City & Guilds Level 2 Diploma in Plumbing Studies (6035-02)

Version 5.9 (February 2025)

Qualification Handbook

Qualification at a glance

Subject area	5.2 Building and construction
City & Guilds number	6035
Age group approved	16-18, 19+
Entry requirements	n/a
Assessment	Multiple choice examination, practical assignment
Grading	Pass/Fail
Approvals	Fast track approval available
Support materials	Qualification handbook Level 2 Assessment pack – practical task manual Level 2 Assessor guidance for Assessment pack – practical task manual Text Book Smartscreen
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	City & Guilds qualification number	Regulatory reference number	GLH	TQT
City & Guilds Level 2 Diploma in Plumbing Studies	6035-02	600/5500/5	453	490

Version and date	Change detail	Section
1.1 Sept 2012	Amended information on where to obtain assessments.	Assessment
	Amended the title of outcome 5 for unit 505. Amended the title of learning outcomes 3, 4 and 5 for unit 205/505	Units
2.0 September 2012	Added permitted reference materials for Units 505, 506, 508 and 509 Amended timing for duration of Unit 210 test to 40 minutes.	Assessment
3.0 May 2013	Added outcome 7, and amended no. of questions and percentages, to (test) table for unit 204/504	Assessment
4.0 July 2013	Amended references to 207/507 – to 207 – there is no 507 unit.	Units
5.0 October 2013	Replaced references to BS 6700 with BS EN 806	Assessment, Units
5.1 March 2014	Amended test spec 509	Test Specs
5.2 April 2014	Added 'terminal guards' to range for unit 509 A.C 1.5.	Units
5.3 September 2014	Added IQA guidance	Centre requirements
5.4 September 2017	Added TQT and GLH details	Qualification at a glance, Structure
	Deleted QCF	Appendix
5.5 December 2017	Additional information provided on e-volve tests.	Test specifications
5.6 April 2019	Amended reference to learning outcome 05	Test specifications
5.7 August 2023	Removal of images	Throughout
5.8 June 2024	Update of Quality Assurance Statement	Centre Requirements
5.9 February 2025	Handbook transferred to latest version of the template. The section on Quality Assurance has been updated and sections on Inclusion and diversity, and Sustainability have been added.	All
	Permitted Reference Materials section moved to Appendix	Appendix 1

Contents

1 Introduction

This document tells you what you need to do to deliver the qualification:

Area	Description
Who is the qualification for?	For candidates who want to work as plumbers in the building services engineering sector. This qualification does not make candidates fully qualified plumbers (see Appendix 3 - Disclaimer)
What does the qualification cover?	It allows candidates to learn, develop and practise the skills required for employment and/or career progression in the plumbing sector. See Appendix 3 – Disclaimer, for further information.
What opportunities for progression are there?	It allows candidates to progress into employment, or to the following City & Guilds qualifications: • Level 3 NVQ Diploma in Plumbing and Heating • Level 3 Diploma in Plumbing Studies
Who did we develop the qualification with?	This qualification has been developed in collaboration with employers, sector experts, colleges and training providers.
Is it part of an apprenticeship framework or initiative?	n/a

Structure

To achieve the City & Guilds Level 2 Diploma in Plumbing Studies, learners must achieve **49** credits from the mandatory units:

UAN	City & Guilds unit number	Unit title	Credit Value	Level	GLH
Mandatory units:					
Learners must achieve **49** credits from the mandatory units.					
T/503/9669	201/501	Health and safety in building services engineering	3	2	26
R/503/9677	202/502	Electrical principles and processes for building services engineering	5	2	48
L/504/0133	203	Scientific principles for domestic, industrial and commercial plumbing	4	2	31
D/503/9679	204/504	Common plumbing processes	6	2	54
D/504/0217	205/505	Cold water systems	7	2	68
H/504/0218	206/506	Domestic hot water systems	6	2	55
K/504/0219	207	Sanitation	5	2	48
D/504/0220	208/508	Central heating systems	6	2	56
H/504/0221	209/509	Drainage systems	4	2	39
J/602/2482	210	Understand how to communicate with others within building services engineering	3	2	28

Total Qualification Time (TQT)

Total Qualification Time (TQT) is the number of notional hours which represents an estimate of the total amount of time that could reasonably be expected for a learner to demonstrate the achievement of the level of attainment necessary for the award of a qualification.

TQT consists of the following two elements:

1) the number of hours that an awarding organisation has assigned to a qualification for guided learning
2) an estimate of the number of hours a learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by – but, unlike guided learning, not under the immediate guidance or supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training.

Title and level	GLH	TQT
City & Guilds Level 2 Diploma in Plumbing Studies	453	490

2 Centre requirements

Approval

Full approval

To offer this qualification, new centres will need to gain both centre and qualification approval. Please refer to the document **Centre Approval Process: Quality Assurance Standards** for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

Fast-track approval

If your centre is approved to offer the 6129 Certificate in Basic Plumbing Studies then you can apply for fast-track approval for the new Level 2 Diploma in Plumbing Studies (6035-02) using the fast-track approval form, available from the City & Guilds website.

Centres should use the fast-track form if:

- there have been no changes to the way the qualifications are delivered
- they meet all of the approval criteria in the fast-track form guidance notes.

Fast-track approval is available for 12 months from the launch of the qualification. After 12 months, centres will have to go through the standard Qualification Approval Process. The centre is responsible for checking that fast-track approval is still current at the time of application.

Please refer to the document **Centre Approval Process: Quality Assurance Standards** for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualifications before designing a course programme.

Resource requirements

Physical resources and site agreements

Centres can use specially designated areas within a centre to develop practical skills and to assess the simulated practical assignments. The equipment, systems and machinery must meet industrial standards and be capable of being used under normal working conditions.

Centre staffing

Staff delivering these qualifications must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be occupationally competent or technically knowledgeable in the area(s) for which they are delivering training and/or have experience of providing training (this knowledge must be to the same level as the training being delivered)
- hold appropriate qualifications detailed in this handbook
- have recent relevant experience in the specific area they are assessing
- be able to demonstrate occupational competence in the areas of the Building Services Engineering (BSE) for which they are delivering training and/or assessment. This competence must be at a level equal to, or above, the level of training being delivered and must include current knowledge and skills of each industry (for which the assessment is taking place), its techniques, settings, legislative and regulatory requirements, codes of practice and guidance
- have credible experience of providing training and/or assessment.

Centre staff may undertake more than one role, eg tutor and assessor or internal quality assurer, but must never verify their own assessments.

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 the Sector Skills Council and/or the Awarding Organisation.

Assessor Occupational Competence

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

- **a relevant sector** qualification equal to or at a level above the training and/or assessment being delivered. Where earlier forerunner qualifications are held eg City and Guilds Craft or Advanced Craft Certificated, the assessor must demonstrate through CPD evidence a thorough knowledge of the qualification standards that they meet the required criteria
- **an up-to-date CPD record including relevant CPD qualifications**. Assessors must either be able to demonstrate that they are registered and up-to-date with their registration with an appropriate approved industry registration body (eg Gas Safe Register) or have one or more relevant occupational qualifications to demonstrate that they can be regarded as occupationally competent in terms of assessing or verifying the qualification and the unit contained
- **a verifiable CV** of industry experience and current knowledge of industry practice and techniques relevant to the occupational area in which they assess. This verifiable evidence must be **at or above the level being assessed**
- a thorough **knowledge and understanding** of the qualification standards and requirements

Internal Quality Assurers (IQAs) must:

- hold, or be working towards TAQA (A1/A2 – D32/33 updated). The 'working towards' IQA should be mentored by, and have his/her judgements and decisions counter signed by a qualified IQA.

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:

- Possession of a building services engineering sector related
- qualification such as a Level 2 NVQ in Plumbing
- Related building services qualification with proven technical
- expertise
- Related building services qualification with access to plumbing technical expertise during their IQA activities.

Continuing professional development (CPD)

Centres are expected to support their staff in ensuring that their knowledge remains current of the occupational area and of best practice in delivery, mentoring, training, assessment and quality assurance, and that it takes account of any national or legislative developments.

Assessor and Internal Quality Assurer continuing professional development (CPD)

The occupational competence of assessors must be updated on a regular basis and be periodically reconfirmed via CPD evidence and quality assured by City & Guilds.

It is the responsibility of the assessor and the IQA to make use of opportunities for CPD such as industry conferences and events, access to trade publications and journals, SSC and professional/Trade Association events, at least on an annual basis to enhance and upgrade their professional development and technical knowledge.

It is imperative that evidence records of these CPD opportunities/ occasions are maintained and retained in a verifiable CPD record.

Guidance note

Where questions arise about the occupational competence/qualification of an individual/trainer/assessor, these should be referred to the centre's Qualifications Adviser for a decision. The Qualification Advisor may decide to refer the decision to the Portfolio/Group Portfolio Consultant for further consideration.

Quality assurance

Approved centres must have effective quality assurance systems to ensure optimum delivery and assessment of qualifications. Quality assurance includes initial centre approval, qualification approval and the centre's own internal procedures for monitoring quality. Centres are responsible for internal quality assurance and City & Guilds is responsible for external quality assurance. All external quality assurance processes reflect the minimum requirements for verified and moderated assessments, as detailed in the Centre Assessment Standards Scrutiny (CASS), section H2 of Ofqual's General Conditions. For more information on both CASS and City & Guilds Quality Assurance processes visit: the **What is CASS?** and **Quality Assurance Standards** documents on the City & Guilds website.

Standards and rigorous quality assurance are maintained by the use of:

- Internal quality assurance
- City & Guilds external quality assurance.

In order to carry out the quality assurance role, Internal Quality Assurers must

- have appropriate teaching and vocational knowledge and expertise
- have experience in quality management/internal quality assurance
- hold or be working towards an appropriate teaching/training/assessing qualification
- be familiar with the occupation and technical content covered within the qualification.

External quality assurance for the qualification will be provided by City & Guilds EQA process. EQAs are appointed by City & Guilds to approve centres, and to monitor the assessment and internal quality assurance carried out by centres. External quality assurance is carried out to ensure that assessment is valid and reliable, and that there is good assessment practice in centres.

The role of the EQA is to:

- provide advice and support to centre staff
- ensure the quality and consistency of assessments and marking/grading within and between centres by the use of systematic sampling
- provide feedback to centres and to City & Guilds.

Learner entry requirements

City & Guilds does not set entry requirements for these qualifications. However, centres must ensure that candidates have the potential and opportunity to gain the qualification successfully.

Age restrictions

This qualification is approved for learners aged 16 or above.

Access arrangements and reasonable adjustments

City & Guilds has considered the design of this qualification and its assessments in order to best support accessibility and inclusion for all learners. We understand however that individuals have diverse learning needs and may require reasonable adjustments to fully participate. Reasonable adjustments, such as additional time or alternative formats, may be provided to accommodate learners with disabilities and support fair access to assessment.

Access arrangements are adjustments that allow candidates with disabilities, special educational needs, and temporary injuries to access the assessment and demonstrate their skills and knowledge without changing the demands of the assessment. These arrangements must be made before assessment takes place.

The Equality Act 2010 requires City & Guilds to make reasonable adjustments where a disabled person would be at a substantial disadvantage in undertaking an assessment.

It is the responsibility of the centre to ensure at the start of a programme of learning that candidates will be able to access the requirements of the qualification.

Please refer to the JCQ access arrangements and reasonable adjustments and Access arrangements - when and how applications need to be made to City & Guilds for more information. Both are available on the **City & Guilds website**

3 Delivering the qualification

Initial assessment and induction

An initial assessment of each learner should be made before the start of their programme to identify:

- if the learner has any specific training needs
- support and guidance they may need when working towards their qualification
- any units they have already completed or credit they have accumulated which is relevant to the qualification
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the learner fully understands the requirements of the qualification, their responsibilities as a learner and the responsibilities of the centre. This information can be recorded on a learning contract.

