

Level 2 Diploma in Plumbing Studies (6035-02)

June 2024 Version 5.8

Qualification at a glance

Subject area	Plumbing
City & Guilds number	6035
Age group approved	16+
Entry requirements	None
Assessment	By online test/practical assignment
Fast track	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	GLH	TQT	City & Guilds number	Accreditation number
Level 2 Diploma in Plumbing Studies	453	490	6035-02	600/5500/5

Version and date	Change detail	Section
1.1 Sept 2012	Amended information on where to obtain assessments. Amended the title of outcome 5 for unit 505. Amended the title of learning outcomes 3, 4 and 5 for unit 205/505	Assessment 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	Units

	A.C 1.5.	
5.3 September 2014	Added IQA guidance	Centre requirements
5.4 September 2017	Added TQT and GLH details Deleted QCF	Qualification at a Glance, Structure 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

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1 Introduction

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

Area	Description
<i>Who is the qualification for?</i>	<i>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 2)</i>
<i>What does the qualification cover?</i>	<i>It allows candidates to learn, develop and practise the skills required for employment and/or career progression in the plumbing sector. See Appendix 2 for further information.</i>
<i>What opportunities for progression are there?</i>	<i>It allows candidates to progress into employment, or to the following City & Guilds qualifications:</i> <ul style="list-style-type: none">• <i>Level 3 NVQ Diploma in Plumbing and Heating</i>• <i>Level 3 Diploma in Plumbing Studies</i>

Structure

To achieve the **Level 2 Diploma in Plumbing Studies**, learners must achieve **49** credits from the mandatory units.

Unit accreditation number	City & Guilds unit no.	Unit title	Credit value	Level	GLH
Mandatory					
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

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

Title and level	GLH	TQT
<i>Level 2 Diploma in Plumbing Studies</i>	453	490

2 Centre requirements

Approval

Centres already offering City & Guilds qualifications

If your Centre is approved to offer the **6129 Certificate in Basic Plumbing Studies** you can apply for the new **Level 2 Diploma in Plumbing Studies (6035-02)** approval 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, and
- 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, the Centre 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.

Centres NOT already offering City & Guilds qualifications

To offer this qualification, new centres will need to gain both centre and qualification approval. Please refer to the Centre Manual – Supporting Customer Excellence for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification 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.

Human Resources

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

- be technically competent in the area(s) for which they are delivering training and/or have experience of providing training
- 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.*

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 Adviser 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 and Guilds Quality Assurance processes visit: the **What is CASS?** and **Quality Assurance Standards** documents on the City & Guilds website.

Candidate entry requirements

City & Guilds does not set entry requirements for this qualification. 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+.

Accreditation of prior learning (APL)

Guidance on APL between this qualification and the 6189 qualification will be available on the website by the start of November 2012.

3 Delivering the qualification

Initial assessment and induction

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

- if the candidate 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 candidate fully understands the requirements of the qualification, their responsibilities as a candidate, 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 2.

Support materials

The following resource is 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

Unit Number	Unit Title	Assessment method	Where to obtain assessment materials
201/501	Health and safety in building services engineering	<p>Practical Assignment (201)</p> <p>City and Guilds on-line multiple choice test (501)</p> <p>The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit.</p> <p>Externally set assignment, locally marked and externally verified.</p>	<p>Go to www.cityandguilds.com and navigate to the 6035 webpage. Password available on the Walled Garden.</p>
202/502	Electrical principles and processes for building services engineering	<p>Practical Assignment (202)</p> <p>City and Guilds on-line multiple choice test (502)</p> <p>The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit.</p> <p>Externally set assignment, locally marked and externally verified.</p>	<p>Go to www.cityandguilds.com and navigate to the 6035 webpage. Password available on the Walled Garden.</p>
203/803	Scientific principles for domestic, industrial and commercial plumbing	<p>City and Guilds on-line multiple choice test</p> <p>The assessment covers the knowledge requirements of the unit and assesses all learning outcomes to verify coverage of the unit.</p> <p>(803) Proxy unit</p>	<p>Test available for booking on the Walled Garden.</p>

204/504	Common plumbing processes	<p>Practical Assignment (204)</p> <p>City and Guilds on-line multiple choice test (504)</p> <p>The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit.</p> <p>Externally set assignment, locally marked and externally verified.</p>	<p>Go to www.cityandguilds.com and navigate to the 6035 webpage. Password available on the Walled Garden.</p>
205/505	Cold water systems	<p>Practical Assignment (205)</p> <p>City and Guilds on-line multiple choice test (505)</p> <p>The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit.</p> <p>Externally set assignment, locally marked and externally verified.</p>	<p>Go to www.cityandguilds.com and navigate to the 6035 webpage. Password available on the Walled Garden.</p>
206/506	Domestic hot water systems	<p>Practical Assignment (206)</p> <p>City and Guilds on-line multiple choice test (506)</p> <p>The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit.</p> <p>Externally set assignment, locally marked and externally verified.</p>	<p>Go to www.cityandguilds.com and navigate to the 6035 webpage. Password available on the Walled Garden.</p>

207	Sanitation	<p>Practical Assignment</p> <p>The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit.</p> <p>Externally set assignment, locally marked and externally verified.</p>	<p>Go to www.cityandguilds.com and navigate to the 6035 webpage. Password available on the Walled Garden.</p>
208/508	Central heating systems	<p>Practical Assignment (208)</p> <p>City and Guilds on-line multiple choice test (508)</p> <p>The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit.</p> <p>Externally set assignment, locally marked and externally verified.</p>	<p>Go to www.cityandguilds.com and navigate to the 6035 webpage. Password available on the Walled Garden.</p>
209/509	Drainage systems	<p>Practical Assignment (209)</p> <p>City and Guilds on-line multiple choice test (509)</p> <p>The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit.</p> <p>Externally set assignment, locally marked and externally verified.</p>	<p>Go to www.cityandguilds.com and navigate to the 6035 webpage. Password available on the Walled Garden.</p>

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.	Test available for booking on the Walled Garden.
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(810) Proxy unit

Test Specifications

Test: Unit 501 Health and safety in building services engineering

Assessment method: e-volve online multiple choice test

Duration: 75 minutes

Grade boundaries: The pass mark is set at approximately 60%, however this may be adjusted to ensure consistency across cohorts (reliability).

Permitted materials: Reference material is not permitted.

Unit	Outcome	Number of questions	%
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

Duration: 75 minutes

Grade boundaries: The pass mark is set at approximately 60%, however this may be adjusted to ensure consistency across cohorts (reliability).

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

Unit	Outcome	Number of questions	%
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

Duration: 75 minutes

Grade boundaries: The pass mark is set at approximately 60%, however this may be adjusted to ensure consistency across cohorts (reliability).

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

Unit	Outcome	Number of questions	%
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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

Duration: 75 minutes

Grade boundaries: The pass mark is set at approximately 60%, however this may be adjusted to ensure consistency across cohorts (reliability).

