Qualification Specification

DGE-001

BPEC Level 3 Diploma in Gas Engineering

Qualification Number – 603/5485/9

Contents

1. About BPEC

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

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

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

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

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

BPEC Certification Ltd

1-2 Mallard Way

Pride Park

Derby

DE24 8GX

Tel: 01332 376000

Or visit our website at:

www.bpec.org.uk

2. Introduction to the Qualification

2.1 Qualification Overview

Qualification Title			BPEC Level 3 Diploma in Gas Engineering			
Qualification Number (QN)			603/5485/9			
BPEC Qualification Code			DGE-001			
Assessment Method/s			Multiple Choice Examination, Portfolio of Evidence, Practical Demonstration/Assignment, Written examination. Task-based Controlled Assessments.			
Entry Requirements			Learners must be 16 years old or over			
1	**GLH**	970	TQT	1358	Credits	N/A
2	**GLH**	800	TQT	1120	Credits	N/A
3	**GLH**	800	TQT	1120	Credits	N/A
4	**GLH**	710	TQT	994	Credits	N/A
Mandatory Units			7-10 dependant on the pathway selected			
Optional Units			2			
Pathways			4 (see pages 4-7)			
Last Registration Date			31/01/2024			
Last Certification Date			31/01/2027			

2.2 Who this Qualification is for

This qualification is for those learners currently employed in the gas industry as an apprentice gas installer/engineer. Learners will be required to demonstrate the necessary abilities, skills and knowledge to be able to plan, select, install and commission all aspects of gas appliances and systems. In addition to this, learners will also demonstrate a knowledge of service, maintenance and fault diagnosis and rectification of gas installations and appliances.

2.3 The Purpose of the Qualification

Learners will develop transferable skills, knowledge and disciplines in the gas utilisation industry. The qualification will demonstrate a commitment to working in the gas industry, giving those that hold the qualification a formal industry recognised qualification in Domestic Gas Engineering. The achievement of this qualification will support access to the gateway for End Point Assessment as part of the Gas Engineering Apprenticeship.

2.4 Support and Accreditation

This qualification is supported by industry and regulated by OFQUAL.

2.5 Relationship to Other Qualifications

N/A

2.6 Qualification Limitations

The holder of this qualification is recognised as being competent to carry out gas work as defined in the Gas Safety (Installation and Use) Regulations 1998 and can apply for Gas Safe Registration in the gas work categories defined in the chosen pathway.

3. Qualification Structure

Pathway 1 (aligned to CCN 1, CENWAT, HTR 1, CKR1, LAU 1, LEI 1, MET 1, CoNGLP1 PD and Unvented Hot Water)

Mandatory Units

This qualification pathway consists of 10 mandatory units.

Unit Code	Unit Type	Unit Title	Level	Credit Value	TQT	GLH
1	K/P	**Understand and apply health and safety in gas utilisation**	3			58
2	K	**Understanding scientific principles in gas utilisation**	3			28
3	K	**Understanding combustion and properties of gas (natural gas and LPG)**	3			97
4	K	**Understanding buildings, services and structures**	3			101
5	K	**Understanding gas safety**	3			121
6	K/P	**Specific core gas safety**	3			225
7	K/P	**Install and maintain domestic gas water heaters and wet central heating appliances**	3			140
8	K/P	**Install and maintain domestic gas cookers, tumble dryers and leisure appliances**	3			80
9	K/P	**Install and maintain domestic gas space heating appliances**	3			90
10	K/P	**Understand and apply domestic hot water system installation, commissioning, service and maintenance techniques**	3			30
		Totals	3		1358	970

Optional units

Unit Code	Unit Type	Unit Title	Level	Credit Value	TQT	GLH
11	K/P	**Understand and apply domestic central heating system installation, commissioning, service and maintenance techniques**	3			98
12	K	**Water Supply (Water Fittings) Regulations and Water Byelaws in the UK**	3			8

Pathway 2 (aligned to CCN 1, CENWAT, MET1, CoNGLP1 PD and Unvented Hot Water)

Mandatory Units

This qualification pathway consists of 8 mandatory units.

Unit Code	Unit Type	Unit Title	Level	Credit Value	TQT	GLH
1	K/P	**Understand and apply health and safety in gas utilisation**	3			58
2	K	**Understanding Scientific Principles in Gas Utilisation**	3			28
3	K	**Understanding combustion and properties of gas (natural gas and LPG)**	3			97
4	K	**Understanding buildings, services and structures**	3			101
5	K	**Understanding gas safety**	3			121
6	K/P	**Specific core gas safety**	3			225
7	K/P	**Install and maintain domestic gas water heaters and wet central heating appliances**	3			140
10	K/P	**Understand and apply domestic hot water system installation, commissioning, service and maintenance techniques**	3			30
		Totals	3		1120	800

Optional Units

Unit Code	Unit Type	Unit Title	Level	Credit Value	TQT	GLH
11	K/P	**Understand and apply domestic central heating system installation, commissioning, service and maintenance techniques**	3			98
12	K	**Water Supply (Water Fittings) Regulations and Water Byelaws in the UK**	3			8

Pathway 3 (aligned to CCN 1, HTR 1, CKR1, LAU 1, LEI 1, MET1 and CoNGLP1 PD)

Mandatory Units

This qualification pathway consists of 8 mandatory units.

Unit Code	Unit Type	Unit Title	Level	Credit Value	TQT	GLH
1	K/P	**Understand and apply health and safety in gas utilisation**	3			58
2	K	**Understanding scientific principles in gas utilisation**	3			28
3	K	**Understanding combustion and properties of gas (natural gas and LPG)**	3			97
4	K	**Understanding buildings, services and structures**	3			101
5	K	**Understanding gas safety**	3			121
6	K/P	**Specific core gas safety**	3			225
8	K/P	**Install and maintain domestic gas cookers, tumble dryers and leisure appliances**	3			80
9	K/P	**Install and maintain domestic gas space heating appliances**	3			90
		Totals	3		1120	800

Optional Units

Unit Code	Unit Type	Unit Title	Level	Credit Value	TQT	GLH
12	K	**Water Supply (Water Fittings) Regulations and Water Byelaws in the UK**	3			8

Pathway 4 (aligned to CCN 1, CKR1, LAU 1, LEI 1, MET1, and CoNGLP1 PD)

Mandatory Units

This qualification pathway consists of 7 mandatory units.

Unit Code	Unit Type	Unit Title	Level	Credit Value	TQT	GLH
1	K/P	**Understanding health and safety in gas utilisation**	3			58
2	K	**Understanding scientific principles in gas utilisation**	3			28
3	K	**Understanding combustion and properties of gas (natural gas and LPG)**	3			97
4	K	**Understanding buildings, services and structures**	3			101
5	K	**Understanding gas safety**	3			121
6	K/P	**Specific core gas safety**	3			225
8	K/P	**Install and maintain domestic gas cookers, tumble dryers and leisure appliances**	3			80
		Totals	3		994	710

Optional Units

Unit Code	Unit Type	Unit Title	Level	Credit Value	TQT	GLH
12	K	**Water Supply (Water Fittings) Regulations and Water Byelaws in the UK**	3			8

Key	Unit Type	Key	Unit Type
K	Knowledge	P	Performance

4. The Learners

4.1 Qualifications which a Learner must have completed before taking the qualification

None applicable.

4.2 Knowledge, skills or understanding which the Learner is required to have before taking the qualification

General

1. **The Centre should:**

   Undertake an initial assessment of each Learner to ensure they have the minimum levels of numeracy and literacy to comply with the health and safety aspects of the qualification and the completion of the learning outcomes and assessments.

   Establish if the Learner has any specific training needs.

   Identify any support and guidance the Learner may require when working towards the qualification.

2. **Specific**

   None applicable

4.3 The units which a Learner must have completed before the qualification will be awarded and any optional routes

Learners will need to complete all of the mandatory units for the selected pathway.

4.4 Any other requirements which a Learner must have satisfied before the Learner will be assessed or before the qualification will be awarded

None identified.

4.5 Qualification Achievement

The qualification will be awarded when all necessary units have been achieved.

5. Delivery Requirements

5.1 Centre Recognition

Centres wishing to deliver this qualification will need to gain Centre Recognition and Qualification Approval (see 4.2). For full details of the recognition process please contact:

BPEC Certification Ltd
1 – 2 Mallard Way
Pride Park
Derby
DE24 8GX
Tel: 01332 376000
aoadmin@bpec.org.uk

5.2 Qualification Approval

Centres wishing to deliver this qualification who are already recognised (see 4.1) should complete and submit a Qualification Approval Form to BPEC Certification Ltd.

Before submission, centres should ensure they can meet the delivery requirements.

Centres who are approved to deliver this qualification and wish to extend delivery to satellite sites must seek approval for each additional site.

5.3 Physical Resources

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

6. Assessor/Trainer Requirements

6.1 Staff Conducting Assessments

6.1.1 Technical/occupational competency

Any staff assessing on this qualification must be vocationally and occupationally competent in the areas they will be assessing. They must also have a thorough knowledge of the units within the qualification being assessed.

In addition to the qualifications listed in 6.2.2, the assessor must also be able to provide documented evidence that demonstrates they have a minimum of five years relevant occupational experience in the activities they will be assessing.

6.1.2 Assessor Competency

Any assessor must hold one of the following qualifications:

- Level 3 Diploma in Gas Utilisation or
- SQA S/NVQ in Domestic Natural Gas (Level 3) or
- Certificate for Service Engineers (Gas) or
- Certificate in Gas Installation Studies or
- Certificate in Gas Fitting – Final.

Other qualifications in Mechanical Engineering Services or Building Engineering Services at Level 3/SCQF Level 6 or equivalent may be accepted, but centres must submit assessor approval documentation to confirm the acceptability of other qualifications to their External Quality Assurer for a decision regarding the suitability of other qualifications.

Assessors must also hold a current gas safety certificate of competence in the categories of gas work they will be assessing that is not more than 5 years old.

For elective units (Units 10-12) assessors must hold relevant qualifications in the areas being assessed and supporting CPD proving current experience.

In addition to the above qualifications, all assessors must:

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

6.1.3 Assessor CPD

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

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

It is imperative that records are kept of all such CPD opportunities/occasions and that they provide evidence of cascading such technical knowledge and industry intelligence to all relevant colleagues.

6.2 Staff Conducting Internal Quality Assurance

Any staff verifying this qualification must be vocationally and occupationally competent in the areas they will be verifying. They must also have a thorough knowledge of the units within the qualification being verified.

In addition to the qualifications listed below, the internal quality assurer must also be able to provide documented evidence that demonstrates they have a minimum of five years relevant occupational experience in the activities they will be verifying.