Induction should also be used to ensure that candidates are aware that this qualification does not make them qualified plumbers.

All candidates must complete a declaration confirming their understanding. This declaration can be found in **Appendix 3 - Disclaimer**.

Inclusion and diversity

City & Guilds is committed to improving inclusion and diversity within the way we work and how we deliver our purpose which is to help people and organisations develop the skills they need for growth.

More information and guidance to support centres in supporting inclusion and diversity through the delivery of City & Guilds qualifications can be found here:

Inclusion and diversity | City & Guilds (cityandguilds.com)

Sustainability

City & Guilds are committed to net zero. Our ambition is to reduce our carbon emissions by at least 50% before 2030 and develop environmentally responsible operations to achieve net zero by 2040 or sooner if we can. City & Guilds is committed to supporting qualifications that support our customers to consider sustainability and their environmental footprint.

More information and guidance to support centres in developing sustainable practices through the delivery of City & Guilds qualifications can be found here:

Our Pathway to Net Zero | City & Guilds (cityandguilds.com)

Centres should consider their own carbon footprint when delivering this qualification and consider reasonable and practical ways of delivering this qualification with sustainability in mind. This could include:

- reviewing purchasing and procurement processes (such as buying in bulk to reduce the amount of travel time and energy, considering and investing in the use of components that can be reused, instead of the use of disposable or single use consumables)
- reusing components wherever possible
- waste procedures (ensuring that waste is minimised, recycling of components is in place wherever possible)
- minimising water use and considering options for reuse/salvage as part of plumbing activities wherever possible.

Support materials

The following resources are available for this qualification:

Description	How to access
Level 2 Assessment pack – practical task manual	City & Guilds website
Level 2 Assessor guidance for Assessment pack – practical task manual	City & Guilds website
Text Book	www.cityandguildsbookshop.com
SmartScreen	www.smartscreen.co.uk

4 Assessment

Assessment of the qualification

Assessment types			
Unit	**Title**	**Assessment method(s)**	**Where to obtain assessment materials**
201/501	Health and safety in building services engineering	**Practical Assignment (201)** **City and Guilds on-line multiple choice test (501)** The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 6035 web page. Password available on the Walled Garden.
202/502	Electrical principles and processes for building services engineering	**Practical Assignment (202)** **City and Guilds on-line multiple choice test (502)** The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 6035 web page. Password available on the Walled Garden.

Assessment types			
Unit	**Title**	**Assessment method(s)**	**Where to obtain assessment materials**
203/803	Scientific principles for domestic, industrial and commercial plumbing	**City and Guilds on-line multiple choice test** The assessment covers the knowledge requirements of the unit and assesses all learning outcomes to verify coverage of the unit. (803) Proxy unit	Test available for booking on the Walled Garden.
204/504	Common plumbing processes	**Practical Assignment (204)** **City and Guilds on-line multiple choice test (504)** The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 6035 webpage. Password available on the Walled Garden.
205/505	Cold water systems	**Practical Assignment (205)** **City and Guilds on-line multiple choice test (505)** The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 6035 webpage. Password available on the Walled Garden.

Assessment types			
Unit	**Title**	**Assessment method(s)**	**Where to obtain assessment materials**
206/506	Domestic hot water systems	**Practical Assignment (206)** **City and Guilds on-line multiple choice test (506)** The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 6035 webpage. Password available on the Walled Garden.
207	Sanitation	**Practical Assignment** The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 6035 webpage. Password available on the Walled Garden.
208/508	Central heating systems	**Practical Assignment (208)** **City and Guilds on-line multiple choice test (508)** The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 6035 webpage. Password available on the Walled Garden.

Assessment types			
Unit	**Title**	**Assessment method(s)**	**Where to obtain assessment materials**
209/509	Drainage systems	**Practical Assignment (209)** **City and Guilds on-line multiple choice test (509)** The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 6035 webpage. Password available on the Walled Garden.
210/810	Understand how to communicate with others within building services engineering	**City and Guilds on-line multiple choice test** The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. (810) Proxy unit	Test available for booking on the Walled Garden.

Assessment strategy

City & Guilds has written the following assignments to use with this qualification:

- live assignments that can be downloaded from the City & Guilds website

Time constraints

Qualification registration is valid for 36 months.

Recognition of prior learning (RPL)

Recognition of prior learning means using a person's previous experience or qualifications which have already been achieved to contribute to a new qualification.

Recognition of prior learning (RPL)

Guidance on RPL between this qualification and other City & Guilds plumbing qualifications is available on the City & Guilds website: **www.cityandguilds.com**.

Accreditation of prior learning (APL)

Guidance on APL between this qualification and other City & Guilds plumbing qualifications is available on the City & Guilds website: **www.cityandguilds.com**.

Test specifications

The way the knowledge is covered by each test is laid out in the table(s) below:

Test: Unit 501 Health and safety in building services engineering

Assessment method: e-volve online multiple choice test

Permitted materials: Reference material is not permitted

Graded: Pass/Fail

Pass mark: the pass mark for this examination is set at approx. 60%

These boundaries may be subject to slight variation to ensure fairness should any variations in the difficulty of the test be identified.

Test: 6035-501	**Duration: 75 minutes**		
Unit	**Outcome**	**Number of questions**	**Percentage %**
501	01 Know health and safety legislation	4	10
	02 Know how to handle hazardous situations	14	33
	03 Know electrical safety requirements when working in the building services industry	7	17
	04 Know the safety requirements for working with gases and heat producing equipment	8	19
	05 Know the safety requirements for using access equipment in the building services industry	4	9
	06 Know the safety requirements for working safely in excavations and confined spaces in the building services industry	5	12
	Total	42	100%

Test: Unit 502 Electrical principles and processes for building services engineering

Assessment method: e-volve online multiple choice test

Permitted materials: Reference material is not permitted. A calculator is allowed.

Graded: Pass/Fail

Pass mark: the pass mark for this examination is set at approx. 60%

These boundaries may be subject to slight variation to ensure fairness should any variations in the difficulty of the test be identified.

Test: 6035-502	**Duration: 75 minutes**		
Unit	**Outcome**	**Number of questions**	**Percentage %**
502	01 Understand electrical supplies used in domestic plumbing systems	10	25
	02 Know the components used in electrical installations	6	15
	03 Understand the procedures for safely isolating supplies	6	15
	05 Understand how to identify safety critical faults on electrical components	8	20
	06 Understand how to undertake basic electrical tasks	10	25
	Total	40	100%

Test: Unit 203 Scientific principles for domestic, industrial and commercial plumbing

Assessment method: e-volve online multiple choice test

Permitted materials: Reference material is not permitted. A calculator is allowed.

Graded: Pass/Fail

Pass mark: the pass mark for this examination is set at approx. 60%

These boundaries may be subject to slight variation to ensure fairness should any variations in the difficulty of the test be identified.

Test: 6035-203	**Duration: 75 minutes**		
Unit	**Outcome**	**Number of questions**	**Percentage %**
203	01 Understand the properties of common plumbing materials	11	27.5
	02 Understand the scientific properties and principles of water	10	25
	03 Understand the pressure, force and flow of water	6	15
	04 Understand the principles of heat in relation to plumbing systems	6	15
	05 Know the principles of combustion and heating gases	3	7.5
	06 Know the basic principles of electricity	4	10
	Total	40	100%

Test: Unit 504 Common plumbing processes

Assessment method: e-volve online multiple choice test

Permitted materials: Reference material is not permitted. A calculator is allowed.

Graded: Pass/Fail

Pass mark: the pass mark for this examination is set at approx. 60%

These boundaries may be subject to slight variation to ensure fairness should any variations in the difficulty of the test be identified.

Test: 6035-504	**Duration: 75 minutes**		
Unit	**Outcome**	**Number of questions**	**Percentage %**
504	01 Understand the procedures for measuring and bending plumbing tubes	9	23
	03 Understand how to joint common plumbing materials	7	17
	04 Know common plumbing hand and power tools	9	23
	05 Know fixings and components used in common plumbing processes	6	15
	06 Know common plumbing preparation techniques	6	15
	07 Know symbols used for identifying plumbing pipework and fittings	3	7
	Total	40	100%

Test: Unit 505 Cold water systems

Assessment method: e-volve online multiple choice test

Permitted materials: Details of permitted materials can be found in **Appendix 1** of this document. A calculator is allowed.

Graded: Pass/Fail

Pass mark: the pass mark for this examination is set at approx. 60%

These boundaries may be subject to slight variation to ensure fairness should any variations in the difficulty of the test be identified.

Test: 6035-505	**Duration: 75 minutes**		
Unit	**Outcome**	**Number of questions**	**Percentage %**
505	01 Know the requirements for water distribution to domestic dwellings	5	12.5
	02 Understand the requirements of the cold water supplies into domestic dwellings	9	22.5
	03 Know the components used in domestic cold water systems	7	17.5
	04 Understand the requirements for pipework Installations in domestic cold water systems	5	12.5
	05 Understand the key requirements of testing and decommissioning of domestic cold water systems	8	20
	06 Understand the basic maintenance requirements of domestic cold water systems	6	15
	Total	40	100%

Test: Unit 506 Domestic hot water systems

Assessment method: e-volve online multiple choice test

Permitted materials: Details of permitted materials can be found in **Appendix 1** of this document. A calculator is allowed.

Graded: Pass/Fail

Pass mark: the pass mark for this examination is set at approx. 60%

These boundaries may be subject to slight variation to ensure fairness should any variations in the difficulty of the test be identified.

Test: 6035-506	**Duration: 75 minutes**		
Unit	**Outcome**	**Number of questions**	**Percentage %**
506	01 Know the types of domestic hot water systems	8	20
	02 Know the components used in domestic hot water systems	7	17.5
	03 Understand the installation requirements of domestic hot water plumbing systems	10	25
	04 Know the design features of showers	3	7.5
	05 Understand the basic maintenance requirements of hot water systems	5	12.5
	06 Understand the key requirements of testing and decommissioning of domestic hot water systems	7	17.5
	Total	40	100%

Test: Unit 508 Central heating systems

Assessment method: e-volve online multiple choice test

Permitted materials: Details of permitted materials can be found in **Appendix 1** of this document. A calculator is allowed.

Graded: Pass/Fail

Pass mark: the pass mark for this examination is set at approx. 60%

These boundaries may be subject to slight variation to ensure fairness should any variations in the difficulty of the test be identified.

Test: 6035-508	**Duration: 75 minutes**		
Unit	**Outcome**	**Number of questions**	**Percentage %**
508	01 Understand the types of domestic central heating systems installed in domestic dwellings	12	30
	02 Know the different materials used to install domestic central heating pipework	7	17.5
	03 Understand heat emitters and their components	14	35
	04 Understand mechanical central heating controls	7	17.5
	Total	40	100%

Test: Unit 509 Drainage systems

Assessment method: e-volve online multiple choice test

Permitted materials: Details of permitted materials can be found in **Appendix 1** of this document. A calculator is allowed.

Graded: Pass/Fail

Pass mark: the pass mark for this examination is set at approx. 60%

These boundaries may be subject to slight variation to ensure fairness should any variations in the difficulty of the test be identified.

Test: 6035-509	**Duration: 75 minutes**		
Unit	**Outcome**	**Number of questions**	**Percentage %**
509	01 Understand the requirements of drainage systems	14	35
	02 Know the types of traps and associated requirements	8	20
	03 Know the procedures for soundness testing and commissioning above ground systems	11	27.5
	05 Know the requirements of rainwater systems and associated guttering	7	17.5
	Total	40	100%

Test: Unit 210 Understand how to communicate with others within building services engineering

Assessment method: e-volve online multiple choice test

Permitted materials: Reference material is not permitted. A calculator is allowed.