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

Unit	Outcome	Number of questions	%
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

Duration: 75 minutes

Grade boundaries: The pass mark is set at approximately 60%, however this may be adjusted to ensure consistency across cohorts (reliability).

Permitted materials: Details of permitted materials can be found on page 22 of this document. A calculator is allowed.

Unit	Outcome	Number of questions	%
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

Duration: 75 minutes

Grade boundaries: The pass mark is set at approximately 60%, however this may be adjusted to ensure consistency across cohorts (reliability).

Permitted materials: Details of permitted materials can be found on page 22 of this document. A calculator is allowed.

Unit	Outcome	Number of questions	%
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

Duration: 75 minutes

Grade boundaries: The pass mark is set at approximately 60%, however this may be adjusted to ensure consistency across cohorts (reliability).

Permitted materials: Details of permitted materials can be found on page 22 of this document. A calculator is allowed.

Unit	Outcome	Number of questions	%
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

Duration: 75 minutes

Grade boundaries: The pass mark is set at approximately 60%, however this may be adjusted to ensure consistency across cohorts (reliability).

Permitted materials: Details of permitted materials can be found on page 22 of this document. A calculator is allowed.

Unit	Outcome	Number of questions	%
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

Duration: 75 minutes

Grade boundaries: The pass mark is set at approximately 60%, however this may be adjusted to ensure consistency across cohorts (reliability).

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

Unit	Outcome	Number of questions	%
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

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.

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 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.

Unit 201/501 Health and safety in building services engineering

UAN:	T/503/9669
Level:	Level 2
Credit value:	3
GLH:	26
Aim:	<i>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.</i>
Health and safety:	<i>Health and safety behaviour learned in this mandatory unit should be displayed in all arenas.</i>

Learning outcome
<i>The learner will:</i> 1. Know health and safety legislation
Assessment criteria
<i>The learner can:</i> 1.1 State the aims of health and safety legislation 1.2 Identify the responsibilities of individuals under health and safety legislation 1.3 Identify statutory and non-statutory health and safety materials 1.4 Identify the different roles of Health and Safety Executive in enforcing health and safety legislation.

Range

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.

Individuals

Employers, employees and contractors, visitors to site.

Health and safety materials

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

Roles

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

Learning outcome

The learner will:

2. Know how to handle hazardous situations

Assessment criteria

The learner can:

- 2.1 Identify common **hazardous situations** found on site
- 2.2 Describe safe systems at work
- 2.3 Identify the **categories** of safety signs
- 2.4 Identify **symbols** for hazardous substances
- 2.5 List common **hazardous substances** used in the building services industry
- 2.6 List **precautions** to be taken when working with hazardous substances
- 2.7 Identify the **types of asbestos** that may be encountered in the workplace
- 2.8 Identify the **actions** to be taken if the presence of asbestos is suspected
- 2.9 Describe the **implications** of being exposed to asbestos
- 2.10 State the application of different types of **personal protective equipment**
- 2.11 Identify the **procedures for manually handling** heavy and bulky items
- 2.12 Identify the **actions** that should be taken when an accident or emergency is discovered
- 2.13 State procedures for handling injuries sustained on-site
- 2.14 State the **procedures for recording accidents** and near misses at work.

Range

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.

Safe systems at work

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

Categories

Mandatory, prohibition, information, warning.

Symbols

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

Hazardous substances

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

Precautions

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

Types of asbestos

White asbestos (Chrysotile), brown or grey asbestos (Amosite), blue asbestos (Crocidolite), asbestos cement materials.

Actions

Stop working immediately, report to supervisor.

Implications

Long-term health implications (mesothelioma, asbestosis).

Personal protective equipment

Clothing protection including high visibility, eye protection, hand protection, head protection, foot protection, hearing protection, respiratory protection.

Procedures for manually handling

Single, two-person lift, mechanical lift.

Actions

Raising the alarm, contact emergency services, follow typical emergency evacuation procedures, inform supervisor.

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.

Procedures for recording accidents

RIDDOR, the use of company accident books, details to be recorded.

Learning outcome

The learner will:

3. Know electrical safety requirements when working in the building services industry

Assessment criteria

The learner can:

- 3.1 Identify the common **electrical dangers** to be aware of on site
- 3.2 List different **sources** of electrical supply for tools and equipment
- 3.3 Describe **reasons** for using reduced low voltage electrical supplies for tool and equipment on site
- 3.4 Identify how to conduct a **visual inspection** of portable electrical equipment for safe condition before use
- 3.5 State **actions** to take when portable electrical equipment fails visual inspection
- 3.6 Outline the Safe Isolation Procedure
- 3.7 State the **procedures** for dealing with electric shocks.

Range**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.

Sources

Battery powered supplies, 110 volt supplies, 230 volt supplies, generating sets.

Reasons

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

Visual inspection

Checking for a valid PAT test, Inspection for general condition.

Actions

Remove from use, report to supervisor.

Procedures

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

Learning outcome

The learner will:

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

Assessment criteria

The learner can:

- 4.1 Identify different **types of gases** used on site
- 4.2 Describe how bottled gases and equipment should be safely transported and stored
- 4.3 Describe how to conduct a **visual inspection** on heat producing equipment for safe condition
- 4.4 Describe how **combustion** takes place
- 4.5 State the **dangers** of working with heat producing equipment
- 4.6 State the **procedures** to follow on discovery of fires on site
- 4.7 Identify different classifications of fires
- 4.8 Identify types of fire **extinguisher** for different classifications of fires.

Range**Types of gases**

Propane, butane, oxy-acetylene, nitrogen.

Visual inspection

Inspection for general condition.

Combustion

Three elements of the fire triangle.

Dangers

Fires, burns, fumes, equipment damage, explosions.

Procedures

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

Classifications of fires

Class A, B, C, D, electrical fires.

Fire extinguisher

Carbon dioxide, water, powder, foam.

Learning outcome

The learner will:

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

Assessment criteria

The learner can:

- 5.1 Identify different types of access equipment
- 5.2 Select suitable equipment for carrying out work at heights based on the **work being carried out**
- 5.3 Describe the **safety checks** to be carried out on access equipment
- 5.4 Describe safe erection methods for **access equipment**.

Range**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.

Work being carried out

Duration at work, action points for heights.

Safety checks

Visual, tagging, fit for purpose, secure level ground.

Access equipment

Step ladders, ladders, roof ladders, mobile tower scaffolds, podiums, telescopic ladders.

Learning outcome

The learner will:

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

Assessment criteria

The learner can:

- 6.1 Identify the situations in which it may be necessary to work in excavations
- 6.2 Describe how excavations should be **prepared** for safe working
- 6.3 State **precautions** to be taken to make excavations safe
- 6.4 Identify areas where working in **confined space** may be a consideration
- 6.5 State **safety considerations** when working in confined spaces.

