Level 3 Diploma in Gas Engineering (9074-03)

Version 3 (November 2020)

Qualification Handbook

Qualification at a glance

Subject area	Gas Engineering (Installation and Maintenance)
City & Guilds number	9074
Age group approved	16-19, 19+
Entry requirements	None
Assessment types	E-assessment, Written Examination, Practical Assignment, Multiple Choice Examination, Portfolio of Evidence
Approvals	Qualification approval
Support materials	Assessment Packs; Gas Work Log
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	GLH	TQT	City & Guilds qualification number	Ofqual accreditation number
Level 3 Diploma in Gas Engineering - Pathway A (aligned to CCN 1 , CPA 1, MET 1, CKR 1, LEI 1, LAU 1, CENWAT)	908	1384	9074-03	603/3085/5
Level 3 Diploma in Gas Engineering - Pathway B (aligned to CCN 1, CPA 1, MET 1, CKR 1, LEI 1, LAU 1, HTR 1)	877	1335	9074-03	603/3085/5
Level 3 Diploma in Gas Engineering - Pathway C (aligned to CCN 1 , CPA 1, MET 1, CENWAT, HTR 1)	952	1432	9074-03	603/3085/5

Title and level	GLH	TQT	City & Guilds qualification number	Ofqual accreditation number
Level 3 Diploma in Gas Engineering - Pathway D (aligned to CCN 1 , CPA 1, MET 1, CENWAT, Unvented)	830	1128	9074-03	603/3085/5
Level 3 Diploma in Gas Engineering - Pathway E (aligned to CCN 1 , CPA 1, MET 1, CKR 1, LEI 1, LAU 1, CENWAT, HTR 1)	1044	1702	9074-03	603/3085/5

Date/Version	Change Details	Section
January 2018 v1.1	Learning Outcome 4 corrected	Unit 307
March 2018 v1.2	TQT and GL values, Assessment details	All
May 2018 v1.3	Updating of general information Updating assessment information for 9074-16 Supporting information and range statements added Assessment criterion amended	Sections 1, 2 and 4 Section 4 Section 5 (all units) Section 5 (Unit 301, AC 3.2)
June 2018 v1.4	Removed learning outcome 8 – text included in error	Unit 310
November 2018 v1.5	The units, assessment 018 is covering was updated	Scheduling assessments page 27
January 2019 v1.6	Pass marks added to test specifications	Test specifications pp. 27–31
June 2019 V2	Pathway E added	Qualifications at a glance, delivering the qualification, assessment
November 2020 v3	Conflict of Interest statement added	Centre requirements

Contents

1 Introduction

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

Area	Description
Who is the qualification for?	The Level 3 Diploma in Gas Engineering is for individuals who are currently working or want to work within the Gas Sector as a gas engineer. It allows learners to develop the knowledge and practise the skills required for employment in the gas engineering industry. It has been designed to support the on-programme element of the Gas Engineering Level 3 Apprenticeship Standard.
What does the qualification cover?	Learners will develop and practise the skills required for employment in gas engineering such as relevant gas safety principles, installing and maintaining appliances such as gas cookers, tumble dryers and central heating.
What opportunities for progression are there?	On completion of the Level 3 Diploma in Gas Engineering qualification, learners can apply to become a member of Gas Safe Register and receive a licence card for the relevant gas categories.
Who did we develop the qualification with?	The content of this qualification is based on the knowledge, skills and behaviours within the Gas Engineering Level 3 Apprenticeship Standard that has been designed by an employer group including representatives from Energy & Utilities Skills and the Institution for Gas Engineers & Managers. This qualification has been designed to meet the requirements of the Standards of Training in Gas Work IGEM/IG/1
Is it part of an apprenticeship framework or initiative?	This qualification supports the delivery of the on-programme element of the Gas Engineering Level 3 Apprenticeship Standard for England. Upon completion of this qualification, learners will have met the criteria needed for the Gas Safe Register categories needed to progress through the gateway onto End-point Assessment.

Structure

To achieve Pathway A, candidates must be taught and complete the associated assessments for 12 mandatory units (*see* below). Candidates can also be taught content and complete the associated assessments for the three elective units – these will not, however, contribute to the achievement of the qualification.

Level 3 Diploma in Gas Engineering – Pathway A (aligned to CCN 1, CPA 1, MET 1, CKR 1, LEI 1, LAU 1, CENWAT)

City & Guilds unit number	Unit title	GLH
Mandatory		
301	Health and safety in gas utilisation	61
302	Scientific principles in gas utilisation	30
303	Combustion and properties of gas	90
304	Buildings, services and structures	94
305	Gas safety principles	114
306	Specific core installation and maintenance	124
307	Tightness test, purge, commission and de-commission gas pipework up to 35 mm (1¼) diameter in small gas installations	21
308	Install, commission and de-commission gas pipework up to 35 mm (1¼) diameter in domestic and small commercial premises	115
309	Install domestic gas cookers, tumble dryers and leisure appliances	43
310	Maintain domestic gas cookers, tumble dryers and leisure appliances	49
311	Install domestic gas water heaters and wet central heating appliances	103
312	Maintain gas water heating and wet central heating appliances	64

Elective

315	The installation, commissioning and safety aspects of hot water systems for domestic use in accordance with UK building regulations	14
316	Central heating systems	140
317	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK	13

To achieve Pathway B, candidates must be taught and complete the associated assessments for 12 mandatory units (*see* below). Candidates can also be taught content and complete the associated assessments for the three elective units – these will not, however, contribute to the achievement of the qualification.

Level 3 Diploma in Gas Engineering – Pathway B (aligned to CCN 1, CPA 1, MET 1, CKR 1, LEI 1, LAU 1, HTR 1)

City & Guilds unit number	Unit title	GLH
Mandatory		
301	Health and safety in gas utilisation	61
302	Scientific principles in gas utilisation	30
303	Combustion and properties of gas	90
304	Buildings, services and structures	94
305	Gas safety principles	114
306	Specific core installation and maintenance	124
307	Tightness test, purge, commission and de-commission gas pipework up to 35 mm (1¼) diameter in small gas installations	21
308	Install, commission and de-commission gas pipework up to 35 mm (1¼) diameter in domestic and small commercial premises	115
309	Install domestic gas cookers, tumble dryers and leisure appliances	43
310	Maintain domestic gas cookers, tumble dryers and leisure appliances	49
313	Install domestic gas space heating appliances	68
314	Maintain domestic gas space heating appliances	68
Elective		
315	The installation, commissioning and safety aspects of hot water systems for domestic use in accordance with UK building regulations	14
316	Central heating systems	140
317	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK	13

To achieve Pathway C, candidates must be taught and complete the associated assessments for 12 mandatory units (*see* below). Candidates can also be taught content and complete the associated assessments for the three elective units – these will not, however, contribute to the achievement of the qualification.

Level 3 Diploma in Gas Engineering – Pathway C (aligned to CCN 1, CPA 1, MET 1, CENWAT, HTR 1)

City & Guilds unit number	Unit title	GLH
Mandatory		
301	Health and safety in gas utilisation	61
302	Scientific principles in gas utilisation	30
303	Combustion and properties of gas	90
304	Buildings, services and structures	94
305	Gas safety principles	114
306	Specific core installation and maintenance	124
307	Tightness test, purge, commission and de-commission gas pipework up to 35 mm (1¼) diameter in small gas installations	21
308	Install, commission and de-commission gas pipework up to 35 mm (1¼) diameter in domestic and small commercial premises	115
311	Install domestic gas water heaters and wet central heating appliances	103
312	Maintain gas water heating and wet central heating appliances	64
313	Install domestic gas space heating appliances	68
314	Maintain domestic gas space heating appliances	68
Elective		
315	The installation, commissioning and safety aspects of hot water systems for domestic use in accordance with UK building regulations	14
316	Central heating systems	140
317	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK	13

To achieve Pathway D , candidates must be taught and complete the associated assessments for 11 mandatory units (*see* below). Candidates can also be taught content and complete the associated assessments for the two elective units – these will not, however, contribute to the achievement of the qualification.

Level 3 Diploma in Gas Engineering – Pathway D (aligned to CCN 1, CPA 1, MET 1, CENWAT, Unvented)

City & Guilds unit number	Unit title	GLH
Mandatory		
301	Health and safety in gas utilisation	61
302	Scientific principles in gas utilisation	30
303	Combustion and properties of gas	90
304	Buildings, services and structures	94
305	Gas safety principles	114
306	Specific core installation and maintenance	124
307	Tightness test, purge, commission and de-commission gas pipework up to 35 mm (1¼) diameter in small gas installations	21
308	Install, commission and de-commission gas pipework up to 35 mm (1¼) diameter in domestic and small commercial premises	115
311	Install domestic gas water heaters and wet central heating appliances	103
312	Maintain gas water heating and wet central heating appliances	64
315	The installation, commissioning and safety aspects of hot water systems for domestic use in accordance with UK building regulations	14
Elective		
316	Central heating systems	140
317	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK	13

To achieve Pathway E, candidates must be taught and complete the associated assessments for mandatory units (*see* below). Candidates can also be taught content and complete the associated assessments for the three elective units – these will not, however, contribute to the achievement of the qualification.

Level 3 Diploma in Gas Engineering - Pathway E (aligned to CCN 1 , CPA 1, MET 1, CKR 1, LEI 1, LAU 1, CENWAT, HTR 1)

City & Guilds unit number	Unit title	GLH
Mandatory		
301	Health and safety in gas utilisation	61
302	Scientific principles in gas utilisation	30
303	Combustion and properties of gas	90
304	Buildings, services and structures	94
305	Gas safety principles	114
306	Specific core installation and maintenance	124
307	Tightness test, purge, commission and de-commission gas pipework up to 35 mm (1¼) diameter in small gas installations	21
308	Install, commission and de-commission gas pipework up to 35 mm (1¼) diameter in domestic and small commercial premises	115
309	Install domestic gas cookers, tumble dryers and leisure appliances	43
310	Maintain domestic gas cookers, tumble dryers and leisure appliances	49
311	Install domestic gas water heaters and wet central heating appliances	103
312	Maintain gas water heating and wet central heating appliances	64
313	Install domestic gas space heating appliances	68
314	Maintain domestic gas space heating appliances	68
Elective		
315	The installation, commissioning and safety aspects of hot water systems for domestic use in accordance with UK building regulations	14
316	Central heating systems	140
317	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK	13

Total qualification time and guided learning

Total qualification time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. Guided learning (GL), also expressed in hours, is time spent under the direct supervision of a provider of education or training (including assessment). Guided learning contributes to TQT.

TQT and GL values are estimates.

Title and level	TQT	GLH
Level 3 Diploma in Gas Engineering - Pathway A (aligned to CCN 1, CPA 1, MET 1, CKR 1, LEI 1, LAU 1, CENWAT)	1384	908
Level 3 Diploma in Gas Engineering - Pathway B (aligned to CCN 1, CPA 1, MET 1, CKR 1, LEI 1, LAU 1, HTR 1)	1335	877
Level 3 Diploma in Gas Engineering - Pathway C (aligned to CCN 1, CPA 1, MET 1, CENWAT, HTR 1)	1432	952
Level 3 Diploma in Gas Engineering - Pathway D (aligned to CCN 1, CPA 1, MET 1, CENWAT, Unvented)	1128	830
Level 3 Diploma in Gas Engineering - Pathway E (aligned to CCN 1 , CPA 1, MET 1, CKR 1, LEI 1, LAU 1, CENWAT, HTR 1)	1702	1044

2 Centre requirements

Approval

If your Centre is approved to offer the following qualifications:

- 6014-03, 05, 13
- 6189-33, 44

then your centre will be granted automatic approval for the 9074-03

To offer these qualifications, 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 qualifications before designing a course programme.

Resource requirements

Resources

Centres will require the use of specifically designated areas, such as fully equipped workshops to fulfil assessment requirements for the Independent Summative Assessments (ISAs). The equipment must meet industry standards and the workshops reflect a realistic working environment.

Assessors

The centre must nominate all assessors to City & Guilds for approval prior to them conducting any assessments. Assessors may be employed by the centre (centre-based assessors) or be work based (workplace assessors) who may or may not be from the same organisation as the learner.

Assessors must be vocationally and occupationally competent in the areas they are assessing and have a thorough knowledge of the units, within the qualification, being assessed.

In addition to the qualifications listed below, the assessor must be able to provide appropriate documented evidence that demonstrates they have a minimum of five years' proven occupational experience in the activities they will be assessing. Particular attention should be paid to providing evidence of occupational experience in the gas safety critical areas being assessed.

Where assessors undertake assessments in the workplace, and are not supported by a suitable gas operative, then they or their employer must be a member of an appropriate Gas Registration Body in accordance with the Gas Safety (Installation and Use) Regulations. In these circumstances they should also hold suitable insurance for this activity.

Qualifications

Assessors must be technically qualified in domestic gas installation/maintenance and hold one of the following qualifications:

- City & Guilds Level 3 Diploma in Gas Utilisation
- City & Guilds / SQA S/NVQ in Domestic Natural Gas (Level 3) *or*
- City & Guilds 662 Certificate for Service Engineers (Gas) *or*
- City & Guilds 598-2 Certificate in Gas Installation Studies *or*
- City & Guilds 660 Certificate in Gas Fitting - Final

This list is not considered exhaustive and other 'Mechanical Engineering Services' (MES) or 'Building Engineering Services' (BES) qualifications at Level 3 / SCQF Level 6 or equivalent may be considered acceptable. Centres must submit requests to confirm the acceptability of other qualifications to their External Quality Assurer. The External Quality Assurer must keep a record of any such decisions.

In addition to the above qualifications, all assessors must hold a current certificate of gas safety competence in the areas of gas work they will be assessing that is not more than five years old (either current ACS Certificates of Gas Safety Competence or an aligned qualification are acceptable). For elective units, assessors must hold a relevant qualification and/or evidence of current competency in the areas they will be assessing.

Centre-based assessors must hold:

- Level 3 Award in Assessing Vocational Related Achievement – in Centres/Colleges or Training Providers *or*
- Level 3 Certificate in Assessing Vocationally Related Achievement – in Centres/Colleges and The Workplace *or*
- A1or D32 /D33 with an Upgrade to A1 as a minimum* *or*
- SQA Accredited Learning and Development Unit L&D 9DI *Assess workplace competence using direct and indirect methods (replaces Units A1).

Workplace assessors must hold:

- Level 3 Award in Assessing Competence in the Workplace Environment *or*
- Level 3 Certificate in Assessing Vocationally Related Achievement – in Centres/Colleges and the Workplace *or*
- A2 or D32 with an upgrade to A2 as a minimum* *or*
- SQA Accredited Learning and Development Unit L&D 9D Assess workplace competence using direct methods.

* The Teaching Qualification for Secondary Education (TQSE) and the Teaching Qualification for Further Education (TQFE) (which is recognised in Scotland) are acceptable, providing they are the versions that are recognised as equivalents to the A1 award plus appropriate CPD.

Assessors holding D units must have evidence of Continuing Professional Development (CPD) to demonstrate compliance with the A units.

A qualified assessor must supervise 'candidate assessors' who are working towards their assessor qualifications. A clear action plan should be in place for achieving the assessor qualification(s).

A 'candidate assessor's' approval will be withdrawn if the qualification/units have not been attained within the approved period (18 months).

Evidence of CPD will be sought by the External Quality Assurer for all assessors approved to assess for the centre.

Internal quality assurance

The centre must nominate all internal quality assurers to City & Guilds for approval prior to them conducting any verification activities. Internal quality assurers can be employed by the centre or be work based, who may or may not be from the same organisation as the learners.

Internal Quality Assurers must be vocationally and occupationally competent in the areas they are verifying and have a thorough knowledge of the units within the qualification they are verifying.

In addition to the qualifications listed below, the Internal Quality Assurers must be able to provide appropriate documentary evidence that demonstrates they have a minimum of five years' proven occupational experience in the activities they will be verifying. Particular attention should be paid to providing evidence of occupational experience in the gas safety critical areas being verified.

Qualifications

Internal Quality Assurers must be technically qualified in domestic gas installation/maintenance and hold one of the following qualifications:

- City & Guilds Level 3 Diploma in Gas Utilisation
- City & Guilds/SQA - S/NVQ in Domestic Natural Gas (Level 3) *or*
- City & Guilds 662 Certificate for Service Engineers (Gas) *or*
- City & Guilds 598-2 Certificate in Gas Installation Studies *or*
- City & Guilds 660 Certificate in Gas Fitting – Final.

This list is not considered exhaustive and other 'Mechanical Engineering Services' (MES) or 'Building Engineering Services' (BES) qualifications at Level 3 / SCQF Level 6 or equivalent may be considered acceptable. Centres must submit requests to confirm the acceptability of other qualifications to their External Quality Assurer. The External Quality Assurer must keep a record of any such decisions.

In addition to the above, the Internal Quality Assurer must hold a current certificate of gas safety competence in the areas of gas work they will be internally verifying that is not more than five years old (either current ACS Certificates of Gas Safety Competence or an aligned qualification are acceptable). For elective units, the Internal Quality Assurer must hold a relevant qualification and/or evidence of current competency in the areas they will be assessing.

Where the Internal Quality Assurers themselves do not hold a suitable technical qualification they must have access to technical expertise from qualified personnel, who hold the relevant qualifications, to support them where the quality assurance requires technical support and interpretation.

Internal Quality Assurers must hold the following:

- Level 3 Certificate in Assessing Vocationally Related Achievement – in Centres/Colleges and The Workplace *or*
- A1 or D32 /D33 with an Upgrade to A1 as a minimum* *or*
- SQA Accredited Learning and Development Unit L&D 9DI *Assess workplace competence using direct and indirect methods (replaces Units A1)

AND

- Level 4 Award in Internal Quality Assurance of Assessment Processes and Practice *or*
- Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Processes and Practice *or*
- V1 or D34 with an upgrade to V1 as a minimum* *or*
- SQA Accredited Learning and Development Unit L&D 11 Internally monitor and maintain the quality of workplace assessment.

It is recommended that candidate Internal Quality Assurers have a clear action plan for achieving the internal quality assurer qualification(s).

Internal Quality Assurer (IQA) approval for the candidate, will be withdrawn if they have not attained the IQA qualification/units within the approved period (18 months).

* The Teaching Qualification for Secondary Education (TQSE) or the Teaching Qualification for Further Education (TQFE) (which is recognised in Scotland) are acceptable providing they are the versions that are recognised as equivalents to the A1 award plus appropriate CPD.

Internal Quality Assurers holding D units must have evidence of Continuing Professional Development (CPD) to demonstrate compliance with the A and V units.

Conflict of interests

Assessors involved in providing direct training to a learner, either as part of a group or on a 'one to one' basis should not carry out assessment for any of those trained aspects.
Alternatively, centres must agree effective quality control measures (includes enhanced IQA and data monitoring) with the assessment organisation to ensure that any potential conflicts of interest do not have an adverse effect on assessment outcomes. Any potential conflict of interest must be documented and available for scrutiny in line with our Quality Assurance Requirements

For further details of onsite assessments please refer to the '*Gas common assessment strategy'* on our website

Learner entry requirements

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

Age restrictions

City & Guilds cannot accept any registrations for learners under 16 as these qualifications are not approved for learners under 16.

3 Delivering the qualification

Initial assessment and induction

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

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

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

Support materials

The following resources are available for these qualifications:

Description	How to access
Assessment packs	www.cityandguilds.com
Gas work log	www.cityandguilds.com

Recording documents

Learners and centres may decide to use a paper-based or electronic method of recording evidence.

City & Guilds endorses several ePortfolio systems, including our own, Learning Assistant, an easy-to-use and secure online tool to support and evidence learners' progress towards achieving qualifications. Further details are available at: www.cityandguilds.com/eportfolios.

City & Guilds has developed a set of recording forms including examples of completed forms, for new and existing centres to use as appropriate. Recording forms are available on the City & Guilds website.