Graded: Pass/Fail

Pass mark: the pass mark for this examination is set at approx. 60%

These boundaries may be subject to slight variation to ensure fairness should any variations in the difficulty of the test be identified.

Test: 6035-210	**Duration: 75 minutes**		
Unit	**Outcome**	**Number of questions**	**Percentage %**
210	01 Know the members of the construction team and their role within the building services industry	5	25
	02 Know how to apply information sources in the building services industry	9	45
	03 Know how to communicate with others in the building services industry	6	30
	Total	20	100%

5 Units

Availability of units

The following units can also be obtained from The Register of Regulated Qualifications:
http://register.ofqual.gov.uk/Unit

Structure of the units

These units each have the following:

- City & Guilds reference number
- unit accreditation number (UAN)
- title
- level
- credit value
- guided learning hours
- unit aim
- health and safety requirements
- learning outcomes which are comprised of a number of assessment criteria
- notes for guidance, where applicable.

Guidance for delivery of the units

This qualification comprises a number of **units**. A unit describes what is expected of a competent person in particular aspects of their job.

Each **unit** is divided into **learning outcomes** which describe in further detail the skills and knowledge that a candidate should possess.

Each **learning outcome** has a set of **assessment criteria** (performance and knowledge and understanding) which specify the desired criteria that must be satisfied before an individual can be said to have performed to the agreed standard.

Range statements define the breadth or scope of a learning outcome and its assessment criteria by setting out the various circumstances in which they are to be applied.

Supporting information provides guidance of the evidence requirement for the unit and specific guidance on delivery and range statements. Centres are advised to review this information carefully before delivering the unit.

Unit 201/501 Health and safety in building services engineering

UAN:	T/503/9669
Level:	Level 2
Credit value:	3
GLH:	26
Aim:	This combination unit provides learners with the essential health and safety knowledge and skills to demonstrate best practice in a business services engineering environment or sector. The unit provides learners with an awareness of relevant legislation and should underpin all business services engineering activities learners take part in.
Health and safety:	Health and safety behaviour learned in this mandatory unit should be displayed in all arenas.

Learning outcome

The learner will:

LO1 Know health and safety legislation

Assessment criteria

The learner can:

AC1.1 State the aims of **health and safety legislation**

AC1.2 Identify the responsibilities of **individuals** under health and safety legislation

AC1.3 Identify statutory and non-statutory **health and safety materials**

AC1.4 Identify the different **roles** of Health and Safety Executive in enforcing health and safety legislation.

Range

AC1.1 **Health and safety legislation**

The Health & Safety at Work Act, The Electricity at Work Regulations, Control of Substances Hazardous to Health (COSHH) Regulations, Working at Heights Regulations, Personal Protective Equipment at Work Regulations (PPE), Lifting and Manual Handling Operations Regulations, Provision and Use of Work Equipment Regulations, Control of Asbestos at Work Regulations, Health, Safety and Welfare Regulations, Health and Safety (First Aid) Regulations, Confined Spaces Regulations.

AC1.2 **Individuals**

Employers, employees and contractors, visitors to site.

AC1.3 **Health and safety materials**

Acts of Parliament, regulations, approved codes of practice, HSE Guidance notes.

AC1.4 **Roles**

Improvement notice, prohibition notice, powers of prosecution, providing advice and guidance.

Learning outcome

The learner will:

LO2 Know how to handle hazardous situations

Assessment criteria

The learner can:

AC2.1 Identify common **hazardous situations** found on site

AC2.2 Describe **safe systems at work**

AC2.3 Identify the **categories** of safety signs

AC2.4 Identify **symbols** for hazardous substances

AC2.5 List common **hazardous substances** used in the building services industry

AC2.6 List **precautions** to be taken when working with hazardous substances

AC2.7 Identify the **types of asbestos** that may be encountered in the workplace

AC2.8 Identify the **actions** to be taken if the presence of asbestos is suspected

AC2.9 Describe the **implications** of being exposed to asbestos

AC2.10 State the application of different types of **personal protective equipment**

AC2.11 Identify the **procedures for manually handling** heavy and bulky items

AC2.12 Identify the **actions** that should be taken when an accident or emergency is discovered

AC2.13 State **procedures for handling injuries** sustained on-site

AC2.14 State the **procedures for recording accidents** and near misses at work.

Range

AC2.1 **Hazardous situations**

Trailing leads, slippery or uneven surfaces, presence of dust and fumes, handling and transporting equipment or materials, contaminants and irritants, fire, working at heights, malfunctioning equipment, improper use and storage of tools and equipment, potential presence of asbestos.

AC2.2 **Safe systems at work**

Method statements, permit to work systems, risk assessments, safety signs and notices.

AC2.3 **Categories**

Mandatory, prohibition, information, warning.

AC2.4 **Symbols**

Toxic, harmful, corrosive, irritant, oxidising, extremely flammable.

AC2.5 **Hazardous substances**

Lead - solid and fume, solvents and lubricants, fluxes, jointing compounds, sealants, gases – LPG, oxy-acetylene and carbon dioxide, cleaning agents.

AC2.6 **Precautions**

PPE, ventilation, risk assessment, method statements, safe systems of work.

AC2.7 **Types of asbestos**
White asbestos (Chrysotile), brown or grey asbestos (Amosite), blue asbestos (Crocidolite), asbestos cement materials.
AC2.8 **Actions**
Stop working immediately, report to supervisor.
AC2.9 **Implications**
Long-term health implications (mesothelioma, asbestosis).
AC2.10 **Personal protective equipment**
Clothing protection including high visibility, eye protection, hand protection, head protection, foot protection, hearing protection, respiratory protection.
AC2.11 **Procedures for manually handling**
Single, two-person lift, mechanical lift.
AC2.12 **Actions**
Raising the alarm, contact emergency services, follow typical emergency evacuation procedures, inform supervisor.
AC2.13 **Procedures for handling injuries**
Make self safe, make area safe, administer first aid where appropriate, contact emergency services, contact nominated first aid person, contact supervisor.
AC2.14 **Procedures for recording accidents**
RIDDOR, the use of company accident books, details to be recorded..

Learning outcome

The learner will:
LO3 Know electrical safety requirements when working in the building services industry

Assessment criteria

The learner can:
AC3.1 Identify the common **electrical dangers** to be aware of on site
AC3.2 List different **sources** of electrical supply for tools and equipment
AC3.3 Describe **reasons** for using reduced low voltage electrical supplies for tool and equipment on site
AC3.4 Identify how to conduct a **visual inspection** of portable electrical equipment for safe condition before use
AC3.5 State **actions** to take when portable electrical equipment fails visual inspection
AC3.6 Outline the Safe Isolation Procedure
AC3.7 State the **procedures** for dealing with electric shocks.

Range

AC3.1 **Electrical dangers**
Faulty electrical equipment, damaged electrical equipment, exposed conductors, damaged insulation, worn electrical cables and cords, trailing cables, proximity of cables, buried/hidden cables.
AC3.2 **Sources**
Battery powered supplies, 110 volt supplies, 230 volt supplies, generating sets.
AC3.3 **Reasons**

Increased likelihood for damage to equipment, operative in better contact with earth, protect from electric shock, reduces trailing leads.

AC3.4 **Visual inspection**
Checking for a valid PAT test, Inspection for general condition.

AC3.5 **Actions**
Remove from use, report to supervisor.

AC3.7 **Procedures**
Removal from supply, CPR method, contact emergency services, report to supervisors, treatment of minor burns.

Learning outcome

The learner will:

LO4 Know the safety requirements for working with gases and heat producing equipment

Assessment criteria

The learner can:

AC4.1 Identify different **types of gases** used on site
AC4.2 Describe how bottled gases and equipment should be safely transported and stored
AC4.3 Describe how to conduct a **visual inspection** on heat producing equipment for safe condition
AC4.4 Describe how **combustion** takes place
AC4.5 State the **dangers** of working with heat producing equipment
AC4.6 State the **procedures** to follow on discovery of fires on site
AC4.7 Identify different **classifications** of fires
AC4.8 Identify **types of fire extinguisher** for different classifications of fires.

Range

AC4.1 **Types of gases**
Propane, butane, oxy-acetylene, nitrogen.

AC4.3 **Visual inspection**: Inspection for general condition.

AC4.4 **Combustion**: Three elements of the fire triangle.

AC4.5 **Dangers**
Fires, burns, fumes, equipment damage, explosions.

AC4.6 **Procedures**
Raise the alarm, follow safety evacuation procedures, fight fire if trained to do so.

AC4.7 **Classifications** of fires
Class A, B, C, D, electrical fires.

AC4.8 **Types of fire extinguisher**
Carbon dioxide, water, powder, foam.

Learning outcome

The learner will:

LO5 Know the safety requirements for using access equipment in the building services industry

Assessment criteria

The learner can:

AC5.1 Identify different **types of access equipment**

AC5.2 Select suitable equipment for carrying out work at heights based on the **work being carried out**

AC5.3 Describe the **safety checks** to be carried out on access equipment

AC5.4 Describe safe erection methods for **access equipment**.

Range

AC5.1 **Types of access equipment**
Step ladders, ladders, roof ladders and crawling boards, mobile tower scaffolds, podiums fixed scaffolds and edge protection, mobile elevated work platforms including scissor lifts and cherry pickers, telescopic ladders.

AC5.2 **Work being carried out**
Duration at work, action points for heights.

AC5.3 **Safety checks**
Visual, tagging, fit for purpose, secure level ground.

AC5.4 **Access equipment**
Step ladders, ladders, roof ladders, mobile tower scaffolds, podiums, telescopic ladders.

Learning outcome

The learner will:

LO6 Know the safety requirements for working safely in excavations and confined spaces in the building services industry

Assessment criteria

The learner can:

AC6.1 Identify the situations in which it may be necessary to work in excavations

AC6.2 Describe how excavations should be **prepared** for safe working

AC6.3 State **precautions** to be taken to make excavations safe

AC6.4 Identify areas where working in **confined space** may be a consideration

AC6.5 State **safety considerations** when working in confined spaces.

Range

AC6.2 **Prepared** for safe working:
Safe access into the excavation, trench support systems.

AC6.3 **Precautions**
Use of warning signs, use of barriers, vehicle proximity to excavation edges.

AC6.4 **Confined space**
Drainage systems, Plant rooms, Main service duct-rooms, In tanks, cylinders, boilers or cisterns, Under suspended timber floors, In roof spaces.

AC6.5 **Safety considerations**
Ventilation, lighting, PPE, evacuation procedures, medical conditions, lone working.

Learning outcome

The learner will:

LO7 Be able to apply safe working practice

Assessment criteria

The learner can:

AC7.1 Perform **manual handling** techniques

AC7.2 Manually handle loads using mechanical lifting aids

AC7.3 Demonstrate the safe method of assembly of **access equipment**

AC7.4 Use access equipment safely.

Range

AC7.1 **Manual handling** techniques:
Single, two-person lift.

AC7.3 **Access equipment**
Step ladders, ladders, mobile tower scaffolds.

Unit 201/501 Health and safety in building services engineering

Supporting information

Guidance

Electrical equipment

Includes power tools, lights etc

Safe Isolation Procedure

Recommend referring to JIB Safe Isolation Procedure

On Site

Where reference to ‘on site’ is made in this unit, the intention is that this covers building sites and domestic sites.

It is recommended that assessors cover employee rights in relation to Health and Safety.

This First Aid element of this unit is not intended to replicate a full First Aid course but to give learners the underpinning knowledge to understand the types of injuries they may come across in a work place.