Range
<p>Prepared Safe access into the excavation, trench support systems.</p> <p>Precautions Use of warning signs, use of barriers, vehicle proximity to excavation edges.</p> <p>Confined space Drainage systems, Plant rooms, Main service duct-rooms, In tanks, cylinders, boilers or cisterns, Under suspended timber floors, In roof spaces.</p> <p>Safety considerations Ventilation, lighting, PPE, evacuation procedures, medical conditions, lone working.</p>

Learning outcome
<p>The learner will:</p> <p>7. Be able to apply safe working practice</p>
Assessment criteria
<p>The learner can:</p> <p>7.1 Perform manual handling techniques</p> <p>7.2 Manually handle loads using mechanical lifting aids</p> <p>7.3 Demonstrate the safe method of assembly of access equipment</p> <p>7.4 Use access equipment safely.</p>

Range
<p>Manual handling Single, two-person lift.</p> <p>Access equipment Step ladders, ladders, mobile tower scaffolds.</p>

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:	<i>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.</i>
Health and safety:	<i>Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.</i>

Learning outcome
<i>The learner will:</i>
<i>1. Understand electrical supplies used in domestic plumbing systems</i>
Assessment criteria
<i>The learner can:</i>
<i>1.1 Identify documents required to design electrical systems</i>
<i>1.2 Identify the different types of supplies used in domestic plumbing systems</i>
<i>1.3 Identify the common voltages used in domestic plumbing systems</i>
<i>1.4 Describe the layouts of electrical supplies and connections</i>
<i>1.5 Identify the different types of earthing systems</i>
<i>1.6 Describe protective equipotential bonding</i>
<i>1.7 Describe supplementary earthing bonding</i>
<i>1.8 Describe the protection methods used on electrical systems</i>
<i>1.9 Explain the relationship between the size of fuses and the current in the system.</i>

Range
<p>Documents <i>Manufacturer's instructions, electrical regulation, building regulation, British/European standards.</i></p> <p>Supplies <i>AC Supplies, DC Supplies.</i></p> <p>Voltages <i>240 Volts, 24 Volts, 12 Volts.</i></p> <p>Electrical supplies and connections <i>Lighting circuits, ring mains, spurs fused outlets, consumer units, s-plan, y-plan.</i></p> <p>Types <i>TT System, TN System, TN-CS system.</i></p> <p>Methods <i>Miniature circuit breakers, residual current devices, cartridge fuses, wired fuses, RCBO.</i></p>

Learning outcome
<p>The learner will:</p> <p>2. Know the components used in electrical installations</p>
Assessment criteria
<p>The learner can:</p> <p>2.1 Identify incoming electrical systems in domestic dwellings</p> <p>2.2 Identify the types of wiring used in electrical systems</p> <p>2.3 Identify types of wire protection</p> <p>2.4 State the relationship between the size of wire to the voltage carried</p> <p>2.5 Identify components on electrical systems.</p>

Range
<p>Systems <i>Electric meter, consumer unit.</i></p> <p>Types of wiring <i>Cable, flex, heat resistant flex.</i></p> <p>Types of wire protection <i>Trunking, conduit.</i></p> <p>Relationship <i>Volts, current, insulation, cross section of wiring.</i></p> <p>Components <i>3 Pin plugs, plug sockets (switched and non-switched), fuse spurs (switched and non-switched), one and two way switches, junction boxes,</i></p>

pull cords, isolators, electrical timers.

Learning outcome

The learner will:

3. *Understand the procedures for safely isolating supplies*

Assessment criteria

The learner can:

3.1 *Identify the test **equipment** required to carry out safe isolation of an electrical supply*

3.2 *Describe how to test voltage indicators on a known source*

3.3 *Identify the correct **locations** to carry out safe isolation*

3.4 *Describe the **procedure** for preventing the supply being turned back on*

3.5 *Describe how to check the supply is dead.*

Range

Equipment

Voltage indicators, proving devices, labels, locking off devices.

Locations

Consumer unit, fuse spurs, electrical isolators.

Procedure

Isolate, test, lock, label, re-test device.

Learning outcome

The learner will:

4. *Be able to safely isolate electrical supplies*

Assessment criteria

The learner can:

4.1 *Select test **equipment** required to carry out safe isolation of an electrical supply*

4.2 *Test voltage indicators on known sources*

4.3 *Select the correct **locations** to carry out safe isolation*

4.4 *Demonstrate safe isolation of electrical supplies.*

Range

Equipment

Voltage indicators, proving devices, labels, locking off devices.

Locations

Consumer unit, fuse spurs, electrical isolators.

Learning outcome
The learner will: 5. Understand how to identify safety critical faults on electrical components and systems
Assessment criteria
The learner can: 5.1 Describe the consequences of the failure to rectify faults on electrical systems 5.2 Describe safety critical faults on electrical installations 5.3 Identify responsible persons to be informed of any electrical faults 5.4 Explain the actions to be taken when finding a fault on an electrical installation.

Range
Consequences Electrocution, death, fire, component failure, reduced lifecycle of component.
Faults Damaged cables and flex, loose wires, incorrect cables (size, type), broken junction boxes, missing earth bonding, incorrect size fuse.
Responsible persons Home owners, tenants, landlords, site manager, supervisor, co-contractors, site agent, caretakers, managing agents.
Actions Safe isolation, report to responsible person.

Learning outcome
The learner will: 6. Understand how to undertake basic electrical tasks
Assessment criteria
The learner can: 6.1 Explain the importance of electrical temporary continuity bonds 6.2 Describe the procedure for applying temporary electrical continuity bonds 6.3 Describe the process for wiring three 3 pin plugs 6.4 Identify the tools required to cut and join cable 6.5 Describe the method for attaching a cable to a junction box 6.6 Describe basic safety electrical checks .

Range
Procedure <i>Identify pipe, remove paint, secure clamping device, correctly position.</i>
Tools <i>Insulated screw drivers, insulated wire cutters and pliers, wire strippers, crimping tools.</i>
Basic safety electrical checks <i>Earth continuity, short circuit, resistance to earth, polarity, socket tester.</i>

Learning outcome
<i>The learner will:</i> 7. Be able to undertake basic electrical tasks
Assessment criteria
<i>The learner can:</i> 7.1 Demonstrate the procedure for temporary electrical continuity bonds 7.2 Perform wiring of 3 pin plugs 7.3 Attach cables to junction boxes 7.4 Carry out basic safety electrical checks .

Range
Procedure <i>Identify pipe, remove paint, secure clamping device, correctly position.</i>
Basic safety electrical checks <i>Earth continuity, short circuit, resistance to earth, polarity, socket tester.</i>

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

UAN:	L/504/0133
Level:	Level 2
Credit value:	4
GLH:	31
Aim:	<i>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.</i>
Health and safety:	<i>Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.</i>

Learning outcome
<i>The learner will:</i> 1. Understand the properties of common plumbing materials
Assessment criteria
<i>The learner can:</i> 1.1 Identify different uses of materials in plumbing 1.2 Describe the properties of materials used in plumbing 1.3 Describe specific heat capacity 1.4 Describe coefficient linear expansion 1.5 Describe heat conductivity 1.6 Explain the concept of capillarity in liquids 1.7 Describe the different effects of capillarity in plumbing materials 1.8 Explain the causes of corrosion in plumbing system materials 1.9 Identify methods of corrosion prevention in plumbing materials.