Internal Quality Assurers must hold one of the following qualifications:

- Level 3 Diploma in Gas Utilisation
- SQA - S/NVQ in Domestic Natural Gas (Level 3)
- Certificate for Service Engineers (Gas)
- Certificate in Gas Installation Studies
- Certificate in Gas Fitting – Final.

Other qualifications in Mechanical Engineering Services or Building Engineering Services at Level 3/SCQF Level 6 or equivalent may be accepted, but centres must submit assessor/IV approval documentation to confirm the acceptability of other qualifications to their External Quality Assurer for a decision regarding the suitability of other qualifications.

Internal Quality Assurers must also hold a current gas safety certificate of competence in the categories of gas work they will be verifying that is not more than 5 years old.

For elective units (Units 10-12) Internal Quality Assurers must hold relevant qualifications in the areas being assessed and provide supporting CPD proving current experience.

6.3 IQA Competence

The IQA must hold:

- Level 3 Certificate in Assessing Vocationally Related Achievement or A1
- D32 /D33 with an Upgrade to A1 as a minimum* and Level 4 Award in Internal Quality
- Assurance of Assessment Processes and Practice
- Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Processes and Practice
- V1 or D34 with an upgrade to V1 as a minimum*.

6.3.1 IQA CPD

- The occupational competence of IQA's must be updated through CPD and/or requalification if required on a regular basis
- Records of an IQA's CPD should be maintained for verification by the External Verifier.

6.3.2 IQA Approval

- IQA must be approved by BPEC Certification Ltd before undertaking any IQA activity.

6.3.3 Candidate IQA's

- Must meet the technical/occupational competence detailed above
- Must hold Level 3 Certificate in Assessing Vocationally Related Achievement or A1 or
- D32/33 with an upgrade to A1*
- Must be registered on a programme to attain their IQA qualification and have a clear
- action plan for achieving the qualification within 18 months (Candidate IQA approval may be withdrawn if the qualification has not been attained in this period)
- Must be supervised and their decisions countersigned by a qualified IQA who is approved by BPEC Certification Ltd.

*Assessors/IQAs holding D units must have evidence of continuing professional development (CPD) to demonstrate compliance with the A/V units. Evidence of CPD will be sought by the External Quality Assurer for all assessors/ IQAs approved by the centre.

6.4 Staff Conducting Knowledge Assessments (Invigilators)

This relates to staff that are conducting and controlling knowledge assessment sessions only – as per the requirements in this qualification. Centres should refer to BPEC's AO exams procedure when administering knowledge assessments.

These must:

- Be experienced - Staff should be experienced in the supervision of assessments or be under the supervision of an experienced person
- Knowledgeable - Staff should be knowledgeable of the assessment procedure
- Be Independent - Staff conducting exams should not be related to any learner sitting the assessment exam nor be involved in teaching or quality assuring the subject.

6.5 Expert Witness Roles and Responsibilities

- To observe the Learner's performance undertaking practical assessment tasks in the workplace
- Using the assessment criteria provided, determine whether or not the learner has completed the tasks satisfactorily
- To satisfactorily complete the assessment documentation to reflect the outcomes of the assessment.

6.5.1 Expert Witness Competence Requirements

The Expert witness should:

- Be occupationally competent i.e. having up-to-date knowledge of each industry (for the assessment being undertaken), its settings, legislative and regulatory requirements, codes of practice, guidance, working practices and techniques
- Be familiar with the national occupational standards and be able to interpret current working practices and technologies within the area of work
- Evidence from expert witnesses must meet the tests of validity, reliability, authenticity and sufficiency
- Have no conflict of interest in the outcome of their evidence
- (It is not necessary for expert witnesses to hold an assessor qualification, as a qualified assessor must assess the performance evidence provided by an expert witness).

7. Support Materials

7.1 Qualification Specification

This Qualification Specification provides details of all units, Learning Outcomes, Range and specific advice regarding the assessment process.

7.2 Learner Result Submission form

A Learner Result Submission Form is available for this qualification. This should be completed for each learner and submitted when certification is required.

Centres are reminded that they should retain a copy of the Learner Result Submission Form in Centre for a period of 3 years.

7.3 Learner Assessment Packs

A learner assessment pack for this qualification is available.

7.4 Learner Assessment Pack Rationale

A learner assessment pack rationale is available for this qualification. These are for use by the Assessor and Internal Quality Assurer only and must be stored securely in accordance with BPEC Certification Ltd guidance.

7.5 Manuals

Manuals are available to support the gas specific units of this qualification from www.bpec.org.uk.

7.6 Scheme of work

A full scheme of work is available from BPEC to support this qualification.

8. Unit Details

The tables below detail the units which comprises the qualification; outlining the title, UAN, GLH, aim, learning outcomes, learning points and range.

Unit 1 – Understanding health and safety in gas utilisation

UAN – K/617/9471
GLH - 58
AIM This knowledge unit aims to provide learners with the knowledge and understanding of the general health and safety requirements for working within the gas industry. Upon completion of the unit the learner will be able to:

LO1 - Understand the health and safety legislation	
Assessment Criteria and Range	
1.1	Explain the aims of health and safety legislation in protecting the workforce and members of the public
1.2	Explain the key features 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 (clients) under health and safety legislation
1.5	State the role of the following enforcing authorities under Health and Safety Legislation: Health and Safety Executive (HSE) Local Authority
1.6	State the roles, responsibilities and powers of HSE inspectors under Health and Safety Legislation for: Issue of improvement and Prohibition notices Powers of prosecution
1.7	Describe the HSE role in providing advice and guidance

LO2 - Know the health and safety measures for gas utilisation	
Assessment Criteria and Range	
2.1	State the general hazards and dangers found on a typical work site and the organisations recording procedures
2.2	Explain the purpose and importance of completing a risk assessment
2.3	Describe the categories which are completed as part of a risk assessment: a) Hazards b) Risks c) Likelihood d) Severity

2.4	Describe the following risk control measures: a) Eliminate b) Reduce c) Isolate d) Control e) PPE f) Personal Discipline
2.5	State the types and purpose of personal protective equipment and clothing how and when it must be used, cleaned and stored to include: a) Eye Protection b) Hand protection c) Head protection d) Foot protection e) Clothing protection/Visibility f) Hearing Protection g) Respiratory Protection
2.6	Describe the types and purpose of signs and safety notices to include: a) Mandatory Signs b) Prohibition Signs c) Hazard Signs
2.7	State the purpose of and contents of: a) Method Statements b) Permit to Work Systems
2.8	Develop a model risk assessment to include all the key elements

LO3 - Know the regulations covering the use and disposal of hazardous substances	
Assessment Criteria and Range	
3.1	State the key purpose of the control of substances hazardous to health regulations(COSHH)
3.2	Describe hazardous substances and provide examples from each classification category to include: a) Toxic b) Harmful c) Corrosive d) Irritant e) Oxidising f) Extremely Flammable
3.3	Explain the general precautions necessary for working with commonly encountered substances to include: a) Fluxes b) Solder c) Lead d) Jointing Compounds e) Sealants f) Gaskets g) Solvents and lubricants h) Cleaning agents i) Gases

3.4	State the key purpose of the Control of Asbestos at Work Regulations
3.5	Identify the different types of asbestos found in the workplace
3.6	Define the key risks associated with working with the following: a) White Asbestos (Chrysotile) b) Brown or Grey asbestos (Amosite) c) Blue Asbestos (Crocidolite) d) Asbestos cement materials
3.7	Explain the methods and actions required to protect workers and members of the public from the risk of asbestos
3.8	Describe how to remove and dispose of asbestos safely
3.9	State the licensing requirements for asbestos removal organisations
3.10	Identify common building materials and services components that may contain asbestos: a) Flue pipes b) Tanks and cisterns c) Artex d) Small gaskets and seals e) Floor tiles
3.11	Identify the procedures that must be used to safely work with asbestos cement based materials
3.12	State the actions to be taken when asbestos is encountered while undertaking work activities. (e.g. PPE)

LO4 - Know manual handling methodology and lifting techniques	
Assessment Criteria and Range	
4.1	Explain the process of planning a lift: a) How to assess a load b) Moving the load, route, safety c) Duration of lift, accessibility d) Informing others
4.2	Describe the safe manual handling of heavy and bulky loads
4.3	Explain the risks of personal injury associated with lifting and handling
4.4	Explain kinetic lifting techniques
4.5	Describe the safe lifting techniques used: a) To move loads alone b) For a 2-person lift c) Using mechanical aids
4.6	Develop a plan for a simulated lifting activity which includes all key factors

LO5 - Know how to identify and respond to accidents which occur at work	
Assessment Criteria and Range	
5.1	State the main responsibilities of the employer and employee under the 'Health and Safety at Work Act 1974' in relation to reporting of accidents at work
5.2	State the requirements for personal first aid provision
5.3	Describe the typical accident and incident recording and reporting procedures whilst working in: a) Domestic dwellings b) Business premises
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 the responsibilities and procedures for dealing with minor and major 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	Explain the correct method of placing an accident victim in the recovery position and identify when this action would be performed
5.10	Describe the key elements which are included in a typical organisations evacuation procedure

LO6 - Know the requirements for maintaining electrical safety, the associated dangers and earthing protection systems	
Assessment Criteria and Range	
6.1	Describe the electrical dangers of construction sites, business properties private dwellings to include the following: a) Signs of damage or warn electrical cables on power tools and property hard wiring systems b) Signs of visual fault on electrical components c) Trailing cables d) Proximity of cables to service pipe work e) Buried and hidden cables f) Avoidance of cables under wooden floors g) Inadequate over current protection devices
6.2	Identify the types and safe use of electrical tools and equipment including: a) Battery powered b) 100V supplies c) 240V supplies
6.3	Explain the purpose of the visual inspection of 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: a) The existing electrical installation b) Faulty electrical tools and equipment
6.6	Identify the different types of earthing systems used in properties including their typical cable sizes: a) Lighting circuit b) Ring main c) Radial d) Spur
6.7	State the key purpose and differences between: a) Main protective bonding b) Supplementary bonding c) Temporary continuity bonding
6.8	Explain the use of electrical earth bonding labels
6.9	Explain the electrical industry safe isolation procedure, to safely isolate an item of fixed mechanical or electrical equipment
6.10	State the requirements for the use of temporary continuity bonds
6.11	Describe the process for applying a temporary continuity bond when cutting into a fixed metallic pipe work system

LO7 - Know Fire safety	
Assessment Criteria and Range	
7.1	State the three elements of the combustion triangle
7.2	State the circumstances when, and when not to tackle a fire
7.3	State which types of fire extinguisher would be required to tackle: a) An electrical fire b) A general fire c) A flammable liquids fire d) A small paper fire
7.4	State when it would be appropriate to use a fire blanket to extinguish a fire
7.5	State the precautions to be taken when using heat producing equipment: a) Blow lamps/torches b) Soldering irons c) Heat guns
7.6	Describe the safe storage, transportation, assembly, testing and use of blow lamps/torches and associated LPG cylinders

