6	Carry out preparatory work in order to install sanitary appliances and pipework systems.

Learning Outcome 5	
Know the installation requirements of sanitary appliances and connecting pipework systems	
Assessment Criteria	
5.1	Identify how to assemble sanitary appliance fixtures and fittings. a) Waste fittings to appliances b) Terminal fittings to appliances c) Flushing cistern assemblies d) Pre-fabricated bath supports and fixings
5.2	Identify how to make joints to sanitary pipework systems. a) Ring seal joints b) Solvent weld joints c) Compression joints d) Specialist joints such as pan connectors
5.3	Identify how expansion and contraction may be catered for in plastics pipework. a) Ring seal joints b) Solvent weld joints c) Compression joints

Learning Outcome 5	
Know the installation requirements of sanitary appliances and connecting pipework systems	
Assessment Criteria (continued)	
5.4	State the positioning and fixing requirements of sanitary appliances. <ul style="list-style-type: none"> a) Conventional WCs (not macerators) b) Baths c) Bidets d) Wash hand basins e) Showers/cubicles f) Sinks (not waste disposal units) g) Urinals
5.5	State how to select brackets appropriate to the sanitary pipework and the industry recommended spacing's. <ul style="list-style-type: none"> a) Horizontally mounted pipework b) Vertically mounted pipework
5.6	Identify the suitability of below ground drainage systems to receive foul soil and waste water. <ul style="list-style-type: none"> a) Combined drainage systems b) Separate drainage systems c) Partially separate drainage systems
5.7	Identify suitable methods for making new plastic pipework connections. <ul style="list-style-type: none"> a) Soil stack at ground level to below ground plastic, clay or cast iron drainage pipework b) Waste pipework discharging to ground floor gullies c) Stub waste connection to ground floor drainage pipework d) WC pan connector direct to ground floor drain
5.8	Identify suitable methods for making new plastic pipework connections into existing soil and waste systems. <ul style="list-style-type: none"> a) Soil and waste connections to existing cast iron pipework b) Soil and waste pipework to existing plastic pipework

Learning Outcome 6	
Be able to apply site preparation techniques for sanitary appliances and connecting pipework systems.	
Assessment Criteria	
6.1	Assemble sanitary appliance fixtures and fittings. <ul style="list-style-type: none"> a) Waste fittings to appliances b) Terminal fittings to appliances c) Flushing cistern assemblies d) Pre-fabricated bath supports and fixings
6.2	Joint sanitary pipework systems. <ul style="list-style-type: none"> a) Ring seal joints b) Solvent weld joints c) Compression joints d) Specialist joints such as pan connectors

Learning Outcome 6	
Be able to apply site preparation techniques for sanitary appliances and connecting pipework systems.	
Assessment Criteria (continued)	
6.3	Position and fix bathroom appliances to new systems pipework. a) Bath or shower tray b) Wash hand basin c) WC
6.4	Make plastic sanitary pipework connections. a) To existing below ground drainage systems b) From new sanitary appliances into existing sanitary pipework systems
6.5	Demonstrate that sanitary appliances or pipework systems cannot be brought into operation by the end user before the work has been fully completed.

Learning Outcome 7	
Know the service and maintenance requirements of sanitary appliances and connecting pipe work systems	
Assessment Criteria	
7.1	Identify how to use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of system components.
7.2	Identify how to carry out routine checks on sanitary appliances and pipework systems as part of a periodic maintenance programme. a) Visual inspection of pipe work for leakage and adequate support b) Operation of flushing cisterns/mechanisms c) Fitting of effective waste outlet plugs d) Effective operation of appliance traps/ self sealing valves
7.3	State the procedures for dealing with defects in sanitary pipe work systems. a) Leakage from plastic soil and waste pipe work b) Improper support to plastic pipe work systems c) Loss of trap seal at sanitary appliances d) Blockage in above ground soil and waste pipe work e) Blockage in below ground drainage systems
7.4	Identify the types of information to be provided on a maintenance record for sanitary appliances and pipe work systems.

Learning Outcome 8	
Be able to apply site preparation techniques for sanitary appliances and connecting pipe work systems	
Assessment Criteria	
8.1	Use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of system components.