Range
<p>Materials Steel, iron, ferrous metals, plastic, alloys, non-ferrous metals.</p> <p>Properties Mass/weight – relative density, malleability, ductility, hardness, tensile strength, specific heat capacity.</p> <p>Effects Positive and negative.</p> <p>Causes Electrolytic action, atmospheric corrosion.</p> <p>Methods Enamelling, painted coatings, galvanised coatings, inhibitors, sacrificial anodes.</p>

Learning outcome
<p>The learner will:</p> <p>2. Understand the scientific properties and principles of water</p>
Assessment criteria
<p>The learner can:</p> <p>2.1 Identify the different states of water</p> <p>2.2 Describe the changing state of water in relation to temperature</p> <p>2.3 Describe relative density of water</p> <p>2.4 Describe maximum density of water</p> <p>2.5 Explain the concept of latent heat</p> <p>2.6 Describe the expansion of water</p> <p>2.7 Explain how different factors can affect the properties of water</p> <p>2.8 Describe the effects of hard water on plumbing systems and components</p> <p>2.9 Identify methods of water treatment.</p>

Range
<p>States of water Solid, liquid, gas.</p> <p>Temperatures Freezing, boiling, maximum density.</p> <p>Properties Temporary and permanent hard or soft water.</p> <p>Effects Corrosion, lime-scale, reduced lifespan of material, performance of appliance.</p> <p>Methods</p>

Softeners, conditioners.

Learning outcome
The learner will: 3. Understand the pressure, force and flow of water
Assessment criteria
The learner can: 3.1 Identify the units of measurement for pressure 3.2 Describe the relationship between pressure and head of water 3.3 Explain the procedure for calculating pressures of water 3.4 Describe frictional resistance to water flow in pipes and fittings 3.5 Describe principles of velocity 3.6 Describe the principles of siphonic action.

Range
Units of measurement Pascalle, Newton, Bar, metres head.
Pipes and fittings Steel, plastic, copper. Elbows, bends, tees, valves, reducers, taps.

Learning outcome
The learner will: 4. Understand the principles of heat in relation to plumbing systems
Assessment criteria
The learner can: 4.1 Identify units of measurement for temperature 4.2 Explain the procedure for calculating heat capacity 4.3 Compare the methods of heat transfer 4.4 Describe the effectiveness of different surfaces and finishes in the relationship to heat transfer 4.5 Describe the advantages of insulators used in plumbing systems 4.6 State the negative aspects of heat transfer.

Range
Units of measurement Celsius, Kelvin.
Heat transfer Conduction, convection, radiation.
Surfaces and finishes Shiny, dull.
Advantages Energy efficiency, controls heat transfer.
Negative

Heat loss, wastage, condensation.

Learning outcome
The learner will: 5. Know the principles of combustion and heating gases
Assessment criteria
The learner can: 5.1 Describe the requirements for combustion 5.2 Identify combustion temperatures of gases 5.3 Describe the properties of gases used for heating purposes.

Range
Requirements Fuel, oxygen, ignition.
Gases Natural, Butane, Propane.
Properties Relative density, calorific value, air requirements.

Learning outcome
The learner will: 6. Know the basic principles of electricity
Assessment criteria
The learner can: 6.1 Identify units of measurement for electricity 6.2 Explain the procedure for calculating basic electricity relationships 6.3 Describe the differences of AC and DC currents 6.4 Identify how AC and DC currents are generated.

Range
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:	<i>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.</i>
Health and safety:	<i>Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.</i>

Learning outcome
<i>The learner will:</i> 1. Understand the procedures for measuring and bending plumbing tubes
Assessment criteria
<i>The learner can:</i> 1.1 Identify equipment used for measuring and bending 1.2 Identify common materials used for plumbing tubes 1.3 Identify different angles 1.4 Describe the procedure for bending different angles 1.5 Explain the method of measuring tube.

Range
Equipment <i>Steel rule, measuring tape, scissor bending machine, copper stand bending machine, hydraulic bender, internal spring, external spring, electric tube bender, mini benders.</i>
Common materials <i>Copper, steel, plastic.</i>
Angles <i>90 degree bend, 45 degree bend, Passover, off-set, kickover.</i>
Procedure <i>Select materials, select correct machine, measure, mark, bend.</i>
Method

Using x and z dimensions.

Learning outcome

The learner will:

2. Be able to measure and bend plumbing tubes

Assessment criteria

The learner can:

- 2.1 Select **equipment** for measuring and bending
- 2.2 Perform bending of tubes made from different **materials**
- 2.3 Perform bending of tubes to different **angles**
- 2.4 Carry out **methods** for measuring tubes.

Range

Equipment

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

Materials

Copper, steel.

Angles

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

Methods

Using x and y dimensions.

Learning outcome

The learner will:

3. Understand how to joint common plumbing materials

Assessment criteria

The learner can:

- 3.1 Identify common plumbing **fittings**
- 3.2 Describe methods for joining plumbing materials using common **jointing** techniques
- 3.3 Identify different **sealing material** used for tubes
- 3.4 Identify **hazards** associated with soldering copper tube
- 3.5 Describe the importance of appropriate ventilation when soldering.

Range

Fittings

Elbows, tees, couplings, sockets, reducers.

Jointing

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

Sealing material

PTFE, jointing compounds.
Hazards Burns, fires, explosions.

Learning outcome
The learner will: 4. Know common plumbing hand and power tools
Assessment criteria
The learner can: 4.1 Identify plumbing hand tools 4.2 Identify plumbing power tools 4.3 Identify common faults found on power tools 4.4 Describe safe working practice when using hand and power tools 4.5 Describe maintenance requirements for plumbing hand tools.

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

Learning outcome
The learner will: 5. Know fixings and components used in common plumbing processes
Assessment criteria
The learner can: 5.1 List different screws heads used for fixing during plumbing activities 5.2 Describe the rationale for using screws made from different materials 5.3 Identify fixings used in plumbing activities 5.4 Identify different clips used for plumbing installations 5.5 Describe the reasons for using different clipping distances 5.6 Describe which fixing to use on different surfaces .