LO8 - Know the safety requirements for working at heights	
Assessment Criteria and Range	
8.1	State the safety measures and checks needed when working with steps and ladders
8.2	Describe the types of equipment to be used when working at heights to include: a) Step Ladders b) Ladders c) Roof ladders and crawling boards d) Mobile tower scaffolds
8.3	Describe how to assemble, erect and use access equipment when working at heights a) Step Ladders b) Ladders c) Roof ladders and crawling boards d) Mobile tower scaffolds
8.4	Describe the working at height safety hierarchy of Control Measures

LO9 - Know how to identify and work safety in confined spaces	
Assessment Criteria and Range	
9.1	State the definition of a confined space and state the requirements of the confined spaces legislation
9.2	Identify the typical confined spaces which gas engineers encounter at work to include: a) Roof spaces b) Under wooden floors c) Cellars d) Plant rooms e) Duct rooms f) Metering or governor houses g) Trenches
9.3	Describe the additional dangers when working in confined spaces
9.4	Describe the additional safety measures which need to be taken when working in confined spaces

LO10 - Know the regulations in force to protect the environment and control waste	
Assessment Criteria and Range	
10.1	State the requirements of environmental protection regulations: a) The controlled waste regulations b) Controlled waste (registration of carriers and seizure of vehicles) - packaging - building regulations (including energy efficiency requirements for new dwellings) and water supply regulations c) 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
10.2	Describe the environmental protection measures which can be incorporated into installation methods and practises: a) Minimising the wastage of equipment and materials b) Accurate cutting, bending and jointing c) Loss and/or theft of material on-site d) Using principles that minimise the usage of energy in installed systems and components e) Using principles that minimise the usage of water in installed systems and components f) Materials that can be readily recycled g) Ensuring that installed systems/components are correctly commissioned h) Ensuring that customers are informed on key operating requirements

Unit 2 – Understanding scientific principles in gas utilisation

UAN – M/617/9472
GLH - 28
AIM This knowledge unit aims to provide the learner with the knowledge and understanding of the scientific principles in gas utilisation. Upon completion of the unit the learner will be able to:

LO1 - Know the Systeme Internationale (SI) units used within gas utilisation	
Assessment Criteria and Range	
1.1	Understand the Systeme Internationale (SI) Units used in gas utilisation to include: a) Metre b) Kilogram c) Second d) Kelvin
1.2	Describe SI derived units for: a) Area b) Volume c) Velocity d) Flow rate e) Acceleration f) Density g) Force h) Pressure i) Specific heat capacity j) Temperature k) Heat l) Power
1.3	Describe how to convert from imperial to SI units using formulas and conversion tables
1.4	Explain the basic scientific principles used in gas utilisation: a) Mass and weight b) Speed and velocity c) Force d) Temperature e) Sensible heat and latent heat f) Comfort conditions g) Heat energy rates h) Thermal efficiency

LO2 - Know the sources of energy and heat transfer	
Assessment Criteria and Range	
2.1	Define renewable and non-renewable energy
2.2	State the different types of non-renewable energy to include: a) Natural Gas and LPG b) Oil c) Solid fuel d) Electricity generate by fossil fuels
2.3	State the different types of renewable energy to include: a) Electricity generated by renewable energy sources b) Solar c) Biomass d) Hydrogen fuel cells e) Wind f) Hydro
2.4	Describe the methods of heat transfer: a) Radiation b) Conduction c) Convection

LO3 - Understand the combined gas laws	
Assessment Criteria and Range	
3.1	State the formula for Charles and Boyles law
3.2	Explain the interrelationship between pressure, volume and temperature

LO4 - Understand the combustion of fossil fuels and its alleged contribution to climate change	
Assessment Criteria and Range	
4.1	Describe the effects of using renewable and non-renewable energy sources: a) The environment b) Climate change
4.2	Outline the benefits of energy efficient products, services and equipment
4.3	State the key factors of the building regulations (Part L1) which apply to energy efficiency

Unit 3 – Understanding combustion and properties of gas (natural gas and LPG)

UAN – T/617/9473
GLH – 97
AIM This Knowledge unit aims to provide the learner with the knowledge and understanding of combustion and properties of gas. Upon completion of the unit the learners will be able to:

LO1 - Know the natural gas supply network and LPG supplies	
Assessment Criteria and Range	
1.1	Describe the key features of a natural gas network to include: a) Gas terminals b) Pipe materials and sizes c) Compressors d) Pressure regulation e) Storage f) Gas quality
1.2	Define the operating pressure ranges for: a) Low pressure b) Medium pressure c) Intermediate pressure d) High pressure
1.3	Identify LPG bulk and cylinder supply systems
1.4	Know the requirements for sizing and locating LPG bulk and cylinder supply systems

LO2 - Understand the operation of pressure regulators	
Assessment Criteria and Range	
2.1	Explain the purpose and application of pressure regulators
2.2	State the different types of pressure regulators
2.3	Describe the construction and operation of a compensated constant pressure regulator

LO3 - Know the factors affecting pressure loss and the equipment used to measure gas pressure	
Assessment Criteria and Range	
3.1	State the factors affecting pressure loss
3.2	Describe the operation and uses of a typical monometer, clarify the required reading accuracy
3.3	Describe the operation and uses of a typical digital pressure gauge, clarify the required accuracy of reading and calibration checks

LO4 - Understand combustion of gases, the effects of its products and associated risks	
Assessment Criteria and Range	
4.1	Describe the characteristics of complete and incomplete combustion including air and fuel requirements
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
4.11	Explain the combustion process for gases used in dwellings: a) Combustion equation b) Calorific Values of gases • Gross/Net • British Thermal Units (BTUs) • Kilowatts (kW)
4.12	Describe the movement of Carbon Monoxide within a building and how it may enter a property
4.13	Explain the advice to give to a person who may be suffering from CO poisoning
4.14	Identify the causes of CO detector/indicator activation
4.15	Identify the measures necessary to ensure that exposure to Carbon Monoxide does not take place/ is minimised including correct appliance installation and maintenance

LO5 - Know gas burner operation, design, features and types	
Assessment Criteria and Range	
5.1	Describe the operation of the following burners: a) Natural draught b) Pre and post aerated c) Pre-mix d) Forced draught e) Radiant f) Flameless combustion
5.2	State the differences between the performance of pre- and post-aerated burners

5.3	Describe the burner faults that can result in: a) Incomplete combustion b) Flame lift c) Lighting back
5.4	Describe the key parts and operation of a per-aerated natural draught burner to include: a) Gas injector b) Primary airports c) Venturi d) Burner head e) Burner/flame retention

LO6 - Know the properties and characteristics of natural gas and LPG	
Assessment Criteria and Range	
6.1	Identify first, second and third families of gases
6.2	Explain the characteristics of natural gas and LPG a) Relative density b) Calorific value c) Gross and net calorific value d) Wobbe numbers e) Flammability limits f) Flame speed g) Ignition temperature h) Viscosity
6.3	Describe the characteristics and properties of LPG: a) Storage of LPG b) Boiling points of LPG c) Types of gases d) Vapour pressure curves e) Vaporisation and off-takes f) Viscosity g) Auto-refrigeration and excessive off-takes h) Origins of LPG

Unit 4 – Understanding buildings, services and structures

UAN – A/617/9474
GLH - 101
AIM The aim of this knowledge unit is to provide the learner with the knowledge and understanding of buildings, services and structures required for working in the gas industry. Upon completion of the unit the learners will be able to:

LO1 - Know the types and characteristics of construction materials	
Assessment Criteria and Range	
1.1	Explain heat treatments and the effects on metals
1.2	Identify and 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 properties of construction materials used in the workplace to include: a) Concrete b) Bricks c) Blocks d) Cement e) Plaster f) Timber g) Roofing tiles
1.5	Describe the following building components: a) Foundations – Mass fill, strip b) Damp proof courses c) Brick/block Walls – exterior, load bearing d) Partition Walls e) Flooring types – concrete and wooden f) Ceilings g) Lintels h) Wall plates i) Roofing types- flat, traditional and trussed j) Types of Roof tiling

LO2 - Know how to use hand and power tools within gas utilisation	
Assessment Criteria and Range	
2.1	Identify basic tools associated with the gas industry and describe their uses to include: a) Hand tools b) Battery operated power tools c) 110 V and 240 V power tools
2.2	Describe the safety checking processes of gas industry tools carried out prior to their use to include: a) Visual inspections b) PAT testing/electrical checks c) Use of RCD adaptors

2.3	Identify appropriate personal protective equipment (PPE) to be used
2.4	Describe the tools required and the methods of cutting: a) Metal b) Wood c) Plastics
2.5	Identify the typical Fasteners and Fixings used for securing to different materials: a) Wood b) Solid walls and floors c) Dry lined walls and ceilings d) Timber and steel framed walls
2.6	Describe the types of drills required when drilling through different types of materials: a) Metal b) Wood c) Plastics d) Brick e) Concrete f) Solid walls and floors g) dry lined walls and ceilings h) Timber and steel framed walls

LO3 - Understand the requirements for ventilation, types of ventilation, correct sizing and installation methods	
Assessment Criteria and Range	
3.1	Describe the general requirements and reasons for ventilation in regard to gas appliances and installations
3.2	Recognise the differences between the following: a) Permanent ventilation b) Adventitious ventilation c) Compartment ventilation
3.3	Recognise the differences between gross and net calorific values (CV) and clarity the effect on ventilation calculations
3.4	Identify the approved types of ventilation grilles and openings and define the criteria they must meet
3.5	Identify suitable and unsuitable installations of ventilation: a) Through walls b) Via paths through other rooms c) Compartments d) Ventilated ducts
3.6	Describe the process of accurately measuring ventilator free areas
3.7	Identify the requirements for the provision of ventilation label and notices

3.8	Describe the potential effects on ventilation caused by the building environment: a) Extract fans b) Circulating hoods c) Fans in appliances d) Appliances of different fuel sources e) Double Glazing f) Building insulation g) Draught proofing h) Passive stack ventilation
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