Although new centres are expected to use these forms, centres may devise or customise alternative forms, which must be approved for use by the External Quality Assurer, before they are used by learners and assessors at the centre. Amendable (MS Word) versions of the forms are available on the City & Guilds website.

4 Assessment

Types of assessment

City & Guilds have developed a range of assessments this qualification:

- multiple choice tests (online and paper-based)
- short-answer question papers
- practical assignments
- a Gas Work Log that can be used to produce a portfolio of evidence.

An Assessment Pack, Assessors' Pack and the Gas Work Log are available on the 9074-03 web page. Passwords to access these materials are available on the Walled Garden.

In addition to the assessments listed above, and in order that learners can apply to become a member of the Gas Safe Register, they will also have to complete a series of:

- Independent Summative Assessments (ISAs) developed to meet Gas Safe Register competence requirements – learners' competence in performing specific gas-safety-related tasks is assessed by an independent assessor in a managed assessment environment.

- Question papers developed to meet the knowledge and understanding elements of the Gas Safe Register competence requirements – learners will complete externally set and internally assessed question papers.

Further details of the ISAs and question papers can be found in the 9074-03 ISA and QP Candidate and Assessor Packs.

The ISAs and question papers in the ISA and QP Candidate and Assessor Packs are periodically reviewed and revised and it is important that the most up-to-date versions are used.

To gain access to the ISA and QP Candidate and Assessor Packs, centres must complete an 'ISA and QP Password Application Form' and submit this to Blue Flame Associates by email to PWrequest@blueflameassociates.com.

The 9074-03 ISA packs (containing current versions of the ISAs and question papers) and password application form can be downloaded from the 9074 webpage on the City & Guilds website.

Assessment Types

Assessment no.	Assessment title	Assessment method
001	Health and Safety in Gas Utilisation	e-volve online multiple choice test
015	The Installation, Commissioning and Safety Aspects of Hot Water Systems for Domestic use in Accordance with UK Building Regulations	Externally set, internally assessed multiple-choice question paper and practical assignment
016	Central Heating Systems	Externally set, internally assessed practical assignment and short-answer question paper
017	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK	Externally set, internally assessed multiple-choice question paper
018	Gas Engineering Knowledge Test	Externally set, internally assessed short-answer question paper
020	Domestic Core Natural Gas Safety including Combustion Performance Analysis	ISAs and question papers
021	Domestic Gas Meters (Badged Capacities ≤6 m^3/h)	ISA and question paper
022	Domestic Gas Cooking Appliances including Laundry Appliances up to 6 kW and Leisure and Miscellaneous Equipment / Appliances	ISA and question paper
023	Domestic Gas Fires, Wall Heaters, Convector Heaters and Stoves (Type A, B and C)	ISA and question paper
024	Gas Boilers (Central Heating, Combination, Hot Water),Circulators and Water Heaters (Storage and Instantaneous) up to 70 kW	ISA and question paper
030	Gas Work Log	Portfolio of evidence

Assessment requirements for each pathway

Candidates must achieve the following assessments for the relevant pathways:

Level 3 Diploma in Gas Engineering – Pathway A (aligned to CCN 1, CPA 1, MET 1, CKR 1, LEI 1, LAU 1, CENWAT)

City & Guilds assessment number	Assessment title
001	Health and Safety in Gas Utilisation
018	Gas Engineering Knowledge Test
020	Domestic Core Natural Gas Safety including Combustion Performance Analysis (ISAs 1 and 13 and Question Papers 1–7)
021	Domestic Gas Meters (Badged Capacities ≤ 6 m^3/h) (ISA 3 and Question Paper 9)
022	Domestic Gas Cooking Appliances including Laundry Appliances up to 6 kW and Leisure and Miscellaneous Equipment/Appliances (ISA 2 and Question Paper 8)
024	Gas Boilers (Central Heating, Combination, Hot Water), Circulators and Water Heaters (Storage and Instantaneous) up to 70 kW (ISA 5 and Question Paper 11)
030	Gas Work Log

Elective Assessments for Pathway A

Candidates can also achieve the elective assessments, however these will not contribute to the qualification.

City & Guilds assessment number	Assessment title
015	The Installation, Commissioning and Safety Aspects of Hot Water Systems for Domestic Use in Accordance with UK Building Regulations
016	Central Heating Systems
017	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK

Level 3 Diploma in Gas Engineering – Pathway B (aligned to CCN 1, CPA 1, MET 1, CKR 1, LEI 1, LAU 1, HTR 1)

City & Guilds assessment number	Assessment title
001	Health and Safety in Gas Utilisation
018	Gas Engineering Knowledge Test
020	Domestic Core Natural Gas Safety including Combustion Performance Analysis (ISAs 1 and 13 and Question Papers 1–7)
021	Domestic Gas Meters (Badged Capacities ≤ 6 m^3/h) (ISA 3 and Question Paper 9)
022	Domestic Gas Cooking Appliances Including Laundry Appliances up to 6 kW and Leisure and Miscellaneous Equipment/Appliances (ISA 2 and Question Paper 8)
023	Domestic Gas Fires, Wall Heaters, Convector Heaters and Stoves (Type A, B and C) (ISA 4 and Question Paper 10)
030	Gas Work Log

Elective Assessments for Pathway B

Candidates can also achieve the elective assessments, however these will not contribute to the qualification.

City & Guilds assessment number	Assessment title
015	The Installation, Commissioning and Safety Aspects of Hot Water Systems for Domestic Use in Accordance with UK Building Regulations
016	Central Heating Systems
017	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK

Level 3 Diploma in Gas Engineering – Pathway C (aligned to CCN 1, CPA 1, MET 1, CENWAT, HTR 1)

City & Guilds assessment number	Assessment title
001	Health and Safety in Gas Utilisation
018	Gas Engineering Knowledge Test
020	Domestic Core Natural Gas Safety including Combustion Performance Analysis (ISAs 1 and 13 and Question Papers 1–7)
021	Domestic Gas Meters (Badged Capacities ≤ 6 m^3/h) (ISA 3 and Question Paper 9)
023	Domestic Gas Fires, Wall Heaters, Convector Heaters and Stoves (Type A, B and C) (ISA 4 and Question Paper 10)
024	Gas Boilers (Central Heating, Combination, Hot Water), Circulators and Water Heaters (Storage and Instantaneous) up to 70 kW (ISA 5 and Question Paper 11)
030	Gas Work Log

Elective Assessments for Pathway C

Candidates can also achieve the elective assessments, however these will not contribute to the qualification.

City & Guilds assessment number	Assessment title
015	The Installation, Commissioning and Safety Aspects of Hot Water Systems for Domestic Use in Accordance with UK Building Regulations
016	Central Heating Systems
017	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK

Level 3 Diploma in Gas Engineering – Pathway D (aligned to CCN 1, CPA 1, MET 1, CENWAT, Unvented)

City & Guilds assessment number	Assessment title
001	Health and Safety in Gas Utilisation
015	The Installation, Commissioning and Safety Aspects of Hot Water Systems for Domestic Use in Accordance with UK Building Regulations
018	Gas Engineering Knowledge Test
020	Domestic Core Natural Gas Safety including Combustion Performance Analysis (ISAs 1 and 13 and Question Papers 1–7)
021	Domestic Gas Meters (Badged Capacities ≤ 6 m^3/h) (ISA 3 and Question Paper 9)
024	Gas Boilers (Central Heating, Combination, Hot Water), Circulators and Water Heaters (Storage and Instantaneous) up to 70 kW (ISA 5 and Question Paper 11)
030	Gas Work Log

Elective Assessments for Pathway D

Candidates can also achieve the elective assessments, however these will not contribute to the qualification.

City & Guilds assessment number	Assessment title
016	Central Heating Systems
017	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK

Level 3 Diploma in Gas Engineering - Pathway E (aligned to CCN 1 , CPA 1, MET 1, CKR 1, LEI 1, LAU 1, CENWAT, HTR 1)

City & Guilds assessment number	Assessment title
001	Health and Safety in Gas Utilisation
018	Gas Engineering Knowledge Test
020	Domestic Core Natural Gas Safety including Combustion Performance Analysis (ISAs 1 and 13 and Question Papers 1–7)
021	Domestic Gas Meters (Badged Capacities ≤ 6 m^3/h) (ISA 3 and Question Paper 9)
022	Domestic Gas Cooking Appliances Including Laundry Appliances up to 6 kW and Leisure and Miscellaneous Equipment/Appliances (ISA 2 and Question Paper 8)
023	Domestic Gas Fires, Wall Heaters, Convector Heaters and Stoves (Type A, B and C) (ISA 4 and Question Paper 10)
024	Gas Boilers (Central Heating, Combination, Hot Water), Circulators and Water Heaters (Storage and Instantaneous) up to 70 kW (ISA 5 and Question Paper 11)
030	Gas Work Log

Elective Assessments for Pathway E

Candidates can also achieve the elective assessments, however these will not contribute to the qualification.

City & Guilds assessment number	Assessment title
015	The Installation, Commissioning and Safety Aspects of Hot Water Systems for Domestic Use in Accordance with UK Building Regulations
016	Central Heating Systems
017	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK

Scheduling assessments

The following must be applied to the assessment of this qualification:

- candidates must not take any assessment before they are registered for this qualification
- centres should ensure all relevant content has been delivered before candidates attempt the assessments.

Some assessments within this qualification assess knowledge and skills from various units, centres must ensure all relevant training has been delivered prior to assessment. The following table provides guidance (linking units to assessments) to help centres with delivery.

City & Guilds unit(s)	City & Guilds assessment	Assessment title	Details
301	001	Health and Safety in Gas Utilisation	e-volve online multiple choice test
302–305	018	Gas Engineering Knowledge Test	Externally set, internally assessed short-answer question paper
301–306	020	Domestic Core Natural Gas Safety including Combustion Performance Analysis	ISAs 1 and 13 and Question Papers 1–7
301–314	030	Gas Work Log	Portfolio of evidence
305–306	021	Domestic Gas Meters (Badged Capacities ≤ 6 m^3/h)	ISA 3 and Question Paper 9
309–310	022	Domestic Gas Cooking Appliances including Laundry Appliances up to 6 kW and Leisure and Miscellaneous Equipment/Appliances	ISA 2 and Question Paper 8
313–314	023	Domestic Gas Fires, Wall Heaters, Convector Heaters and Stoves (Type A, B and C)	ISA 4 and Question Paper 10
311–312	024	Gas Boilers (Central Heating, Combination, Hot Water), Circulators and Water Heaters (Storage and Instantaneous) up to 70 kW	ISA 5 and Question Paper 11
315	015	The Installation, Commissioning and Safety Aspects of Hot Water Systems for Domestic Use in Accordance with UK Building Regulations	Externally set, internally assessed multiple-choice question paper and practical assignment
316	016	Central Heating Systems	Externally set, internally assessed assignment
317	017	Water Supply (Water Fittings) Regulations and Water Byelaws in the UK	Externally set, internally assessed multiple-choice question paper

Recognition of prior learning (RPL)

Recognition of prior learning means using a person's previous experience, or qualifications which have already been achieved, to contribute to a new qualification. For this qualification, RPL is allowed and is not sector specific.

Test specifications

Assessment: 001 Health and Safety in Gas Utilisation

Assessment method: e-volve online multiple choice test

Duration: 80 minutes

Grade boundaries: Pass/Fail – Pass ≥ 70% (approximately)

Permitted materials: Closed book

Outcome		Number of questions	%
1	Understand the health and safety legislation	**4**	**10**
2	Know the health and safety measures for gas utilisation	**4**	**10**
3	Know the regulations covering the use and disposal of hazardous substances	**4**	**10**
4	Know manual handling methodology and lifting techniques	**4**	**10**
5	Know how to identify and respond to accidents that occur at work	**4**	**10**
6	Understand the requirements for maintaining electrical safety, earthing protection systems and associated dangers	**4**	**10**
7	Know fire safety	**4**	**10**
8	Know the safety requirements for working at heights	**4**	**10**
9	Know how to work safely in confined spaces	**4**	**10**

10	Know the regulations in force to protect the environment and control waste	**4**	**10**
	Total	**40**	**100**

Assessment: 015 The Installation, Commissioning and Safety Aspects of Hot Water Systems for Domestic Use in Accordance with UK Building Regulations

Assessment method: Externally set, internally assessed, multiple choice question paper

Duration: 50 minutes

Grade boundaries: Pass/Fail – Pass ≥ 19 marks

Permitted materials: Open book

Outcome		Number of questions	%
1	Understand the types and configurations of vented/unvented hot water systems including the design installation requirements	**5**	**20**
2	Know the types and operation of specialist components used in hot water systems	**4**	**16**
3	Understand the design requirements for hot water systems	**5**	**20**
4	Know the installation and safety features of hot water systems and components	**4**	**20**
5	Know the requirements for the installation of cold water components associated with hot water systems	**2**	**8**
6	Know the commissioning requirements of hot water systems and components in accordance with design specifications	**4**	**16**
	Total	**24**	**100**

Assessment: 016 Central Heating Systems

Assessment method: Externally set, internally assessed, short-answer question paper.

Duration: 80 minutes

Grade boundaries: Pass/Fail – Pass ≥ 32 marks

Permitted materials: Closed book

Outcome	Number of marks	%
1 Understand how to install central heating systems	**36**	**90**
2 Be able to decommission central heating systems	**1**	**2.5**
4 Be able to fault diagnose on central heating systems	**3**	**7.5**
Total	**40**	**100**

Assessment: 017 Water Supply (Water Fittings) Regulations and Water Byelaws in the UK

Assessment method: Externally set, internally assessed, multiple choice question paper.

Duration: 100 minutes

Grade boundaries: Pass/Fail – Pass ≥ 40 marks

Permitted materials: Non-programmable calculator, open book

Outcome		Number of questions	%
1	Understand the requirements of the Water Supply (Water Fittings) Regulations and Water Byelaws	**2**	**4**
2	Understand terminology used to confirm requirements of the water regulations	**1**	**2**
3	Know the suitability of materials and substances in contact with water	**2**	**4**
4	Understand the requirements for water fittings	**7**	**14**
5	Know the design and installation requirements for a water supply system	**9**	**18**
6	Know the requirements for the prevention of cross connection to unwholesome water	**2**	**4**
7	Know the backflow prevention fluid categories	**1**	**2**
8	Know the requirements for backflow prevention	**1**	**2**
9	Understand the guidance clauses relating to backflow prevention	**11**	**22**
10	Know the installation requirements for cold water services	**1**	**2**
11	Know the installation requirements for hot water services	**4**	**8**
12	Know the installation requirements for WCs, flushing devices and urinals approved for use	**4**	**8**
13	Know the types of bath, sink, showers taps location and installation requirements	**2**	**4**
14	Know the consumption limitations for washing machines, dishwashers and other appliances	**1**	**2**
15	Know the requirements for water supplied for outside use.	**2**	**4**
	Total	**50**	**100**

Assessment: 018 Gas Engineering Knowledge Test

Assessment method: Externally set, internally assessed, short-answer question paper.

Duration: 100 minutes

Grade boundaries: Pass/Fail – Pass ≥ 35 marks

Permitted materials: Non-programmable calculator, closed book

Unit	Outcome		Assessment criteria	Number of marks	%
9074-302	1	Understand the System Internationale (SI) units and uses within gas utilisation	1.1,1.2,1.3, 1.4	**5**	**10**
	2	Know the sources of energy and heat transfer	2.1, 2.2, 2.3, 2.4	**5**	**10**
	3	Understand the combined gas laws	3.1, 3.2	**3**	**6**
	4	Know current energy efficiency advice and guidance	4.1, 4.2, 4.3	**5**	**10**
9074-303	4	Understand the combustion of gases and the potential risks	4.1, 4.5, 4.10	**4**	**8**
	5	Know gas burner operation, design, features and types	5.1, 5.2	**4**	**8**
	6	Understand the properties and characteristics of Natural Gas and LPG	6.1	**2**	**4**
9074-304	1	Understand the types and characteristics of construction materials	1.1, 1.3	**3**	**6**
	2	Know how to use hand and power tools within gas utilisation	2.5, 2.6	**4**	**8**
9074-305	1	Know industry specific legislation and standards for gas safety	1.3	**3**	**6**
	3	Understand the Gas Industry Unsafe Situations Procedure	3.2, 3.3	**4**	**8**
	4	Understand the gas operatives responsibilities in accurately completing emergency notices, warning labels and forms	4.1, 4.2	**5**	**10**
	10	Know where to acquire information and documentation used during daily work activities	10.1	**3**	**6**

	Total	**50**	**100**

5 Units

Structure of the units

These units each have the following:

- City & Guilds reference number
- title
- level
- guided learning values (including assessment)
- unit aim
- supporting information linking unit content to National Occupational Standards (NOS) and relevant registration scheme requirements
- learning outcomes, which are comprised of a number of assessment criteria with, if necessary, supporting range statements.

Centres must deliver the full breadth of the range. Specialist equipment or commodities may not be available to all centres, so centres should ensure that their delivery covers their use. This may be covered by a practical demonstration (e.g. video). For practical assessments, centres should ensure that there are sufficient resources to complete the task but are not required to use all the equipment or commodities in the range.

Unit 301 Health and safety in gas utilisation

Unit level:	3
GLH:	61
Unit aim:	This unit aims to provide learners with the knowledge and understanding of the general health and safety requirements for working in the gas industry
Supporting information:	This unit relates to the core knowledge requirements for a gas utilisation operative/engineer, specifically Understanding Health and Safety in Gas Utilisation (EUS DSG 1.1).

Learning outcome

The learner will:

1 Understand the health and safety legislation.

Assessment criteria

The learner can:

1.1 explain the aims of health and safety legislation in protecting the workforce and members of the public

1.2 explain the key requirements of the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)

1.3 describe examples of where RIDDOR would be used in the gas industry

1.4 state the key responsibilities of employees, employers and customers under health and safety legislation

1.5 state the role of **enforcing authorities** under health and safety legislation

1.6 state the roles, responsibilities and **powers** of HSE inspectors.

Range

Enforcing authorities

Health and Safety Executive (HSE) and Local Authority.

Powers

Issuing of improvement and prohibition notices, powers of prosecution.

Learning outcome

The learner will:

2 Know the health and safety measures for gas utilisation.

Assessment criteria

The learner can:

2.1 state general hazards found on a work site and the organisations recording procedures

2.2 explain the purpose and importance of completing a risk assessment

2.3 describe the **categories** that are completed as part of a risk assessment

2.4 describe **risk control measures**

2.5 state the **types**, purpose and application **of personal protective equipment** (PPE)

2.6 describe the **types** and purpose **of safety signs** and notices

2.7 state the purpose and contents of method statements and permit to work systems.

Range

Categories

Hazards, risks, likelihood, severity

Risk control measures

Eliminate, reduce, isolate, control, personal protective equipment (PPE), personal discipline

Types of PPE

Eye protection, hand protection, head protection, foot protection, clothing protection/visibility, hearing protection, respiratory protection.

Types of safety signs

Prohibition, warning, mandatory, emergency escape or first-aid signs.

Learning outcome

The learner will:

3 Know the regulations covering the use and disposal of hazardous substances.

Assessment criteria

The learner can:

3.1 state the key purpose of the Control of Substances Hazardous to Health regulations (COSHH)

3.2 identify different **forms of hazardous substances** and how the hazards of some substances and mixtures can be identified from the **labels** on packaging

3.3 explain the general precautions necessary for working with **commonly encountered hazardous substances**

3.4 state the key purpose of the Control of Asbestos at Work Regulations

3.5 describe the different **types of asbestos** found in the workplace

3.6 explain the key risks associated with working with asbestos

3.7 explain the methods and actions required to protect workers and members of the public from the risk of asbestos

3.8 describe the procedure for removing and disposing of asbestos safely

3.9 state the licensing requirements for asbestos removal organisations.