Range
<p>Screws heads Slotted, Phillips, Pozidriv, roundhead and countersunk.</p> <p>Rationale Longevity, cost, hygiene, corrosive properties, safety.</p> <p>Fixings Plastic plugs, spring toggles, wall bolts, rawl bolts, Fischer fixings.</p> <p>Clips Plastic push on clips for copper, brass school board clips, Munsen rings, plastic clips.</p> <p>Reasons Horizontal, vertical, tube material.</p> <p>Surfaces Wood, block, tiles, plasterboard, brick.</p>

Learning outcome
<p>The learner will:</p> <p>6. Know common plumbing preparation techniques</p>
Assessment criteria
<p>The learner can:</p> <p>6.1 Describe methods of preparing flooring materials</p> <p>6.2 Identify risk factors to consider when removing flooring materials</p> <p>6.3 Describe different types of flooring materials</p> <p>6.4 Describe the process of replacing flooring materials</p> <p>6.5 Identify the requirements to consider when carrying out notching</p> <p>6.6 Describe installation techniques for fitting pipework in concealed locations.</p>

Range
<p>Methods of preparing Measuring, marking out.</p> <p>Risk factors Buried pipework and cables.</p> <p>Types of flooring materials Tongue and groove, chipboard.</p> <p>Requirements Building regulations.</p> <p>Installation techniques Ducting, notching, clipping, sleeving.</p>

Learning outcome
The learner will: 7. Know symbols used for identifying plumbing pipework and fittings
Assessment criteria
The learner can: 7.1 Identify different plumbing symbols 7.2 Identify colour coding of plumbing pipes and tubes 7.3 Describe drawing methods used for plumbing installations.

Range
Plumbing symbols British standard.
Drawing methods Isometric, plans.

Learning outcome
The learner will: 8. Be able to carry out common plumbing processes
Assessment criteria
The learner can: 8.1 Interpret drawings for plumbing installations 8.2 Use common hand tools to carry out plumbing tasks 8.3 Operate common power tools 8.4 Prepare tubes and fittings for jointing 8.5 Demonstrate procedures for jointing tubes 8.6 Identify different surfaces 8.7 Select fixing methods for different surfaces 8.8 Measure clip distances 8.9 Perform fixing of clips to different surfaces . 8.10 Measure joists for notching in line with building regulations 8.11 Demonstrate notching of joists 8.12 Demonstrate replacing timber floor board.

Range**Drawings**

Plans.

Hand tools

Pipe grips, pipe cutters, adjustable spanner, hammers, screwdrivers, chisels, hacksaws.

Power tools

Battery drill, 240V hammer drill.

Tubes

Copper, steel, plastic.

Jointing

Threaded, soldered, compression, push fit high low pressure.

Surfaces

Wood, block, tile, plasterboard.

Fixing methods

Plastic plugs, spring toggles, wall bolts.

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:	<i>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.</i>
Health and safety:	<i>Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.</i>

Learning outcome

The learner will:

1. Know the requirements for water distribution to domestic dwellings

Assessment criteria

The learner can:

- 1.1 Identify the key sources of **information** related to the installation of cold water systems
- 1.2 Describe the rainwater cycle
- 1.3 Describe the different **sources** of water supply
- 1.4 Identify **treatment methods** of water supply prior to its distribution to properties
- 1.5 Describe typical **distribution pipework systems** from treatment works to properties.

Range
<p>Information</p> <p>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</p> <p>Sources</p> <p>Surface sources - lakes, reservoirs, rivers, streams. Underground sources – wells, bore-holes, springs.</p> <p>Treatment methods</p> <p>Filtered, ionized, chlorinated, UV treated, aeration.</p> <p>Distribution pipework systems</p> <p>Mains, local mains, pumping stations, service pipe.</p>

Learning outcome
<p>The learner will:</p> <p>2. Understand the requirements of the cold water supplies into domestic dwellings</p>
Assessment criteria
<p>The learner can:</p> <p>2.1 Describe Medium-Density Polyethylene (MDPE) pipework</p> <p>2.2 Explain the difference between a communication pipe and a service pipe</p> <p>2.3 Explain the key requirements related to the supply pipework into a domestic dwelling</p> <p>2.4 Identify pipework isolation points</p> <p>2.5 Identify the different types of water meter installations</p> <p>2.6 Describe key aspects of incoming mains into domestic dwellings</p> <p>2.7 Identify factors that may impact measurements</p> <p>2.8 Identify basic domestic cold water systems.</p>

Range
<p>Requirements <i>Depth of supply pipework, supply pipework entry to the property, prevention of freezing, insulation requirements.</i></p> <p>Pipework isolation points <i>Property boundary, entry to the property.</i></p> <p>Types <i>Underground, external to the building, internal within the building.</i></p> <p>Key aspects <i>Pressure, flow rate.</i></p> <p>Factors <i>Time of day, location, incoming size of main, local demand.</i></p> <p>Systems <i>Direct cold water system, indirect cold water system, rainwater harvesting systems, grey water systems.</i></p>

Learning outcome
<p>The learner will:</p> <p>3. Know the components used in domestic cold water</p>
Assessment criteria
<p>The learner can:</p> <p>3.1 State reasons for using approved water fittings in cold water plumbing systems</p> <p>3.2 Describe methods of operation of key isolation valves</p> <p>3.3 Explain the method of operation of float operated valves used in cisterns</p> <p>3.4 Describe the methods of operation of different taps</p> <p>3.5 Explain the requirements for positioning drain valves in cold water plumbing systems</p> <p>3.6 Explain the requirements for a cold water storage cistern (CWSC) in a domestic cold water plumbing system.</p> <p>3.7 Explain the procedures for linking two small cisterns in a plumbing system.</p>

<p>Range</p>
<p>Reasons <i>Legal requirement, backflow, contamination, corrosion.</i></p> <p>Isolation valves <i>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).</i></p> <p>Taps <i>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 twinflaw.</i></p> <p>Requirements <i>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.</i></p>

<p>Learning outcome</p> <p><i>The learner will:</i></p> <p>4. <i>Understand the requirements for pipework installations in domestic cold water systems</i></p>
<p>Assessment criteria</p> <p><i>The learner can:</i></p> <p>4.1 <i>Explain the reasons for insulating cold water systems pipework and components</i></p> <p>4.2 <i>Describe the key contamination issues in plumbing systems</i></p> <p>4.3 <i>Describe the fluid categories</i></p> <p>4.4 <i>Describe the need for point of use backflow protection</i></p> <p>4.5 <i>Identify the use of backflow protection devices in typical domestic dwellings.</i></p>

<p>Range</p>
<p>Reasons <i>Frost protection, prevention of undue warming, normal conditions, exposed conditions.</i></p> <p>Issues <i>Non-approved materials, backflow, back syphonage cross connection.</i></p> <p>Fluid categories <i>1 to 5.</i></p> <p>Devices <i>Type AUK2 tap gap to domestic basins and baths.</i></p>

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: 5. Understand the key requirements of testing and decommissioning of domestic cold water systems
Assessment criteria
The learner can: 5.1 Explain methods of testing cold water pipework systems 5.2 Describe how to use hydraulic test equipment 5.3 Describe the requirements for flushing a system 5.4 Identify the key phases in soundness testing a cold water system 5.5 Describe commissioning checks for cold water systems 5.6 Describe the differences between permanently and temporarily decommissioning a cold water system 5.7 Explain the method for draining cold water systems 5.8 Describe the negative impact of dead legs in systems.