LO4 - Understand the different types and operation of suitable chimney systems for gas appliances	
Assessment Criteria and Range	
4.1	State the Classification of Gas appliances according to chimney types: a) Type A (Flueless) b) Type B (Open Chimney) c) Type C (Room Sealed Chimney)
4.2	Identify the construction and materials of chimney types to include: a) Brick / Masonry/Chimney Blocks b) Single and Double Wall c) Metallic and Non Metallic d) Flexible Metallic Liners e) Shared Chimney Systems(Common, SE Duct and U Duct) f) Fan draught g) Vertex chimneys
4.3	Explain the design, component parts and general operation of Open Flue Chimney systems to include: a) Parts of an Open-Flue Chimney System b) Primary c) Secondary flue d) Draught diverter e) Terminal f) Chimney System Operation g) Natural draught and fan draught h) Flue dampers i) Shared chimneys j) Cross sectional areas k) Temperature effects l) Condensing appliances and condensation m) Terminal Design n) Bird guards o) Requirements for the catchment space to open flued space heaters p) Existing solid fuel chimneys q) Effective flue height
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 to include: a) Air supply duct, flue duct and terminals b) Chimney system operation c) Natural draught and fan draught d) Terminal Design e) Condensing Flues
4.6	State the requirements for room sealed chimney outlet locations and positions
4.7	Describe the requirements for open chimney balanced compartment installations to include: a) Compartment construction b) Ducted air positions and sizes
4.8	Describe the methods and checks required to establish satisfactory construction, effective and safe operation of a chimney to include: a) Open flue chimney b) Room sealed chimney
4.9	Describe the requirements for the provision of hearths to gas appliances

Unit 5 – Understanding gas safety

UAN – F/617/9475
GLH - 121
AIM This knowledge unit aims to provide learners with the knowledge and understanding of the gas safety requirements for working in the gas industry. Upon completion of the unit the learners will be able to:

LO1 - Have a general knowledge of industry specific legislation and standards	
Assessment Criteria and Range	
1.1	State the key points of gas industry legislation to include: a) The Gas Safety (Installation and Use) Regulations b) Building Regulations and Building Standards
1.2	Describe the content of the Gas Safety (Installation and Use) Regulations
1.3	State the key features of gas safety Regulations: a) The Gas Act b) Gas Safety (Management) Regulations c) Gas Safety (Rights of Entry) Regulations
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
1.6	Describe the guidance information that applies to the Gas Utilisation industry: a) Approved codes of practice b) Industry standards for NG and LPG c) Manufacturer installation and service/maintenance instructions d) Information available to Gas Safe registered operatives (Technical bulletins/Safety updates)
1.7	Explain the Responsibilities under gas safety legislation a) Business registration and competence b) Personnel registration and competence c) Landlords, Consumers – private householders and tenants

LO2 - Know the emergency actions, responsibilities and procedures	
Assessment Criteria and Range	
2.1	State the responsibilities and appropriate actions to be taken in the event of a gas emergency to include: a) Priorities of actions b) Reporting gas escapes c) Responsibilities of the gas user d) Responsibilities of the gas operative to give gas users advice and safety information e) Responsibilities of the gas engineer f) Turning off at emergency controls g) Elimination of ignition sources h) Reduction of gas concentrations via ventilation i) Action by the gas transporter j) Actions required to stop a gas escape downstream of an ECV k) Actions required if gas continues to escape l) Advice to occupants

2.2	State the gas emergency Priorities: a) Protect life b) Protect property c) Secure the escape d) Leave the site safe

LO3 - Know the Gas Industry Unsafe Situations Procedure	
Assessment Criteria and Range	
3.1	Describe the purpose and scope of the Unsafe Situations Procedure and define the criteria of the following categories: a) Immediately Dangerous (ID) Appliances/Installations b) At Risk (AR) Appliances/Installations c) Concern for safety notices
3.2	Explain how the Unsafe Situations procedure is applied
3.3	State the types of RIDDOR reportable work/incidents

LO4 - Understand the gas operatives' responsibilities in accurately completing the emergency notices, labels and forms	
Assessment Criteria and Range	
4.1	Describe the emergency notices, labels and forms to include: a) Warning Notices b) Warning Labels c) RIDDOR Reporting Forms d) Advice Notices e) Gas emergency notices and labels
4.2	Explain gas operative's responsibilities in completing the emergency notices, warning labels and forms

LO5 - Understand the correct installation locations and types of emergency control and appliance isolation valves	
Assessment Criteria and Range	
5.1	Describe the installation, operation and positioning requirements for Emergency Control Valves (ECV) to include: a) Gas meter installations b) Remote meter installations c) Multiple occupancy meter installations d) Meter Inlet Valves (MIV)
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

LO6 - Know the requirements for gas meter installations up to 6 m^3/h	
Assessment Criteria and Range	
6.1	State the installation methods and requirements for the installation of Natural Gas meters to include: a) Primary meters b) Secondary meters
6.2	Describe the associated meter labels required for primary and secondary meters

LO7 - Understand the types of gas meter housings and compartments and the requirements for installation and labelling	
Assessment Criteria and Range	
7.1	Describe the types of gas meter housings and compartments to include: a) Surface mounted b) Semi-concealed c) Built-in meter boxes d) Purpose built meter housings
7.2	State the suitable locations and fixing requirements for gas meter housings and compartments
7.3	Explain the differences between low pressure and medium pressure gas meter houses and compartments
7.4	State gas operatives responsibilities and the associated labels for meter housings and compartments

LO8 - Know how to check and set gas installation operating pressures	
Assessment Criteria and Range	
8.1	Describe the process of checking and setting gas installation operating pressures to include: a) Meter regulators - low and medium pressure b) Low pressure c) Medium pressure d) Maintaining correct installation operating pressures e) Static (standing) pressure
8.2	State the procedure for contacting those authorised to re-set or exchange defective meter regulators

LO9 – Understand how to safely assess the potential risks and re-light temporarily isolated appliances	
Assessment Criteria and Range	
9.1	Describe the process and safety factors associated with relighting temporarily isolated appliances to include: a) Confirmation that the installation is gas tight b) System and appliances are purged of air c) Appliance(s)are re-lit d) Satisfactory operation of user controls is confirmed e) Visual risk assessments are carried out for unsafe situations
9.2	Explain the correct actions required when un-commissioned appliances and systems are identified
9.3	Explain the correct actions required when pipework and appliances are not commissioned when the gas supply to the property is re-established

LO10 - Understand how to check and set appliance burner operating pressures and compare measured gas rates with published figures	
Assessment Criteria and Range	
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
10.4	Describe the procedure for gas rating a range rated appliance

LO11 - Know the principles of operation, methods of testing and application of gas appliance safety controls	
Assessment Criteria and Range	
11.1	Describe the principles of operation, methods of testing and application of gas appliance safety controls to include: **Gas Controls:** a) Pressure regulators b) Air/gas ratio valves c) Thermal cut off d) Gas cocks/valves e) Cooker hotplate lid control f) Electric solenoid valve g) Excess flow valves h) Flame protection devices: i) Vapour pressure device j) Thermoelectric valve k) Flame conduction and rectification l) Interrupter devices m) Atmosphere sensing devices n) Spillage detection devices o) Multifunction control **Thermostats:** a) Bi metallic b) Liquid expansion c) Vapour pressure d) Electrical e) Overheat/limit f) Thermistors

LO12 - Know where to acquire information and the types of documentation used during daily work activities	
Assessment Criteria and Range	
12.1	Explain how to access the types of “in company” information and documentation to include: a) Delivery notes b) Work programmes c) Time sheets d) Plans/drawings e) Job specifications f) Invoices/statements g) Quotations/estimates

Unit 6 – Specific core gas safety

UAN – J/617/9476
GLH - 225
AIM This practical and knowledge unit enables learners to demonstrate competence in the work activities related to the installation and maintenance of gas appliances and associated gas fittings. Upon completion of the unit the learners will:

LO1 – Be able to use of correct Personal Protective Equipment (PPE)	
Assessment Criteria and Range	
1.1	Select PPE needed for specific activities, to include: a) Gloves b) Protective footwear c) Eye protectors d) Ear protection e) High visibility clothing f) Knee protectors g) Dust masks
1.2	Carry out gas installation or maintenance work wearing PPE as determined by each specific task

LO2 – Be able to demonstrate safe lifting and handling techniques when moving equipment, materials and appliances associated with gas utilisation activities	
Assessment Criteria and Range	
2.1	Risk assess the work site and work activities to be undertaken
2.2	Assess loads to be handled and moved, to include: a) Size of loads b) Weight of loads c) Shape of loads d) Configuration of loads e) Need for assistance
2.3	Prepare to lift and handle loads, to include: a) Using correct PPE b) Communication to others c) Ensuring a clear path
2.4	Lift and move loads in accordance with best practice and safe systems of work, to include: a) Correct kinetic techniques b) Assisted lift needing two people c) Simple mechanical lifting device

LO3 – Be able to use steps and ladders safely	
Assessment Criteria and Range	
3.1	Risk assess the work site and work activities to be undertaken
3.2	Prepare the site location where steps and /or ladders need to be used
3.3	Inspect ladders and steps for defects
3.4	Position and erect steps and ladders in accordance with regulations and safe working practice
3.5	Secure ladders by approved methods to ensure no slippage or movement may occur during use
3.6	Use steps and ladders for work activities in accordance with Regulations and safe working practice

LO4 – Be able to demonstrate the safe use of common tools used in the gas utilisation industry	
Assessment Criteria and Range	
4.1	Demonstrate the correct and safe use of tools for drilling, securing and cutting brick, concrete, block, studded, timber framed and dry lined walls to include: a) Basic hand tools b) Battery operated tools c) RCD adaptors d) Power tools including visual inspection of drills, circular saws and jig saws e) Visual Inspections of tools including checking the condition of flexes cables and plugs f) Checking that PAT certificates are in date
4.2	Demonstrate the correct and safe use of the following tools used to test systems: a) Pressure gauges b) Voltage indicators c) Continuity testers d) Electrical multi-meters e) Plug in socket testers f) Electrical proving units g) Thermometers
4.3	Make good materials and surfaces to include brick, concrete, block, studded, timber framed, tiled and dry lined

LO5 – Be able to work safely with electrical systems and components used in domestic gas utilisation	
Assessment Criteria and Range	
5.1	Using Ohms law, calculate: a) Current and power b) Voltage c) Resistance
5.2	Identify simple series and parallel circuits

5.3	Identify the type of electrical installation as: a) TT b) TN-S c) TN-C-S
5.4	Connect a domestic gas appliance to a fixed domestic electrical installation to include: a) Cable type and sizing calculation b) Fuse rating calculation c) Fused spur connection d) Wiring a three pin plug
5.5	Safely carry out preliminary electrical safety checks to include: a) Earth continuity b) Polarity c) Short circuit d) Resistance to earth e) RCD operation test
5.6	Interpret appliance wiring diagrams to establish: a) Sequence of electrical operation b) Correct appliance and component wiring
5.7	Differentiate between main and supplementary electrical bonding connections
5.8	Demonstrate the correct procedure for safe electrical isolation to gas appliances and controls to include: a) Use of locking devices b) Circuit protection device retention c) Voltage indicating device d) Use of proving unit e) Confirmation of safety – absence of electricity
5.9	Identify electrical faults and defects on gas installations, initiating actions as required, to include: a) Inadequate earthing provision b) Incorrect cable types and position c) Clearances from other services d) Failed components e) Inadequate circuit protection conductors f) Defective automatic disconnection device g) Appliance connections