Learning Outcome 8	
Be able to apply site preparation techniques for sanitary appliances and connecting pipe work systems	
Assessment Criteria (continued)	
8.2	Carry out routine checks on sanitary appliances and pipe work systems as part of a periodic maintenance programme. <ul style="list-style-type: none"> a) Visual inspection of pipe work for leakage and adequate support b) Operation of flushing cisterns/mechanisms c) Fitting of effective waste outlet plugs d) Effective operation of appliance traps/ self-sealing valves
8.3	Carry out repairs to defects in sanitary pipe work systems. <ul style="list-style-type: none"> a) Leakage from plastic soil and waste pipe work b) Loss of trap seal at waste appliances c) Blockage in above ground sanitary appliances
8.4	Complete the required details contained in a simple maintenance record for a sanitation system.

Learning Outcome 9	
Know the decommissioning requirements of sanitary appliances and connecting pipework systems	
Assessment Criteria	
9.1	Identify working methods that reduce the periods during which toilet and washing facilities are not available to building users.
9.2	State the information that needs to be provided to other persons before decommissioning work takes place.
9.3	Identify the safety procedures for safely handling sanitary appliances and pipe work components that may be contaminated with foul waste.
9.4	Identify how to temporarily decommission sanitary appliances and connecting pipework systems.
9.5	Identify the work sequences for permanently decommissioning sanitary appliances and pipe work systems.
9.6	Identify the methods used during the decommissioning process to prevent the end-user from operating the appliance or system. <ul style="list-style-type: none"> a) Temporary capping of pipe work sections b) Use of warning notices and signs

Learning Outcome 10	
Be able to decommission sanitary appliances and connecting pipe work systems	
Assessment Criteria	
10.1	Advise appropriate persons before a sanitary appliance or pipe work system is isolated in order to undertake work.
10.2	Carry out temporary decommissioning of sanitary appliances and connecting pipe work systems.

Learning Outcome 10	
Be able to decommission sanitary appliances and connecting pipe work systems	
Assessment Criteria (continued)	
10.3	<p>Check to ensure that the decommissioning procedures carried out prevent the end-user from operating the appliance or system.</p> <ul style="list-style-type: none"> a) Temporary capping of pipe work sections b) Use of warning notices and signs

Learning Outcome 11	
Know the inspection and soundness testing requirements of sanitary appliances and connecting pipe work systems	
Assessment Criteria	
11.1	State the checks to be carried out during a visual inspection of a sanitation system to confirm that it is ready to receive foul water.
11.2	Identify how to carry out an air test on a sanitary pipe work system to industry requirements.
11.3	<p>Identify the actions that must be taken when inspection and testing reveals defects in sanitary pipe work systems.</p> <ul style="list-style-type: none"> a) Dealing with systems that do not meet correct installation requirements b) Remedial work associated with defective pipe work bracketing c) Remedial work associated with leakage from pipe work systems

Learning Outcome 12	
Be able to inspect and soundness test sanitary appliances and connecting pipe work systems	
Assessment Criteria	
12.1	Carry out a visual inspection of a sanitation system to confirm that it is ready to receive foul water.
12.2	Perform an air test on a sanitary pipe work system to industry requirements.

7. Assessment Requirements for Individual Units

7.1. L2 Generic Units

Unit Ref: J/602/2479 – Understand and carry out safe working practices in building services engineering

To achieve the completion of this **combination unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes within the unit. You must also complete the appropriate practical performance activities in simulated conditions as per the requirements for the unit as specified in the BPEC Qualification manual.

Unit Ref: J/602/2482 – Understand how to communicate with others within Building Services Engineering

To achieve the completion of this **knowledge unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes and assessment criteria within the unit.

Unit Ref: D/602/2486 – Understand how to apply environmental protection measures within BSE

To achieve the completion of this **knowledge unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes and assessment criteria within the unit.

J/602/2496: Understand how to apply scientific principles within MES

To achieve the completion of this **knowledge unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes and assessment criteria within the unit.

D/602/2682: Understand and carry out site preparation, and pipework fabrication techniques for domestic plumbing and heating systems

To achieve the completion of this **combination unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes within the unit. You must also complete the appropriate practical performance activities in simulated conditions as per the requirements for the unit as specified in the BPEC Qualification manual.