Range
Methods Plastic – type A and type B. Metal procedure.
Requirements Wholesome water to be flushed through following any amendments.
Phases Visual inspection Setting up hydraulic test equipment Test period Final check Completion of documentation.
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.
Negative impact Bacteria growth, Legionella, noise.

Learning outcome
The learner will: 6. Understand the basic maintenance requirements of domestic cold water systems
Assessment criteria
The learner can: 6.1 Identify common defects found in cold water components 6.2 Explain procedures for rectifying common defects in cold water components 6.3 Identify the sources of noise in the system 6.4 Describe reasons for inadequate water supply 6.5 State the procedure for leak identification 6.6 Explain the procedure for repairing leaks on cold water components.

Range
Defects Worn or broken washer, defective tap seat, jammed headgear, ceramic disc failure.
Sources Insecure pipework, air in system, loose components, defective washer.
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: 7. Be able to install cold water systems and components
Assessment criteria
The learner can: 7.1 Install cold water pipework using different methods 7.2 Connect cold water pipework to components 7.3 Carry out commissioning tasks on cold water pipework installations 7.4 Install insulation to cold water pipework and storage cisterns.

Range
Pipework Copper, plastic.
Methods Soldered, compression, push fit.

Components

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

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:	<i>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.</i>
Health and safety:	<i>Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.</i>

Learning outcome

The learner will:

1. Know the types of domestic hot water systems

Assessment criteria

The learner can:

- 1.1 Identify the key sources of **information** related to the installation of hot water systems
- 1.2 Identify the main **types** of hot water systems
- 1.3 Describe the operating principles of basic hot water **storage systems** in domestic dwellings.
- 1.4 Describe the operating principles of basic hot water **non storage systems**
- 1.5 Identify the **fuel types** used with direct and indirect hot water storage systems
- 1.6 Explain the advantages of **hot water storage systems**
- 1.7 Explain the disadvantages of **hot water storage systems**.

Range

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

Types

Storage – vented, unvented.

Non-storage (instantaneous) - multipoint, single point.

Storage systems

Direct type, indirect.

Non storage systems

Electric, gas, single point, multipoint, combi boiler.

Fuel types

Gas, solar thermal, electric, geo-thermal, solid fuel/biomass.

Hot water storage systems

Direct, indirect.

Learning outcome

The learner will:

- 2. Know the components used in domestic hot water systems

Assessment criteria

The learner can:

- 2.1 Identify the types of storage **cylinder** used in domestic hot water systems
- 2.2 Describe the **operating principles** of immersion heaters
- 2.3 Explain the **importance** of temperature control on hot water systems
- 2.4 Identify **methods** of controlling temperature
- 2.5 Describe the operating principles of blending valves
- 2.6 Identify types of **showers** used in domestic water systems.

Range
<p>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.</p> <p>Operating principles Thermostat, element, isolation, rating, cabling, timer.</p> <p>Importance Avoid scalding, avoid explosion, economy, environmental, build up of scale.</p> <p>Methods Control thermostats, over heat thermostats, temperature relief valves, blending valve.</p> <p>Showers Gravity, pumped, electric.</p>

Learning outcome
<p>The learner will:</p> <p>3. Understand the installation requirements of domestic hot water plumbing systems</p>
Assessment criteria
<p>The learner can:</p> <p>3.1 Explain the requirements for pipework from a cold water storage cistern (CWSC) to a domestic hot water storage cylinder</p> <p>3.2 Identify the key installation features of hot water storage cylinders</p> <p>3.3 Describe requirements for minimising the installation of long hot water draw-offs</p> <p>3.4 List the methods of optimising the length of hot water draw-offs</p> <p>3.5 Identify the considerations when installing pipework in relation to hot water pipework and cold water pipework</p> <p>3.6 Identify the reasons for insulating hot water systems pipework and components</p> <p>3.7 Describe the fluid categories</p> <p>3.8 Identify the key contamination issues in plumbing systems</p> <p>3.9 Identify the need for point of use backflow protection</p> <p>3.10 Identify the use of backflow protection devices.</p>

<p>Range</p> <p>Requirements for pipework Feed, vent, no valve on vent pipes, gate valve, should rise, minimum height of vent over cistern.</p> <p>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.</p> <p>Requirements Energy conservation, wastage of water, risk of Legionella.</p> <p>Methods Trace heating, pumped secondary circulation system, centralised direct heat source, centralised hot water storage cylinder.</p> <p>Considerations Location of pipes (hot to cold transfer), insulation.</p> <p>Reasons Frost protection, heat loss, energy conservation, limit undue consumption.</p> <p>Fluid categories 1 to 5.</p> <p>Issues Non-approved materials backflow, backpressure, back syphonage cross connection.</p> <p>Devices Type AUK2 tap gap, type AUK3 tap gap, single and double check valves.</p>

<p>Learning outcome</p> <p>The learner will:</p> <p>4. Know the design features of showers</p>
<p>Assessment criteria</p> <p>The learner can:</p> <p>4.1 Identify the pipework configurations of hot water showers</p> <p>4.2 Explain the importance of balanced water supplies</p> <p>4.3 Explain the different options for shower controls.</p>

<p>Range</p> <p>Showers Pumped, gravity, mains fed.</p> <p>Shower controls Manual, thermostatic, low or high pressure.</p>

Learning outcome

The learner will:

5. Understand the basic maintenance requirements of hot water systems

Assessment criteria

The learner can:

- 5.1 Describe the **indicators** of faults found in hot water systems
- 5.2 Describe common **faults** that are found in hot water systems
- 5.3 Explain the **reasons** for the build-up of limescale in hot water systems
- 5.4 Identify the **methods** of removing limescale in hot water systems.

Range**Indicators**

Poor flow rate through mixer and shower rose, unbalanced hot/cold pressures, valves passing water, water leak, expansion noise.

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.

Reasons

Water heated too high, hard water.

Methods

Water softeners, water filters, water conditioners, magnetic.

Learning outcome

The learner will:

6. Understand the key requirements of testing and decommissioning of domestic hot water systems

Assessment criteria

The learner can:

- 6.1 Describe **methods** of testing hot water pipework systems
- 6.2 Describe how to use hydraulic test equipment
- 6.3 Describe the **requirements** for flushing a system
- 6.4 Identify the key **phases** in soundness testing a hot water system
- 6.5 Describe commissioning **checks** for hot water systems
- 6.6 Describe the differences between permanently and temporarily decommissioning a hot water system
- 6.7 Describe the method for draining hot water systems.

Range**Methods**

Plastic – Type A and Type B

Metal procedure.

Requirements

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

Phases

Visual inspection

Setting up hydraulic test equipment

Test period

Final check

Completion of documentation.