LO6 – Be able to calculate the requirements for permanent ventilation in domestic gas utilisation environments	
Assessment Criteria and Range	
6.1	Calculate the correct ventilation requirements for a range of domestic appliance installations in accordance with the relevant standards to include: a) Type A (Flueless) appliances b) Type B (Open) chimney appliances c) Type B and Type C appliances in compartments d) Multiple appliance installations e) Ventilation pathways via other rooms
6.2	Specify ventilation vents/grilles and methods
6.3	Measure existing vents and grilles to ensure that they are the correct type and provide the correct supply of air

LO7 – Be able to plan and prepare work activities for installing domestic gas pipework and domestic gas appliances	
Assessment Criteria and Range	
7.1	Apply a risk assessment and method statement to work activities
7.2	Survey the work site and record details of any features that may affect the installation including: a) Any pre-installation damage b) Defects to existing building features
7.3	Advise the property occupier of any defects found in the survey
7.4	Protect the work site and the building fabric against possible damage being caused during: a) De-commissioning b) Installation
7.5	Obtain confirmation from the customer before the job starts to ensure that they agree to the planned work
7.6	Check and confirm that all materials, tools and equipment are available as required and are fit for purpose
7.7	Check and confirm that the proposed siting of the gas supply meets the appliance manufacturers and industry standards requirements
7.8	Check and confirm that the gas supply meets 'industry standards' requirements in relation to other services: a) The gas supply b) Equipotential bonding c) Provision of ventilation
7.9	Confirm that the proposed siting of the gas supply meets industry standards' requirements in relation to other services
7.10	Calculate and confirm the correct sizing of pipework to ensure minimum pressure loss across the installation
7.11	Check the existing installation for unsafe situations and apply the gas industry unsafe situations procedures to any identified unsafe situations

LO8 – Know how to install, commission and de-commission gas pipework up to 35mm (1 ¼) diameter in domestic and small commercial properties	
Assessment Criteria and Range	
8.1	Describe the health, safety and environmental factors which need to be incorporated in risk assessment 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 de-commissioning, maintenance and commissioning 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

LO9 – Be able to install, exchange and remove gas pipework to industry standards	
Assessment Criteria and Range	
9.1	Carry out preparatory work to meet the installation requirements
9.2	Confirm that the proposed siting of the gas supply meets industry standards' requirements in relation to other services
9.3	Ensure the work is completed in accordance with manufacturers and industry standards requirements
9.4	Advise of any delays to the work to any persons who are affected by the delay in a timely manner, to include: a) Customers b) Line managers c) Other trades
9.5	Carry out the installation processes minimising damage to the customer property
9.6	Use the correct tools and equipment
9.7	Remove existing gas and equipotential bonding system components required for the installation
9.8	Fabricate gas pipework system, fittings and components as required by the installation including **jointing and bending:** a) Steel tube b) Copper tube c) Pliable corrugated (stainless steel) tube d) Polyethylene pipe e) Stainless steel pipework f) Capillary fittings g) Mechanical joints h) Press end connections i) Pliable corrugated (stainless steel) fittings j) Screwed joints k) Lead composition pipework joints l) Electrofusion joints m) Double sets/offset bends n) 90°degree bends o) Crank sets/pass-over bends

9.9	Position the pipework and confirm it meets the pipework manufacturers and industry standards requirements: a) Surface mounted b) Laid in joisted floors c) In solid floors d) In walls e) Above-ground external pipework f) Buried external pipework
9.10	Provide the required ventilation for the pipework installation in accordance with the pipework manufacturers and industry standards requirements
9.11	Provide adequate support(s) for pipework installations to conform with the pipework manufacturers and industry standards requirements
9.12	Position and protect pipework installation in and through walls to meet the pipework manufacturers and industry standards requirements for sleeving and purpose designed channels
9.13	Position and protect pipework installation in multi-occupancy dwellings to meet industry standards' requirements
9.14	Position and protect pipework installations in protected areas to meet the pipework manufacturers and industry standards' requirements
9.15	Position and protect external installations to meet the pipework manufacturers and industry standards requirements
9.16	Ensure existing gas systems are clean and free of debris
9.17	Fix and connect gas pipework, valves, fittings and components to the supply
9.18	Install additional emergency control valve (AECV) to the supply
9.19	Carry out precautionary actions to prevent the unauthorised use of un-commissioned or potentially unsafe gas pipework, appliances and equipotential bonding by following: a) isolation b) procedures and use of warning notices
9.20	Protect the work site and the building fabric against possible damage being caused during: a) De-commissioning b) Installation c) Using exposed flame when pipework previously may have contained gas/or with gas meter already fitted
9.21	Calculate and confirm the correct sizing of pipework to ensure minimum pressure loss across the installation
9.22	Check the existing installation for unsafe situations and apply the gas industry unsafe situations procedures to any identified unsafe situations

9.23	Install a domestic gas meter, pipework and domestic appliance(s) to include: a) Selecting correct materials and fittings b) Demonstrate the correct method of jointing materials and fittings c) Demonstrate the correct method of installing securing and supporting domestic meters and regulators d) Demonstrate the correct method of installing the appliance
9.24	Demonstrate tightness testing, purging and commissioning procedures
9.25	Carry out a gas rate check and confirm it complies with manufacturer's instructions
9.26	Demonstrate the correct method of removal of domestic meters and regulators to include: a) Permanent removal b) Temporary removal
9.27	Identify correct and incorrect methods of connecting the main equipotential bonding
9.28	Demonstrate how to identify gas pipework
9.29	Explain the thermal movement of gas pipework
9.30	Explain the difference between gas rate and heat input

LO10 - Be able to de-commission domestic gas pipework to industry standards	
Assessment Criteria and Range	
10.1	Check that the gas supply and electrical supply are in a condition that enables safe installation de-commissioning
10.2	Use the correct tools and equipment
10.3	Use designated safe Isolation methods, tests and procedures
10.4	Take precautionary actions to ensure that temporarily de-commissioned appliances, systems and components do not present a safety hazard
10.5	Permanently remove and disconnect appliances, gas system components and equipotential bonding system components as necessary
10.6	After permanent removal of pipework mark any live gas pipes with a notice to indicate the pipe contains gas

LO11 - Understand how to tightness test, purge, commission and de-commission gas pipework up to 35mm (1 ¼) diameter in small natural gas and LPG installations	
Assessment Criteria and Range	
11.1	Describe the health, safety and environmental factors which need to be incorporated in risk assessment for the domestic tightness testing and direct purging process
11.2	Explain the processes for ordering, supplying, checking and delivery of equipment, materials and components required for the work activity
11.3	Explain how to safely secure and store tools, equipment, materials and components to minimise loss or wastage

11.4	Describe the potential hazards that could arise from all de-commissioning, tightness testing and direct purging activities and the checks to be carried out before work takes place
11.5	Explain the steps to take should materials, components, tools and equipment not be available at the site to commence the de-commissioning, tightness testing and direct purging activity
11.6	Measure, calculate and record gas system installation volumes for tightness testing and direct purging activities – IGEM/UP/1B
11.7	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
11.8	Explain the 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: a) Where a meter inlet valve (MIV) is fitted b) No meter inlet valve is fitted
11.9	State the routines and sequences for direct purging of gas systems, appliances and components – IGEM/UP/1B
11.10	Outline the routines and sequences for commissioning gas systems, valves and components to industry standards
11.11	Explain the system handover procedures and demonstrating the operation of gas systems, valves and components to industry standards
11.12	Describe how to safely collect and dispose of system contents that may be hazardous to health or the environments
11.13	Explain how to isolate unsafe gas appliances, gas systems and components and application of the gas industry unsafe situations procedure
11.14	Know the types of pressure gauges suitable for carrying out tightness tests and identify the requirements for accuracy of reading
11.15	Describe the actions to be taken in the event of an emergency control valve (ECV) letting by
11.16	Describe the potential effects of electronic token meter tamper devices on tightness testing
11.17	Identify gaps in knowledge and skills to undertake continuous professional development (CPD)
11.18	Confirm the permissible pressure drops for new and existing installations and in relation to: a) Meter type/size b) Pipe diameter c) Installation volume d) Appliances connected to a gas supply and not isolated e) No meter fitted
11.19	Confirm the procedures for Tightness testing of pipework >35mm or total installation volume >0.035m^3
11.20	Explain what actions are to be taken when a smell of gas persists following a gas tightness test, e.g. use of gas detection equipment and leak detection fluid

11.21	Explain what actions are to be taken when a smell of gas persists following a gas tightness test in relation to: a) When the emergency control valve / additional emergency control valve / meter inlet valve is turned off b) When a leaking installation cannot be repaired

LO12 - Be able to pre-commission and commission gas pipework to industry standards	
Assessment Criteria and Range	
12.1	Confirm that the complete pipework installation complies with: a) Manufacturers' specification b) Industry standards
12.2	Check that conditions within the gas system will permit safe commissioning
12.3	Select and use the correct tools and equipment
12.4	Use tightness testing and purging procedures to confirm the integrity of the installed pipework installation
12.5	Measure, calculate and record gas system installation volumes for tightness testing and direct purging activities
12.6	Ensure ventilation meets industry standards' requirements
12.7	Remove existing gas components as necessary
12.8	Carry out the tightness testing and direct purging process, minimising damage to Customer property
12.9	Use tightness testing procedures to confirm the integrity of the newly installed gas installation: a) With meter fitted b) Without meter fitted c) With appliances fitted d) Without appliances fitted
12.10	Use tightness testing procedures to confirm the integrity of the existing gas installation
12.11	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 is fitted
12.12	Where the installation fails the tightness test, either: a) Apply the gas industry unsafe situations procedure b) Trace and repair the escape and retest installation c) Isolate unsafe gas appliances, gas system and components
12.13	Use purging procedures to confirm the safe supply of gas to the installed gas system and appliances
12.14	Instruct the customer on the correct operation of the gas system, valves and components
12.15	Prevent the unauthorised use of un-commissioned or potentially unsafe gas installations by following isolation procedures and use of warning notices
12.16	Apply protective coating to pipework and to joints after gas tightness testing has been completed
12.17	Check and confirm the operation of the installed gas valves and components to ensure they function safely and operate in accordance with manufacturers' instructions
12.18	Complete records/documentation to confirm the safe tightness testing and direct purging of the gas system and components
12.19	Complete gas system commissioning and de-commissioning records
12.20	Carry out all responsibilities in an ethical manner demonstrating self-discipline and a motivated approach when carrying out the work