Unit 202/502 Electrical principles and processes for building services engineering

UAN:	R/503/9677
Level:	Level 2
Credit value:	5
GLH:	48
Aim:	This unit provides learners with the knowledge and understanding to work safely with types of electrical supplies, earthing systems and components used in domestic building services. Learners will use tools and equipment to demonstrate safe isolation, use of temporary continuity bonds, simple wiring tasks and identify basic faults. The unit is intended to be taken by learners who are gaining experience in a building services engineering environment either through employment or study.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome

The learner will:

LO1 Understand electrical supplies used in domestic plumbing systems

Assessment criteria

The learner can:

AC1.1 Identify **documents** required to design electrical systems
AC1.2 Identify the different types of **supplies** used in domestic plumbing systems
AC1.3 Identify the common **voltages** used in domestic plumbing systems
AC1.4 Describe the layouts of **electrical supplies and connections**
AC1.5 Identify the different **types** of earthing systems
AC1.6 Describe protective equipotential bonding
AC1.7 Describe supplementary earthing bonding
AC1.8 Describe the protection **methods** used on electrical systems
AC1.9 Explain the relationship between the size of fuses and the current in the system.

Range

AC1.1 **Documents**
Manufacturer's instructions, electrical regulation, building regulation, British/European standards.

AC1.2 **Supplies**
AC Supplies, DC Supplies.

AC1.3 **Voltages**
240 Volts, 24 Volts, 12 Volts.

AC1.4 **Electrical supplies and connections**
Lighting circuits, ring mains, spurs fused outlets, consumer units, s-plan, y-plan.

AC1.5 **Types**
TT System, TN System, TN-CS system.

AC1.8 **Methods**
Miniature circuit breakers, residual current devices, cartridge fuses, wired fuses, RCBO.

Learning outcome

The learner will:

LO2 Know the components used in electrical installations

Assessment criteria

The learner can:

AC2.1 Identify incoming electrical **systems** in domestic dwellings
AC2.2 Identify the **types of wiring** used in electrical systems
AC2.3 Identify **types of wire protection**
AC2.4 State the **relationship** between the size of wire to the voltage carried
AC2.5 Identify **components** on electrical systems.

Range

AC2.1 **Systems**
Electric meter, consumer unit.

AC2.2 **Types of wiring**
Cable, flex, heat resistant flex.

AC2.3 **Types of wire protection**
Trunking, conduit.

AC2.4 **Relationship**
Volts, current, insulation, cross section of wiring.

AC2.5 **Components**
3 Pin plugs, plug sockets (switched and non-switched), fuse spurs (switched and non-switched), one and two way switches, junction boxes, pull cords, isolators, electrical timers.

Learning outcome

The learner will:

LO3 Understand the procedures for safely isolating supplies

Assessment criteria

The learner can:

AC3.1 Identify the test **equipment** required to carry out safe isolation of an electrical supply
AC3.2 Describe how to test voltage indicators on a known source
AC3.3 Identify the correct **locations** to carry out safe isolation
AC3.4 Describe the **procedure** for preventing the supply being turned back on
AC3.5 Describe how to check the supply is dead.

Range

AC3.1 **Equipment**
Voltage indicators, proving devices, labels, locking off devices.
AC3.2 **Locations**
Consumer unit, fuse spurs, electrical isolators.
AC3.3 **Procedure**
Isolate, test, lock, label, re-test device.

Learning outcome

The learner will:

LO4 Be able to safely isolate electrical supplies

Assessment criteria

The learner can:

AC4.1 Select test **equipment** required to carry out safe isolation of an electrical supply
AC4.2 Test voltage indicators on known sources
AC4.3 Select the correct **locations** to carry out safe isolation
AC4.4 Demonstrate safe isolation of electrical supplies.

Range

AC4.1 **Equipment**
Voltage indicators, proving devices, labels, locking off devices.
AC4.3 **Locations**
Consumer unit, fuse spurs, electrical isolators.

Learning outcome

The learner will:

LO5 Understand how to identify safety critical faults on electrical components and systems

Assessment criteria

The learner can:

AC5.1 Describe the **consequences** of the failure to rectify faults on electrical systems
AC5.2 Describe safety critical **faults** on electrical installations
AC5.3 Identify **responsible persons** to be informed of any electrical faults
AC5.4 Explain the **actions** to be taken when finding a fault on an electrical installation.

Range

AC5.1 **Consequences**
Electrocution, death, fire, component failure, reduced lifecycle of component.

AC5.2 **Faults**
Damaged cables and flex, loose wires, incorrect cables (size, type), broken junction boxes, missing earth bonding, incorrect size fuse.

AC5.3 **Responsible persons**
Home owners, tenants, landlords, site manager, supervisor, co-contractors, site agent, caretakers, managing agents.

AC5.4 **Actions**
Safe isolation, report to responsible person.

Learning outcome

The learner will:

LO6 Understand how to undertake basic electrical tasks

Assessment criteria

The learner can:

AC6.1 Explain the importance of electrical temporary continuity bonds
AC6.2 Describe the **procedure** for applying temporary electrical continuity bonds
AC6.3 Describe the process for wiring three 3 pin plugs
AC6.4 Identify the **tools** required to cut and join cable
AC6.5 Describe the method for attaching a cable to a junction box
AC6.6 Describe **basic safety electrical checks**.

Range

AC6.2 **Procedure**
Identify pipe, remove paint, secure clamping device, correctly position.

AC6.4 **Tools**
Insulated screw drivers, insulated wire cutters and pliers, wire strippers, crimping tools.

AC6.6 **Basic safety electrical checks**
Earth continuity, short circuit, resistance to earth, polarity, socket tester.

Learning outcome

The learner will:

LO7 Be able to undertake basic electrical tasks

Assessment criteria

The learner can:

AC7.1 Demonstrate the **procedure** for temporary electrical continuity bonds
AC7.2 Perform wiring of 3 pin plugs
AC7.3 Attach cables to junction boxes
AC7.4 Carry out **basic safety electrical checks**.

Range

AC7.1 **Procedure**

Identify pipe, remove paint, secure clamping device, correctly position.

AC7.4 **Basic safety electrical checks**

Earth continuity, short circuit, resistance to earth, polarity, socket tester.

Unit 203/803 Scientific principles for domestic, industrial and commercial plumbing

UAN:	L/504/0133
Level:	Level 2
Credit value:	4
GLH:	31
Aim:	This unit provides the learner with the knowledge and understanding of basic scientific principles applied to domestic, industrial and commercial plumbing systems. Learners will be introduced to pressure, force, flow, temperature, electricity and gas and heat transfer methods.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome

The learner will:

LO1 Understand the properties of common plumbing materials

Assessment criteria

The learner can:

AC1.1 Identify different uses of **materials** in plumbing
AC1.2 Describe the **properties** of materials used in plumbing
AC1.3 Describe specific heat capacity
AC1.4 Describe coefficient linear expansion
AC1.5 Describe heat conductivity
AC1.6 Explain the concept of capillarity in liquids
AC1.7 Describe the different **effects** of capillarity in plumbing materials
AC1.8 Explain the **causes** of corrosion in plumbing system materials
AC1.9 Identify **methods** of corrosion prevention in plumbing materials.

Range

AC1.1 **Materials**
Steel, iron, ferrous metals, plastic, alloys, non-ferrous metals.

AC1.2 **Properties**
Mass/weight – relative density, malleability, ductility, hardness, tensile strength, specific heat capacity.

AC1.7 **Effects**
Positive and negative.
AC1.8 **Causes**
Electrolytic action, atmospheric corrosion.
AC1.9 **Methods**
Enamelling, painted coatings, galvanised coatings, inhibitors, sacrificial anodes.

Learning outcome

The learner will:
LO2 Understand the scientific properties and principles of water

Assessment criteria

The learner can:
AC2.1 Identify the different **states of water**
AC2.2 Describe the changing state of water in relation to **temperature**
AC2.3 Describe relative density of water
AC2.4 Describe maximum density of water
AC2.5 Explain the concept of latent heat
AC2.6 Describe the expansion of water
AC2.7 Explain how different factors can affect the **properties** of water
AC2.8 Describe the **effects** of hard water on plumbing systems and components
AC2.9 Identify **methods** of water treatment.

Range

AC2.1 **States of water**
Solid, liquid, gas.
AC2.2 **Temperatures**
Freezing, boiling, maximum density.
AC2.7 **Properties**
Temporary and permanent hard or soft water.
AC2.8 **Effects**
Corrosion, lime-scale, reduced lifespan of material, performance of appliance.
AC2.9 **Methods**
Softeners, conditioners.

Learning outcome

The learner will:
LO3 Understand the pressure, force and flow of water

Assessment criteria

The learner can:
AC3.1 Identify the **units of measurement** for pressure
AC3.2 Describe the relationship between pressure and head of water
AC3.3 Explain the procedure for calculating pressures of water
AC3.4 Describe frictional resistance to water flow in **pipes and fittings**
AC3.5 Describe principles of velocity

AC3.6 Describe the principles of siphonic action.

Range

AC3.1 **Units of measurement**
Pascale, Newton, Bar, metres head.
AC3.4 **Pipes and fittings**
Steel, plastic, copper.
Elbows, bends, tees, valves, reducers, taps.

Learning outcome

The learner will:
LO4 Understand the principles of heat in relation to plumbing systems

Assessment criteria

The learner can:
AC4.1 Identify **units of measurement** for temperature
AC4.2 Explain the procedure for calculating heat capacity
AC4.3 Compare the methods of **heat transfer**
AC4.4 Describe the effectiveness of different surfaces and finishes in the relationship to heat transfer
AC4.5 Describe the **advantages** of insulators used in plumbing systems
AC4.6 State the **negative** aspects of heat transfer.

Range

AC4.1 **Units of measurement**
Celsius, Kelvin.
AC4.3 **Heat transfer**
Conduction, convection, radiation.
Surfaces and finishes
Shiny, dull.
AC4.5 **Advantages**
Energy efficiency, controls heat transfer.
AC4.6 **Negative**
Heat loss, wastage, condensation.

Learning outcome

The learner will:
LO5 Know the principles of combustion and heating gases

Assessment criteria

The learner can:
AC5.1 Describe the **requirements** for combustion
AC5.2 Identify combustion temperatures of **gases**
AC5.3 Describe the **properties** of gases used for heating purposes.

Range

AC5.1 **Requirements**
Fuel, oxygen, ignition.
AC5.2 **Gases**
Natural, Butane, Propane.
AC5.3 **Properties**
Relative density, calorific value, air requirements.

Learning outcome

The learner will:
LO6 Know the basic principles of electricity

Assessment criteria

The learner can:
AC6.1 Identify **units of measurement** for electricity
AC6.2 Explain the procedure for calculating basic electricity relationships
AC6.3 Describe the differences of AC and DC currents
AC6.4 Identify how AC and DC currents are generated.

Range

AC6.1 **Units of measurement**
Amps, volts, watts, ohms.

Unit 204/504 Common plumbing processes

UAN:	D/503/9679
Level:	Level 2
Credit value:	6
GLH:	54
Aim:	This unit provides the learner with the knowledge, understanding and skills of common plumbing processes. Learners will be introduced to measuring, bending and jointing tubes and the tools required. Learners will also carry out basic preparation tasks commonly used in plumbing.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome

The learner will:

LO1. Understand the procedures for measuring and bending plumbing tubes

Assessment criteria

The learner can:

AC1.1 Identify **equipment** used for measuring and bending
AC1.2 Identify **common materials** used for plumbing tubes
AC1.3 Identify different **angles**
AC1.4 Describe the **procedure** for bending different angles
AC1.5 Explain the **method** of measuring tube.

Range

AC1.1 **Equipment**
Steel rule, measuring tape, scissor bending machine, copper stand bending machine, hydraulic bender, internal spring, external spring, electric tube bender, mini benders.

AC1.2 **Common materials**
Copper, steel, plastic.

AC1.3 **Angles**
90 degree bend, 45 degree bend, Passover, off-set, kickover.

AC1.4 **Procedure**
Select materials, select correct machine, measure, mark, bend.