Range

Forms of hazardous substances

Chemicals, products containing chemicals, fumes, dusts, vapours, mists, nanotechnology, gases and asphyxiating gases, biological agents (germs).

Labels

Classification – physical, health and environmental hazards – under the Classification, Labelling and Packaging (CLP) Regulation.

Labelling of hazardous substances – GHS pictogram, signal word, hazard statement, precautionary statement.

Commonly encountered hazardous substances

Fluxes, solder, lead, jointing compounds, sealants, gaskets, oil and lubricants, system cleansers and inhibitors.

Types of asbestos

White asbestos (Chrysotile), brown or grey asbestos (Amorite), blue asbestos (Crocidilite), asbestos cement materials

Learning outcome

The learner will:

4 Know manual handling methodology and lifting techniques.

Assessment criteria

The learner can:

4.1 state the **considerations** of planning a lift

4.2 describe the procedure of kinetic lifting techniques for safe manual handling

4.3 explain the risks of personal injury associated with lifting and handling

4.4 describe safe lifting techniques with regard to multiple person lifts and using mechanical aids.

Range

Considerations

How to assess a load, moving the load, route safety, duration of lift, accessibility, informing others.

Learning outcome

The learner will:

5 Know how to identify and respond to accidents that occur at work.

Assessment criteria

The learner can:

5.1 state the main responsibilities of the employer and employee under the 'Health and Safety at Work Act, etc 1974 in relation to reporting accidents at work

5.2 state the requirements for personal first aid provision

5.3 describe the accident and incident recording and reporting procedures

5.4 describe the benefits of reporting accidents and near misses

5.5 explain how to raise the alarm following an accident and how to contact the police, fire service, ambulance and gas emergency service

5.6 state responsibilities and procedures for dealing with workplace injuries

5.7 describe how to deal with victims of electric shock including their removal from an electrical supply

5.8 describe the correct method of administering CPR and identify when it would be performed

5.9 state the correct method of placing an accident victim in the recovery position and when this action would be performed

5.10 state the key elements that are included in the evacuation procedure of a typical organsiation

Learning outcome

The learner will:

6 Understand the requirements for maintaining electrical safety, earthing protection systems and associated dangers.

Assessment criteria

The learner can:

6.1 identify the **electrical dangers** of construction sites, business properties and private dwellings

6.2 identify the safe use and **types of electrical supply** for electrical tools and equipment:

6.3 explain the purpose of the visual inspection for power tools

6.4 state the Portable Appliance Testing (PAT) requirements of electrical equipment

6.5 describe the potential risks of electric shock resulting from the existing electrical installation and faulty electrical tools and equipment

6.6 state the key purpose and differences between different **types of bonding**

6.7 explain the use of electrical earth bonding labels

6.8 state the requirements for the use of temporary continuity bonds

6.9 describe the process for applying a temporary continuity bond when cutting into a fixed metallic pipe work system.

Range

Electrical dangers

Signs of damaged electrical cables on power tools and property hard wiring systems, signs of visual fault on electrical components, trailing cables, proximity of cables to service pipe work, buried and hidden cables, inadequate over current protection devices.

Types of electrical supply

Battery powered, 110 V supplies, 230 V supplies.

Types of bonding

Main equipotential bonding, supplementary protective bonding, temporary protective bonding.

Learning outcome

The learner will:

7 Know fire safety.

Assessment criteria

The learner can:

7.1 state the three elements of the fire triangle

7.2 state appropriate circumstances when to tackle a fire

7.3 describe the types of fire extinguisher used to tackle different **types of fires**

7.4 state when it would be appropriate to use a fire blanket to extinguish a fire

7.5 state the precautions when using **heat producing equipment**

7.6 describe the safe storage, transportation, assembly, testing and use of blow torches and associated LPG cylinders.

Range

Types of fire

Electrical fire, general fire, flammable liquids fire.

Heat producing equipment

Blow torches, soldering irons/clamps, heat guns.

Learning outcome

The learner will:

8 Know the safety requirements for working at heights.

Assessment criteria

The learner can:

8.1 state safety measures and checks needed when working with steps and ladders

8.2 describe the types of equipment used when working at heights

8.3 describe how to assemble, erect and use **types of equipment** when working at heights

8.4 describe the working at height safety Hierarchy of Control Measures

Range

Types of equipment

Step ladders, ladders, roof ladders and crawling boards, mobile tower scaffolds.

Learning outcome

The learner will:

9 Know how to work safely in confined spaces.

Assessment criteria

The learner can:

9.1 state the definition of a confined space and the requirements of the confined spaces legislation

9.2 describe the **typical confined spaces** that gas engineers encounter at work:

9.3 describe the additional dangers when working in confined spaces

9.4 describe the additional safety measures that need to be taken when working in confined spaces

Range

Typical confined spaces

Roof spaces, under wooden floors, cellars, plant rooms, duct rooms, metering or governor houses, trenches

Learning outcome

The learner will:

10 Know the regulations in force to protect the environment and control waste.

Assessment criteria

The learner can:

10.1 state the requirements of **environmental protection regulations**

10.2 describe the **environmental protection measures** that can be incorporated into installation methods and practises

Range

Environmental protection regulations

Controlled Waste Regulations, controlled waste, registration of carriers and seizure of vehicles, packaging, Building Regulations (including energy efficiency requirements for new dwellings) and Water Supply Regulations, methods of disposing of waste (including licensed waste disposal sites, specialist waste disposal requirements e.g. asbestos, carriage of waste by roads – waste carriers' license).

Environmental protection measures

Minimising the wastage of equipment and materials,accurate cutting, bending and jointing, loss/theft of material on-site, using principles that minimise the usage of energy in installed systems/components, using principles that minimise the usage of water in installed systems/components, materials that can be readily recycled, ensuring that installed systems/components are correctly commissioned, ensuring that customers are informed on key operating requirements.

Unit 302 Scientific principles in gas utilisation

Unit level:	3
GLH:	30
Unit aim:	This unit aims to provide the learner with the knowledge and understanding of scientific principles in gas utilisation.
Supporting information:	This unit is based on the core knowledge requirements for a gas utilisation operative/engineer, specifically Understanding Scientific Principles in Gas Utilisation (EUS DSG 1.2).

Learning outcome

The learner will:

1 Understand the Systeme Internationale (SI) units and uses within gas utilisation.

Assessment criteria

The learner can:

1.1 identify the **Systeme Internationale (SI) units** used in gas utilisation:

1.2 state the **measurements** for SI derived units:

1.3 describe how to convert from imperial to **SI** units using formulas and tables

1.4 explain the basic **scientific principles** used in gas utilisation:

Range

Systeme Internationale (SI) units

Metre, kilogram, second, kelvin

Measurements

Area, volume, speed and velocity, flow rate, density, pressure, temperature, heat, power.

Scientific principles

Mass and weight, speed and velocity, force, temperature, sensible heat and latent heat.

Learning outcome

The learner will:

2 Know the sources of energy and heat transfer.

Assessment criteria

The learner can:

2.1 define renewable and non-renewable energy

2.2 state the different **types of non-renewable energy**

2.3 state the different **types of renewable energy**

2.4 describe the **methods of heat transfer**

Range

Types of non-renewable energy

Gas, oil, solid fuel, electricity generated by non-renewable energy sources.

Types of renewable energy

Electricity generated by renewable energy sources, solar, wind, hydro, biomass, hydrogen

Methods of heat transfer

Radiation, conduction, convection.

Learning outcome

The learner will:

3 Understand the combined gas laws.

Assessment criteria

The learner can:

3.1 state the formula for Charles' and Boyle's Law

3.2 explain the interrelationship between pressure, volume and temperature

Learning outcome

The learner will:

4 Know current energy efficiency advice and guidance.

Assessment criteria

The learner can:

4.1 describe the **effects** of using renewable and non-renewable energy sources

4.2 outline the benefits of energy efficient products, services and equipment

4.3 state the key factors of the Building Regulations that apply to energy efficiency.

Range

Effects

On the environment, climate change.

Unit 303 Combustion and properties of gas

Unit level:	3
GLH:	90
Unit aim:	This unit aims to provide the learner with the knowledge and understanding of combustion and properties of gas.
Supporting information:	This unit is based on the core knowledge requirements for a gas utilisation operative/engineer, specifically Understanding Combustion and Properties of Gas (EUS DSG 1.3).

Learning outcome

The learner will:

1 Know the natural gas supply network and LPG supplies.

Assessment criteria

The learner can:

1.1 describe the key features of a natural gas network

1.2 state the **operating pressure ranges**

1.3 identify LPG bulk and cylinder supply systems.

Range

Operating pressure ranges

Low, medium, intermediate and high pressure.

Learning outcome

The learner will:

2 Understand the operation of pressure regulators.

Assessment criteria

The learner can:

2.1 explain the purpose and application of pressure regulators

2.2 identify different types of pressure regulators

2.3 describe the construction and operation of a compensated constant pressure regulator

Learning outcome

The learner will:

3 Know the factors affecting pressure loss and the equipment used to measure gas pressure.

Assessment criteria

The learner can:

3.1 state the factors affecting pressure loss

3.2 describe the operation and uses of a typical manometer

3.3 describe the uses of a typical digital pressure gauges including accuracy and calibration requirements.

Learning outcome

The learner will:

4 Understand the combustion of gases and potential risks.

Assessment criteria

The learner can:

4.1 describe the characteristics of complete and incomplete combustion

4.2 explain the causes of incomplete combustion

4.3 state the main constituents of complete and incomplete combustion

4.4 explain pre- and post-aerated flames

4.5 state the symptoms/effects when humans are exposed to carbon monoxide

4.6 state other sources of carbon monoxide and carbon dioxide found in dwellings

4.7 describe typical ambient levels of carbon dioxide and identify critical levels and the potential effects on the gas combustion process

4.8 describe the types of gas and carbon monoxide detectors

4.9 state where gas and carbon monoxide detectors should be placed/installed and identify the associated maintenance requirements

4.10 describe the visible warning signs associated with incomplete combustion.Learning outcome

Learning outcome

The learner will:

5 Know gas burner operation, design, features and types.

Assessment criteria

The learner can:

5.1 describe the operation of **burners**

5.2 state the differences between the performance of pre- and post-aerated burners

5.3 describe burner faults that result in incomplete combustion, flame lift and lighting back

5.4 describe the **key parts** and operation of a pre-aerated natural draught burner

Range

Burners

Natural draught, pre- and post-aerated, pre-mix, forced draught, radiant.

Key parts

Gas injector, primary airports, venture, burner head, flame retention.

Learning outcome

The learner will:

6 Understand the properties and characteristics of Natural Gas and LPG.

Assessment criteria

The learner can:

6.1 identify first, second and third family gases

6.2 explain **characteristics** of Natural Gas and LPG:

6.3 describe the **additional characteristics and properties** of LPG.

Range

Characteristics

Relative density, calorific value, gross and net calorific value, flammability limits, flame speed, ignition temperature.

Additional characteristics and properties

Relative density, calorific value, gross and net calorific value, flammability limits, flame speed, ignition temperature.

Unit 304 Buildings, services and structures

Unit level:	3
GLH:	94
Unit aim:	The aim of this unit is to provide the learner with the knowledge and understanding of building services and structures required for working in the gas industry.
Supporting information:	This unit is based on the core knowledge requirements for a gas utilisation operative/engineer, specifically Understanding Buildings, Services and Structures (EUS DSG 1.4)

Learning outcome

The learner will:

1 Understand the types and characteristics of construction materials.

Assessment criteria

The learner can:

1.1 explain heat treatments and their effects on metals

1.2 describe the effects of corrosion on metals

1.3 state the precautions taken to stop the effects of corrosion on metals

1.4 describe the types and use of **construction materials** used in the workplace

1.5 describe the **components** used in the construction of a building.

Range

Construction materials

Concrete, bricks, blocks, cement, plaster, timber, tiles.

Components

Foundations, damp proof courses, solid walls, timber and steel frame walls, floors, ceilings, lintels, roofs.

Learning outcome

The learner will:

2 Know how to use hand and power tools within gas utilisation.

Assessment criteria

The learner can:

2.1 describe the range of **tools** and their uses

2.2 describe the **safety checking processes** of tools carried out prior to their use

2.3 identify appropriate personal protective equipment (PPE) to be used

2.4 describe the tools required for **cutting different materials**

2.5 identify the correct types of fasteners and fixings to be used for **securing to different materials**

2.6 describe the types of drills required when **drilling different materials**.

Range

Tools

Hand tools, battery operated power tools, 110 V and 240 V power tools.

Safe checking processes

Visual inspections, PAT testing/electrical checks, use of RCD adaptors.

Cutting different materials

Metal, wood, plastics.

Securing to different materials

Wood, solid walls/floors, dry lined walls/ceilings, timber and steel frame walls.

Drilling different materials

Metal, wood, tile, plastics, concrete, solid walls/floors, dry lined walls/ceilings, timer and steel frame walls.

Learning outcome

The learner will:

3 Understand the ventilation requirements, types and methods.

Assessment criteria

The learner can:

3.1 describe the general requirements and reasons for ventilation in regard to gas appliances and installations

3.2 recognise the differences between permanent ventilation, adventitious ventilation and compartment ventilation

3.3 recognise the differences between gross and net calorific value (CV) and the effect on ventilation calculations

3.4 identify the approved types of ventilation openings and grilles and define the criteria they must meet

3.5 identify suitable and unsuitable **ventilation installations**

3.6 describe the process of accurately measuring the free area of air vents

3.7 state the requirements for the provision of ventilation labels / notices

3.8 describe the potential **effects on ventilation** caused by the building environment

3.9 explain the ventilation requirements for vertex flues

3.10 state the minimum separation distances between ventilators and appliance flue terminals

3.11 describe the purpose and requirements to install intumescent air vents.

Range

Ventilation installation

Vents through walls, ventilation paths via other rooms, ventilation paths to compartments, ducted ventilation.

Effects on ventilation

Depressurising extract fans, circulating fans, fans in appliances, appliances with a different fuel source, double glazing, building insulation, passive stack ventilation.

Learning outcome

The learner will:

4 Understand the different types and operation of suitable chimney systems for gas appliances.

Assessment criteria

The learner can:

4.1 state the classification of gas appliances according to **chimney types**

4.2 identify the **construction methods and materials** used for chimneys

4.3 explain the design, component parts and general operation of **open-flue chimney systems**

4.4 state the requirements for open-flue, natural draught chimney outlet locations and positions

4.5 explain the design considerations, component parts and general operation of **room-sealed chimney systems**

4.6 state the requirements for room sealed chimney outlet locations and positions

4.7 describe the requirements for **balanced compartment installations**

4.8 describe the methods and checks required to establish satisfactory construction, effective and safe operation of a **chimney.**

Range

Chimney types

Type A (flueless), Type B (open chimney), Type C (room sealed chimney).

Construction methods and materials

Brick/masonry, chimney blocks, single and double wall flue pipe, metallic and non-metallic flue materials, flexible metallic liners, shared chimney systems (common, SE Duct and U Duct), vertex chimney systems.

Open-flue chimney systems

Primary flue, secondary flue, draught diverter and terminals, chimney system operation, natural draught and fanned draught, flue dampers, shared chimney, cross sectional area, temperature effect, condensation and condensing appliances, terminal design, bird guards.

Room-sealed chimney systems

Air supply duct, flue duct and terminals, chimney system operation, natural draught and fanned draught, terminal design, condensation and condensing appliances.

Balanced compartment installations

Compartment construction, ducted air positions and sizes.

Chimney

Open-flue and room-sealed chimneys.

Unit 305 Gas safety principles

Unit level:	3
GLH:	114
Unit aim:	This unit aims to provide learners with the knowledge and understanding of the gas safety requirements for working in the gas industry.
Supporting information:	This unit is based on the core knowledge requirements for a gas utilisation operative/engineer, specifically Understanding Gas Safety (EUS DSG 1.5).

Learning outcome

The learner will:

1 Know industry specific legislation and standards for gas safety.

Assessment criteria

The learner can:

1.1 state the application of gas industry **legislation** to work activities

1.2 describe the content of the Gas Safety (Installation and Use) Regulations

1.3 state the key features of **gas safety regulation**

1.4 describe how and when to use the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) procedures

1.5 state the registration and competence process that applies to gas engineers.

Range

Legislation

Gas Safety (Installation and Use) Regulations, Building Regulations and Building Standards.

Gas safety regulations

Gas Safety (Management) Regulations and Gas Safety (Rights of Entry) Regulations.

Learning outcome

The learner will:

2 Know the emergency actions, responsibilities and procedures.

Assessment criteria

The learner can:

2.1 state the **responsibilities and appropriate actions** to be taken in the event of a gas emergency:

2.2 state the gas emergency **priorities**.

Range

Responsibilities and appropriate actions

Reporting gas escapes, responsibilities of the gas user, responsibilities of the gas operative to give gas users advice and safety information, responsibilities of the gas operative, turning off at emergency controls, elimination of ignition sources, reduction of gas concentrations via ventilation, action by the gas transporter.

Priorities

Protect life, protect property, secure the escape, leave the site safe.

Learning outcome

The learner will:

3 Understand the Gas Industry Unsafe Situations Procedure

Assessment criteria

The learner can:

3.1 describe the purpose and scope of the Unsafe Situations Procedure and **categories**.

3.2 explain how the Unsafe Situations Procedure is applied

3.3 state the types of RIDDOR reportable work/incidents.

Range

Categories

Immediately Dangerous (ID) and At Risk (AR) appliances/installations.

Learning outcome

The learner will:

4 Understand the gas operative's responsibilities in accurately completing emergency notices, warning labels and forms.

Assessment criteria

The learner can:

4.1 describe the emergency **notices, labels and forms**

4.2 explain the gas operative's responsibilities in completing the emergency notices, warning labels and forms

Range

Notices, labels and forms

Warning notices, warning labels, RIDDOR reporting forms, advice notices, gas emergency notices and labels.

Learning outcome

The learner will:

5 Understand the correct installation locations and types of emergency control and appliance isolation valves.

Assessment criteria

The learner can:

5.1 describe the installation, operation and positioning requirements for **emergency control valves** (ECV)

5.2 explain the installation, operation and positioning requirements for appliance isolation valves (AIV)

5.3 describe the associated labels required for ECVs

5.4 identify the positions for service entries into buildings.

Range

Emergency control valves

Gas meter installations, remote meter installations, multiple occupancy meter installations, meter inlet valves (MIV).

Learning outcome

The learner will:

6 Know the requirements for gas meter installations up to 6 m^3/h.

Assessment criteria

The learner can:

6.1 state the methods and requirements for the installation of natural gas primary and secondary meters

6.2 identify the associated meter labels required for primary and secondary meters.

Learning outcome

The learner will:

7 Understand the types of gas meter housings and compartments, and their requirements for installation and labelling.

Assessment criteria

The learner can:

7.1 describe the types of gas meter **housings and compartments**

7.2 state the suitable locations and fixing requirements for gas meter housings and compartments

7.3 explain the differences between low and medium pressure gas meter houses and compartments

7.4 describe the associated labels required meter housings and compartments.

Range

Housings and compartments

Surface mounted, semi-concealed, built-in meter boxes, purpose-built meter housings.

Learning outcome

The learner will:

8 Know how to check and set gas installation operating pressures.

Assessment criteria

The learner can:

8.1 describe the process of checking and setting gas installation **operating pressures**

8.2 state the procedure for contacting those authorised to re-set or exchange defective meter regulators.

Range

Operating pressures

Meter regulators (low and medium pressure), maintaining correct installation operating pressures.

Learning outcome

The learner will:

9 Understand how to safely assess the potential risks and re-light temporarily isolated appliances.

Assessment criteria

The learner can:

9.1 describe the process and **safety factors** associated with relighting temporarily isolated appliances:

9.2 explain the correct actions required when un-commissioned appliances and systems are identified.