LO13 - Be able to resolve problems which could affect the de-commissioning, installation and commissioning process	
Assessment Criteria and Range	
13.1	Report deficiencies with supply services: a) Gas b) Equipotential bonding
13.2	Resolve problems in accordance with approved procedures where pre-commissioning checks and tests reveal gas pipework system or component defects
13.3	Resolve problems in accordance with approved procedures when gas pipework systems and components being commissioned do not meet design requirements
13.4	Resolve problems in accordance with approved procedures when the gas pipework system and components cannot be restored to full performance
13.5	Demonstrate the correct method of making and breaking gas connections to appliances

LO14 – Be able to complete the correct notices, forms and labels used in domestic gas utilisation	
Assessment Criteria and Range	
14.1	Identify correct application and complete the following records, forms and labels: a) Landlord/home owner gas safety record b) Gas safety inspection form c) Benchmark maintenance report d) Service/maintenance checklist(s) e) Chimney/hearth notice plate
14.2	Select and attach appropriate labels applicable to domestic gas work: a) Un-commissioned appliance label b) Compartment label

LO15 – Be able to use and communicate data and information to carry out de-commissioning, installation and commissioning work	
Assessment Criteria and Range	
15.1	Liaise with the property occupier and other people who will be affected by the work processes to minimise disturbance to the job
15.2	Ensure the work is completed in accordance with pipework manufacturers and industry standards requirements
15.3	Advise of any delays to the work to any persons who are affected by the delay in a timely manner: a) Customers b) Line managers c) Other trades
15.4	Advise the designated persons of any unsafe situations and actions required to remedy those situations
15.5	Complete documentation to confirm the safe commissioning of the gas system and Components
15.6	Complete records and documentation confirming the safe commissioning of gas systems and components
15.7	Complete gas pipework and components commissioning and de-commissioning records

LO16 – Be able to demonstrate the correct use of combustion and atmosphere sampling analysers	
Assessment Criteria and Range	
16.1	Demonstrate the correct use of a combustion performance analysers and atmosphere sampling analysers, interpreting readings for type A, B and C gas appliances: a) CO, CO2, O2 readings, CO/CO2 ratios in a flueway b) CO, CO2, O2 readings in the atmosphere
16.2	Describe the required checks using a combustion/atmosphere analyser in the event of a "carbon monoxide detector" activation
16.3	Explain when to carry out combustion performance analysis: a) Retesting appliances after repair b) Action levels for appliances
16.4	Explain the various types of portable combustion analysers

LO17 - Be able to demonstrate how to carry out chimney performance checks	
Assessment Criteria and Range	
17.1	Carry out checks on open chimney systems, to include: a) Confirmation of correct type and visual checks throughout the length b) Chimney flow test c) Chimney spillage test
17.2	Carry out checks on room sealed chimney systems, to include: a) Confirmation of correct type and installation b) Correct terminal location and protection c) Testing operation to include case seal integrity

LO18- Be able to demonstrate that gas safety controls are operating correctly and demonstrate action to take if unsafe or ineffective operation is found	
Assessment Criteria and Range	
18.1	Safely diagnose correct, unsafe or ineffective operation of: **Flame protection devices, to include:** Vapour pressure Thermoelectric Flame rectification Flame conduction **Controls to include:** Atmosphere sensing device Spillage detection device Pressure regulators Low pressure cut off Thermal cut off Gas cocks/valves Cooker hotplate lid control Electric solenoid valve Excess flow valves Thermoelectric valve Interrupter devices Multifunction control Thermostats to include: Liquid expansion Vapour pressure Electrical thermostats Thermistors Air/gas ratio valves Bi-metallic flame failure devices
18.2	Demonstrate actions to be taken when defective or unsafe control operation is identified

Unit 7 – Install and maintain domestic gas water heaters and wet central heating appliances

UAN – L/617/9477
GLH – 140
AIM This practical and knowledge unit covers the installation, and maintenance of domestic gas water heaters and wet central heating appliances. Upon completion of the unit the learners will:

LO1 - Know the uses of gas water heating and wet central heating appliances in dwellings	
Assessment Criteria and Range	
1.1	State the purpose of gas water heating and wet central heating appliances used in dwellings.
1.2	Identify the different types of wet central heating appliances used in dwellings: a) System boiler b) Heat only boiler c) Combination boiler d) Gas Fire & Back Boiler e) Open-Flued Natural Draught Appliance f) Room Sealed Natural Draught Appliance
1.3	Identify the different types of gas water heating appliances used in dwellings: a) Multi point b) Circulator c) Single point

LO2 - Know the types of gas water heating and wet central heating appliances and their layout requirements	
Assessment Criteria and Range	
2.1	Identify the working principles of wet central heating appliances: a) System boiler b) Heat only boiler c) Combination boiler d) Gas Fire & Back Boiler e) Open-Flued Natural Draught Appliance f) Room Sealed Natural Draught Appliance
2.2	Identify the working principles of water heating appliances: a) Multi point b) Circulator c) Single point

2.3	State the general operating principles of gas fired heat producing appliances systems in dwellings: a) Open flued appliances b) Room sealed appliances c) Freestanding appliances d) Wall mounted appliances e) Fan assisted appliances f) Flueless water heaters
2.4	State the operating principles of wet central heating and hot water appliance control components: a) Chimney and flue systems b) Air pressure switches c) Horizontal and vertical systems d) Extended flue runs e) Fans f) Combustion g) Flueing h) Safety controls i) Burners j) Automatic air vents k) Circulating pumps l) Automatic bypass valves m) Diverter valves n) PCB's o) Condensate requirements p) Internal/external user controls q) Timing devices – clocks and programmers r) Room thermostats s) Hot water thermostats t) "Smart" controls u) Frost thermostats

LO3 - Plan gas systems for installing domestic gas water heaters and wet central heating appliances	
Assessment Criteria and Range	
3.1	State the positioning and fixing requirements of gas water heating and wet central heating appliances: a) Installation pipework b) Gas / water c) Chimney and flue systems d) Horizontal and vertical systems e) Extended flue runs f) Plume kits g) Ventilation requirements h) Condensate requirements i) Pressure release valve pipework
3.2	Identify and record the customer's job requirements

3.3	Compare the customer's job requirements with statutory and industry requirements and identify any conflicting issues: a) Location b) Siting c) Clearances
3.4	Survey the work site: a) Key structural features that could affect the installation b) Record details
3.5	Check that the proposed positioning of the appliance meets the manufacturers' and industry standards' requirements: a) Gas supply b) Electricity supply c) Chimney suitability d) The provision of ventilation
3.6	Check that the availability of input services meet the appliance manufacturers' and industry standards' requirements for the appliance installation: a) Gas supply b) Electricity supply c) Chimney suitability d) The provision of ventilation
3.7	Apply changes to customer job requirements and obtain customer agreement to those changes
3.8	Check and ensure the design of the proposed installation is compliant: a) Appliance manufacturer's instructions b) Industry standards
3.9	Check proposed location of condensate disposal is compliant: a) Appliance manufacturer's instructions b) Industry standards

LO4 - Prepare work activities for installing, maintaining domestic gas water heaters and wet central heating appliances	
Assessment Criteria and Range	
4.1	Obtain confirmation from the customer before the job starts to ensure that they agree the planned work
4.2	Check and confirm all materials, tools and equipment necessary for the are available and are fit for purpose: a) Tightness testing process b) Direct purging process c) De-commissioning d) Installation e) Maintenance f) Commissioning

4.3	Carry out all necessary checks and tests to confirm the installation meets the manufacturers' and industry requirements: a) Gas supply b) Electricity supply c) The chimney system d) The provision of ventilation
4.4	Confirm that the siting of the gas supply meets industry standards' requirements in relation to other services: a) Electricity b) Water supply
4.5	Confirm the suitability of the proposed location of condensate disposal as required
4.6	Check the existing installation for any unsafe appliances and system components and apply the gas industry unsafe situations procedures as required
4.7	Carry out preparatory work to meet the activity Requirements: a) Tightness testing process b) Direct purging process c) De-commissioning d) Installation e) Maintenance f) Commissioning
4.8	Select and use the correct tools and equipment for the planned activity Tightness testing process: a) Direct purging process b) De-commissioning c) Installation d) Maintenance e) Commissioning
4.9	Demonstrate the correct procedure for commissioning central heating appliances in accordance with manufacturer's instructions
4.10	Demonstrate the correct handover procedure to the end user including safe demonstration of the appliance and system control features

LO5 - De-commission domestic gas water heaters and wet central heating appliances	
Assessment Criteria and Range	
5.1	Explain procedures for decommissioning systems a) Permanent b) Temporary
5.2	Carry out decommissioning procedures: a) Notify relevant person b) Isolate electricity supply c) Isolate water supply d) Isolate gas supply e) Apply warning notices and signs f) Drain system to a suitable location g) Appropriately dispose of contents and any additives h) Continuity bonding as required i) Temporary capping of pipework sections as required j) Notify building users k) Alternative source of heat or supplies as required

Unit 8 – Install and maintain domestic gas cookers, tumble dryers and leisure appliances

UAN – R/617/9478
GLH - 80
AIM This practical and knowledge unit covers the installation, and maintenance of domestic gas cookers, tumble dryers and leisure appliances. Upon completion of the unit the learners will:

LO1 - Know the uses of domestic gas cookers, tumble dryers and leisure appliances in dwellings	
Assessment Criteria and Range	
1.1	State the purpose of domestic gas cookers, tumble dryers and leisure appliances used in dwellings
1.2	Identify the different types of domestic gas cookers, tumble dryers and leisure appliances used in dwellings: a) Free standing b) Built-in c) Hob d) Flexible connection e) Rigid connection

LO2 - Know the types of domestic gas cookers, tumble dryers and leisure appliances and their layout requirements	
Assessment Criteria and Range	
2.1	Identify the working principles of domestic gas cookers, tumble dryers and leisure appliances
2.2	Identify the working principles of domestic gas cookers, tumble dryers and leisure appliances: a) Free standing b) Built-in c) Hob
2.3	State the general operating principles of domestic gas cookers, tumble dryers and leisure appliances systems in dwellings: a) Free standing b) Built-in c) Hob
2.4	State the operating principles of domestic gas cookers, tumble dryers and leisure appliances control components: a) Safety controls b) Burners

LO3 - Plan gas systems for installing domestic gas cookers, tumble dryers and leisure appliances	
Assessment Criteria and Range	
3.1	State the positioning and fixing requirements of domestic gas cookers, tumble dryers and leisure appliances: a) Installation pipework b) Gas c) Ventilation requirements
3.2	Identify and record the customer's job requirements
3.3	Compare the customer's job requirements with statutory and industry requirements and identify any conflicting issues: a) Location b) Siting c) Clearances
3.4	Survey the work site a) Key structural features that could affect the installation b) Record details
3.5	Check that the proposed positioning of the appliance meets the manufacturers' and industry standards' requirements: a) Gas supply b) Electricity supply c) The provision of ventilation
3.6	Check that the availability of input services meet the appliance manufacturers' and industry standards' requirements for the appliance installation: a) Gas supply b) Electricity supply c) The provision of ventilation
3.7	Apply changes to customer job requirements and obtain customer agreement to those changes
3.8	Check and ensure the design of the proposed installation is compliant: a) Appliance manufacturer's instructions b) Industry standards