AC1.5 **Method**
Using x and z dimensions.

Learning outcome

The learner will:

LO2 Be able to measure and bend plumbing tubes

Assessment criteria

The learner can:

AC2.1 Select **equipment** for measuring and bending

AC2.2 Perform bending of tubes made from different **materials**

AC2.3 Perform bending of tubes to different **angles**

AC2.4 Carry out **methods** for measuring tubes.

Range

AC2.1 **Equipment**

Steel rule, measuring tape, scissor bending machine, hydraulic bender.

AC2.2 **Materials**

Copper, steel.

AC2.3 **Angles**

90 degree bend, 45 degree bend, passover, off-set, kickover.

AC2.4 **Methods**

Using x and y dimensions.

Learning outcome

The learner will:

LO3 Understand how to joint common plumbing materials

Assessment criteria

The learner can:

AC3.1 Identify common plumbing **fittings**

AC3.2 Describe methods for joining plumbing materials using common **jointing** techniques

AC3.3 Identify different **sealing material** used for tubes

AC3.4 Identify **hazards** associated with soldering copper tube

AC3.5 Describe the importance of appropriate ventilation when soldering.

Range

AC3.1 **Fittings**

Elbows, tees, couplings, sockets, reducers.

AC3.2 **Jointing**

Threaded, soldered, compression, manipulative, solvent weld, steel compression fitting, push-fit high low pressure, press-fit.

AC3.3 **Sealing material**

PTFE, jointing compounds.

AC3.4 **Hazards**

Burns, fires, explosions.

Learning outcome

The learner will:

LO4 Know common plumbing hand and power tools

Assessment criteria

The learner can:

AC4.1 Identify plumbing **hand tools**
AC4.2 Identify plumbing **power tools**
AC4.3 Identify common **faults** found on power tools
AC4.4 Describe **safe working practice** when using hand and power tools
AC4.5 Describe maintenance requirements for plumbing hand tools.

Range

AC4.1 **Hand tools**
Pipe grips, pipe cutters, adjustable spanner, hammers, screwdrivers, chisels, hacksaws.
AC4.5 **Power tools**
Battery drill, 240V hammer drill, SDS chuck, battery screwdriver, circular saw, jig-saw.
AC4.3 **Faults**
Frayed lead, damaged plugs, mechanical damage, missing safety features.
AC4.4 **Safe working practice**
Follow manufacturer's instructions, awareness of environment and others, use of PPE, selection of tool.

Learning outcome

The learner will:

LO5 Know fixings and components used in common plumbing processes

Assessment criteria

The learner can:

AC5.1 List different **screws heads** used for fixing during plumbing activities
AC5.2 Describe the **rationale** for using screws made from different materials
AC5.3 Identify **fixings** used in plumbing activities
AC5.4 Identify different **clips** used for plumbing installations
AC5.5 Describe the **reasons** for using different clipping distances
AC5.6 Describe which fixing to use on different **surfaces**.

Range

AC5.1 **Screws heads**
Slotted, Phillips, Pozidriv, roundhead and countersunk.
AC5.2 **Rationale**
Longevity, cost, hygiene, corrosive properties, safety.
AC5.3 **Fixings**
Plastic plugs, spring toggles, wall bolts, rawl bolts, Fischer fixings.
AC5.4 **Clips**

Plastic push on clips for copper, brass school board clips, Munsen rings, plastic clips.

AC5.5 **Reasons**

Horizontal, vertical, tube material.

AC5.6 **Surfaces**

Wood, block, tiles, plasterboard, brick.

Learning outcome

The learner will:

LO6 Know common plumbing preparation techniques

Assessment criteria

The learner can:

AC6.1 Describe **methods of preparing** flooring materials

AC6.2 Identify **risk factors** to consider when removing flooring materials

AC6.3 Describe different **types of flooring materials**

AC6.4 Describe the process of replacing flooring materials

AC6.5 Identify the **requirements** to consider when carrying out notching

AC6.6 Describe **installation techniques** for fitting pipework in concealed locations.

Range

AC6.1 **Methods of preparing**

Measuring, marking out.

AC6.2 **Risk factors**

Buried pipework and cables.

AC6.3 **Types of flooring materials**

Tongue and groove, chipboard.

AC6.5 **Requirements**

Building regulations.

AC6.6 **Installation techniques**

Ducting, notching, clipping, sleeving.

Learning outcome

The learner will:

LO7 Know symbols used for identifying plumbing pipework and fittings

Assessment criteria

The learner can:

AC7.1 Identify different **plumbing symbols**

AC7.2 Identify colour coding of plumbing pipes and tubes

AC7.3 Describe **drawing methods** used for plumbing installations.

Range

AC7.1 **Plumbing symbols**
British standard.
AC7.3 **Drawing methods**
Isometric, plans.

Learning outcome

The learner will:
LO8 Be able to carry out common plumbing processes

Assessment criteria

The learner can:
AC8.1 Interpret **drawings** for plumbing installations
AC8.2 Use common **hand tools** to carry out plumbing tasks
AC8.3 Operate common **power tools**
AC8.4 Prepare **tubes** and fittings for jointing
AC8.5 Demonstrate procedures for **jointing** tubes
AC8.6 Identify different **surfaces**
AC8.7 Select **fixing methods** for different **surfaces**
AC8.8 Measure clip distances
AC8.9 Perform fixing of **clips** to different **surfaces**.
AC8.10 Measure joists for notching in line with building regulations
AC8.11 Demonstrate notching of joists
AC8.12 Demonstrate replacing timber floor board.

Range

AC8.1 **Drawings**
Plans.
AC8.2 **Hand tools**
Pipe grips, pipe cutters, adjustable spanner, hammers, screwdrivers, chisels, hacksaws.
AC8.3 **Power tools**
Battery drill, 240V hammer drill.
AC8.4 **Tubes**
Copper, steel, plastic.
AC8.5 **Jointing**
Threaded, soldered, compression, push fit high low pressure.
AC8.6. AC8.7, AC8.9 **Surfaces**
Wood, block, tile, plasterboard.
AC8.7 **Fixing methods**
Plastic plugs, spring toggles, wall bolts.
AC8.9 **Clips**
Plastic push on clips for copper, brass school board clips, Munsen rings, plastic clips.

Unit 205/505 Cold water systems

UAN:	D/504/0217
Level:	Level 2
Credit value:	7
GLH:	68
Aim:	This unit provides learners with knowledge and practical experience in fitting types of domestic cold water systems and components. Learners will explore direct and indirect cold water systems, pipework, maintenance requirements, fault recognition and back flow prevention. This unit also provides learners with the knowledge and experience of carrying out commissioning tasks.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome

The learner will:

LO1 Know the requirements for water distribution to domestic dwellings

Assessment criteria

The learner can:

AC1.1 Identify the key sources of **information** related to the installation of cold water systems

AC1.2 Describe the rainwater cycle

AC1.3 Describe the different **sources** of water supply

AC1.4 Identify **treatment methods** of water supply prior to its distribution to properties

AC1.5 Describe typical **distribution pipework systems** from treatment works to properties.

Range

AC1.1 **Information**

- Water regulations, guide to the water regulations,
- BS EN 806- Specification for installations inside buildings conveying water for human consumption (parts 1-5)
- BS 8558- Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages – Complementary guidance to BS EN 806

AC1.3 **Sources**

- Surface sources - lakes, reservoirs, rivers, streams.
- Underground sources – wells, bore-holes, springs.

- Treatment methods
- Filtered, ionized, chlorinated, UV treated, aeration.
- Distribution pipework systems
- Mains, local mains, pumping stations, service pipe.

Learning outcome

The learner will:

LO2 Understand the requirements of the cold water supplies into domestic dwellings

Assessment criteria

The learner can:

AC2.1 Describe Medium-Density Polyethylene (MDPE) pipework
AC2.2 Explain the difference between a communication pipe and a service pipe
AC2.3 Explain the key **requirements** related to the supply pipework into a domestic dwelling
AC2.4 Identify **pipework isolation points**
AC2.5 Identify the different **types** of water meter installations
AC2.6 Describe **key aspects** of incoming mains into domestic dwellings
AC2.7 Identify **factors** that may impact measurements
AC2.8 Identify basic domestic cold water **systems**.

Range

AC2.3 **Requirements**
Depth of supply pipework, supply pipework entry to the property, prevention of freezing, insulation requirements.

AC2.4 **Pipework isolation points**
Property boundary, entry to the property.

AC2.5 **Types**
Underground, external to the building, internal within the building.

AC2.6 **Key aspects**
Pressure, flow rate.

AC2.7 **Factors**
Time of day, location, incoming size of main, local demand.

AC2.8 **Systems**
Direct cold water system, indirect cold water system, rainwater harvesting systems, grey water systems.

Learning outcome

The learner will:

LO3 Know the components used in domestic cold water

Assessment criteria

The learner can:

AC3.1 State **reasons** for using approved water fittings in cold water plumbing systems
AC3.2 Describe methods of operation of key **isolation valves**
AC3.3 Explain the method of operation of float operated valves used in cisterns
AC3.4 Describe the methods of operation of different **taps**

AC3.5 Explain the **requirements** for positioning drain valves in cold water plumbing systems
AC3.6 Explain the requirements for a cold water storage cistern (CWSC) in a domestic cold water plumbing system.
AC3.7 Explain the procedures for linking two small cisterns in a plumbing system.

Range

AC3.1 **Reasons**

Legal requirement, backflow, contamination, corrosion.

AC3.2 **Isolation valves**

Supply stop valve, screw down stop valve, service valve (high pressure), spherical plug valve and screw down stop valve, service valve (low pressure) – gate valve, drain valve, full-bore, water-fuse (surestop).

AC3.4 **Taps**

Bib taps with rising spindles, pillar taps with rising spindles, taps with non-rising spindles, taps with ceramic discs as their operating mechanism, mixer taps – including water mixing in the valve body and twinflow.

AC3.5 **Requirements**

- Need for a lid, screened vent and overflow.
- Position and purpose of the float operated valve.
- Purpose of the overflow.
- Position of outlets from the cistern.
- Cistern support requirements – plastic/metallic cisterns, insulated jacket, adequate access, height in relation to feed and expansion cistern.

Learning outcome

The learner will:

LO4 Understand the requirements for pipework installations in domestic cold water systems

Assessment criteria

The learner can:

AC4.1 Explain the **reasons** for insulating cold water systems pipework and components
AC4.2 Describe the key contamination **issues** in plumbing systems
AC4.3 Describe the fluid categories
AC4.4 Describe the need for point of use backflow protection
AC4.5 Identify the use of backflow protection **devices** in typical domestic dwellings.

Range

AC4.1 **Reasons**

Frost protection, prevention of undue warming, normal conditions, exposed conditions.

AC4.2 **Issues**

Non-approved materials, backflow, back syphonage cross connection.

Fluid categories 1 to 5.

AC4.5 **Devices**

- Type AUK2 tap gap to domestic basins and baths.
- Type AUK3 tap gap to domestic sinks.
- Double check valve to outside tap supply.

- Single check valve to mixer taps (hot and cold mixing in valve body).

Learning outcome

The learner will:

LO5 Understand the key requirements of testing and decommissioning of domestic cold water systems

Assessment criteria

The learner can:

AC5.1 Explain **methods** of testing cold water pipework systems
AC5.2 Describe how to use hydraulic test equipment
AC5.3 Describe the **requirements** for flushing a system
AC5.4 Identify the key **phases** in soundness testing a cold water system
AC5.5 Describe commissioning **checks** for cold water systems
AC5.6 Describe the differences between permanently and temporarily decommissioning a cold water system
AC5.7 Explain the method for draining cold water systems
AC5.8 Describe the **negative impact** of dead legs in systems.

Range

AC5.1 **Methods**

Plastic – type A and type B.
Metal procedure.