Range

Safety factors

Confirmation that the installation is gas tight, system and appliances are purged of air, appliance(s) are re-lit, satisfactory operation of user controls is confirmed, visual risk assessments are carried out for unsafe situations.

Learning outcome

The learner will:

10 Understand how to check and set appliance burner operating pressures and compare measured gas rates with published figures.

Assessment criteria

The learner can:

10.1 explain the process of checking appliance inlet and burner operating pressures

10.2 describe the procedure of accurately checking appliance gas rates in both metric (m^3) and imperial (ft^3)

10.3 explain the process of establishing the potential causes of low/poor gas pressures.

Learning outcome

The learner will:

11 Know the principles of operation and methods of testing gas appliance safety controls.

Assessment criteria

The learner can:

11.1 describe the principles of operation, methods of testing and application of **gas safety controls**

Range

Gas safety controls

Gas controls – pressure regulators, air/gas ratio controls, thermal cut off, gas cocks/valves, cooker hotplate lid control, electric solenoid valve, excess flow valves.

Flame protection devices – vapour pressure device, thermoelectric valve, flame conduction and rectification, interrupter devices, atmosphere sensing devices/spillage detection devices, multifunction control.

Thermostats – bi-metallic, liquid expansion, vapour pressure, electrical, overheat/limit, thermistors.

Learning outcome

The learner will:

12 Know where to acquire information and documentation used during daily work activities.

Assessment criteria

The learner can:

12.1 explain how to access the types of 'in-company' **information and documentation**.

Range

Information and documentation

Delivery notes, work programmes, time sheets, plans/drawings, job specifications, invoices/statements, quotations/estimates.

Unit 306 Specific core installation and maintenance

Unit level:	3
GLH:	124
Unit aim:	This unit is part of a defined combination of units, to enable learners to demonstrate competence in the work activities related to the installation and maintenance of gas appliances and associated gas fittings. This unit will provide evidence of competence to enable an individual to apply for a 'licence to practice' from the Gas Safe Register.
Supporting information:	This unit is based on the core occupational requirements for a gas utilisation operative/engineer, specifically Specific Core Installation and Maintenance (EUS DSG 2.3).

Learning outcome

The learner will:

1 Be able to demonstrate the use of common tools used in the gas utilisation industry.

Assessment criteria

The learner can:

1.1 demonstrate the **safe use of tools** for drilling, securing and cutting brick, concrete, block, studded, timber framed and dry lined walls

1.2 demonstrate the correct and safe use of **tools used to test systems**

1.3 make good materials and surfaces to include brick, concrete, block, studded, timber framed, tiled and dry lined.

Range

Safe use of tools

Basic hand tools, battery operated tools, power tools, visual inspections of tools, checking PAT certificates.

Tools used to test systems

Pressure gauges, voltage indicators, continuity testers, electrical multi-meters, plug in socket testers, electrical proving units, thermometers.

Learning outcome

The learner will:

2 Be able to demonstrate that gas safety controls are operating correctly and take the actions required when unsafe or ineffective operation is found.

Assessment criteria

The learner can:

2.1 safely diagnose correct, unsafe or ineffective **operation controls**

2.2 demonstrate actions to be taken when defective or unsafe control operation is identified.

Range

Operation controls

Flame supervision devices, to include liquid/vapour expansion, thermo-electric.

Flame rectification controls to include atmosphere sensing device/spillage detection device, pressure regulators, low pressure cut off, thermal cut off, valves (manual), cooker hotplate lid control, electric solenoid valve, excess flow valves, interrupter devices, multifunction control.

Thermostats to include liquid/vapour expansion, liquid/vapour expansion, electrical thermostats, thermistors.

Learning outcome

The learner will:

3 Be able to carry out chimney performance checks.

Assessment criteria

The learner can:

3.1 carry out **checks** on open chimney systems.

3.2 carry out **checks** on room sealed chimney systems.

Range

Checks

Open chimney systems – confirmation of correct type and visual inspection throughout the length, chimney flow test, chimney spillage test.

Room chimney systems – confirmation of correct type and installation, correct terminal location and protection, testing operation to include case seal integrity.

Learning outcome

The learner will:

4 Be able to complete the correct notices, forms and labels used in domestic gas utilisation.

Assessment criteria

The learner can:

4.1 identify correct application and complete **records, forms and labels**:

4.2 select and attach appropriate **labels** applicable to domestic gas work:

Range

Records, forms and labels

Landlord/home owner gas safety record, gas safety inspection form, service/maintenance checklist(s), chimney/hearth notice plate.

Labels

Un-commissioned appliance label, compartment label.

Learning outcome

The learner will:

5 Be able to work safely with electrical systems and components used in domestic gas utilisation.

Assessment criteria

The learner can:

5.1 use Ohms law to calculate current and power, voltage and resistance

5.2 identify simple series and parallel circuits

5.3 identify the **type** of electrical installation

5.4 carry out the **process of connecting** a domestic gas appliance to a fixed domestic electrical installation

5.5 safely carry out preliminary electrical **safety checks**

5.6 interpret appliance wiring diagrams to establish sequence of electrical operation and correct appliance wiring

5.7 differentiate between main and supplementary equipotential bonding connections

5.8 demonstrate the correct procedure for **safe electrical isolation** to gas appliances or controls in accordance with industry requirements

5.9 identify electrical **faults and defects** on domestic gas installations, initiating actions as required.

Range

Type

TT, TN-S, TN-C-S

Process of connecting

Cable type and sizing, fuse rating calculation, fused spur connection, wiring a three-pin plug.

Safety checks

Earth continuity, polarity, short circuit, resistance to earth, RCD operation test.

Safety electrical isolation

Use of locking devices, voltage indicating device, use of proving unit, confirmation of safety – absence of electricity.

Faults and defects

Inadequate equipotential bonding provision, incorrect cable types and position, clearances from other services, failed components, inadequate circuit protection conductors, defective automatic disconnection device (RCD), appliance connections.

Learning outcome

The learner will:

6 Be able to use combustion and atmosphere sampling analysers.

Assessment criteria

The learner can:

6.1 demonstrate the correct use of a combustion performance analysers and atmosphere sampling analysers interpreting **readings** for type 'A', 'B' and 'C' gas appliances:

6.2 describe the required checks using a combustion/atmosphere analyser in the event of 'carbon monoxide detector' activation.

Range

Readings

CO, CO_2, O_2 readings, CO/CO_2 ratios in a flueway, CO, CO_2, O_2 readings in the atmosphere

Learning outcome

The learner will:

7 Be able to demonstrate safe lifting and handling techniques when moving equipment, materials and appliances associated with gas utilisation activities.

Assessment criteria

The learner can:

7.1 risk assess the work site and work activities to be undertaken

7.2 **assess loads** to be handled and moved

7.3 **prepare** to lift and handle loads

7.4 lift and move loads in accordance with **best practice** and safe systems of work.

Range

Assess loads

Size, weight, shape, configuration of loads, need for assistance.

Prepare

Using correct PPE, communication with others, ensuring a clear path.

Best practice

Correct kinetic techniques, assisted lift needing two people, simple mechanical lifting device.

Learning outcome

The learner will:

8 Be able to use steps and ladders safely.

Assessment criteria

The learner can:

8.1 risk assess the work site and work activities to be undertaken

8.2 prepare the site location where steps and /or ladders need to be used

8.3 inspect ladders and steps for defects

8.4 position and erect steps and ladders in accordance with regulations and safe working practice

8.5 secure ladders by approved methods to ensure no slippage or movement may occur during use

8.6 use steps and ladders for work activities in accordance with regulations and safe working practice.

Learning outcome

The learner will:

9 Be able to use personal protective equipment (PPE).

Assessment criteria

The learner can:

9.1 select **PPE** needed for specific activities

9.2 carry out gas installation or maintenance work wearing PPE as determined by each specific task.

Range

PPE

Gloves, protective footwear, eye protectors, ear protection, high visibility clothing, knee protectors, dust masks.

Learning outcome

The learner will:

10 Be able to install and commission a small domestic gas installation.

Assessment criteria

The learner can:

10.1 **install** a domestic gas meter, pipework and domestic appliance

10.2 demonstrate tightness testing, purging and commissioning procedures including the procedure for resetting and sealing a regulator

10.3 carry out a gas rate check and confirm it complies with manufacturers' instructions

10.4 demonstrate the correct method of **removal** of domestic meters and regulators

10.5 identify correct and incorrect methods of connecting the main equipotential bonding.

Range

Install

Selecting correct materials and fittings, demonstrate the correct method of jointing materials and fittings, demonstrate the correct method of installing securing and supporting domestic meters and regulators, demonstrate the correct method of installing a domestic appliance.

Removal

Temporary and permanent.

Learning outcome

The learner will:

11 Be able to calculate the requirements for permanent ventilation in domestic gas utilisation environments.

Assessment criteria

The learner can:

11.1 calculate the correct **ventilation requirements** for a range of domestic appliances

11.2 specify ventilation vents/grilles and methods

11.3 measure existing vents and grilles to ensure that they are the correct type and provide the correct supply of air.

Range

Ventilation requirements

Type B (open) chimney appliances, Type A (flueless) appliances, Type B and Type C appliances in compartments, multiple appliance installations, ventilation pathways via other rooms

Unit 307 Tightness test, purge, commission and de-commission gas pipework up to 35mm (1¼) diameter in small gas installations

Unit level:	2
GLH:	21
Unit aim:	The aim of the unit is to develop the competencies necessary to tightness test, purge, commission and de-commission gas pipework. This unit will provide evidence of competence to enable an individual to apply for a 'licence to practice' from the Gas Safe Register.
Supporting information:	This unit is based on the core occupational requirements for a gas utilisation operative/engineer, specifically Gas Tightness Testing and Direct Purging – IGEM/UP/1B (NOS EUSDSG3.6). The scope of this unit covers gas installations to be tested and purged that have: • a maximum operating pressure (MOP) at the outlet of the ECV not exceeding 2 bar (natural gas) • an operating pressure (OP) at the outlet of the primary meter and any point in the section to be tested not exceeding 21 mbar (natural gas) *or* final stage regulator and any point in the section to be tested not exceeding 37 mbar (LPG) • a nominal bore of pipework not greater than 35 mm (DN 32, R1¼) • a maximum rated capacity through the primary meter of 16m^3/h • a maximum installation volume (IV) supplying an individual dwelling or non-domestic premises of 0.035 m^3.

Learning outcome

The learner will:

1 Be able to plan and prepare work activities for maintaining water heating and wet central heating appliances.

Assessment criteria

The learner can:

1.1 apply a risk assessment and method statement to work activities

1.2 survey the work site for any pre-work damage and defects to existing building features recording details of any issues

1.3 advise the property occupier of any defects found

1.4 protect the work site and the building fabric against possible damage whilst showing care and respect to the customer's property

1.5 obtain confirmation from the property occupier before the job starts

1.6 confirm the siting of the gas supply, provision of ventilation meets the requirements for tightness testing and direct purging

1.7 check and confirm all materials, tools and equipment are available as required and are fit for purpose

1.8 check existing installation for unsafe situations applying the gas industry unsafe situations procedures to any identified unsafe situations.

Learning outcome

The learner will:

2 Be able to de-commission gas systems and components to industry standards.

Assessment criteria

The learner can:

2.1 check that the gas and electricity supply is in a condition that enables safe installation de-commissioning

2.2 use the correct tools and equipment

2.3 use designated safe isolation methods, tests and procedures

2.4 take precautionary actions to ensure that temporarily de-commissioned appliances, systems and components do not present a safety hazard

2.5 permanently remove and disconnect appliances, gas system components, electricity system components and equipotential bonding system components, as necessary.

Learning outcome

The learner will:

3 Be able to tightness test and direct purge gas systems and components.

Assessment criteria

The learner can:

3.1 carry out preparatory work to meet industry standards

3.2 check that the gas system will permit safe tightness testing and direct purging

3.3 use the correct tools and equipment

3.4 measure, calculate and record gas system installation volumes for tightness testing and direct purging

3.5 ensure ventilation meets industry standards' requirements

3.6 remove existing gas components as necessary

3.7 carry out the tightness testing and direct purging process, minimising damage to customer property

3.8 use tightness testing procedures to confirm the integrity of new installations

3.9 use tightness testing procedures to confirm the integrity of existing installations

3.10 use tightness testing procedures to confirm the integrity of the gas system where the maximum operating pressure (MOP) at the outlet of the emergency control valve (ECV) is above 75mbar but not exceeding 2 bar and no Meter Inlet Valve (MIV) is fitted

3.11 carry out appropriate **actions** where installation fails the tightness test

3.12 use purging procedures to confirm the safe supply of gas to the installed gas system and appliances

3.13 instruct the customer on the correct operation of the gas system, valves and components

3.14 prevent the unauthorised use of un-commissioned or potentially unsafe gas installations by following isolation procedures and use of warning notices.

Range

Actions

Trace and repair gas escapes and isolate unsafe gas appliance systems and components.

Learning outcome

The learner will:

4 Be able to use and communicate information to carry out de-commissioning, tightness testing and direct purging.

Assessment criteria

The learner can:

4.1 liaise with the property occupier and other people who will be affected by the work processes to minimise disturbance to the job

4.2 ensure the work is completed in accordance with manufacturers' and industry standards' requirements

4.3 advise any delays to the work to any **persons** who are affected by the delay in a timely manner

4.4 advise the appropriate persons that need to be informed of unsafe situations and actions required to remedy those situations

4.5 check that the customer is satisfied with the finished job

4.6 complete documentation to confirm the safe tightness testing and direct purging of the gas system and components

4.7 complete gas system commissioning and de-commissioning records.

Range

Persons

Customers, line mangers, other trades.

Learning outcome

The learner will:

5 Be able to resolve problems that could affect de-commissioning, tightness testing and direct purging.

Assessment criteria

The learner can:

5.1 report **deficiencies** with supply services

5.2 resolve problems in accordance with approved procedures where pre-tightness testing and direct purging checks and tests reveal gas system or component defects

5.3 resolve problems in accordance with approved procedures when gas systems or components being tightness tested and purged do not meet design requirements

5.4 resolve problems in accordance with approved procedures when the gas system or components cannot be restored to full performance.

Range

Deficiencies

In relation to gas and equipotential bonding.

Learning outcome

The learner will:

6 Understand how to tightness test, purge, commission and de-commission gas pipework up to 35mm (1¼) diameter in small natural gas installations

Assessment criteria

The learner can:

6.1 describe the health, safety and environmental factors that need to be incorporated in risk assessments for the domestic tightness testing and direct purging process

6.2 explain the processes for ordering, supplying, checking and delivery of equipment, materials and components required for the work activity

6.3 explain how to safely secure and store tools, equipment, materials and components

6.4 describe the potential hazards that could arise from all activities and the checks to be carried out before work takes place

6.5 explain the steps to take should materials, components, tools and equipment not be available at the site

6.6 describe measures to prevent de-commissioned gas systems being brought into operation utilising safety and warning notices

6.7 summarise the points in the work process where co-operation and liaison with other trades and property occupier may be required

6.8 measure, calculate and record gas system installation volumes for tightness testing and direct purging activities – IGEM/UP/1B

6.9 identify medium pressure regulator sets – IGEM/UP/1B where the maximum operating pressure (MOP) at the outlet of the emergency control valve (ECV) is above 75mbar but not exceeding 2bar and, whether a meter inlet valve (MIV) is fitted

6.10 explain tightness testing procedures – IGEM/UP/1B to confirm the integrity of gas systems where the maximum operating pressure (MOP) at the outlet of the emergency control valve (ECV) is above 75mbar but not exceeding 2bar and, where a meter inlet valve (MIV) is fitted or, no meter inlet valve is fitted

6.11 state the routines and sequences for direct purging of gas systems, appliances and components – IGEM/UP/1B

6.12 outline the routines and sequences for commissioning gas systems, valves and components to industry standards

6.13 explain the system handover procedures and demonstrate the operation of gas systems and components to end users

6.14 describe how to safely collect and dispose of system contents that may be hazardous to health or the environments

6.15 explain how to isolate unsafe gas appliances, gas systems and components and application of the gas industry unsafe situations procedure

6.16 outline the types of pressure gauges suitable for carrying out tightness tests and identify the requirements for accuracy of reading

6.17 describe the actions to be taken in the event of an emergency control valve (ECV) letting by

6.18 describe the potential effects of electronic token meter tamper devices on tightness testing

6.19 identify gaps in knowledge and skills to undertake continuous professional development (CPD).

Unit 308 Install, commission and de-commission gas pipework up to 35mm (1¼) diameter in domestic and small commercial premises

Unit level:	3
GLH:	115
Unit aim:	The aim of this unit is to develop the competencies necessary to install, commission and decommission gas pipework. This unit will provide evidence of competence to enable an individual to apply for a 'licence to practice' from the Gas Safe Register.
Supporting information:	This unit is based on the core occupational requirements for a gas utilisation operative/engineer, specifically Install Gas Pipework up to 35mm BS6891 (NOS EUSDSG3.5). This unit requires installation work on various pipework materials and sizes up to 35mm(1 ¼") diameter covered by BS 6891

Learning outcome

The learner will:

1 Be able to design gas systems for installing gas pipework.

Assessment criteria

The learner can:

1.1 identify and record the customer's job requirements

1.2 compare the customer's job requirements with statutory and industry requirements and identify any conflicting issues

1.3 survey the work site consulting site diagrams for any key structural features that could affect the installation, recording details of any features that may affect the installation

1.4 ensure the proposed positioning of the pipework meets the manufacturers' and industry standards' requirements for location and clearances

1.5 check that the availability of input services meet the pipework manufacturers' and industry standards' requirements

1.6 check and ensure the design of the proposed installation is in compliance with the pipework manufacturers' and industry standards' requirements

1.7 prepare a range of design options to meet both customer and industry requirements, taking due consideration to costs

1.8 present design options to the customer

1.9 consult with the customer and obtain agreement to the design option that best meets all the requirements.

Learning outcome

The learner will:

2 Be able to plan and prepare work activities for installing domestic gas cookers, tumble dryers and leisure appliances.

Assessment criteria

The learner can:

2.1 apply a risk assessment and method statement to work activities

2.2 survey the work site for any pre-installation damage and defects to existing building features recording details of any issues

2.3 advise the property occupier of any defects found

2.4 protect the work site and the building fabric against possible damage whilst showing care and respect to the customer's property

2.5 obtain confirmation from the customer before the job starts

2.6 check and confirm that all materials, tools and equipment are available as required and are fit for purpose

2.7 check and confirm that the proposed siting of the gas installation pipework meets the pipework manufacturers' and industry standards' requirements

2.8 carry out checks and tests to confirm that the gas supply, equipotential bonding and provision of ventilation meets the pipework manufacturers' and industry standards' requirements

2.9 confirm that the proposed siting of the gas installation pipework meets industry standards' requirements in relation to other services

2.10 calculate and confirm the correct sizing of pipework to ensure minimum pressure loss across the installation

2.11 check the existing installation for unsafe situations applying the gas industry unsafe situations procedures to any identified unsafe situations.

Learning outcome

The learner will:

3 Be able to de-commission domestic gas pipework to industry standards.

Assessment criteria

The learner can:

3.1 check that the gas supply and electricity supply is in a condition that enables safe installation de-commissioning

3.2 use the correct tools and equipment

3.3 use designated safe isolation methods, tests and procedures

3.4 take precautionary actions to ensure that temporarily de-commissioned pipework, systems and components do not present a safety hazard

3.5 permanently remove and disconnect pipework, gas system components and equipotential bonding system components, as necessary

3.6 after permanent removal of pipework mark any live gas service pipes with a notice to indicate the pipe contains gas.