LO4 - Prepare work activities for installing, maintaining domestic gas cookers, tumble dryers and leisure appliances	
Assessment Criteria and Range	
4.1	Obtain confirmation from the customer before the job starts to ensure that they agree the planned work
4.2	Check and confirm all materials, tools and equipment necessary for the activity are available and are fit for purpose: a) Tightness testing process b) Direct purging process c) De-commissioning d) Installation e) Maintenance f) Commissioning

4.3	Carry out all necessary checks and tests to confirm the installation meets the manufacturers' and industry requirements: a) Gas supply b) Electricity supply c) The provision of ventilation
4.4	Confirm that the siting of the gas supply meets industry standards' requirements in relation to other services a) Water supply b) Electricity supply
4.5	Confirm the suitability of the proposed location of condensate disposal as required
4.6	Check the existing installation for any unsafe appliances and system components and apply the gas industry unsafe situations procedures as required
4.7	Carry out preparatory work to meet the activity requirements: a) Tightness testing process b) Direct purging process c) De-commissioning d) Installation e) Maintenance f) Commissioning
4.8	Select and use the correct tools and equipment for the planned activity: a) Tightness testing process b) Direct purging process c) De-commissioning d) Installation e) Maintenance f) Commissioning
4.9	Demonstrate the correct procedure for commissioning domestic gas cookers, tumble dryers and leisure appliances in accordance with manufacturer's instructions
4.10	Demonstrate the correct handover procedure to the end user including safe demonstration of the appliance and system control features

LO5 - De-commission domestic gas cookers, tumble dryers and leisure appliances	
Assessment Criteria and Range	
5.1	**Explain procedures for decommissioning systems:** **a) Permanent** **b) Temporary**
5.2	Carry out decommissioning procedures: a) Notify relevant person b) Isolate electricity supply c) Isolate gas supply d) Apply warning notices and signs e) Drain system to a suitable location f) Appropriately dispose of contents and any additives g) Continuity bonding as required h) Temporary capping of pipework sections as required **i)** Notify building users

Unit 9 – Install and maintain domestic gas space heating appliances

UAN – Y/617/9479
GLH - 90
AIM This practical and knowledge unit covers the installation, and maintenance of domestic gas space heating appliances. Upon completion of the unit the learners will:

LO1 - Know the uses of domestic gas space heating appliances in dwellings	
Assessment Criteria and Range	
1.1	State the purpose of domestic gas space heating appliances used in dwellings
1.2	Identify the different types of domestic gas space heating appliances used in dwellings: a) Outset Gas Fire b) Inset Live Fuel Effect Gas Fire c) Decorative Fuel Effect Appliance d) Convector Heater e) Flueless f) Open-Flued Natural Draught Appliance g) Room Sealed Natural Draught Appliance h) Open-Flued or Room Sealed Fanned Draught Appliance

LO2 - Know the types of domestic gas space heating appliances and their layout requirements	
Assessment Criteria and Range	
2.1	Identify the working principles of domestic gas space heating appliances
2.2	Identify the working principles of domestic gas space heating appliances: a) Outset gas fire b) Inset live fuel effect gas fire c) Decorative fuel effect appliance d) Convector heater
2.3	State the general operating principles of domestic gas space heating appliances systems in dwellings: a) Outset gas fire b) Inset live fuel effect gas fire c) Decorative fuel effect appliance d) Convector heater
2.4	State the operating principles of domestic gas space heating appliances control components: a) Safety controls b) Burners
2.5	Explain the correct installation procedure of domestic space heaters: a) Freestanding radiant type gas fire b) Inset live fuel effect gas fire c) Decorative fuel effect gas fire

LO3 - Plan gas systems for installing domestic gas space heating appliances	
Assessment Criteria and Range	
3.1	State the positioning and fixing requirements of domestic gas space heating appliances: a) Installation pipework b) Gas c) Electricity supply d) Ventilation requirements
3.2	Identify and record the customer's job requirements
3.3	Compare the customer's job requirements with statutory and industry requirements and identify any conflicting issues: a) Location b) Siting c) Clearances
3.4	Survey the work site: a) Key structural features that could affect the installation b) Record details
3.5	Check that the proposed positioning of the appliance meets the manufacturers' and industry standards' requirements: a) Gas supply b) Electricity supply c) Chimney suitability d) The provision of ventilation
3.6	Check that the availability of input services meet the appliance manufacturers' and industry standards' requirements for the appliance installation: a) Gas supply b) Electricity supply c) Chimney suitability d) The provision of ventilation
3.7	Apply changes to customer job requirements and obtain customer agreement to those changes
3.8	Check and ensure the design of the proposed installation is compliant: a) Appliance manufacturer's instructions b) Industry standards

LO4 - Prepare work activities for installing, maintaining domestic gas space heating appliances	
Assessment Criteria and Range	
4.1	Obtain confirmation from the customer before the job starts to ensure that they agree the planned work
4.2	Check and confirm all materials, tools and equipment necessary for the activity are available and are fit for purpose: a) Tightness testing process b) Direct purging process c) De-commissioning d) Installation e) Maintenance f) Commissioning

4.3	Carry out all necessary checks and tests to confirm the installation meets the manufacturers' and industry requirements: a) Gas supply b) Electricity supply c) Chimney suitability d) The provision of ventilation
4.4	Confirm that the siting of the gas supply meets industry standards' requirements in relation to other services: a) Water supply b) Electricity supply
4.5	Confirm the suitability of the proposed location of condensate disposal as required
4.6	Check the existing installation for any unsafe appliances and system components and apply the gas industry unsafe situations procedures as required
4.7	Carry out preparatory work to meet the activity requirements: a) Tightness testing process b) Direct purging process c) De-commissioning d) Installation e) Maintenance f) Commissioning
4.8	Select and use the correct tools and equipment for the planned activity: a) Tightness testing process b) Direct purging process c) De-commissioning d) Installation e) Maintenance f) Commissioning
4.9	Demonstrate the correct procedure for commissioning space heating appliances in accordance with manufacturer's instructions
4.10	Demonstrate the correct handover procedure to the end user including safe demonstration of the appliance and control features

LO5 - De-commission domestic gas space heating appliances	
Assessment Criteria and Range	
5.1	Explain procedures for decommissioning systems a) Permanent b) Temporary
5.2	Carry out decommissioning procedures: a) Notify relevant person b) Isolate electricity supply c) Isolate gas supply d) Apply warning notices and signs e) Drain system to a suitable location f) Appropriately dispose of contents and any additives g) Continuity bonding as required h) Temporary capping of pipework sections as required i) Notify building users

Unit 10 – Understand and apply domestic hot water system installation, commissioning, service and maintenance techniques

UAN – L/617/9480
GLH - 30
AIM This performance and knowledge unit provides learning in the design, installation, maintenance, and commissioning of a complex range of hot water system/component types. The unit also covers the requirements of statutory legislation for the installation, maintenance and commissioning of unvented hot water storage systems. Upon completion of the unit the learners will:

LO1 - Understand the types of hot water system and their layout requirements	
Assessment Criteria and Range	
1.1	Explain the types of hot water supply systems used in dwellings: **Centralised systems:** a) Unvented hot water systems b) Open vented hot water systems **Localised systems:** a) Unvented point of use heaters b) Instantaneous heaters
1.2	Describe types of unvented/vented hot water systems: a) Indirect storage systems (include water jacketed tube heaters) b) Direct storage systems c) Electrically heated d) Gas or oil fired e) Small point of use (under sink) f) Bulk storage heaters (combination tank) g) Solar thermal hot water systems h) Combination boilers
1.3	Identify hot water system pipework layout features including systems with secondary circulation: a) Direct and indirect vented and unvented b) Direct and indirect cylinders c) Solar thermal d) Thermal stores e) Combination boilers f) Secondary circulation g) Location of pump and type h) Automated timing devices i) Methods of balancing systems

1.4	State the recommended design temperatures within hot water systems: a) Hot water storage vessel b) Hot water delivery c) Secondary return d) At point of use: e) Instantaneous heaters f) Storage system g) Fixed bath h) Basin i) Blending valve installation
1.5	Identify the layout requirements, location and safety features for unvented/vented hot water systems: a) Expansion and temperature relief pipework b) Vent pipes
1.6	Evaluate the various types of unvented hot water system: a) Indirect storage systems b) Direct storage systems: • Electrically heated • Gas or oil fired • Small point of use (under sink)
1.7	Clarify the use of cold water accumulators in unvented hot water systems

LO2 - Know the types and operation of specialist components in hot water systems	
Assessment Criteria and Range	
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: a) Line strainer b) Pressure reducing valve c) Check valves d) Expansion device (vessel or integral to cylinder) e) Tundish f) Composite valve

LO3 - Understand the design techniques for hot water systems	
Assessment Criteria and Range	
3.1	Identify the factors which affect the selection of hot water systems for single occupancy dwellings
3.2	Explain how to minimise bacterial growth in hot water systems
3.3	State the criteria used for selecting hot water system and component types: a) Customers/occupiers needs/usage (Maximum usage per person per day) b) Building layout and features c) Suitability of system d) Energy efficiency e) Water efficiency f) Environmental impact

3.4	Interpret information sources when undertaking design work on hot water systems: a) Statutory regulations b) Industry standards c) Manufacturer technical instructions d) Verbal and written feedback from the customer
3.5	State which regulation applies to the installation of unvented hot water systems of more than 45kW and a capacity of 500 litres
3.6	Clarify how to take measurements of building features in order to carry out design calculations: a) From plans, drawings and specifications b) From site

LO4 - Know the installation requirements of hot water systems and components including any associated cold water components	
Assessment Criteria and Range	
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	Describe the installation and siting requirements of cold water cisterns
4.5	Describe the requirements for positioning a cold water pipe in relation to sources of heat
4.6	Identify the positioning and fixing requirements of components in unvented hot water systems: a) Safety devices: • Control thermostat • Overheat thermostat (thermal cut-out) • Temperature relief valve b) Functional devices: • Line strainer • Pressure reducing valve • Check valve • Expansion device • Expansion relief valve • Tundish arrangements • Composite valves
4.7	State the pipe size and positioning methods for safety relief pipework: a) D1 discharge b) Tundish c) D2 discharge d) Multiple discharge pipe arrangements from safety devices e) Termination