AC5.3 **Requirements**

Wholesome water to be flushed through following any amendments.

AC5.4 **Phases**

- Visual inspection
- Setting up hydraulic test equipment
- Test period
- Final check
- Completion of documentation.

AC5.5 **Checks**

Flow rate, pressure, no dirt or debris, taps working, valves, documentation completion.
Method for draining cold water systems
Notify, identify, warning notice, isolate, check drained water going to appropriate location.

AC5.8 **Negative impact**

Bacteria growth, Legionella, noise.

Learning outcome

The learner will:

LO6 Understand the basic maintenance requirements of domestic cold water systems

Assessment criteria

The learner can:

AC6.1 Identify common **defects** found in cold water components

AC6.2 Explain procedures for rectifying common **defects** in cold water components
AC6.3 Identify the **sources** of noise in the system
AC6.4 Describe reasons for **inadequate water supply**
AC6.5 State the procedure for leak identification
AC6.6 Explain the procedure for repairing leaks on cold water components.

Range

AC6.1, AC6.2 **Defects**
Worn or broken washer, defective tap seat, jammed headgear, ceramic disc failure.
AC6.3 **Sources**
Insecure pipework, air in system, loose components, defective washer.
AC6.4 **Inadequate water supply**
Underground bursts, blocked/partially blocked components, incorrectly sized components, partially closed valves, air locks to low pressure systems, low incoming water pressure.

Learning outcome

The learner will:
LO7 Be able to install cold water systems and components

Assessment criteria

The learner can:
AC7.1 Install cold water **pipework** using different **methods**
AC7.2 Connect cold water pipework to **components**
AC7.3 Carry out **commissioning tasks** on cold water pipework installations
AC7.4 Install insulation to cold water pipework and storage cisterns.

Range

AC7.1 **Pipework**
Copper, plastic.
AC7.1 **Methods**
Soldered, compression, push fit.
AC7.2 **Components**
Bath tap, basin tap, sink tap, WC cistern.
AC7.3 **Commissioning tasks**
Flush systems, adjust float valves, flow rates, pressure readings, temperature readings, complete documentation, soundness testing.

Unit 206/506 Domestic hot water systems

UAN:	H/504/0218
Level:	Level 2
Credit value:	6
GLH:	55
Aim:	This unit provides learners with knowledge and practical experience in fitting types of domestic hot water systems and components. Learners will maintenance, installation and commissioning requirements. This unit also provides learners with the knowledge and experience of carrying out installation tasks.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome

The learner will:

LO1 Know the types of domestic hot water systems

Assessment criteria

The learner can:

AC1.1 Identify the key sources of **information** related to the installation of hot water systems
AC1.2 Identify the main **types** of hot water systems
AC1.3 Describe the operating principles of basic hot water **storage systems** in domestic dwellings.
AC1.4 Describe the operating principles of basic hot water **non storage systems**
AC1.5 Identify the **fuel types** used with direct and indirect hot water storage systems
AC1.6 Explain the advantages of **hot water storage systems**
AC1.7 Explain the disadvantages of **hot water storage systems**.

Range

AC1.1 **Information**

- Water Regulations, guide to the Water Regulations
- BS EN 806- Specification for installations inside buildings conveying water for human consumption (parts 1-5)
- BS 8558- Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages – Complementary guidance to BS EN 806

AC1.2 **Types**
Storage – vented, unvented.
Non-storage (instantaneous) - multipoint, single point.
AC1.3 **Storage systems**
Direct type, indirect.
AC1.4 **Non storage systems**
Electric, gas, single point, multipoint, combi boiler.
AC1.5 **Fuel types**
Gas, solar thermal, electric, geo-thermal, solid fuel/biomass.
AC1.6, AC1.7 **Hot water storage systems**
Direct, indirect.

Learning outcome

The learner will:
LO2 Know the components used in domestic hot water systems

Assessment criteria

The learner can:
AC2.1 Identify the types of storage **cylinder** used in domestic hot water systems
AC2.2 Describe the **operating principles** of immersion heaters
AC2.3 Explain the **importance** of temperature control on hot water systems
AC2.4 Identify **methods** of controlling temperature
AC2.5 Describe the operating principles of blending valves
AC2.6 Identify types of **showers** used in domestic water systems.

Range

AC2.1 **Cylinder**
Direct, indirect, single feed, twin feed, unvented, single coil, twin coil, triple coil, quad coil, un-lagged, pre-lagged, copper, steel, combination, high recovery.
AC2.2 **Operating principles**
Thermostat, element, isolation, rating, cabling, timer.
AC2.3 **Importance**
Avoid scalding, avoid explosion, economy, environmental, build up of scale.
AC2.4 **Methods**
Control thermostats, over heat thermostats, temperature relief valves, blending valve.
AC2.6 **Showers**
Gravity, pumped, electric.

Learning outcome

The learner will:
LO3 Understand the installation requirements of domestic hot water plumbing systems

Assessment criteria

The learner can:
AC3.1 Explain the **requirements for pipework** from a cold water storage cistern (CWSC) to a domestic hot water storage cylinder

AC3.2 Identify the key installation **features** of hot water storage cylinders
AC3.3 Describe **requirements** for minimising the installation of long hot water draw-offs
AC3.4 List the **methods** of optimising the length of hot water draw-offs
AC3.5 Identify the **considerations** when installing pipework in relation to hot water pipework and cold water pipework
AC3.6 Identify the **reasons** for insulating hot water systems pipework and components
AC3.7 Describe the **fluid categories**
AC3.8 Identify the key contamination **issues** in plumbing systems
AC3.9 Identify the need for point of use backflow protection
AC3.10 Identify the use of backflow protection **devices**.

Range

AC3.1 **Requirements for pipework**
Feed, vent, no valve on vent pipes, gate valve, should rise, minimum height of vent over cistern.
AC3.2 **Features**
Cylinder specification – compliance with Part L1 Building Regulations, avoidance of parasitic circulation, stratification in hot water storage cylinders, temperature control methods – solid fuel (uncontrolled), other fuel types, thermostatic control, application of horizontal cylinders and combination cylinders.
AC3.3 **Requirements**
Energy conservation, wastage of water, risk of Legionella.
AC3.4 **Methods**
Trace heating, pumped secondary circulation system, centralised direct heat source, centralised hot water storage cylinder.
AC3.5 **Considerations**
Location of pipes (hot to cold transfer), insulation.
AC3.6 **Reasons**
Frost protection, heat loss, energy conservation, limit undue consumption.
AC3.7 **Fluid categories**
1 to 5.
AC3.8 **Issues**
Non-approved materials backflow, backpressure, back syphonage cross connection.
AC3.10 **Devices**
Type AUK2 tap gap, type AUK3 tap gap, single and double check valves.

Learning outcome

The learner will:
LO4 Know the design features of showers

Assessment criteria

The learner can:
AC4.1 Identify the pipework configurations of hot water **showers**
AC4.2 Explain the importance of balanced water supplies
AC4.3 Explain the different options for **shower controls**.

Range

AC4.1 **Showers**
Pumped, gravity, mains fed.
AC4.3 **Shower controls**
Manual, thermostatic, low or high pressure.

Learning outcome

The learner will:
LO5. Understand the basic maintenance requirements of hot water systems

Assessment criteria

The learner can:
AC5.1 Describe the **indicators** of faults found in hot water systems
AC5.2 Describe common **faults** that are found in hot water systems
AC5.3 Explain the **reasons** for the build-up of limescale in hot water systems
AC5.4 Identify the **methods** of removing limescale in hot water systems.

Range

AC5.1 **Indicators**
Poor flow rate through mixer and shower rose, unbalanced hot/cold pressures, valves passing water, water leak, expansion noise.
AC5.2 **Faults**
Thermostat failure, immersion element failure, failure of heat source, failure of coil, loss of air bubble in single feed cylinder, water boiling, warming to cold pipes, air locks, blockages, limescale.
AC5.3 **Reasons**
Water heated too high, hard water.
AC5.4 **Methods**
Water softeners, water filters, water conditioners, magnetic.

Learning outcome

The learner will:
LO6 Understand the key requirements of testing and decommissioning of domestic hot water systems

Assessment criteria

The learner can:
AC6.1 Describe **methods** of testing hot water pipework systems
AC6.2 Describe how to use hydraulic test equipment
AC6.3 Describe the **requirements** for flushing a system
AC6.4 Identify the key **phases** in soundness testing a hot water system
AC6.5 Describe commissioning **checks** for hot water systems
AC6.6 Describe the differences between permanently and temporarily decommissioning a hot water system
AC6.7 Describe the method for draining hot water systems.

Range

AC6.1 **Methods**

Plastic – Type A and Type B

Metal procedure.

AC6.3 **Requirements**

Wholesome water to be flushed through following any amendments, hot water to be flushed through following any amendments.

AC6.4 **Phases**

- Visual inspection
- Setting up hydraulic test equipment
- Test period
- Final check
- Completion of documentation.

AC6.5 **Checks**

Flow rate, pressure, no dirt or debris, taps working, valves, blending valves, temperature, check thermostat settings and operation, documentation completion.

Method for draining hot water systems

Notify, identify, warning notice, isolate, check drained water going to appropriate location, temperature.

Learning outcome

The learner will:

LO7 Be able to install cold water systems and components

Assessment criteria

The learner can:

AC7.1 Be able to carry out a soundness test on hot water **pipework**

AC7.2 Install hot water **pipework** using different **methods**

AC7.3 Connect hot water pipework to **components**

AC7.4 Install open vented hot water storage cylinder

AC7.5 Carry out **commissioning tasks** on hot water pipework installations

AC7.6 Install insulation to hot water pipework.

Range

AC7.1, AC7.2 **Pipework**

Copper, plastic.

AC7.2 **Methods**

Soldered, compression, push fit.

AC7.3 **Components**

Bath tap, basin tap, sink tap, WC cistern.

AC7.5 **Commissioning tasks**

Flush systems, flow rates, temperature readings, complete documentation, soundness testing.

Unit 207 Sanitation

UAN:	K/504/0219
Level:	Level 2
Credit value:	5
GLH:	48
Aim:	This unit provides the learner with the knowledge, understanding and skills of common sanitation systems. Learners will be introduced to common sanitary installations and associated installation practices. Learners will also carry out basic installation tasks commonly used in plumbing.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome

The learner will:

LO1 Know the appliances and associated components used in sanitary installation

Assessment criteria

The learner can:

AC1.1 describe the working principles of different types of **toilets**
AC1.2 List different types of **urinal**
AC1.3 Explain the working principles of an automatic flushing cistern
AC1.4 Identify different types of **bidet**
AC1.5 Identify different types of **wash basin**
AC1.6 Identify **factors** to consider when selecting taps for installing with a bath and basin
AC1.7 Identify different types of **sinks**
AC1.8 Describe methods of connecting **waste fittings** to sanitary appliances
AC1.9 Identify alternate means of waste disposal.

Range

AC1.1 **Toilets**
Single siphonic, double siphonic, wash down, high and low level, concealed, close coupled, dual flush, single flush, siphonic, flushing valves.

AC1.2 **Urinal**
Slab, bowl, trough.

AC1.4 **Bidet**

Over the rim, ascending spray.

AC1.5 **Wash basin**

Pedestal, wall hung, countersunk, in wall, counter top.

AC1.6 **Factors**

Size (¾ and ½ inch), location, appearance, type, operation, design of basin/bath.

AC1.7 **Sinks**

London, Belfast, stainless steel, ceramic, manmade, single drainer, double drainer, corner.

AC1.8 **Waste fittings**

Slotted, internal, external, overflow.

Alternate means of waste disposal

Macerator, sink waste disposal unit.