Learning outcome

The learner will:

4 Be able to install, exchange, and remove gas pipework to industry standards.

Assessment criteria

The learner can:

4.1 carry out preparatory work to meet the installation requirements

4.2 install the pipework minimising damage to customer property

4.3 use the correct tools and equipment

4.4 remove existing gas and equipotential bonding system components required for the installation

4.5 fabricate **gas pipework systems**, fittings and components as required by the installation including jointing and bending

4.6 **position** the pipework and confirm it meets the pipework manufacturers' and industry standards' requirements

4.7 provide the required ventilation for the pipework installation in accordance with the pipework manufacturers' and industry standards' requirements

4.8 provide adequate support(s) for pipework installations to conform with the pipework manufacturers' and industry standards' requirements

4.9 position and protect pipework installation in and through walls to meet the pipework manufacturers' and industry standards' requirements for sleeving and purpose designed channels

4.10 position and protect pipework installations in multi-occupancy dwellings to meet the pipework manufacturers' and industry standards' requirements

4.11 position and protect pipework installations in protected areas to meet the pipework manufacturers' and industry standards' requirements

4.12 position and protect external installations to meet the pipework manufacturers' and industry standards' requirements

4.13 ensure existing gas pipework systems are clean and free of debris

4.14 fix and connect gas pipework, valves, fittings and components to the supply

4.15 install an additional emergency control valve (AECV) to the supply

4.16 carry out precautionary actions to prevent the unauthorised use of un-commissioned or potentially unsafe gas pipework, appliances and equipotential bonding by following isolation procedures and use of warning notices.

Range

Gas pipework systems

Steel tube, copper tube, pliable corrugated (stainless steel) tube, polyethylene pipe, capillary fittings, mechanical joints, press end connections, pliable corrugated (stainless steel) fittings, screwed joints, lead composition pipework joints, electrofusion joints, double sets/offset bends, 90° degree bends, crank sets/pass-over bends.

Position

Surface mounted, laid in joisted floors, installed in solid floors, installed in walls, above-ground external pipework, buried external pipework.

Learning outcome

The learner will:

5 Be able to pre-commission and commission gas pipework to industry standards.

Assessment criteria

The learner can:

5.1 confirm that the complete pipework installation complies with pipework manufacturers' and industry standards' requirements

5.2 check that conditions within the gas system will allow safe commissioning

5.3 use the correct tools and equipment

5.4 use tightness testing procedures to confirm the integrity of the installed pipework installation

5.5 use purging procedures to confirm the safe supply of gas to the installed gas system

5.6 apply protective coating to pipework and to joints after gas tightness testing has been completed

5.7 check the operation of the installed gas valves and components to ensure they function safely and operate in accordance with manufacturers' instructions

5.8 instruct the customer on the correct operation of the pipework installation and associated gas system providing the customer with a copy of any manufacturer's instructions.

Learning outcome

The learner will:

6 Be able to use and communicate information to carry out de-commissioning, installation and commissioning work.

Assessment criteria

The learner can:

6.1 liaise with the property occupier and other people who will be affected by the work processes to minimise disturbance to the job

6.2 ensure the work is completed in accordance with pipework manufacturers' and industry standards' requirements

6.3 advise any delays to the work to any **persons** who are affected by the delay in a timely manner

6.4 advise appropriate persons who need to be informed of unsafe situations and actions required to remedy those situations

6.5 check that the customer is satisfied with the finished job

6.6 complete documentation to confirm the safe commissioning of the gas pipework and components

6.7 complete gas pipework and components commissioning and de-commissioning records.

Range

Persons

Customers, line managers, other trades.

Learning outcome

The learner will:

7 Be able to resolve problems that could affect the de-commissioning, installation and commissioning process.

Assessment criteria

The learner can:

7.1 report deficiencies with supply services - gas - equipotential bonding

7.2 resolve problems in accordance with approved procedures where pre-commissioning checks and tests reveal gas pipework system or component defects

7.3 resolve problems in accordance with approved procedures when the gas pipework systems or components being commissioned do not meet design requirements

7.4 resolve problems in accordance with approved procedures when the gas pipework system or components cannot be restored to full performance.

Learning outcome

The learner will:

8 Know how to install, commission and de-commission gas pipework up to 35mm (1¼) diameter in domestic and small commercial premises.

Assessment criteria

The learner can:

8.1 describe the health, safety and environmental factors that need to be incorporated in risk assessments for the domestic installation process

8.2 explain the processes for ordering, supplying, checking and delivery of equipment, materials and components required for the work activity

8.3 explain how to safely secure and store tools, equipment, materials and components

8.4 describe the potential hazards that could arise from all activities and the checks to be carried out before work takes place

8.5 explain the steps to take should materials, components, tools and equipment not be available at the site

8.6 describe how to confirm that the gas supply and equipotential bonding system requirements are adequate for the installation of the new gas pipework system

8.7 explain how to confirm that the provision of ventilation meets the industry standards' requirements for the installation i.e. in voids, shafts, ducts

8.8 calculate correct sizing of pipework to ensure minimum pressure loss across installation

8.9 state checks and tests to confirm suitability of the bonding system, including the installation and positioning of the main equipotential bonding.

Unit 309 Install domestic gas cookers, tumble dryers and leisure appliances

Unit level:	3
GLH:	43
Unit aim:	The aim of the unit is to develop the competencies necessary to install, commission and decommission gas cookers, tumble dryers and leisure appliances. This unit will provide evidence of competence to enable an individual to apply for a 'licence to practice' from the Gas Safe Register.
Supporting information:	This unit is based on the core occupational requirements for a gas utilisation operative/engineer, specifically Install Domestic Gas Cookers, Tumble Dryers and Leisure Appliances (NOS EUSDSG3.1) The scope of work covered by this unit is the installation of gas cookers (freestanding, built in, slide under, hotplates, grills, range cookers, dual fuel), tumble dryers and leisure appliances (greenhouse heaters, barbeques, patio heaters, gas flambeaux and outdoor gas lighting) from the appliance isolation valve. Electrical connection (where necessary) will be made to an existing 13 amp 240 volt plug socket adjacent to the appliance.

Learning outcome

The learner will:

1 Be able to design gas systems for installing domestic gas cookers, tumble dryers and leisure appliances.

Assessment criteria

The learner can:

1.1 identify and record the customer's job requirements

1.2 compare the customer's job requirements with statutory and industry requirements and identify any conflicting issues

1.3 survey the work site consulting site diagrams for any key structural features that could affect the installation, recording details of any features that may affect the installation

1.4 ensure the proposed positioning of the appliance meets the manufacturers' and industry standards' requirements for location and clearances

1.5 check that the availability of input services meet the appliance manufacturers' and industry standards' requirements

1.6 check and ensure the design of the proposed installation is in compliance with the appliance manufacturers' and industry standards' requirements

1.7 prepare a range of design options to meet both customer and industry requirements, taking due consideration to costs

1.8 present design options to the customer

1.9 consult with the customer and obtain agreement to the design option that best meets all the requirements.

Learning outcome

The learner will:

2 Be able to plan and prepare work activities for installing domestic gas cookers, tumble dryers and leisure appliances.

Assessment criteria

The learner can:

2.1 apply a risk assessment and method statement to work activities

2.2 survey the work site for any pre-installation damage and defects to existing building features recording details of any issues

2.3 advise the property occupier of any defects found

2.4 protect the work site and the building fabric against possible damage whilst showing care and respect to the customer's property

2.5 obtain confirmation from the customer before the job starts

2.6 check and confirm that all materials, tools and equipment are available as required and are fit for purpose

2.7 check and confirm that the proposed siting of the appliance meets the appliance manufacturers' and industry standards' requirements

2.8 carry out checks and tests to confirm that the gas supply, electricity supply, provision of ventilation and chimney / flue, where necessary, meets the appliance manufacturers' and industry standards' requirements

2.9 confirm that the proposed siting of the gas supply meets industry standards' requirements in relation to other services

2.10 confirm the correct sizing of pipework to ensure minimum pressure loss across the installation

2.11 check the existing installation for unsafe situations applying the gas industry unsafe situations procedures to any identified unsafe situations.

Learning outcome

The learner will:

3 Be able to de-commission domestic gas cookers, tumble dryers and leisure appliances.

Assessment criteria

The learner can:

3.1 check that the gas and electricity supply is in a condition that enables safe appliance de-commissioning

3.2 use the correct tools and equipment

3.3 use designated safe isolation methods, tests and procedures

3.4 take precautionary actions to ensure that temporarily de-commissioned appliances, systems and components do not present a safety hazard

3.5 permanently remove and disconnect appliances, gas system components and electricity system components, as necessary.

Learning outcome

The learner will:

4 Be able to install, exchange, and remove domestic gas cookers, tumble dryers, and leisure appliances.

Assessment criteria

The learner can:

4.1 carry out preparatory work to meet the manufacturers' installation requirements

4.2 install the appliance minimising damage to customer property

4.3 use the correct tools and equipment

4.4 remove any existing gas and electricity system components required for the installation

4.5 fabricate gas and electricity system components required by the installation

4.6 position the appliance and confirm it meets the appliance manufacturers' and industry standards' requirements

4.7 provide the required ventilation for the appliance installation in accordance with manufacturers' requirements

4.8 ensure existing gas system is clean and free of debris

4.9 connect the gas and electricity supply components to the appliance

4.10 install the chimney system and connect to the appliance, where required

4.11 use tightness testing and purging procedures to confirm the integrity of the installed gas system and appliance

4.12 use electrical testing procedures to confirm the integrity of the installed electrical system and appliance

4.13 use testing procedures to confirm the integrity of the chimney system and appliance flue seals according to appliance manufacturers' and industry standards' requirements, where necessary

4.14 carry out precautionary actions to prevent the unauthorised use of un-commissioned or potentially unsafe gas appliances by following isolation procedures and use of warning notices.

Learning outcome

The learner will:

5 Be able to pre-commission and commission domestic gas cookers, tumble dryers and leisure appliances.

Assessment criteria

The learner can:

5.1 confirm that the complete appliance installation complies with appliance manufacturers' and industry standards' requirements

5.2 check that the condition of the gas and electricity systems will allow safe commissioning

5.3 use the correct tools and equipment

5.4 check and confirm the gas system operating pressures meet industry standards

5.5 check and confirm the appliance operating pressure and/or heat input meet appliance manufacturers' and industry standards' requirements

5.6 check the combustion performance visually and/or by combustion performance analysis as required

5.7 test chimney performance and confirm it performs according to appliance manufacturers' and industry standards' requirements, where necessary

5.8 check the operation of the gas appliance and components to ensure they function safely and operate in accordance with manufacturers' instructions

5.9 check the electrical system and components function safely and operate in accordance with the manufacturers' instructions

5.10 instruct the customer on the correct operation of the appliance and associated gas system providing the customer with a copy of the appliance manufacturer's instructions.

Learning outcome

The learner will:

6 Be able to use and communicate information to carry out de-commissioning, installation and commissioning work.

Assessment criteria

The learner can:

6.1 liaise with the property occupier and other people who will be affected by the work processes to minimise disturbance to the job

6.2 ensure the work is completed in accordance with appliance manufacturers' and industry standards' requirements

6.3 advise any delays to the work to any **persons** who are affected by the delay in a timely manner

6.4 advise appropriate persons who need to be informed of unsafe situations and actions required to remedy those situations

6.5 check that the customer is satisfied with the finished job

6.6 complete documentation to confirm the safe commissioning of the gas appliance and components

6.7 complete gas appliance and system commissioning and de-commissioning records

6.8 submit details of installation and exchange appliance(s) to a gas work notification scheme.

Range

Persons

Customers, line managers, other trades.

Learning outcome

The learner will:

7 Be able to resolve problems that could affect the de-commissioning, installation and commissioning process.

Assessment criteria

The learner can:

7.1 report deficiencies with **supply services**

7.2 resolve **problems** in accordance with approved procedures where pre-commissioning checks and tests reveal defects

7.3 resolve **problems** in accordance with approved procedures when the installation being commissioned does not meet design requirements

7.4 resolve **problems** in accordance with approved procedures when the installation cannot be restored to full performance.

Range

Supply services

Gas and electricity.

Problems

In relation to the gas appliance, gas supply/installation and components.

Learning outcome

The learner will:

8 Know how to install, commission and de-commission domestic gas cookers, tumble dryers and leisure appliances.

Assessment criteria

The learner can:

8.1 describe the health, safety and environmental factors that need to be incorporated in risk assessments for the domestic installation process

8.2 explain the processes for ordering, supplying, checking and delivery of equipment, materials and components required for the work activity

8.3 explain how to safely secure and store tools, equipment, materials and components

8.4 describe the potential hazards that could arise from all activities and the checks to be carried out before work takes place

8.5 explain the steps to take should materials, components, tools and equipment not be available at the site

8.6 describe how to confirm that the gas supply, electric supply, chimney system and ventilation requirements are adequate for installation of the new gas appliance, gas system and components

8.7 describe measures to prevent de-commissioned gas appliances or systems being brought into operation utilising safety and warning notices

8.8 summarise the points in the work process where co-operation and liaison with other trades and property occupier may be required

8.9 describe the routines and sequences for installing and commissioning domestic gas cookers, tumble dryers, leisure appliances, gas systems and components

8.10 explain the procedures for checking the correct operation and performance of domestic gas cookers, tumble dryers, leisure appliances, gas systems and components

8.11 explain the procedures for checking and confirming the gas system operating pressures

8.12 explain the procedures for checking and confirming the appliance operating pressure and the heat input

8.13 describe the tests, checks and use of combustion performance analysers that confirm the suitability of the gas combustion performance

8.14 describe the tests and checks to confirm the integrity, suitability and performance of the chimney system

8.15 describe the tests and checks to confirm the suitability and performance of the ventilation

8.16 explain how to complete all installation and commissioning documentation and records to be left with the property occupier

8.17 describe the measures to prevent un-commissioned gas appliances and gas systems being brought into operation utilising safety and warning notices

8.18 explain the system handover procedures and demonstrate the operation of domestic gas cookers, tumble dryers, leisure appliances, gas systems and components to end users

8.19 describe how to safely collect and dispose of system contents that may be hazardous to health or the environment

8.20 explain how to isolate unsafe gas appliances, gas systems and components and application

Unit 310 Maintain domestic gas cookers, tumble dryers and leisure appliances

Unit level:	3
GLH:	49
Unit aim	The aim of the unit is to develop the competencies necessary to maintain gas cookers, tumble dryers and leisure appliances. This unit will provide evidence of competence to enable an individual to apply for a 'licence to practice' from the Gas Safe Register.
Supporting information:	This unit is based on the core occupational requirements for a gas utilisation operative/engineer, specifically Maintain Domestic Gas Cookers, Tumble Dryers and Leisure Appliances (NOS EUSDSG3.2). The scope of work covered by this unit is the maintenance of gas cookers (freestanding, built in, slide under, hotplates, grills, range cookers, dual fuel), tumble dryers and leisure appliances (greenhouse heaters, barbeques, patio heaters, gas flambeaux and outdoor gas lighting) up to the appliance isolation valve.

Learning outcome

The learner will:

1 Be able to plan and prepare work activities for maintaining domestic gas cookers, tumble dryers and leisure appliances.

Assessment criteria

The learner can:

1.1 apply a risk assessment and method statement to work activities

1.2 survey the work site for any pre-maintenance damage and defects to existing building features recording details of any issues

1.3 advise the property occupier of any defects found

1.4 protect the work site and the building fabric against possible damage whilst showing care and respect to the customer's property

1.5 obtain confirmation from the property occupier before the job starts

1.6 check and confirm all materials, tools and equipment are available as required and are fit for purpose

1.7 check and confirm that the siting of the appliance meets the appliance manufacturers' and industry standards' requirements

1.8 carry out checks and tests to confirm that the gas supply, electricity supply, provision of ventilation and chimney/flue, where necessary, meets the appliance manufacturers' and industry standards' requirements

1.9 check the existing installation for unsafe situations applying the gas industry unsafe situations procedures to any identified unsafe situations.

Learning outcome

The learner will:

2 Be able to de-commission domestic gas cookers, tumble dryers and leisure appliances to industry standards.

Assessment criteria

The learner can:

2.1 check that the gas supply and electricity supply is in a condition that enables safe appliance de-commissioning

2.2 use the correct tools and equipment

2.3 use designated safe isolation methods, tests and procedures

2.4 take precautionary actions to ensure that temporarily de-commissioned appliances, systems and components do not present a safety hazard

2.5 permanently remove and disconnect appliances, gas system components and electricity system components, as necessary.

Learning outcome

The learner will:

3 Be able to maintain domestic gas cookers, tumble dryers, and leisure appliances to industry standards.

Assessment criteria

The learner can:

3.1 carry out preparatory work to meet the manufacturers' maintenance requirements

3.2 remove existing gas and electricity system components as required by the maintenance activities

3.3 carry out the maintenance process in accordance with appliance manufacturers' and industry standards' requirements

3.4 carry out the maintenance process minimising damage to customer property

3.5 use the correct tools and equipment

3.6 re-position the appliance and confirm it meets the appliance manufacturers' and industry standards' requirements

3.7 check existing ventilation for appliances and system meets the appliance manufacturers' and industry standards' requirements

3.8 ensure existing gas systems are clean and free of debris

3.9 re-connect the gas and electricity supply components to the appliance

3.10 use tightness testing and purging procedures to confirm the integrity of the re-connected gas system and appliance

3.11 use electrical testing procedures to confirm the integrity of the re-installed electrical system and appliance

3.12 use testing procedures to confirm the integrity of the existing chimney system and appliance flue seals according to appliance manufacturers' and industry standards' requirements, where necessary.

Learning outcome

The learner will:

4 Be able to pre-commission and commission domestic gas cookers, tumble dryers and leisure appliances to industry standards.

Assessment criteria

The learner can:

4.1 confirm the complete appliance installation complies with appliance manufacturers' and industry standards' requirements

4.2 check that the condition of the gas and electricity systems will allow safe commissioning

4.3 use the correct tools and equipment

4.4 check and confirm the gas system operating pressures meet industry standards

4.5 check and confirm the appliance operating pressure and/or heat input meet appliance manufacturers' and industry standards' requirements

4.6 check the combustion performance visually and/or by combustion performance analysis as required

4.7 test chimney performance and reconfirm it performs according to appliance manufacturers' and industry standards' requirements, where necessary

4.8 check the operation of the gas appliance and components to ensure they function safely and operate in accordance with manufacturers' instructions

4.9 check the electrical system and components function safely and operate in accordance with the manufacturers' instructions

4.10 explain to the customer the correct operation of the appliance and associated gas system returning to them the appliance manufacturer's instructions

4.11 carry out precautionary actions to prevent the unauthorised use of potentially unsafe gas appliances by following isolation procedures and use of warning notices.

Learning outcome

The learner will:

5 Be able to use and communicate information to carry out de-commissioning, maintenance and commissioning work.

Assessment criteria

The learner can:

5.1 liaise with the property occupier and other people who will be affected by the work processes to minimise disturbance to the job

5.2 ensure the work is completed in accordance with appliance manufacturers' and industry standards' requirements

5.3 advise any delays to the work to any **persons** who are affected by the delay in a timely manner

5.4 advise appropriate **persons** who need to be informed of unsafe situations and actions required to remedy those situations

5.5 check that the customer is satisfied with the finished job

5.6 complete documentation confirming the safe maintenance of the gas appliance and components

5.7 complete gas appliance and system commissioning and de-commissioning records.

Range

Persons

Customers, line managers, other trades.

Learning outcome

The learner will:

6 Be able to resolve problems that could affect the de-commissioning, maintenance and commissioning process.

Assessment criteria

The learner can:

6.1 report deficiencies with **supply services**

6.2 resolve **problems** in accordance with approved procedures where pre-maintenance checks and tests reveal defects

6.3 resolve **problems** in accordance with approved procedures when the maintained equipment cannot be restored to full performance

Range

Supply services

Gas and electricity.

Problems

In relation to the gas appliance, gas supply/installation and components.