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: 7. Be able to install cold water systems and components
Assessment criteria
The learner can: 7.1 Be able to carry out a soundness test on hot water pipework 7.2 Install hot water pipework using different methods 7.3 Connect hot water pipework to components 7.4 Install open vented hot water storage cylinder 7.5 Carry out commissioning tasks on hot water pipework installations 7.6 Install insulation to hot water pipework.

Range
Pipework Copper, plastic.
Methods Soldered, compression, push fit.
Components Bath tap, basin tap, sink tap, WC cistern.
Commissioning tasks Flush systems, flow rates, temperature readings, complete documentation, soundness testing.

UAN:	K/504/0219
Level:	Level 2
Credit value:	5
GLH:	48
Aim:	<i>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.</i>
Health and safety:	<i>Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.</i>

Learning outcome

<i>The learner will:</i>

- | |
|--|
| <ol style="list-style-type: none"> 1. Know the appliances and associated components used in sanitary installation |
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Assessment criteria

<i>The learner can:</i>

- | |
|---|
| <ol style="list-style-type: none"> 1.1 describe the working principles of different types of toilets 1.2 List different types of urinal 1.3 Explain the working principles of an automatic flushing cistern 1.4 Identify different types of bidet 1.5 Identify different types of wash basin 1.6 Identify factors to consider when selecting taps for installing with a bath and basin 1.7 Identify different types of sinks 1.8 Describe methods of connecting waste fittings to sanitary appliances 1.9 Identify alternate means of waste disposal. |
|---|

Range**Toilets**

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

Urinal

Slab, bowl, trough.

Bidet

Over the rim, ascending spray.

Wash basin

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

Factors

Size ($\frac{3}{4}$ and $\frac{1}{2}$ inch), location, appearance, type, operation, design of basin/bath.

Sinks

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

Waste fittings

Slotted, internal, external, overflow.

Alternate means of waste disposal

Macerator, sink waste disposal unit.

Learning outcome

The learner will:

2. Know the requirements for installing sanitary appliances

Assessment criteria

The learner can:

- 2.1 Identify **safe storage methods** for sanitary appliances
- 2.2 Describe the **importance** of safe storage methods for sanitary appliances
- 2.3 Identify **safe handling** of sanitary appliances
- 2.4 Describe the different **fixing methods** required for installing sanitary appliances
- 2.5 Describe the **method** of installing sanitary appliances
- 2.6 State bespoke **tools** used for the installation of sanitary appliances
- 2.7 Describe **quality checks** of sanitary appliances.

<p>Range</p> <p>Safe storage methods Protective covering/packaging, racking, secure environment, labelling.</p> <p>Importance Protect sanitary appliances from damage, avoid replacement costs, customer satisfaction.</p> <p>Safe handling Manual handling, PPE.</p> <p>Fixing methods Wall-hung, freestanding, pedestal, countertop, countersunk, in-built.</p> <p>Method Identify correct location, measure, level, mark, fit components parts (dress), connect waste pipes, connect water pipework.</p> <p>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.</p> <p>Quality checks Installed level, Installed securely, water tight/no leaks.</p>
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<p>Learning outcome</p> <p>The learner will:</p> <p>3. Be able to install sanitary appliances</p>
<p>Assessment criteria</p> <p>The learner can:</p> <p>3.1 Demonstrate the use of bespoke tools to install sanitary appliances</p> <p>3.2 Confirm suitability for installation of sanitary appliances</p> <p>3.3 Demonstrate the installation of sanitary appliances</p> <p>3.4 Carry out quality checks of sanitary appliances.</p>

<p>Range</p>
<p>Tools Tap box spanner, telescopic basin wrench, soft jaw plumbing pliers.</p> <p>Suitability Location, size.</p> <p>Sanitary appliances Bath, close coupled WC and cistern, wash hand pedestal basin.</p> <p>Quality checks Installed level, installed securely, water tight/no leaks.</p>

Unit 208/508 Central heating systems

UAN:	D/504/0220
Level:	Level 2
Credit value:	6
GLH:	56
Aim:	<i>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.</i>
Health and safety:	<i>Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.</i>

Learning outcome

The learner will:

1. Understand the types of domestic central heating systems installed in domestic dwellings

Assessment criteria

The learner can:

- 1.1 State the **purpose** of central heating systems
- 1.2 Identify the principle pipework **systems**
- 1.3 Compare the **operating performance** of principle pipework systems
- 1.4 Explain the function of the pipework **component** parts
- 1.5 Compare the different **types** of space heating systems
- 1.6 Describe the **configuration** of space heating systems.

Range
<p>Purpose Provide thermal comfort, economy.</p> <p>Systems Gravity hot water, pumped heating with gravity hot water, fully pumped system.</p> <p>Operating performance Cost (installation/maintenance/efficiency), general performance, control.</p> <p>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.</p> <p>Types Full central heating, background, selective.</p> <p>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.</p>

Learning outcome
<p>The learner will:</p> <p>2. Know the different materials used to install domestic central heating pipework</p>
Assessment criteria
<p>The learner can:</p> <p>2.1 Identify the principle materials used in domestic central heating applications</p> <p>2.2 Describe the use of plastic barrier tube for installing central heating circuits</p> <p>2.3 Describe the advantages of insulating pipework</p> <p>2.4 State types of pipework insulation</p> <p>2.5 State bespoke tools used for the installation of domestic central heating systems.</p>

Range
<p>Materials Copper, mild steel, plastic.</p> <p>Advantages Saves energy, good for the environment, draw off temperature at the outlet is improved, water stays warmer for longer, frost protection.</p> <p>Insulation Polyethylene pipe, foil backed lagging, nitrile rubber.</p> <p>Tools</p>

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

Learning outcome

The learner will:

3. Understand heat emitters and their components

Assessment criteria

The learner can:

- 3.1 Identify different **heat emitters** used in domestic systems.
- 3.2 Explain the working principles of **different types of heat emitter** used in domestic systems.
- 3.3 Identify the European **Standard** for the Manufacture of Radiators
- 3.4 Define **Delta T**
- 3.5 Compare the **advantages** and **disadvantages** of using underfloor heating
- 3.6 Describe the **importance** of radiator valves found in domestic installations
- 3.7 Explain how **radiator valves** operate
- 3.8 Explain how to **hang** a radiator
- 3.9 Describe how to bleed a radiator.

Range

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.

Different types of heat emitter

Convector, radiator, fan assisted, underfloor.

Standard

BSEN442.

Delta T

The difference between the mean water temperature in the radiator and ambient air temperature.

Advantages

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

Disadvantages

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

Importance

Cost effective, comfort, control, environmental, best practice.

Radiator valves

Thermostatic, manual.

Hang

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

Learning outcome

The learner will:

4. Understand mechanical central heating controls

Assessment criteria

The learner can:

4.1 Describe the function of a domestic circulator pump

4.2 Describe the **effects** of the circulating pump in relation to feed and vent

4.3 State the differences between **motorised valves**

4.4 Describe the process to exchange a Synchron Motor.

Range

Effects

Positive, negative pressure.