Learning outcome

The learner will:

LO2 Know the requirements for installing sanitary appliances

Assessment criteria

The learner can:

AC2.1 Identify **safe storage methods** for sanitary appliances

AC2.2 Describe the **importance** of safe storage methods for sanitary appliances

AC2.3 Identify **safe handling** of sanitary appliances

AC2.4 Describe the different **fixing methods** required for installing sanitary appliances

AC2.5 Describe the **method** of installing sanitary appliances

AC2.6 State bespoke **tools** used for the installation of sanitary appliances

AC2.7 Describe **quality checks** of sanitary appliances.

Range

AC2.1 **Safe storage methods**

Protective covering/packaging, racking, secure environment, labelling.

AC2.2 **Importance**

Protect sanitary appliances from damage, avoid replacement costs, customer satisfaction.

AC2.3 **Safe handling**

Manual handling, PPE.

AC2.4 **Fixing methods**

Wall-hung, freestanding, pedestal, countertop, countersunk, in-built.

AC2.5 **Method**

Identify correct location, measure, level, mark, fit components parts (dress), connect waste pipes, connect water pipework.

AC2.6 **Tools**

Tap box spanner, telescopic basin wrench, basin wrench, soft jaw plumbing pliers, trap spanner, tap reseating tool, toilet seat installation tool, magnetic telescopic plumber's mirror.

AC2.7 **Quality checks**

Installed level, Installed securely, water tight/no leaks.

Learning outcome

The learner will:

LO3 Be able to install sanitary appliances

Assessment criteria

The learner can:

3.1 Demonstrate the use of bespoke **tools** to install sanitary appliances

3.2 Confirm **suitability** for installation of sanitary appliances

3.3 Demonstrate the installation of **sanitary appliances**

3.4 Carry out **quality checks** of sanitary appliances.

Range

AC3.1 **Tools**

Tap box spanner, telescopic basin wrench, soft jaw plumbing pliers.

AC3.2 **Suitability**

Location, size.

AC3.3 **Sanitary appliances**

Bath, close coupled WC and cistern, wash hand pedestal basin.

AC3.4 **Quality checks**

Installed level, installed securely, water tight/no leaks.

Unit 208/508 Central heating systems

UAN:	D/504/0220
Level:	Level 2
Credit value:	6
GLH:	56
Aim:	This unit provides the learner with the core knowledge and understanding of central heating principles and processes applied to plumbing. Learners will be introduced to heating system types, tube materials, pipework systems, component parts, heat emitters, radiator valves, mechanical central heating controls, bespoke tools, and demonstrate competence in installing a single panel radiator with fittings.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome

The learner will:

LO1 Understand the types of domestic central heating systems installed in domestic dwellings

Assessment criteria

The learner can:

AC1.1 State the **purpose** of central heating systems
AC1.2 Identify the principle pipework **systems**
AC1.3 Compare the **operating performance** of principle pipework systems
AC1.4 Explain the function of the pipework **component** parts
AC1.5 Compare the different **types** of space heating systems
AC1.6 Describe the **configuration** of space heating systems.

Range

AC1.1 **Purpose**
Provide thermal comfort, economy.

AC1.2 **Systems**
Gravity hot water, pumped heating with gravity hot water, fully pumped system.

AC1.3 **Operating performance**
Cost (installation/maintenance/efficiency), general performance, control.

AC1.4 **Component**
Feed and expansion cistern, float valve, open vent pipe, air separator, gate valve, full-bore valve, drain-off valve, automatic bypass, lock shield, thermostatic radiator valve.

AC1.5 **Types**
Full central heating, background, selective.

AC1.6 **Configuration**
Gravity hot water systems and pumped only heating systems: one pipe and two pipe. C and C+ system.
The different types of fully pumped systems. Y plan and S plan.

Learning outcome

The learner will:

LO2 Know the different materials used to install domestic central heating pipework

Assessment criteria

The learner can:

AC2.1 Identify the principle **materials** used in domestic central heating applications
AC2.2 Describe the use of plastic barrier tube for installing central heating circuits
AC2.3 Describe the **advantages** of insulating pipework
AC2.4 State types of pipework **insulation**
AC2.5 State bespoke **tools** used for the installation of domestic central heating systems.

Range

AC2.1 **Materials**
Copper, mild steel, plastic.

AC2.3 **Advantages**
Saves energy, good for the environment, draw off temperature at the outlet is improved, water stays warmer for longer, frost protection.

AC2.4 **Insulation**
Polyethylene pipe, foil backed lagging, nitrile rubber.

AC2.5 **Tools**
Radiator spanner, radiator valve spanner ½" Hex, water pump pliers, radiator bleed key, pipe freezing system.

Learning outcome

The learner will:

LO3 Understand heat emitters and their components

Assessment criteria

The learner can:

AC3.1 Identify different **heat emitters** used in domestic systems.
AC3.2 Explain the working principles of **different types of heat emitter** used in domestic systems.
AC3.3 Identify the **European Standard** for the manufacture of radiators
AC3.4 Define **Delta T**
AC3.5 Compare the **advantages** and **disadvantages** of using underfloor heating

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AC3.6 Describe the **importance** of radiator valves found in domestic installations
AC3.7 Explain how **radiator valves** operate
AC3.8 Explain how to **hang** a radiator
AC3.9 Describe how to bleed a radiator.

Range

AC3.1 **Heat emitters**
Compact steel radiators, kick-space heaters (fan assisted convectors), cast-iron column radiators, towel radiators, flat panel radiators, skirting convector heaters, low surface temperature radiators, underfloor.

AC3.2 **Different types of heat emitter**
Convector, radiator, fan assisted, underfloor.

AC3.3 **European Standard**
BSEN442.

AC3.4 **Delta T**
The difference between the mean water temperature in the radiator and ambient air temperature.

AC3.5 **Advantages**
Low temperature of operation, better suited for use with heat pumps and solar, even heat distribution, heat emitter is not visible.

AC3.5 **Disadvantages**
Increased cost of components and installation, takes longer to heat room from cold state, could induce 'sweating' in furniture, not always practical.

AC3.6 **Importance**
Cost effective, comfort, control, environmental, best practice.

AC3.7 **Radiator valves**
Thermostatic, manual.

AC3.8 **Hang**
Identify location, mark out location, level, install brackets, correct height, hang, fit valves, connect pipework, fill.

Learning outcome

The learner will:
LO4 Understand mechanical central heating controls

Assessment criteria

The learner can:
AC4.1 Describe the function of a domestic circulator pump
AC4.2 Describe the **effects** of the circulating pump in relation to feed and vent
AC4.3 State the differences between **motorised valves**
AC4.4 Describe the process to exchange a Synchron Motor.

Range

AC4.2 **Effects**
Positive, negative pressure.

AC4.3 **Motorised valves**

Two-port, mid-position, W-plan priority hot water 3 port diverter.

Learning outcome

The learner will:

LO5 Be able to carry out radiator installation tasks

Assessment criteria

The learner can:

AC5.1 Demonstrate the use of bespoke **tools** to install domestic central heating systems

AC5.2 Perform radiator **hanging**

AC5.3 Demonstrate bleeding radiators.

Range

AC5.1 **Tools**

Radiator spanner, radiator valve spanner ½" Hex, radiator bleed key.

AC5.2 **Hanging**

Identify location, mark out location, level, install brackets, correct height, hang, fit valves, connect pipework, fill.

Unit 208/508 Central heating systems

Supporting information

Guidance

Radiator need only be a single panel radiator remotely installed rather than on an active system. To simulate a live system a hydraulic pump could be used to fill, test and bleed.

Unit 209/509 Drainage systems

UAN:	H/504/0221
Level:	Level 2
Credit value:	4
GLH:	39
Aim:	This unit provides the learner with the knowledge, understanding and skills of common sanitation and drainage systems. Learners will be introduced to soils systems, common sanitary installations and associated installation practices. Learners will also carry out basic installation tasks commonly used in plumbing.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome

The learner will:

LO1 Understand the requirements of drainage systems

Assessment criteria

The learner can:

AC1.1 Identify **documents** relating to sanitation and AGD systems and components
AC1.2 Identify different types of **above ground drainage system**
AC1.3 Explain the installation **considerations** for primary ventilated stack systems
AC1.4 Describe the **requirements** of a stub stack system
AC1.5 Identify **terminals** associated with stacks and stub stacks above ground drainage systems
AC1.6 Describe the differences between permanently and temporarily decommissioning above ground drainage systems
AC1.7 Describe below ground drainage systems
AC1.8 Identify **health hazards** when working with drainage systems.

Range

AC1.1 **Documents**
Manufacturer's instructions, Building Regs H, Building Regs G, BS 6465 Sanitary Installations, BS EN 12056 Gravity drainage systems inside buildings.
AC1.2 **Above ground drainage system**

Primary ventilated stack (single stack), ventilated branch system, secondary ventilated, stub stacks, grey water recovery systems.

AC1.3 **Considerations**

Volume of waste, branch connections, self cleansing gradients, inspection eyes.

AC1.4 **Requirements**

Another associated ventilated stack, minimum/maximum height of waste connection, internal valve.

AC1.5 **Terminals**

Air admittance valves, terminal guards.

Below ground drainage systems

Combined, separate, partially separate.

AC1.8 **Health hazards**

Weil's disease, Hepatitis, dermatitis.

Learning outcome

The learner will:

LO2 Know the types of traps and associated requirements

Assessment criteria

The learner can:

AC2.1 Identify **different traps** used for sanitary appliances

AC2.2 Describe the purpose of trap seals

AC2.3 Describe **design considerations**

AC2.4 Describe the **reasons** for trap seal loss

AC2.5 Describe **methods** for ensuring traps maintain their seal.

Range

AC2.1 **Different traps**

P, S, bottle, sink, self-sealing/re-sealing, running traps, mechanical traps, anti siphon, waterless traps.

AC2.3 **Design considerations**

Minimum/maximum dimensions, falls.

AC2.4 **Reasons**

Induced syphonage, undersized pipework.

AC2.5 **Methods**

Design, correct fall, pipe-bore.

Learning outcome

The learner will:

LO3 Know the procedures for soundness testing and commissioning above ground systems

Assessment criteria

The learner can:

AC3.1 Identify **equipment required** for testing above ground systems

AC3.2 Describe the procedure for checking minimal seal water levels in traps

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AC3.3 Describe the procedure for carrying out soundness testing of a primary ventilated stack system
AC3.4 Identify common **faults** in drainage systems
AC3.5 Identify **equipment used** for maintaining drainage systems
AC3.6 Describe **procedures** for unblocking drainage pipes
AC3.7 State the **requirements** of informing others when testing is taking place.

Range

AC3.1 **Equipment required**
Manometer, hand pump, seal, cap.
AC3.4 **Faults**
Loss of trap seal, blocked drains, pipe sagging.
AC3.5 **Equipment used**
Drain rods, plungers, coil flexible drain unblocker, flushing machines.
AC3.6 **Procedures**
Jetting, rodding, plunging, flushing.
AC3.7 **Requirements**
Label, warning notices, secure area.

Learning outcome

The learner will:
LO4 Be able to install and test above ground systems

Assessment criteria

The learner can:
AC4.1 Use **equipment** to install primary stack systems
AC4.2 Perform **connections** to primary ventilated stacks
AC4.3 Perform soundness test of above ground systems.

Range

AC4.1 **Equipment**
Manometer, seal, cap, drain test plug, hand bellows, y-piece connector.
AC4.2 **Connections**
WC connection, Wash hand basin connection, bath connection.

Learning outcome

The learner will:
LO5 Know the requirements of rainwater systems and associated guttering

Assessment criteria

The learner can:
AC5.1 Describe **rainwater systems**
AC5.2 Identify different **materials** used for rainwater systems
AC5.3 Describe the different **designs** of rainwater systems
AC5.4 Identify **considerations** when fixing rainwater systems

AC5.5 Identify **access considerations** required for working with rainwater systems
AC5.6 Describe the installation **method** for rainwater systems.