Learning outcome

The learner will:

7 Know how to maintain domestic gas cookers, tumble dryers and leisure appliances.

Assessment criteria

The learner can:

7.1 describe the health, safety and environmental factors that need to be incorporated in risk assessments for the domestic maintenance process

7.2 explain the processes for ordering, supplying, checking and delivery of equipment, materials and components required for the work activity

7.3 explain how to safely secure and store tools, equipment, materials and components

7.4 describe the potential hazards that could arise from all activities and the checks to be carried out before work takes place

7.5 explain the steps to take should materials, components, tools and equipment not be available at the site

7.6 describe how to confirm that the gas supply, electric supply, chimney system and ventilation requirements are adequate for an existing gas appliance, gas system and components

7.7 describe measures to prevent de-commissioned gas appliances or systems being brought into operation utilising safety and warning notices

7.8 summarise the points in the work process where co-operation and liaison with other trades and property occupier may be required

7.9 describe the routines and sequences for maintaining and re-commissioning domestic gas cookers, tumble dryers, leisure appliances, gas systems and components

7.10 explain the procedures for checking the correct operation and performance of domestic gas cookers, tumble dryers, leisure appliances, gas systems and components

7.11 explain the procedures for checking and confirming the gas system operating pressures

7.12 explain the procedures for checking and confirming the appliance operating pressure and the heat input

7.13 describe the tests, checks and use of combustion performance analysers that confirm the suitability of the gas combustion performance

7.14 describe the tests and checks to confirm the integrity, suitability and performance of the chimney system

7.15 describe the tests and checks to confirm the suitability and performance of the ventilation

7.16 describe how to complete all maintenance documentation and records to be left with the property occupier

7.17 describe the measures to prevent un-commissioned gas appliances and gas systems being brought into operation utilising safety and warning notices

7.18 explain the system handover procedures and demonstrate the operation of domestic gas cookers, tumble dryers, leisure appliances, gas systems and components to end users

7.19 describe how to safely collect and dispose of system contents that may be hazardous to health or the environment

7.20 explain how to isolate unsafe gas appliances, gas systems and components and application of the gas industry unsafe situations procedure.

Unit 311 Install domestic gas water heaters and wet central heating appliances

Unit level:	3
GLH:	103
Unit aim:	The aim of this unit is to assess develop the competencies necessary to install, commission and decommission domestic gas water heaters and wet central heating appliances. This unit will provide evidence of competence to enable an individual to apply for a 'licence to practice' from the Gas Safe Register.
Supporting information:	This unit is based on the core occupational requirements for a gas utilisation operative/engineer, specifically Install Gas Water Heating and Wet Central Heating Appliances (NOS EUSDSG3.3). The scope of work covered by this unit is the installation of gas water heaters and wet central heating appliances from the appliance isolation valve, including fixing the appliance to the wall, connecting and assembling the chimney components to the appliance, and connecting the appliance to water supplies. Electrical connection will be made either to an existing 13 amp 240 volt plug socket, fused socket outlet or to a suitable connection point on the central heating wiring system. The range of appliances, fitted in domestic and or small commercial premises, covered by this unit are: • instantaneous water heaters not exceeding 70 kW net • storage hot water heating appliances not exceeding 70 kW net • traditional, system and combination boilers not exceeding 70 kW net • room sealed fanned draught appliances • condensing appliances.

Learning outcome

The learner will:

1 Be able to design gas systems for installing domestic gas water heaters and wet central heating appliances.

Assessment criteria

The learner can:

1.1 identify and record the customer's job requirements

1.2 compare the customer's job requirements with statutory and industry requirements and identify any conflicting issues

1.3 survey the work site consulting site diagrams for any key structural features that could affect the installation, recording details of any features that may affect the installation:

1.4 ensure the proposed positioning of the appliance meets the manufacturers' and industry standards' requirements for location and clearances

1.5 check that the availability of input services meet the appliance manufacturers' and industry standards' requirements

1.6 check and ensure the design of the proposed installation is in compliance with the appliance manufacturers' and industry standards requirements

1.7 prepare a range of design options to meet both customer and industry requirements, taking due consideration to costs

1.8 present design options to the customer

1.9 consult with the customer and obtain agreement to the design option that best meets all the requirements.

Learning outcome

The learner will:

2 Be able to plan and prepare work activities for installing domestic gas water heaters and wet central heating appliances.

Assessment criteria

The learner can:

2.1 apply a risk assessment and method statement to work activities

2.2 survey the work site for any pre-installation damage and defects to existing building features recording details of any issues

2.3 advise the property occupier of any defects found

2.4 protect the work site and the building fabric against possible damage whilst showing care and respect to the customer's property

2.5 obtain confirmation from the customer before the job starts

2.6 check and confirm that all materials, tools and equipment are available as required and are fit for purpose

2.7 check and confirm that the proposed siting of the appliance meets the appliance manufacturers' and industry standards' requirements

2.8 carry out checks and tests to confirm that the gas supply, water supply, electricity supply, provision of ventilation and chimney/flue, where necessary, meets the appliance manufacturers' and industry standards' requirements

2.9 confirm that the proposed siting of the gas supply meets industry standards' requirements in relation to other services

2.10 confirm the correct sizing of pipework to ensure minimum pressure loss across the installation

2.11 check the existing installation for unsafe situations applying the gas industry unsafe situations procedures to any identified unsafe situations

2.12 confirm the suitability of the proposed location of condensate disposal as required.

Learning outcome

The learner will:

3 Be able to de-commission domestic gas water heaters and wet central heating appliances.

Assessment criteria

The learner can:

3.1 check that the gas supply, water supply and electricity supply is in a condition that enables safe appliance de-commissioning

3.2 use the correct tools and equipment

3.3 use designated safe isolation methods, tests and procedures

3.4 take precautionary actions to ensure that temporarily de-commissioned appliances, systems and components do not present a safety hazard

3.5 permanently remove and disconnect appliances, gas system components, water system components and electricity system components, as necessary.

Learning outcome

The learner will:

4 Be able to install, exchange, and remove domestic gas water heaters and wet central heating appliances.

Assessment criteria

The learner can:

4.1 carry out preparatory work to meet the manufacturer's installation requirements

4.2 install the appliance minimising damage to customer property

4.3 use the correct tools and equipment

4.4 remove any existing gas, water and electricity system components required for the installation

4.5 fabricate gas, water and electricity system components required by the installation

4.6 position the appliance and confirm it meets the appliance manufacturers' and industry standards' requirements

4.7 provide the required ventilation for the appliance installation in accordance with manufacturers' requirements

4.8 ensure existing gas systems are clean and free from debris

4.9 connect the gas, water and electricity supply components to the appliance

4.10 connect the condensate disposal system to the appliance

4.11 install the chimney system and connect to the appliance, where required

4.12 use tightness testing and purging procedures to confirm the integrity of the installed gas system and appliance

4.13 use electrical testing procedures to confirm the integrity of the installed electrical system and appliance

4.14 use testing procedures to confirm the integrity of the chimney system and appliance flue seals according to appliance manufacturers' and industry standards' requirements, where necessary

4.15 carry out precautionary actions to prevent the unauthorised use of un-commissioned or potentially unsafe gas appliances by following isolation procedures and use of warning notices.

Learning outcome

The learner will:

5 Be able to pre-commission and commission domestic gas water heaters and wet central heating appliances.

Assessment criteria

The learner can:

5.1 confirm that the complete appliance installation complies with appliance manufacturers' and industry standards' requirements:

5.2 check that the condition of the gas, water and electricity systems will allow safe commissioning

5.3 use the correct tools and equipment

5.4 check and confirm the gas system operating pressures meet industry standards

5.5 check and confirm the appliance operating pressure and/or heat input meet appliance manufacturers' and industry standards' requirements

5.6 check the combustion performance visually and/or by combustion performance analysis as required:

5.7 test chimney performance and confirm it performs according to appliance manufacturers' and industry standards' requirements, where necessary

5.8 check the operation of the gas appliance and components to ensure they function safely and operate in accordance with manufacturers' instructions

5.9 check the electrical system and components function safely and operate in accordance with the manufacturers' instructions

5.10 instruct the customer on the correct operation of the appliance and associated gas system providing the customer with a copy of the appliance manufacturer's instructions

5.11 check the operation of the condensate disposal system.

Learning outcome

The learner will:

6 Be able to use and communicate information to carry out de-commissioning, installation and commissioning work.

Assessment criteria

The learner can:

6.1 liaise with the property occupier and other people who will be affected by the work processes to minimise disturbance to the job

6.2 ensure the work is completed in accordance with appliance manufacturers' and industry standards' requirements

6.3 advise any delays to the work to any **persons** who are affected by the delay in a timely manner

6.4 advise appropriate **persons** who need to be informed of unsafe situations and actions required to remedy those situations

6.5 check that the customer is satisfied with the finished job

6.6 complete documentation to confirm the safe commissioning of the gas appliance and components

6.7 complete gas appliance and system commissioning and de-commissioning records

6.8 submit details of installation and exchange appliance(s) to a gas work notification scheme.

Range

Persons

Customers, line managers, other trades.

Learning outcome

The learner will:

7 Be able to resolve problems that could affect the de-commissioning, installation and commissioning process.

Assessment criteria

The learner can:

7.1 report deficiencies with **supply services**

7.2 resolve **problems** in accordance with approved procedures where pre-commissioning checks and tests reveal defects

7.3 resolve **problems** in accordance with approved procedures when the installation being commissioned does not meet design requirements

7.4 resolve **problems** in accordance with approved procedures when the installation cannot be restored to full performance.

Range

Supply services

Gas, water, electricity.

Problems

In relation to the gas appliance, gas supply/installation and components.

Learning outcome

The learner will:

8 Know how to install, commission and de-commission domestic gas water heaters and wet central heating appliances.

Assessment criteria

The learner can:

8.1 describe the health, safety and environmental factors that need to be incorporated in risk assessments for the domestic installation process

8.2 explain the processes for ordering, supplying, checking and delivery of equipment, materials and components required for the work activity

8.3 explain how to safely secure and store tools, equipment, materials and components

8.4 describe the potential hazards that could arise from all activities and the checks to be carried out before work takes place

8.5 explain the steps to take should materials, components, tools and equipment not be available at the site

8.6 describe how to confirm that the gas supply, electric supply, chimney system and ventilation requirements are adequate for installation of the new gas appliance, gas system and components

8.7 describe measures to prevent de-commissioned gas appliances or systems being brought into operation utilising safety and warning notices

8.8 summarise the points in the work process where co-operation and liaison with other trades and property occupier may be required

8.9 describe the routines and sequences for installing and commissioning domestic gas water heaters and wet central heating appliances, gas systems and components

8.10 explain the procedures for checking the correct operation and performance of domestic gas water heaters and wet central heating appliances, gas systems and components

8.11 explain the procedures for checking and confirming the gas system operating pressures

8.12 explain the procedures for checking and confirming the appliance operating pressure and the heat input

8.13 describe the tests, checks and use of combustion performance analysers that confirm the suitability of the gas combustion performance

8.14 describe the tests and checks to confirm the integrity, suitability and performance of the chimney system

8.15 describe the tests and checks to confirm the suitability and performance of the ventilation

8.16 explain how to complete all installation and commissioning documentation and records to be left with the property occupier

8.17 describe measures to prevent un-commissioned gas appliances and gas systems being brought into operation utilising safety and warning notices

8.18 explain the system handover procedures and demonstrate the operation of domestic gas water heaters and wet central heating appliances, gas systems and components to end users

8.19 describe how to safely collect and dispose of system contents that may be hazardous to health or the environment

8.20 explain how to isolate unsafe gas appliances, gas systems and components and application of the gas industry unsafe situations procedure.

Unit 312 Maintain gas water heating and wet central heating appliances

Unit level:	3
GLH:	64
Unit aim:	The aim of this unit is to develop the competencies necessary to maintain domestic water heating and wet central heating gas appliances. This unit will provide evidence of competence to enable an individual to apply for a 'licence to practice' from the Gas Safe Register.
Supporting information:	This unit is based on the core occupational requirements for a gas utilisation operative/engineer, specifically Maintain Gas Water Heating and Wet Central Heating Appliances (NOS EUSDSG3.4). The scope of work covered by this unit is the maintenance of gas water heaters and wet central heating appliances from the appliance isolation valve. The range of appliances, fitted in domestic and or small commercial premises, covered by this unit are: • instantaneous water heaters not exceeding 70 kW net • storage hot water heating appliances not exceeding 70 kW net • traditional, system and combination boilers not exceeding 70 kW net • room sealed fanned draught appliances • condensing appliances •

Learning outcome

The learner will:

1 Be able to plan and prepare work activities for maintaining water heating and wet central heating appliances.

Assessment criteria

The learner can:

1.1 apply a risk assessment and method statement to work activities

1.2 survey the work site for any pre-maintenance damage and defects to existing building features recording details of any issues

1.3 advise the property occupier of any defects found

1.4 protect the work site and the building fabric against possible damage whilst showing care and respect to the customer's property

1.5 obtain confirmation from the property occupier before the job starts

1.6 check and confirm all materials, tools and equipment are available as required and are fit for purpose

1.7 check and confirm that the siting of the appliance meets the appliance manufacturers' and industry standards' requirements

1.8 carry out checks and tests to confirm that the gas supply, water supply, electricity supply, provision of ventilation and chimney/flue, where necessary, meets the appliance manufacturers' and industry standards' requirements

1.9 check the existing installation for unsafe situations applying the gas industry unsafe situations procedures to any identified unsafe situations

1.10 check location of condensate disposal is in compliance with appliance manufacturers' and industry standards' requirements.

Learning outcome

The learner will:

2 Be able to de-commission water heating and wet central heating appliances to industry standards.

Assessment criteria

The learner can:

2.1 check that the gas supply, water supply and electricity supply is in a condition that enables safe appliance de-commissioning

2.2 use the correct tools and equipment

2.3 use designated safe isolation methods, tests and procedures

2.4 take precautionary actions to ensure that temporarily de-commissioned appliances, systems and components do not present a safety hazard

2.5 permanently remove and disconnect appliances, gas system components, water system components and electricity system components.

Learning outcome

The learner will:

3 Be able to maintain domestic water heating and wet central heating appliances to industry standards.

Assessment criteria

The learner can:

3.1 carry out preparatory work to meet the manufacturers' maintenance requirements

3.2 remove existing gas, water and electricity system components as required by the maintenance activities

3.3 carry out the maintenance process in accordance with appliance manufacturers' and industry standards' requirements

3.4 carry out the maintenance process, minimising damage to customer property

3.5 use the correct tools and equipment

3.6 re-position the appliance and confirm it meets the appliance manufacturers' and industry standards' requirements

3.7 check existing ventilation for appliances and system meets the appliance manufacturers' and industry standards' requirements

3.8 ensure existing gas systems are clean and free of debris

3.9 re-connect the gas, water and electricity supply components to the appliance

3.10 use tightness testing and purging procedures to confirm the integrity of the re-connected gas system and appliance

3.11 use electrical testing procedures to confirm the integrity of the re-installed electrical system and appliance

3.12 use testing procedures to confirm the integrity of the existing chimney system and appliance flue seals according to appliance manufacturers' and industry standards' requirements, where necessary.

Learning outcome

The learner will:

4 Be able to pre-commission and commission water heating and wet central heating appliances to industry standards.

Assessment criteria

The learner can:

4.1 confirm the complete appliance installation complies with appliance manufacturers' and industry standards' requirements

4.2 check that the condition of the gas, water and electricity systems will allow safe commissioning

4.3 use the correct tools and equipment

4.4 check and confirm that the gas system operating pressures meet industry standards

4.5 check and confirm the appliance operating pressure and/or heat input meet appliance manufacturers' and industry standards' requirements

4.6 check the combustion performance visually and/or by combustion performance analysis as required

4.7 test chimney performance and reconfirm it performs according to appliance manufacturers' and industry standards' requirements, where necessary

4.8 check the operation of the gas appliance and components to ensure they function safely and operate in accordance with manufacturers' instructions

4.9 check the electrical system and components function safely and operate in accordance with the manufacturers' instructions

4.10 explain to the customer the correct operation of the appliance and associated gas system returning to them the appliance manufacturer's instructions

4.11 carry out precautionary actions to prevent the unauthorised use of potentially unsafe gas appliances by following isolation procedures and use of warning notices

Learning outcome

The learner will:

5 Be able to use and communicate information to carry out de-commissioning, maintenance and commissioning work

Assessment criteria

The learner can:

5.1 liaise with the property occupier and other people who will be affected by the work processes to minimise disturbance to the job

5.2 ensure the work is completed in accordance with appliance manufacturers' and industry standards' requirements

5.3 advise any delays to the work to any **persons** who are affected by the delay in a timely manner

5.4 advise appropriate persons who need to be informed of unsafe situations and actions required to remedy those situations

5.5 check that the customer is satisfied with the finished job

5.6 complete documentation confirming the safe maintenance of the gas appliance and components

5.7 complete gas appliance and system commissioning and de-commissioning records.

Range

Persons

Customers, line managers, other trades

Learning outcome

The learner will:

6 Be able to resolve problems that could affect the de-commissioning, maintenance and commissioning process

Assessment criteria

The learner can:

6.1 report deficiencies with **supply services**

6.2 resolve **problems** in accordance with approved procedures where pre-maintenance checks and tests reveal defects

6.3 resolve **problems** in accordance with approved procedures when the maintained equipment cannot be restored to full performance

Range

Supply services

Gas, water and electricity.

Problems

In relation to the gas appliance, gas supply/installation and components.

Learning outcome

The learner will:

7 Know how to maintain water heating and wet central heating appliances.

Assessment criteria

The learner can:

7.1 describe the health, safety and environmental factors that need to be incorporated in risk assessments for the domestic maintenance process

7.2 explain the processes for ordering, supplying, checking and delivery of equipment, materials and components required for work activity

7.3 explain how to safely secure and store tools, equipment, materials and components

7.4 describe the potential hazards that could arise from all de-commissioning, maintenance and commissioning activities and the checks to be carried out before work takes place

7.5 explain the steps to take should materials, components, tools and equipment not be available at the site to commence the de-commissioning, maintenance and commissioning activity

7.6 describe how to confirm that the gas supply, electric supply, chimney system and ventilation requirements are adequate for an existing gas appliances, gas system and components

7.7 describe measures to prevent de-commissioned gas appliances or systems being brought into operation utilising safety and warning notices

7.8 summarise the points in the work process where co-operation and liaison with other trades and property occupier may be required

7.9 state the positioning and fixing requirements for water heating and wet central heating gas appliances, systems and components in; airing cupboards, compartments, roof spaces and external installations in order to comply with the manufacturers' and industry standards' requirements

7.10 explain the manufacturers' and industry standards' requirements for the positioning and the installation of condensate drain for condensing boilers

7.11 describe the routines and sequences for maintaining and re-commissioning domestic gas water heating and wet central heating appliances, gas systems and components

7.12 explain the procedures for checking the correct operation and performance of domestic gas water heating and wet central heating appliances, gas systems and components

7.13 explain the procedures for checking that the hot water performance of domestic gas water heating appliances and combination boilers complies with the manufacturers' specification

7.14 explain the procedures for checking and confirming the gas system operating pressures

7.15 explain the procedures for checking and confirming the appliance operating pressure and the heat input

7.16 describe the tests, checks and use of combustion performance analysers that confirm the suitability of the gas combustion performance

7.17 describe the tests and checks to confirm the integrity, suitability and performance of the chimney system

7.18 describe the tests and checks to confirm the suitability and performance of the ventilation

7.19 describe how to complete all maintenance documentation and records to be left with the property occupier

7.20 describe the measures to prevent un-commissioned gas appliances and gas systems being brought into operation utilising safety and warning notices

7.21 explain the system handover procedures and demonstrate the operation of domestic gas water heating and wet central heating appliances, gas systems and components to end users

7.22 describe how to safely collect and dispose of system contents that may be hazardous to health or the environment

7.23 explain how to isolate unsafe gas appliances, gas systems and components and application of the gas industry unsafe situations procedure.