Motorised valves

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

Learning outcome

The learner will:

5. Be able to carry out radiator installation tasks

Assessment criteria

The learner can:

5.1 Demonstrate the use of bespoke **tools** to install domestic central heating systems

5.2 Perform radiator **hanging**

5.3 Demonstrate bleeding radiators.

Range

Tools

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

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:	<i>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.</i>
Health and safety:	<i>Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.</i>

Learning outcome

The learner will:

1. Understand the requirements of drainage systems

Assessment criteria

The learner can:

- 1.1 Identify **documents** relating to sanitation and AGD systems and components
- 1.2 Identify different types of **above ground drainage system**
- 1.3 Explain the installation **considerations** for primary ventilated stack systems
- 1.4 Describe the **requirements** of a stub stack system
- 1.5 Identify **terminals** associated with stacks and stub stacks
- 1.6 Describe the differences between permanently and temporarily decommissioning above ground drainage systems
- 1.7 Describe below ground drainage systems
- 1.8 Identify **health hazards** when working with drainage systems.

Range
<p>Documents <i>Manufacturer's instructions, Building Regs H, Building Regs G, BS 6465 Sanitary Installations, BS EN 12056 Gravity drainage systems inside buildings.</i></p> <p>Above ground drainage system <i>Primary ventilated stack (single stack), ventilated branch system, secondary ventilated, stub stacks, grey water recovery systems.</i></p> <p>Considerations <i>Volume of waste, branch connections, self cleansing gradients, inspection eyes.</i></p> <p>Requirements <i>Another associated ventilated stack, minimum/maximum height of waste connection, internal valve.</i></p> <p>Terminals <i>Air admittance valves, terminal guards.</i></p> <p>Below ground drainage systems <i>Combined, separate, partially separate.</i></p> <p>Health hazards <i>Weil's disease, Hepatitis, dermatitis.</i></p>

Learning outcome
<p>The learner will:</p> <p>2. Know the types of traps and associated requirements</p>
Assessment criteria
<p>The learner can:</p> <p>2.1 Identify different traps used for sanitary appliances</p> <p>2.2 Describe the purpose of trap seals</p> <p>2.3 Describe design considerations</p> <p>2.4 Describe the reasons for trap seal loss</p> <p>2.5 Describe methods for ensuring traps maintain their seal.</p>

Range
<p>Different traps <i>P, S, bottle, sink, self-sealing/re-sealing, running traps, mechanical traps, anti siphon, waterless traps.</i></p> <p>Design considerations <i>Minimum/maximum dimensions, falls.</i></p> <p>Reasons <i>Induced syphonage, undersized pipework.</i></p> <p>Methods</p>

Design, correct fall, pipe-bore.

Learning outcome
The learner will: 3. Know the procedures for soundness testing and commissioning above ground systems
Assessment criteria
The learner can: 3.1 Identify equipment required for testing above ground systems 3.2 Describe the procedure for checking minimal seal water levels in traps 3.3 Describe the procedure for carrying out soundness testing of a primary ventilated stack system 3.4 Identify common faults in drainage systems 3.5 Identify equipment used for maintaining drainage systems 3.6 Describe procedures for unblocking drainage pipes 3.7 State the requirements of informing others when testing is taking place.

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

Learning outcome
The learner will: 4. Be able to install and test above ground systems
Assessment criteria
The learner can: 4.1 Use equipment to install primary stack systems 4.2 Perform connections to primary ventilated stacks 4.3 Perform soundness test of above ground systems.

Range
Equipment Manometer, seal, cap, drain test plug, hand bellows, y-piece connector.
Connections

WC connection, Wash hand basin connection, bath connection.
Learning outcome
The learner will: 5. Know the requirements of rainwater systems and associated guttering
Assessment criteria
The learner can: 5.1 Describe rainwater systems 5.2 Identify different materials used for rainwater systems 5.3 Describe the different designs of rainwater systems 5.4 Identify considerations when fixing rainwater systems 5.5 Identify access considerations required for working with rainwater systems 5.6 Describe the installation method for rainwater systems.

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

Learning outcome
The learner will: 6. Be able to install rainwater systems
Assessment criteria
The learner can: 6.1 Identify suitability of area for installation 6.2 Measure fall of rainwater gutter 6.3 Perform installation of rainwater systems.

Range
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:	<i>This knowledge unit provides learning in the development and continued maintenance of effective working relationships in the building services industry associated with work in dwellings, industrial and commercial premises and for private and contract type clients.</i>

Learning outcome

The learner will:

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

Assessment criteria

The learner can:

- 1.1 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

- 1.2 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

- 1.3 identify the key roles of site visitors:

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

Learning outcome

The learner will:

2. Know how to apply information sources in the building services industry

Assessment criteria

The learner can:

- 2.1 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

- 2.2 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

- 2.3 identify the purpose of information given to customers:

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

- 2.4 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:

3. Know how to communicate with others in the building services industry

Assessment criteria

The learner can:

- 3.1 identify suitable communication methods for use in work situations:
- oral communication
 - written communication:
 - e-mail
 - fax
 - letter
- 3.2 define methods of effective communication for people with:
- physical disabilities
 - learning difficulties
 - language differences:
 - dialects
 - accents
 - foreign and second language issues
- 3.3 state the actions to take to deal with conflicts between:
- customers and operatives
 - co-workers
 - supervisors and operatives
- 3.4 state the effects that poor communication may have on an organisation:
- between operatives
 - between operatives and management
 - company to customer.

Appendix 1 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**

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 3 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 **Centres and Training Providers homepage** on **www.cityandguilds.com**.

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document includes sections on:

- The centre and qualification approval process
- Assessment, internal quality assurance and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Management systems
- Maintaining records
- Assessment
- Internal quality assurance
- External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:

- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

and sets out the criteria that centres should adhere to pre and post centre and qualification approval.

Access to Assessment & Qualifications 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 homepage** section of the City & Guilds website also contains useful information such on such things as:

- **Walled Garden:** how to register and certificate candidates on line
- **Events:** dates and information on the latest Centre events
- **Online assessment:** how to register for GOLA/e-volve assessments.

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Useful contacts

UK learners General qualification information	T: +44 (0)844 543 0033 E: learnersupport@cityandguilds.com
International learners General qualification information	T: +44 (0)844 543 0033 F: +44 (0)20 7294 2413 E: intcg@cityandguilds.com
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: centresupport@cityandguilds.com
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 F: +44 (0)20 7294 2404 (BB forms) E: singlesubjects@cityandguilds.com
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: intops@cityandguilds.com
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: walledgarden@cityandguilds.com
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	T: +44 (0)121 503 8993 E: business@cityandguilds.com
Publications Logbooks, Centre documents, Forms, Free literature	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413

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As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group

The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Land Based Services (land-based qualifications), the Centre for Skills Development (CSD works to improve the policy and practice of vocational education and training worldwide) and Learning Assistant (an online e-portfolio).

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