Range

AC5.1 **Rainwater systems**
Gutters, downpipes.
AC5.2 **Materials**
Cast iron, plastic, aluminium.
AC5.3 **Designs**
Ogee, half round, square, round.
AC5.4 **Considerations**
Fall, clipping distances, bracketing, leaf guard.
AC5.5 **Access considerations**
Working at heights, access, PPE.
AC5.6 **Method**
Identify location, measure, mark, level to fall, secure, termination point, test.

Learning outcome

The learner will:
LO6 Be able to install rainwater systems

Assessment criteria

The learner can:
AC6.1 Identify suitability of area for installation
AC6.2 Measure fall of rainwater gutter
AC6.3 Perform **installation** of rainwater systems.

Range

AC6.3 **Installation**
Mark, level to fall, secure, termination point, test.

Unit 210/810 Understand how to communicate with others within building services engineering

UAN:	J/602/2482
Level:	Level 2
Credit value:	3
GLH:	28
Aim:	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.
UAN:	J/602/2482

Learning outcome

Assessment criteria

Range

Learning outcome

The learner will:

LO1 Know the members of the construction team and their role within the building services industry

Assessment criteria

The learner can:

AC1.1 identify the key roles of the site management team:

- architect
- project manager/clerk of works
- structural engineer
- surveyor
- building services engineer
- quantity surveyor
- buyer
- estimator
- contracts manager

- construction manager

AC1.2 identify the key roles of the individuals that report to the site management team:

- sub contractors
- site supervisor
- trade supervisor
- trades:
  - bricklayer
  - joiner
  - plasterer
  - tiler
  - electrician
  - H&V fitter
  - gas fitter
  - decorator
  - groundworkers

AC1.3 identify the key roles of site visitors:

- building control inspector
- water inspector
- HSE inspector
- electrical services inspector.

Learning outcome

The learner will:

LO2 Know how to apply information sources in the building services industry

Assessment criteria

The learner can:

AC2.1 identify the types of statutory legislation and guidance information that applies to working in the industry:

- legislation:
  - data protection
  - equal opportunities
  - health and safety
  - employment
- regulations
- british standards
- codes of practice
- manufacturer guidance:
  - installation instructions
  - service and maintenance instructions
  - user instructions

AC2.2 identify the purpose of information that is used in the workplace:

- job specifications
- plans/drawings
- work programmes
- delivery notes
- time sheets
- policy documentation – health and safety, environmental, customer service

AC2.3 identify the purpose of information given to customers:

- quotations
- estimates
- invoices/statements
- statutory cancelation rights

- handover information

AC2.4 state the importance of company policies and procedures that affect working relationships:

- company working policies/procedures:
  - behaviour
  - timekeeping
  - dress code
  - contract of employment
- limits to personal authority:
  - apprentices
  - level 2 qualified staff
  - level 3 qualified staff
- supervisor and management responsibilities.

Learning outcome

The learner will:

LO3 Know how to communicate with others in the building services industry

Assessment criteria

The learner can:

AC3.1 identify suitable communication methods for use in work situations:

- oral communication
- written communication:
  - e-mail
  - fax
  - letter

AC3.2 define methods of effective communication for people with:

- physical disabilities
- learning difficulties
- language differences:
  - dialects
  - accents
  - foreign and second language issues

AC3.3 state the actions to take to deal with conflicts between:

- customers and operatives
- co-workers
- supervisors and operatives

AC3.4 state the effects that poor communication may have on an organisation:

- between operatives
- between operatives and management
- company to customer.

Appendix 1 Permitted reference materials

6035-505 (Cold water)

- Water Regulations Guide by Laurie Young & Graham May, published by WRAS, 2000
- BS EN 806- Specification for installations inside buildings conveying water for human consumption (parts 1-5)
- BS 8558- Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages – Complementary guidance to BS EN 806
- BS 8000 part 15 - Workmanship on building sites. Code of practice for hot and cold water services (domestic scale)
- Building Regulations Approved Document A (D in Northern Ireland), freely downloaded at www.planningportal.gov.uk (www.dfpni.gov.uk in Northern Ireland)
- Building Regulations Approved Document G (P in Northern Ireland), freely downloaded at www.planningportal.gov.uk (www.dfpni.gov.uk in Northern Ireland)

6035-506 (Hot water)

- Water Regulations Guide by Laurie Young & Graham May, published by WRAS, 2000
- BS EN 806- Specification for installations inside buildings conveying water for human consumption (parts 1-5)
- BS 8558- Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages – Complementary guidance to BS EN 806
- BS 8000 part 15 - Workmanship on building sites. Code of practice for hot and cold water services (domestic scale)
- Building Regulations Approved Document A (D in Northern Ireland), freely downloaded at www.planningportal.gov.uk (www.dfpni.gov.uk in Northern Ireland)
- Building Regulations Approved Document G (P in Northern Ireland), freely downloaded at www.planningportal.gov.uk (www.dfpni.gov.uk in Northern Ireland)
- Domestic Building Services Compliance Guide, freely downloaded at www.planningportal.gov.uk

6035-508 (Central heating)

- Water Regulations Guide by Laurie Young & Graham May, published by WRAS, 2000
- Building Regulations Approved Document A (D in Northern Ireland), freely downloaded at www.planningportal.gov.uk (www.dfpni.gov.uk in Northern Ireland)
- CIBSE Domestic Heating Design Guide, published by CIBSE, 2007
- Domestic Building Services Compliance Guide, freely downloaded at www.planningportal.gov.uk

6035-509 (Drainage)

- BS 6465 part 2 - Code of practice for space requirements for sanitary appliances
- BS 8000 part 13 - Workmanship on building sites. Code of practice for above ground drainage and sanitary appliances
- BS EN 12056 part 2 - BS EN 12056: 2 - Gravity drainage systems inside buildings. Sanitary pipework, layout and calculation

- Building Regulations Approved Document A (D in Northern Ireland), freely downloaded at www.planningportal.gov.uk
- Building Regulations Approved Document H (N in Northern Ireland), freely downloaded at www.planningportal.gov.uk (www.dfpni.gov.uk in Northern Ireland)

Guidance on permitted reference materials

Candidates are permitted to take the stated reference materials into the online examinations. Candidates must not be permitted to communicate with each other or refer to any other materials.

Permitted reference materials taken into examinations can contain the following:

- bookmarks (eg blank post-it notes, post-it notes numbered to indicate chapters or corners of pages folded)
- highlighting of text.

Permitted reference materials taken into exams must not contain the following:

- sample exam questions, answers or diagrams
- any writing in the regulations or accompanying written notes
- notes, diagrams or any content that may in any way advantage the candidate in answering questions within the exam.

It is the responsibility of the centre to ensure the material in the documents does not unfairly advantage candidates in anyway.

FAQs

Question 1: Do we have to access a copy of all these documents for each candidate?

Answer 1: No, these documents are not required to answer the questions. However, for some questions, access to these documents may be helpful for clarifying or referencing specific regulatory policy or codes of practice that candidates should have been taught in reference to the unit content. Centres may wish to make a single set of the documents concerned available for the candidates to refer to, rather than a set of documents per candidate.

Question 2: Can the relevant extracts from the documents be pulled out as reference for candidates so they don't have to browse through lots of irrelevant pages?

Answer 2: This is acceptable as long as the originator/owner of the document deems this acceptable or has given permission. Please note that as stated in the guidance above, bookmarks or blank post-it notes to indicate chapters or folded corners of pages can be used.

Appendix 2 Relationships to other qualifications

Links to other qualifications

This qualification has connections to the:

- Level 3 Diploma in Plumbing Studies (6035)
- Level 2 NVQ in Plumbing and Heating (6189)
- Level 3 NVQ in Plumbing and Heating (6189)
- Level 3 NVQ in Electrotechnical Services (2357)
- Level 2 NVQ in Heating and Ventilating (6188)
- Level 3 NVQ in Heating and Ventilating (6188)
- Level 2 NVQ in Refrigeration and Air Conditioning (6087)
- Level 3 NVQ in Refrigeration and Air Conditioning (6087)
- Level 2 Diploma in Electrical Installations (Buildings and Structures) (2365)
- Level 3 Diploma in Electrical Installations (Buildings and Structures) (2365)
- Level 2 Diploma in Heating and Ventilating (7188)
- Level 3 Diploma in Heating and Ventilating (7188)
- Level 2 Diploma in Refrigeration, Air Conditioning and Heat Pump Systems (7189)
- Level 3 Diploma in Refrigeration, Air Conditioning and Heat Pump Systems (7189)

Literacy, language, numeracy and ICT skills development

This qualification can develop skills that can be used in the following qualifications:

- Functional Skills (England) – see **www.cityandguilds.com/functionalskills**
- Essential Skills (Northern Ireland) – see **www.cityandguilds.com/essentialskillsni**
- Essential Skills Wales – see **www.cityandguilds.com/esw**

Appendix 3 Disclaimer

This document must be completed by the candidate and the tutor as part of the qualification induction.

You have been enrolled on the **Level 2 Diploma in Plumbing Studies (6035-02)**. This is a qualification that tests both practical and knowledge based skills in a realistic working environment. When you have successfully completed this qualification you will be at an **Improver/Plumber's Mate** level.

In order to fully qualify as a Plumber you will need to fully meet the performance criteria as laid down in the National Occupational Standards put together by Summit Skills, the Sector Skills Council. This is covered in the City and Guilds 6189 Level 2 and 3 NVQ Diploma in Plumbing and Heating.

Your tutor/assessor will be able to explain how you may progress onto the City and Guilds 6189 Level 2 and 3 NVQ Diploma in Plumbing and Heating. **However, you should be aware that the relevant performance units will need to be carried out in industry**. Completion of the 6189 will enable you to apply to join a competent person's scheme.

I can confirm that as part of my induction the above statement has been explained and I understand that completing the City and Guilds Level 2 Diploma in Plumbing Studies (6035-02) qualification will not make me a fully qualified Plumber.

Candidate _____ Date _____

Tutor _____ Date _____

Appendix 4 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centre document library** on **www.cityandguilds.com** or click on the links below:

Centre Handbook: Quality Assurance Standards

This document is for all approved centres and provides guidance to support their delivery of our qualifications. It includes information on:

- centre quality assurance criteria and monitoring activities
- administration and assessment systems
- centre-facing support teams at City & Guilds/ILM
- centre quality assurance roles and responsibilities.

The Centre Handbook should be used to ensure compliance with the terms and conditions of the centre contract.

Centre Assessment: Quality Assurance Standards

This document sets out the minimum common quality assurance requirements for our regulated and non-regulated qualifications that feature centre-assessed components. Specific guidance will also be included in relevant qualification handbooks and/or assessment documentation.

It incorporates our expectations for centre internal quality assurance and the external quality assurance methods we use to ensure that assessment standards are met and upheld. It also details the range of sanctions that may be put in place when centres do not comply with our requirements or actions that will be taken to align centre marking/assessment to required standards. Additionally, it provides detailed guidance on the secure and valid administration of centre assessments.

Access arrangements: When and how applications need to be made to City & Guilds provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The **Centre document library** also contains useful information on such things as:

- conducting examinations
- registering learners
- appeals and malpractice.

Useful contacts

Please visit the **Contact us** section of the City & Guilds website.

City & Guilds

For over 140 years, we have worked with people, organisations and economies to help them identify and develop the skills they need to thrive. We understand the life-changing link between skills development, social mobility, prosperity and success. Everything we do is focused on developing and delivering high-quality training, qualifications, assessments and credentials that lead to jobs and meet the changing needs of industry.

We partner with our customers to deliver work-based learning programmes that build competency to support better prospects for people, organisations and wider society. We create flexible learning pathways that support lifelong employability because we believe that people deserve the opportunity to (re)train and (re)learn again and again – gaining new skills at every stage of life, regardless of where they start.

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