Unit 313 Install domestic gas space heating appliances

Unit level:	Level 3
GLH:	68
Unit aim:	The aim of this unit is to develop the competencies necessary to install, commission and decommission gas space heating appliances. This unit will provide evidence of competence to enable an individual to apply for a 'licence to practice' from the Gas Safe Register.
Supporting information:	This unit is based on the core occupational requirements for a gas utilisation operative/engineer, specifically Install Domestic Gas Space Heating Appliances (NOS EUSDSG3.7). The scope of work covered by this unit is the installation of domestic gas space heating appliances from the appliance isolation valve . Electrical connection (where necessary) will be made to an existing 13 amp 240 volt plug socket adjacent to the appliance. The range of space heating appliances covered by this unit are: • outset gas fires • inset live fuel effect (ILFE) gas fires • decorative fuel effect (DFE) appliances • heating stoves • convector heaters • flueless appliances • open flued appliances (natural and fanned draught) • room sealed appliances (natural and fanned draught).

Learning outcome

The learner will:

1 Be able to design gas systems for installing domestic gas space heating appliances.

Assessment criteria

The learner can:

1.1 identify and record the customer's job requirements

1.2 compare the customer's job requirements with statutory and industry requirements and identify any conflicting issues

1.3 survey the work site consulting site diagrams for any key structural features that could affect the installation, recording details of any features that may affect the installation

1.4 ensure the proposed positioning of the appliance meets the manufacturers' and industry standards' requirements for location and clearances

1.5 check that the availability of input services meet the appliance manufacturers' and industry standards' requirements

1.6 check and ensure the design of the proposed installation is in compliance with the appliance manufacturers' and industry standards' requirements

1.7 prepare a range of design options to meet both customer and industry requirements, taking due consideration to costs

1.8 present design options to the customer

1.9 consult with the customer and obtain agreement to the design option that best meets all the requirements.

Learning outcome

The learner will:

2 Be able to plan and prepare work activities for installing domestic gas space heating appliances.

Assessment criteria

The learner can:

2.1 apply a risk assessment and method statement to work activities

2.2 survey the work site for any pre-installation damage and defects to existing building features recording details of any issues

2.3 advise the property occupier of any defects found

2.4 protect the work site and the building fabric against possible damage whilst showing care and respect to the customer's property

2.5 obtain confirmation from the customer before the job starts

2.6 check and confirm that all materials, tools and equipment are available as required and are fit for purpose

2.7 check and confirm that the proposed siting of the appliance meets the appliance manufacturers' and industry standards' requirements

2.8 carry out checks and tests to confirm that the gas supply, electricity supply, provision of ventilation and chimney/flue, where necessary, meets the appliance manufacturers' and industry standards' requirements

2.9 confirm that the proposed siting of the gas supply meets industry standards' requirements in relation to other services

2.10 confirm the correct sizing of pipework to ensure minimum pressure loss across the installation

2.11 check the existing installation for unsafe situations applying the gas industry unsafe situations procedures to any identified unsafe situations.

Learning outcome

The learner will:

3 Be able to de-commission domestic gas space heating appliances.

Assessment criteria

The learner can:

3.1 check that the gas supply and electricity supply is in a condition that enables safe appliance de-commissioning

3.2 use the correct tools and equipment

3.3 use designated safe isolation methods, tests and procedures

3.4 take precautionary actions to ensure that temporarily de-commissioned appliances, systems and components do not present a safety hazard

3.5 permanently remove and disconnect appliances, gas system components and electricity system components, as necessary.

Learning outcome

The learner will:

4 Be able to install, exchange, and remove domestic gas space heating appliances.

Assessment criteria

The learner can:

4.1 carry out preparatory work to meet the manufacturers' installation requirements

4.2 install the appliance minimising damage to customer property

4.3 use the correct tools and equipment

4.4 remove any existing gas and electricity system components required for the installation

4.5 fabricate gas and electricity system components required by the installation

4.6 position the appliance and confirm it meets the appliance manufacturers' and industry standards' requirements

4.7 provide the required ventilation for the appliance installation in accordance with manufacturers' requirements

4.8 ensure existing gas system is clean and free of debris

4.9 connect the gas and electricity supply components to the appliance

4.10 install the chimney system and connect to the appliance, where required

4.11 use tightness testing and purging procedures to confirm the integrity of the installed gas system and appliance

4.12 use electrical testing procedures to confirm the integrity of the installed electrical system and appliance

4.13 use testing procedures to confirm the integrity of the chimney system and appliance flue seals according to appliance manufacturers' and industry standards' requirements, where necessary

4.14 carry out precautionary actions to prevent the unauthorised use of un-commissioned or potentially unsafe gas appliances by following isolation procedures and use of warning notices.

Learning outcome

The learner will:

5 Be able to pre-commission and commission domestic gas space heating appliances.

Assessment criteria

The learner can:

5.1 confirm that the complete appliance installation complies with appliance manufacturers' and industry standards' requirements

5.2 check that the condition of the gas and electricity systems will allow safe commissioning

5.3 use the correct tools and equipment

5.4 check and confirm the gas system operating pressures meet industry standards

5.5 check and confirm the appliance operating pressure and / or heat input meet appliance manufacturers' and industry standards' requirements

5.6 check the combustion performance visually and/or by combustion performance analysis as required

5.7 test chimney performance and confirm it performs according to appliance manufacturer's and industry standards requirements, where necessary

5.8 check the operation of the gas appliance and components to ensure they function safely and operate in accordance with manufacturers' instructions

5.9 check the electrical system and components function safely and operate in accordance with the manufacturers' instructions

5.10 instruct the customer on the correct operation of the appliance and associated gas system providing the customer with a copy of the appliance manufacturer's instructions.

Learning outcome

The learner will:

6 Be able to use and communicate information to carry out de-commissioning, installation and commissioning work.

Assessment criteria

The learner can:

6.1 liaise with the property occupier and other people who will be affected by the work processes to minimise disturbance to the job

6.2 ensure the work is completed in accordance with appliance manufacturers' and industry standards' requirements

6.3 advise any delays to the work to any **persons** who are affected by the delay in a timely manner

6.4 advise appropriate persons who need to be informed of unsafe situations and actions required to remedy those situations

6.5 check that the customer is satisfied with the finished job

6.6 complete documentation to confirm the safe commissioning of the gas appliance and components

6.7 complete gas appliance and system commissioning and de-commissioning records

6.8 submit details of installation and exchange appliance(s) to a gas work notification scheme.

Range

Persons

Customers, line managers and other trades.

Learning outcome

The learner will:

7 Be able to resolve problems that could affect the de-commissioning, installation and commissioning process.

Assessment criteria

The learner can:

7.1 report deficiencies with **supply systems**

7.2 resolve **problems** in accordance with approved procedures where pre-commissioning checks and tests reveal defects

7.3 resolve **problems** in accordance with approved procedures when the installation being commissioned does not meet design requirements

7.4 resolve problems in accordance with approved procedures when the installation cannot be restored to full performance.

Range

Supply systems

Gas and electricity.

Problems

In relation to the gas appliance, gas supply/installation and components.

Learning outcome

The learner will:

8 Know how to install domestic gas space heating appliances.

Assessment criteria

The learner can:

8.1 describe the health, safety and environmental factors that need to be incorporated in risk assessments for the domestic installation process

8.2 explain the processes for ordering, supplying, checking and delivery of equipment, materials and components required for the work activity

8.3 explain how to safely secure and store tools, equipment, materials and components

8.4 describe the potential hazards that could arise from all activities and the checks to be carried out before work takes place

8.5 explain the steps to take should materials, components, tools and equipment not be available at the site

8.6 describe how to confirm that the gas supply, electric supply, chimney system and ventilation requirements are adequate for installation of the new gas appliance, gas system and components

8.7 describe measures to prevent de-commissioned gas appliances or systems being brought into operation utilising safety and warning notices

8.8 summarise the points in the work process where co-operation and liaison with other trades and property occupier may be required

8.9 describe the routines and sequences for installing and commissioning domestic gas space heating appliances, gas systems and components

8.10 explain the procedures for checking the correct operation and performance of domestic gas space heating appliances, gas systems and components

8.11 explain the procedures for checking and confirming the gas system operating pressures

8.12 explain the procedures for checking and confirming the appliance operating pressure and the heat input

8.13 describe the tests, checks and use of combustion performance analysers that confirm the suitability of the gas combustion performance

8.14 describe the tests and checks to confirm the integrity, suitability and performance of the chimney system

8.15 describe the tests and checks to confirm the suitability and performance of the ventilation

8.16 explain how to complete all installation and commissioning documentation and records to be left with the property occupier

8.17 describe the measures to prevent un-commissioned gas appliances and gas systems being brought into operation utilising safety and warning notices

8.18 explain the system handover procedures and demonstrate the operation of domestic gas space heating appliances, gas systems and components to end users

8.19 describe how to safely collect and dispose of system contents that may be hazardous to health or the environment

8.20 explain how to isolate unsafe gas appliances, gas systems and components and application of the gas industry unsafe situations procedure.

Unit 314 Maintain domestic gas space heating appliances

Unit level:	3
GLH:	68
Unit aim:	The aim of this unit is to develop the competencies necessary to maintain domestic gas space heating appliances. This unit will provide evidence of competence to enable an individual to apply for a 'licence to practice' from the Gas Safe Register.
Supporting information:	This unit is based on the core occupational requirements for a gas utilisation operative/engineer, specifically Maintain Domestic Gas Space Heating Appliances (NOS EUSDSG3.8). The scope of work covered by this unit is the maintenance of domestic gas space heating appliances from the appliance isolation valve. The range of space heating appliances covered by this unit are: • outset gas fires • inset live fuel effect (ILFE) gas fires • decorative fuel effect (DFE) appliances • heating stoves • convector heaters • flueless appliances • open flued appliances (natural and fanned draught) • room sealed appliances (natural and fanned draught).

Learning outcome

The learner will:

1 Be able to plan and prepare work activities for maintaining domestic gas fires and wall heaters.

Assessment criteria

The learner can:

1.1 apply a risk assessment and method statement to work activities

1.2 survey the work site for any pre-maintenance damage and defects to existing building features recording details of any issues

1.3 advise the property occupier of any defects found

1.4 protect the work site and the building fabric against possible damage whilst showing care and respect to the customer's property

1.5 obtain confirmation from the property occupier before the job starts

1.6 check and confirm all materials, tools and equipment necessary are available as required and are fit for purpose

1.7 check and confirm that the siting of the appliance meets the appliance manufacturers' and industry standards' requirements

1.8 carry out checks and tests to confirm that the gas supply, electricity supply, provision of ventilation and chimney/flue, where necessary, meets the appliance manufacturers' and industry standards' requirements

1.9 check the existing installation for unsafe situations applying the gas industry unsafe situations procedures to any identified unsafe situations.

Learning outcome

The learner will:

2 Be able to de-commission domestic gas fires and wall heaters to industry standards.

Assessment criteria

The learner can:

2.1 check that the gas supply and electricity supply is in a condition that enables safe appliance de-commissioning

2.2 use the correct tools and equipment

2.3 use designated safe isolation methods, tests and procedures

2.4 take precautionary actions to ensure that temporarily de-commissioned appliances, systems and components do not present a safety hazard

2.5 permanently remove and disconnect appliances, gas system components and electricity system components, as necessary.

Learning outcome

The learner will:

3 Be able to maintain domestic gas fires and wall heaters appliances to industry standards.

Assessment criteria

The learner can:

3.1 carry out preparatory work to meet the manufacturers' maintenance requirements

3.2 remove existing gas and electricity system components as required by the maintenance activities

3.3 carry out the maintenance process in accordance with appliance manufacturers' and industry standards' requirements

3.4 carry out the maintenance process minimising damage to customer property

3.5 use the correct tools and equipment

3.6 re-position the appliance and confirm it meets the appliance manufacturers' and industry standards' requirements

3.7 check existing ventilation for appliances and system meets the appliance manufacturers' and industry standards' requirements

3.8 ensure existing gas systems are clean and free of debris

3.9 re-connect the gas and electricity supply components to the appliance

3.10 use tightness testing and purging procedures to confirm the integrity of the re-connected gas system and appliance

3.11 use electrical testing procedures to confirm the integrity of the re-installed electrical system and appliance

3.12 use testing procedures to confirm the integrity of the existing chimney system and appliance flue seals according to appliance manufacturers' and industry standards' requirements, where necessary.

Learning outcome

The learner will:

4 Be able to pre-commission and commission domestic gas fires and wall heaters to industry standards.

Assessment criteria

The learner can:

4.1 confirm the complete appliance installation complies with appliance manufacturers' and industry standards' requirements

4.2 check that the condition of the gas and electricity systems will allow safe commissioning

4.3 use the correct tools and equipment

4.4 check and confirm the gas system operating pressures meet industry standards

4.5 check and confirm the appliance operating pressure and/or heat input meet appliance manufacturers' and industry standards' requirements

4.6 check the combustion performance visually and/or by combustion performance analysis as required

4.7 test chimney performance and reconfirm it performs according to appliance manufacturers' and industry standards' requirements, where necessary

4.8 check the operation of the gas appliance and components to ensure they function safely and operate in accordance with manufacturers' instructions

4.9 check the electrical system and components function safely and operate in accordance with the manufacturers' instructions

4.10 explain to the customer the correct operation of the appliance and associated gas system returning to them the appliance manufacturer's instructions

4.11 carry out precautionary actions to prevent the unauthorised use of potentially unsafe gas appliances by following isolation procedures and use of warning notices.

Learning outcome

The learner will:

5 Be able to use and communicate information to carry out de-commissioning, maintenance and commissioning work.

Assessment criteria

The learner can:

5.1 liaise with the property occupier and other people who will be affected by the work processes to minimise disturbance to the job

5.2 ensure the work is completed in accordance with appliance manufacturers' and industry standards' requirements

5.3 advise any delays to the work to any **persons** who are affected by the delay in a timely manner

5.4 advise appropriate persons who need to be informed of unsafe situations and actions required to remedy those situations

5.5 check that the customer is satisfied with the finished job

5.6 complete records confirming the safe maintenance of the gas appliance and components

5.7 complete gas appliance and system commissioning and de-commissioning records.

Range

Persons

Customers, line managers, other trades.

Learning outcome

The learner will:

6 Be able to resolve problems that could affect the de-commissioning, maintenance and commissioning process.

Assessment criteria

The learner can:

6.1 report deficiencies with **supply services**

6.2 resolve **problems** in accordance with approved procedures where pre-maintenance checks and tests reveal defects

6.3 resolve **problems** in accordance with approved procedures when the maintained equipment cannot be restored to full performance:

Range

Supply services

Gas and electricity.

Problems

In relation to the gas appliance, gas supply/installation and components.

Learning outcome

The learner will:

7 Know how to maintain domestic gas space heating appliances.

Assessment criteria

The learner can:

7.1 describe the health, safety and environmental factors that need to be incorporated in risk assessments for the domestic maintenance process

7.2 explain the processes for ordering, supplying, checking and delivery of equipment, materials and components required for the work activity

7.3 explain how to safely secure and store tools, equipment, materials and components

7.4 describe the potential hazards that could arise from all de-commissioning, maintenance and commissioning activities and the checks to be carried out before work takes place

7.5 explain the steps to take should materials, components, tools and equipment not be available at the site to commence the de-commissioning, maintenance and commissioning activity

7.6 demonstrate how to confirm that the gas supply, electric supply, chimney system and ventilation requirements are adequate for an existing gas appliance, gas systems and components

7.7 describe measures to prevent de-commissioned gas appliances or systems being brought into operation utilising safety and warning notices

7.8 summarise the points in the work process where co-operation and liaison with other trades and property occupier may be required

7.9 describe the routines and sequences for maintaining and re-commissioning domestic gas space heating appliances, gas systems and components

7.10 explain the procedures for checking the correct operation and performance of domestic gas space heating appliances, gas systems and components

7.11 explain the procedures for checking and confirming the gas system operating pressures

7.12 explain the procedures for checking and confirming the appliance operating pressure and the heat input

7.13 describe the tests, checks and use of combustion performance analysers that confirm the suitability of the gas combustion performance

7.14 describe the tests and checks to confirm the integrity, suitability and performance of the chimney system

7.15 describe the tests and checks to confirm the suitability and performance of the ventilation

7.16 describe how to complete all maintenance documentation and records to be left with the property occupier

7.17 describe the measures to prevent un-commissioned gas appliances and gas systems being brought into operation utilising safety and warning notices

7.18 explain the system handover procedures and demonstrate the operation of domestic gas space heating appliances, gas systems and components to end users

7.19 describe how to safely collect and dispose of system contents that may be hazardous to health or the environment

7.20 explain how to isolate unsafe gas appliances, gas systems and components and application of the gas industry unsafe situations procedure.

Unit 315 The installation, commissioning and safety aspects of hot water systems for domestic use in accordance with UK building regulations

Unit level:	3
GLH:	14
Unit aim:	The purpose and aim of this unit is to enable learners to develop the underpinning knowledge and skills required: • prior to progressing to assessment of occupational competence • to enable existing workers in the occupation to update their professional competence • to extend their range of work.
Supporting information:	This unit is based on the core occupational requirements for Hot Water Systems (CPS Provider Requirement). This unit is assessed in a realistic work environment (RWE) using a fully functioning unvented hot water system although rigs may be used for training purposes. Learners undertaking this unit are expected to have industry experience in hot water systems

Learning outcome

The learner will:

1 Understand the types and configurations of vented/unvented hot water systems including the design installation requirements.

Assessment criteria

The learner can:

1.1 explain types of **domestic hot water supply systems**

1.2 describe types of **unvented/vented hot water systems**

1.3 identify hot water system pipework layout **features** including systems with secondary circulation

1.4 state the recommended design temperatures within **hot water systems**:

1.5 identify the **layout requirements, location and safety features** for unvented/vented hot water systems.

Range

Domestic hot water supply systems

Centralised systems, unvented hot water systems, open vented hot water systems, localised systems, unvented point of use heaters, instantaneous heaters.

Unvented/vented hot water systems

Indirect storage systems (include water jacketed tube heaters), direct storage systems, electrically heated, gas or oil fired, small point of use (under sink), bulk storage heaters (combination tank), solar thermal hot water systems, combination boilers.

Features

Direct and indirect vented and unvented, direct and indirect cylinders, solar thermal, thermal stores, combination boilers, secondary circulation (including location of pump and type, automated timing devices, methods of balancing systems.

Hot water systems

Hot water storage vessels, hot water delivery, secondary return, point of use (including instantaneous heaters, storage system, fixed bath, basin, blending valve installations).

Layout requirements, location and safety features

Expansion and temperature relief pipework and vent pipes.

Learning outcome

The learner will:

2 Know the types and operation of specialist components used in hot water systems.

Assessment criteria

The learner can:

2.1 state methods of preventing stored water from exceeding 100°C

2.2 state the minimum number of independent safety devices required to prevent overheating in unvented hot water systems

2.3 state the expansion rate of water when converted to steam

2.4 explain the working principle of **functional devices** in unvented hot water systems.

Range

Functional devices

Line strainer, pressure reducing valve, check valves, expansion device (vessel or integral to cylinder), tundish, composite valve, thermostats, temperature controls.

Learning outcome

The learner will:

3 Understand the design requirements for hot water systems.

Assessment criteria

The learner can:

3.1 identify factors affecting the selection of hot water systems for domestic use

3.2 explain how to minimise bacterial growth in hot water systems

3.3 state the **criteria** for selecting hot water system and component types

3.4 state which regulation applies to the installation of unvented hot water systems of more than 45kW and a capacity of 500 litres

3.5 state which documents should be used when designing domestic hot water systems.

Range

Criteria

Occupiers needs or usage (maximum usage of water per person per day), building layout and features, suitability of system, water efficiency, environmental impact, energy efficiency.