H/602/2697: Understand and apply domestic cold water system installation and maintenance techniques

To achieve the completion of this **combination unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes within the unit. You must also complete the appropriate practical performance activities in simulated conditions as per the requirements for the unit as specified in the BPEC Qualification manual.

F/602/2884: Understand and apply domestic hot water system installation and maintenance techniques

To achieve the completion of this **combination unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes within the unit. You must also complete the appropriate practical performance activities in simulated conditions as per the requirements for the unit as specified in the BPEC Qualification manual.

Y/602/2888: Understand and apply domestic central heating system installation and maintenance techniques

To achieve the completion of this **combination unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes within the unit. You must also complete the appropriate practical performance activities in simulated conditions as per the requirements for the unit as specified in the BPEC Qualification manual.

F/602/2917: Understand and apply domestic rainwater system installation and maintenance techniques

To achieve the completion of this **combination unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes within the unit. You must also complete the appropriate practical performance activities in simulated conditions as per the requirements for the unit as specified in the BPEC Qualification manual.

J/602/2921: Understand and apply domestic above ground drainage system installation and maintenance techniques

To achieve the completion of this **combination unit**, you must satisfactorily complete the applicable knowledge assessment for the knowledge learning outcomes within the unit. You must also complete the appropriate practical performance activities in simulated conditions as per the requirements for the unit as specified in the BPEC Qualification manual.

8. Marking Strategies

8.1. On-line Multiple-Choice Tests

There are 10 Multiple Choice Tests:

Unit		No. of Questions	Open or closed book
J/602/2479:	Understand and carry out safe working practices in building services engineering	50	Closed book
J/602/2482:	Understand how to communicate with others within Building Services Engineering	20	Closed book
D/602/2486:	Understand how to apply environmental protection measures within BSE	26	Closed book
J/602/2496:	Understand how to apply scientific principles within MES	30	Closed book
D/602/2682:	Understand and carry out site preparation, and pipework fabrication techniques for domestic plumbing and heating systems	35	Closed book
H/602/2697:	Understand and apply domestic cold water system installation and maintenance techniques	50	Open book
F/602/2884:	Understand and apply domestic hot water system installation and maintenance techniques	50	Open book
Y/602/2888:	Understand and apply domestic central heating system installation and maintenance techniques	50	Open book
F/602/2917:	Understand and apply domestic rainwater system installation and maintenance techniques	30	Open book
J/602/2921:	Understand and apply domestic above ground drainage system installation and maintenance techniques	50	Open book

The pass rate for all on-line exams is **60%**.

If the pass rate of 60% is not achieved a full re-sit will be required. The centre should use the exams summary report to identify any areas that would need further training before offering any re-sits.

The centre should not enter any Learner into any exams without first confirming they are ready.

8.2. Performance Assessments

The pass mark for the practical assessments is 100%.

First Attempt - Learners are given a first attempt in all areas of the performance assessment. Second Attempt – performance areas not satisfactorily completed will be re-attempted. At the assessor's discretion, the Learner is re-assessed by oral questioning and/or observing the performance in an attempt to establish competence in all remaining areas. Learners who have not achieved the 100% pass mark at this stage will be deemed to have failed the performance assessment. Learners wishing to retake the assessment will be required to re-attempt the full performance assessment in its entirety.

8.3. Learner Result Submission Form

Learner Result Submission Forms have been produced for the L2 Plumbing qualification. This document shall be used to record that the learner has completed the whole qualification in a satisfactory manner. The document shall be completed and signed by the centre assessor and the internal verifier.

The completed Learner Result Submission Forms shall be sent to BPEC Certification Ltd. for certification. Copies of the Learner Result Form shall also be retained in the Learner Portfolio and the Centre Portfolio.

8.4. Unit Evidence Checklists

A Unit Evidence Checklist has been produced for each unit. This document shall be used to record that the learner has completed the unit in a satisfactory manner. Each section of the document shall be completed, and the document signed by the learner, the assessor(s) and the internal verifier.

9. Further Information

Requests for further information regarding centre/scheme approval or any aspect of assessment of the BPEC qualifications please contact:

BPEC Certification Ltd. 2 Mallard Way, Pride Park, Derby, DE24 8GX

T: 01332 376000

E: AOadmin@bpec.org.uk

W: www.bpec.org.uk