Learning outcome

The learner will:

4 Know the installation and safety features of hot water systems and components.

Assessment criteria

The learner can:

4.1 state the effects of unbalanced supply pressures in hot water systems

4.2 state the take off point on a cold water supply to maintain a balanced hot and cold water supply

4.3 state the additional safety components where multiple heat sources exist

4.4 identify the positioning and fixing requirements of **components** used in unvented hot water systems

4.5 state the installation, fixing and sizing requirements for **safety relief pipework**.

Range

Components

Control thermostat, overheat thermostat, temperature relief valve, line strainer, pressure reducing valve, check valves, expansion device, expansion relief valve, composite valves, tundish arrangements.

Safety relief pipework

Discharge D1, discharge D2, tundish, multiple discharge pipe arrangements from safety devices, termination.

Learning outcome

The learner will:

5 Know the requirements for the installation of cold water components associated with hot water systems.

Assessment criteria

The learner can:

5.1 describe the installation and siting requirements of cold water cisterns

5.2 describe the requirements for positioning a cold water pipe in relation to sources of heat.

Learning outcome

The learner will:

6 Be able to diagnose faults in hot water systems and components.

Assessment criteria

The learner can:

6.1 carry out diagnosis of hot water systems installation and **component** faults

6.2 confirm the correct operation of system **components** and safety valves

6.3 confirm the actions required to rectify the diagnosed faults.

Range

Components

Thermostats, expansion and pressure vessels, temperature relief, expansion relief, discharge pipework.

Learning outcome

The learner will:

7 Know the commissioning requirements of hot water systems and components in accordance with design specifications.

Assessment criteria

The learner can:

7.1 state the checks to be carried out during a visual inspection

7.2 describe the commissioning procedure for an unvented hot water system

7.3 describe the procedure for carrying out a soundness test on a **hot water system**

7.4 describe the flushing procedure after completion of a soundness test.

Range

Hot water system

Metallic systems and plastic pipework systems.

Learning outcome

The learner will:

8 Be able to carry out the commissioning of hot water systems.

Assessment criterion

The learner can:

8.1 carry out the commissioning of a hot water system.

Learning outcome

The learner will:

9 Be able to confirm that unvented hot water systems have been serviced in accordance with manufacturer's instructions.

Assessment criterion

The learner can:

9.1 demonstrate service procedures on an unvented hot water storage system.

Unit 316 Central heating systems

Unit level:	3
GLH:	140
Unit aim:	The aim of the unit is to develop the competencies necessary to install and maintain central heating systems
Supporting information:	This unit is based on the core occupational requirements for Heating (CPS Provider Requirement). This unit is assessed by simulated means in a realistic work environment (RWE). The training equipment required is indicated in the range statements.

Learning outcome

The learner will:

1 Understand how to install central heating systems.

Assessment criteria

The learner can:

1.1 identify **types** and **layout** features of **heating systems**

1.2 state advantages and disadvantages of **heating systems**

1.3 identify typical pipe sizes used in central heating systems **types** within dwellings

1.4 describe working principles of central heating systems types, positioning fixing, connection and operation of **components**

1.5 explain the importance of pump positioning

1.6 identify operating **principles** for system control

1.7 define zoning and control requirements of central heating systems in accordance with statutory legislation

1.8 describe insulation requirements and system frost protection

1.9 identify the positioning and fixing of pipework within the **building fabric**

1.10 explain expansion and contraction in central heating systems and negative effects

1.11 identify **sources of information** required when undertaking work on central heating systems

1.12 describe procedures for filling and venting system **types**

1.13 state the operating principles of **heat producing appliances**

1.14 **install** central heating systems.

Range

Types

Pumped heating gravity hot water, fully pumped, 2 x two port valves (S plan), fully pumped, 3 x two port valves (S plan+), fully pumped, 3 port valve (mid position/diverting) (Y/W plans), combination boiler, system boiler, vented/unvented.

Layout

One pipe, two pipe, manifold (micro and mini-bore), underfloor heating.

Heating systems

Wet central heating, warm air, storage heaters, district heating.

Components

Radiator valves (thermostatic and manual), automatic air vents, filling loop, pressure gauge, feed and expansion cistern, circulating pumps, drain valves, additive, pressure relief valves, zone valves (2 port, 3 port, mid position and diverter), low loss headers for multiple boiler installation, programmer, timer, thermostats, programmable room stat, optimizer, frost stat, wiring centre, cylinder stat, expansion vesse, automatic by-pass, heat emitters, insulation, pipework.

Principles

Time, temperature, weather compensation, delayed start, optimum star, home automation systems, multiple boiler control, zoning requirements.

Building fabric

Suspended timber floors, solid floors, embedded in walls, in areas of the building subject to frost, weight distribution of boilers.

Sources of information

Statutory regulations, industry standard, manufacturer technical instructions.

Heat producing appliances

Traditional boilers, condensing boilers, combination boilers, freestanding boilers, wall-mounted boilers.

Install

Boiler/jig, pump, radiator, radiator valves, controls, valves, pipework.

Learning outcome

The learner will:

2 Be able to decommission central heating systems.

Assessment criteria

The learner can:

2.1 explain procedures for **decommissioning** systems

2.2 carry out decommissioning **procedures**.

Range

Decommissioning

Permanent and temporary.

Procedures

Notify relevant person, Isolation of the fuel/electricity supply to the system as appropriate, isolate water supply, apply warning notices and signs, drain system to a suitable location, appropriately dispose of contents and any additives, continuity bonding as required, temporary capping of pipework sections as required, notify building users, alternative source of heat or supplies as required.

Learning outcome

The learner will:

3 Be able to commission central heating systems.

Assessment criteria

The learner can:

3.1 undertake a **soundness test** to industry requirements on central heating system metallic and plastic pipework and components

3.2 carry out **commissioning procedures** for central heating systems

3.3 complete commissioning documentation.

Range

Soundness test

Visual inspection, notify, inital fill, stabilisation, test to required pressure, check for leaks, check pressures after test period, complete documentation and notify as required**.**

Commissioning procedure

Visual inspection, fill and vent (inhibitor and descaler), flush (cold, hot, neutralisers, cleanser), operational checks (temperature, flow rate, pressure, operation of controls), commissioning documentation, handover procedure.

Learning outcome

The learner will:

4 Be able to fault diagnosis on central heating systems.

Assessment criteria

The learner can:

4.1 describe methods of obtaining **information** on system faults

4.2 carry out diagnostic checks for a range of **faults**

4.3 carry out repair and rectification **procedures** to deal with a range of faults.

Range

Information

From end user, manufacturer's instruction, fault diagnosis flow chart and service history.

Faults

Pumping over, persistent venting, emitter cold spots, stuck TRVs, motorised valves not operating, incorrect pressures, expansion vessel failure, heat exchanger, blockages, pump failure, thermostat, programmer, pressure relief valve, incorrect support to system pipework and components, excessive noise in pipework systems, feed and expansion cistern failure, leakage or ineffective operation of terminal fittings, stop and service valves and pipework.

Procedure

Diagnose, notify client, safely isolate, decommission, rectify, re-commission, hand over.

Unit 317 Water Supply (Water Fittings) Regulations and Water Byelaws in the UK

Unit level:	3
GLH:	13
Unit aim:	The aim of this unit is to provide candidates with the underpinning knowledge of the legal requirements for plumbing systems in the UK covered by Water Supply (Water Fittings) Regulations and Water Byelaws. The purpose of this unit is to enable: • learners to develop the underpinning knowledge and skills required • existing workers in the occupation to develop their professional competence and extend their range of work.
Supporting information:	This is a knowledge unit and covers the requirements of WRAS.

Learning outcome

The learner will:

1 Understand the requirements of the Water Supply (Water Fittings) Regulations and Water Byelaws.

Assessment criteria

The learner can:

1.1 explain the **requirements** of the Water Regulations/Byelaws (Part 1)

1.2 explain the **requirements** of the Water Regulations/Byelaws (Part 2)

1.3 explain the **requirements** of the Water Regulations/Byelaws (Part 3).

Range

Requirements Part 1

The domestic environment and the commercial, industrial environment.

Requirements Part 2

The restriction on installation of water fittings, requirements for water fittings, notification requirements relating to any person who proposes to install a water fitting, approved contractors.

Requirements Part 3

Penalties for contravening the Water Regulations, relaxation of the Water Regulations, dispute with a water undertaker.

Learning outcome

The learner will:

2 Understand terminology used to confirm requirements of the Water Regulations.

Assessment criteria

The learner can:

2.1 explain the meanings of the **key factors** within the interpretations of the Water Regulations

2.2 identify the different types of water treatment apparatus available to dwellings.

Range

Key factors

Backflow, cistern, combined feed and expansion cistern, combined temperature and pressure relief, contamination, distributing pipe, expansion cistern/vessel, expansion valve, flushing cistern, overflow

pipe, pressure relief valve, primary circuit, secondary circuit, secondary system, servicing valve, stop valve, storage cistern, temperature relief valve, terminal fitting, vent pipe.

Learning outcome

The learner will:

3 Know the suitability of **materials** and substances in contact with water.

Assessment criteria

The learner can:

3.1 describe situations where materials or substances either alone or in combination are likely to cause contamination of water

3.2 identify suitable **fittings** for use above and below ground

3.3 identify suitable jointing materials and compounds.

Range

Materials

Different classes of steel pipes, copper tubes and their connections above and below ground, unplasticised PVC, polyethylene pipes, stainless steel pipes.

Fittings

Stopvalves, drain-off valves, servicing valves.

Learning outcome

The learner will:

4 Understand the requirements for water fittings.

Assessment criteria

The learner can:

4.1 state the **fitness for purpose** of water fittings

4.2 state the **requirements** for installed water fittings

4.3 describe the requirement for pressure testing **pipework systems**

4.4 explain how surges within a pipework system can **affect system performance**

4.5 state the connection requirements for the **installation of a pump** on a supply pipe

4.6 state the connection requirements for the **installation of a pumped shower**

4.7 state the installation **requirements for pipes and operational fittings**

4.8 state the installation **requirements for pipes entering a building**

4.9 state the installation requirements for **underground pipework**

4.10 explain the terms ‘concealed fitting’ and ‘dezincification resistant material’.

Range

Fitness for purpose

British Standards or equivalent, immunity and protection from galvanic action.

Requirements

Water tightness, prevention of ingress from contaminants, prevention from damage by freezing and other causes, prevention from deterioration by permeation, the supporting pipework, the fixings for water fittings.

Pipework systems

Metallic and plastic.

Affect system performance

Water hammer, relief valve discharge, pneumatic accumulators.

Installation of a pump

Permissible pump output capacity permitted siting of a pump.

Installation of a pumped shower

Permissible pump output capacity, recommended siting of a pump.

Requirements for pipes and operational fittings

Located in the cavity of a cavity wall, embedded in any wall or solid floor, located below a suspended floor, below a solid floor at ground level, location and accessibility to operational fittings.

Requirements for pipes entering a building

Depth of pipework, insulation requirements, protection of pipework.

Underground pipework

Pipes laid underground, pipes laid over an underground obstruction, pipes under an underground obstruction, pipes supplying water to a building below street level, pipes beneath a stream.

Learning outcome

The learner will:

5 Know the design and installation requirements for a water supply system.

Assessment criteria

The learner can:

5.1 state **factors** to be taken into consideration in the design of a water supply system

5.2 describe **types of distribution system** available within a dwelling

5.3 explain the methods of preventing the contamination of water fittings and the water contained within them when passing through contaminated environment

5.4 state the distribution temperature of cold water

5.5 state the installation requirements for stop valves to **premises**

5.6 state the installation requirements for the provision, operation and location of **servicing valves**

5.7 state the **installation requirements** for the provision of draining taps

5.8 state the requirements with respect to dead legs and redundant fittings

5.9 state the requirements for pressure testing different **systems**

5.10 explain the reason for the flushing of a system installation

5.11 state when system disinfection is required.

Range

Factors

Total daily consumption, maximum and average flows required, availability of mains supply, mains pressure variance, water storage capacity where needed, transient or surge pressures, environmental issues surrounding area and supply.

Types of distribution system

Direct fed system, indirect fed system, combination of direct and indirect fed systems.

Premises

Individual property, location within premises supplied with water, block of flats supplied from a common supply pipe, block of flats with separate supply pipes to each flat.

Servicing valves

Inlet to Float Operated Valve (FOV), outlet of storage cisterns, inlet to appliances, accessibility of servicing valves, methods of operation

Installation requirements

Location, accessibility, types of draining taps.

Systems

Systems that do not include any plastic, systems that include plastic pipes.

Learning outcome

The learner will:

6 Know the requirements for the prevention of cross connection to unwholesome water.

Assessment criteria

The learner can:

6.1 state the meaning of **unwholesome water**

6.2 state the **requirements** for identifying an unwholesome water system so that it is readily distinguishable from a wholesome system

6.3 identify the correct arrangement for connecting a wholesome water supply to a re-use system.

Range

Unwholesome water

In relation to rainwater, recycled water, any fluid not supplied by a water undertaker.

Requirements

Colour coding for pipes and fittings and labelling for pipes and terminal fittings

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Learning outcome

The learner will:

7 Know the backflow prevention fluid categories.

Assessment criterion

The learner can:

7.1 define the five fluid categories.

Learning outcome

The learner will:

8 Know the requirements for backflow prevention.

Assessment criteria

The learner can:

8.1 state the requirements for the arrangements or devices to prevent the cross connection to unwholesome water

8.2 identify devices or arrangements used for backflow, back pressure and back siphonage prevention and their suitability.

Learning outcome

The learner will:

9 Understand the guidance clauses relating to backflow prevention.

Assessment criteria

The learner can:

9.1 describe the requirements whereby water can flow back into a supply or distributing pipe

9.2 explain the terms ‘upstream’ and ‘downstream’

9.3 identify the method of protection against the backflow of water into a supply or distributing pipe without the need for a mechanical backflow prevention device

9.4 describe **installation requirements** for a mechanical backflow protection device

9.5 state the requirements for appliances supplied through or incorporating a pump

9.6 state the requirements for the **installation of a bidet** or appliance using a hand-held spray

9.7 explain the requirements for a water supply to a manually operated WC or urinal using a pressure flushing valve when supplied from a supply pipe or distributing pipe

9.8 explain the requirements for **tap outlets**

9.9 explain the requirements for a sink in a non-domestic environment

9.10 identify the requirements for submerged inlets to baths and washbasins in a dwelling and non-dwelling

9.11 identify the requirements for the installation of a drinking water fountain

9.12 identify the requirements for the installation of washing machines, washer-dryers and dishwashers in a in a dwelling and non-dwelling

9.13 state the requirements for the installation of hose pipes for a house garden and commercial installations

9.14 explain when whole site and zone protection are required

9.15 state the requirements for **fire protection systems**

9.16 state the requirements when applied to **miscellaneous commercial and industrial applications**.

Range

Installation requirements

Accessibility of the mechanical backflow protection device, location within the premises, not to be buried in the ground, vented and verifiable, or devices with relief outlets not to be installed in chambers below ground or where liable to flooding, the installation of line strainers, the lowest point of discharge from the ground and termination with a Type AA air gap.

Installation of a bidet

Ascending spray type, over rim type, spray handset fittings used with bidets and WCs.

Tap outlets

Single outlet taps, combination tap assembly outlets, fixed shower heads over basins, baths and bidets, explain the requirements for a sink in a non-domestic environment.

Fire protection systems

Direct fed sprinkler systems with no additives, direct fed sprinkler systems with additives, elevated storage cisterns with or without additives by gravity, elevated storage cisterns with pumped outlet with or without additives, dual feed cisterns with water from the water undertaker and from another source.

Miscellaneous commercial and industrial applications

Pumped supply to laboratory fittings, separation of wholesome water from supplementary sources, separation of wholesome water from water that has been used, water supply taken directly from a supply pipe to a ship, water supply taken by gravity from storage on a quayside, water supply pumped from storage on a quayside, water taken from a hose union tap on a quayside.

Learning outcome

The learner will:

10 Know the installation requirements for cold water services.

Assessment criterion

The learner can:

10.1 describe the installation requirements and methods of connection for **water fittings**.

Range

Water fittings

Float operated valves, inlets to cisterns, outlets from cisterns, warning and overflow pipes, cold water storage cisterns.

Learning outcome

The learner will:

11 Know the installation requirements for hot water services.

Assessment criteria

The learner can:

11.1 describe the installation requirements and methods of connection for **water fittings**

11.2 state the requirements for discharge pipes from safety devices

11.3 state the requirements for discharge pipes from expansion valves

11.4 state the requirements for vent pipes from a primary circuit

11.5 state the requirements for vent pipes from a secondary hot water storage system.

Range

Water fittings

Directly heated unvented hot water systems, indirectly heated unvented hot water systems, independent water heaters, methods of accommodating expanded water in a hot water system, maximum temperature within a hot water system, hot water distribution temperatures, temperature of hot water at terminal fittings and surfaces of hot water pipes.

Learning outcome

The learner will:

12 Know the installation requirements for WCs, flushing devices and urinals approved for use.

Assessment criteria

The learner can:

12.1 identify the **installation methods and requirements** for the operation of WC pans

12.2 explain **methods for flushing** urinals

12.3 describe **methods for filling** a urinal cistern

12.4 state the requirements for urinal cistern **filling rates**

12.5 state the requirements for the renewal of a WC cistern installed before 1 July 1999.

Range

Installation methods and requirements

Single flush cisterns, dual flush cisterns, single flush siphonic outlet, dual flush siphonic outlet, drop and flap valve, dual flush cistern capacities, operating instructions for dual flush cisterns, pressure flushing valves, cistern water line mark, requirements for warning pipes, internal overflows.

Methods for flushing

Manually operated cistern, automatically operated cistern, pressure flushing valves.

Methods for filling

Manual infill, electronic sensor, pressure pad, time switch, frequency of flushing.

Filling rates

For a single urinal bowl and urinal stall or slab serving two or more urinals.

Learning outcome

The learner will:

13 Know the types of bath, sink, showers, taps, location and installation requirements.

Assessment criteria

The learner can:

13.1 state the requirements for drinking water points in premises

13.2 state the requirements for **drinking water supplies**

13.3 state the requirements for waste outlets from appliances.

Range

Drinking water supplies

Water supplied from a supply pipe, water supplied from a pumped supply pipe, water supplied from a storage cistern, water that has been softened used for drinking purposes.

Learning outcome

The learner will:

14 Know the consumption limitations for washing machines, dishwashers and other appliances.

Assessment criterion

The learner can:

14.1 state the upper limits of water consumption for domestic horizontal axis washing machines, washer driers and dish washers.

Learning outcome

The learner will:

15 Know the requirements for water supplied for outside use.

Assessment criteria

The learner can:

15.1 state the **installation requirements** for animal drinking troughs or bowls

15.2 state the **installation requirements** for ponds, fountains and pools.

Range

Installation requirements

For animal drinking troughs or bowls – in relation to methods of controlling the inflow to a trough or bowl, the siting of servicing valves, backflow protection.

For ponds, fountains and pools – in relation to impervious liners and water tightness, temporary connections to ponds, pools and fountains.

Appendix 1 Relationships to other qualifications

Links to other qualifications

Centres are responsible for checking the different requirements of all qualifications they are delivering and ensuring that candidates meet requirements of all units/qualifications.

Literacy, language, numeracy and ICT skills development

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

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

Appendix 2 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 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 e-assessments.

Centre Guide – Delivering International Qualifications 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.

Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

Appendix 3 Useful contacts

UK learners General qualification information	**E: learnersupport@cityandguilds.com**
International learners General qualification information	**E: intcg@cityandguilds.com**
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	**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	**E: singlesubjects@cityandguilds.com**
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	**E: intops@cityandguilds.com**
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	**E: walledgarden@cityandguilds.com**
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	**E: business@cityandguilds.com**
Publications Logbooks, Centre documents, Forms, Free literature	**F: +44 (0)20 7294 2413**

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