4.8	State how to position, fix and connect new hot water safety relief pipework: a) D1 discharge b) Tundish c) D2 discharge d) Multiple discharge pipe arrangements from safety devices e) Termination
4.9	State the positioning and fixing requirements of components of secondary circulation systems: a) System pipework b) Pump c) Control valves d) Timing devices e) Reverse circulation control valves f) Pipework insulation

LO5 - Be able to install hot water systems and components	
Assessment Criteria and Range	
5.1	Connect pipework to an unvented hot water system: Incoming supply pipework: a) Line strainer b) Pressure reducing valve c) Expansion vessel d) Storage cylinder e) Check valve
5.2	Position, fix and connect new hot water safety relief pipework: a) D1 pipework b) Tundish c) D2 pipework d) Correction termination

LO6 - Be able to diagnose and rectify faults in hot water systems and components	
Assessment Criteria and Range	
6.1	Use manufacturer instructions and industry standards to establish the diagnostic requirements of hot water system components
6.2	Isolate hot water systems or components to prevent them being brought into operation before the work has been fully completed
6.3	Carry out diagnostic tests to locate faults in hot water system components, carry out repair work and confirm the correct operation of the system components and safety valves: a) Discharge pipework b) Expansion and pressure vessels c) Expansion relief d) Temperature relief e) Thermostats
6.4	Carry out the periodic service of an unvented hot water storage system

LO7 - Be able to commission hot water systems and components	
Assessment Criteria and Range	
7.1	State the checks to be carried out during a visual inspection
7.2	State how to fill hot water pipework with water at normal operating pressure and check for leakage
7.3	Identify how to conduct a soundness test on hot water systems: a) Metallic systems b) Plastic pipework systems
7.4	Describe the flushing procedure for hot water systems and components
7.5	Clarify how to take flow rate and pressure readings from new and existing hot water outlets
7.6	State how to balance a secondary circulation system during commissioning activities
7.7	Specify the actions that must be taken when commissioning reveals defects in hot water systems: a) Dealing with systems that do not meet correct installation requirements b) Remedial work associated with defective components
7.8	State the procedure for notifying works carried out to the relevant authority

LO8 - Be able to confirm that unvented hot water systems have been serviced in accordance with manufacturer's instructions	
Assessment Criteria and Range	
8.1	Carry out a visual inspection, service and commissioning of hot water systems

Unit 11 – Understand and apply domestic central heating system installation, commissioning, service and maintenance techniques

UAN – R/617/9481
GLH - 98
AIM This performance and knowledge unit provides learning in the design, installation, maintenance, and commissioning of a complex range of central heating system/component types in single occupancy dwellings. The unit also covers the requirements of statutory legislation relating to the energy conservation of heating systems. The scope of the unit also covers underfloor heating systems, complex control systems and multiple boiler installations in larger dwellings using low loss headers. Upon completion of the unit the learners will:

LO1 - Know the types of central heating system and their layout requirements	
Assessment Criteria and Range	
1.1	State the purpose of central heating systems used in dwellings
1.2	State the layout features for the systems that include micro and minibore pipe work: a) Open flued boilers b) Room sealed boilers c) Traditional boilers d) Condensing boilers e) Combination boilers f) System boilers g) Freestanding boilers h) Wall mounted boilers i) Fan assisted boilers
1.3	State the operating principles of heat emitters: a) Panel radiators b) Column radiators c) Low surface temperature radiators d) Fan convectors e) Wall mounted f) Kick space g) Towel warmers h) Towel warmers with integral panel radiators

1.4	State the operating principles of central heating control components: a) Radiator valves – thermostatic and manual valves b) Automatic air vents c) Motorised valves – two port and three port mid position and diverter d) Hot water storage cylinders e) Feed and expansion cisterns f) Circulating pumps g) Automatic bypass valves h) Thermo-mechanical cylinder control valves i) Anti-gravity valves j) Drain valves k) Timing devices – clocks and programmers l) Room thermostats m) Cylinder thermostats and overheat protection devices n) Frost and pipe combined thermostats
1.5	State the operating principles of devices used in central heating systems to minimise the build-up of sediment
1.6	Identify the different types of space heating systems used in dwellings: a) Full central heating b) Background heating c) Selective heating d) Two and one pipe systems
1.7	Plan the work to be undertaken to comply with industry standards and manufacturer's guidelines taking into account risk assessment, location, ventilation
1.8	Define the space heating zoning requirements under statutory legislation for larger single occupancy dwellings
1.9	Define the function of components used in central heating systems: Zone control valves for multiple space heating applications with appropriate time and temperature control arrangements **Controllers:** a) Weather compensation b) Delayed start c) Optimum start d) Home automation systems.
1.10	Analyse the operating principles of environmental heat sources used in conjunction with central heating systems: a) Heat pumps: b) Ground source c) Air source. d) Micro combined heat and power
1.11	Identify the layout features of underfloor central heating systems
1.12	Analyse the working principles of underfloor central heating system pipework and components: a) Underfloor pipework arrangements from manifold to room b) Use of manifolds c) Controls system application - time and temperature to space heating zones

1.13	Identify the system layout features for multiple boiler installations incorporating low loss headers
1.14	Identify the type of central heating system from layout diagrams: a) Open vented b) Pumped heating only c) Pumped with gravity hot water including heat sink circuits d) Fully pumped with 2 x port valves e) Fully pumped with a mid-position valve f) Sealed system g) Pumped heating only h) Fully pumped with 2 x port valves i) Fully pumped with a mid-position valve j) Combination boiler with pumped heating k) System boiler with pumped heating
1.15	Analyse functional flow wiring diagrams to determine the method of control operation for central heating systems: a) Pumped heating only systems b) Pumped heating systems with combination boilers c) Pumped heating with gravity hot water systems d) Fully pumped incorporating 3 port valves – mid position and diverter valves e) Fully pumped incorporating 2 x two port valves f) Fully pumped incorporating hot water and multiple space heating zones g) Fully pumped incorporating weather compensation, optimum start or delayed start controllers h) Multiple boiler controls application i) Application of frost thermostats and boilers with pump overrun facility
1.16	State the system layout features for filling and venting systems: a) Open vented systems b) Feed and expansion cistern position c) Pump position d) Cold feed and open vent pipe connection e) Methods of releasing air from the system f) Sealed systems g) Expansion vessel position h) Pressure gauge, pressure relief valve and filling loop position i) Pump position j) Methods of releasing air from the system

LO2 - Know the design techniques for central heating systems	
Assessment Criteria and Range	
2.1	Define the factors which affect the selection of central heating systems for dwellings
2.2	State the criteria used when selecting heating system and component types: a) Customers' needs b) Building layout and features c) Suitability of system d) Energy efficiency e) Environmental impact

2.3	Interpret information sources when undertaking design work on central heating systems: a) Statutory regulations b) Industry standards c) Manufacturer technical instructions d) Verbal and written feedback from the customer
2.4	Clarify how to take measurements of building features in order to carry out design calculations: a) From plans, drawings and specifications b) From site
2.5	Justify the selection of system and control types for single family dwellings
2.6	State the principles of heat loss and gain in dwellings: a) Through the building fabric b) Due to ventilation
2.7	Evaluate the heating requirements of rooms in dwellings when designing a central heating system: a) Room size b) Temperature required – indoor to outdoor c) Air change rate
2.8	Specify the methods of sizing pipework and circulators for central heating systems: a) Pipe sizing calculations – space heating and hot water circuits b) Pump sizing calculations
2.9	Justify the selection criteria for boilers in dwellings: a) Space heating load b) Hot water heating load c) Heat loss from pipework d) Factors for intermittent heating
2.10	Clarify how to size expansion vessels for sealed central heating systems and feed and expansion cisterns for open vented systems
2.11	Clarify the design principles for underfloor central heating systems: a) Combined with radiators b) Stand alone
2.12	Calculate the size of central heating components used in single occupancy dwellings: a) Heat emitter size b) Hot water heating load c) Pipe size d) Pump size e) Boiler size
2.13	Clarify how to present design calculations in an acceptable format: a) Using basic not to scale line drawings b) Details for insertion into a quotation or tender for work in a small-scale dwelling

LO3 - Be able to apply design techniques for central heating systems	
Assessment Criteria and Range	
3.1	Use information sources when undertaking design work for central heating systems: a) Statutory regulations b) Industry standards c) Manufacturer technical instructions d) Verbal and written feedback from the customer
3.2	Calculate the size of central heating components used in single occupancy dwellings: a) Heat emitter size b) Hot water heating load c) Pipe size d) Pump size e) Boiler size
3.3	Present design calculations in an acceptable format: a) Using basic not to scale line drawings b) Details for insertion into a quotation or tender for work in a small-scale dwelling

LO4 - Know the installation requirements of central heating systems and components	
Assessment Criteria and Range	
4.1	Identify the sources of information required when undertaking work on central heating systems: a) Statutory regulations b) Industry standards c) Manufacturer technical instructions
4.2	Identify the preparatory work required to be carried out to the building fabric in order to install, decommission or maintain central heating systems
4.3	Identify the protection measures required to the building fabric or customer property, during and on completion of work on central heating systems and components
4.4	Identify the pipework materials and fittings required to complete work on central heating systems ensuring that they are not damaged
4.5	State the procedures required to assemble valves to radiators and mount radiators on wall surfaces
4.6	State the range of hand and power tools required to complete work on central heating systems
4.7	State the positioning and fixing requirements of central heating pipework and components: a) In suspended timber floors b) In solid floors c) Embedded in walls d) In all areas of the building subject to frost
4.8	Identify how expansion and contraction may be catered for in central heating pipework containing: a) Plastics b) Copper

4.9	State how to select clips and brackets appropriate to the hot water system pipework and the industry recommended spacing's: a) Horizontally mounted pipework b) Vertically mounted pipework
4.10	Identify how to select joints for use in central heating system pipework: a) LCS threaded joints b) Plastic push-fit joints c) Capillary solder joints d) Compression joints
4.11	State the positioning and fixing requirements of components in central heating systems: a) Radiator valves – thermostatic and manual valves b) Automatic air vents c) Hot water storage cylinders d) Feed and expansion cisterns e) Motorised valves – two port and three port mid position and diverter f) Circulating pumps g) Automatic bypass valves h) Thermo mechanical cylinder control valve i) Anti-gravity valve j) Drain valves k) Timing devices – clocks and programmers l) Room thermostats m) Cylinder thermostats and overheat protection devices n) Frost and pipe combined thermostat
4.12	Identify suitable methods for making new central heating pipework connections to components: a) Boilers b) Central heating control system components c) Heat emitters d) Hot water storage cylinders e) Feed and expansion cisterns
4.13	State how to position, fix and connect new central heating pipework to components: a) Panel radiators b) Boilers c) Control components d) Hot water storage cylinders e) Filling and venting components
4.14	Identify suitable methods for making new central heating pipework connections into existing central heating circuits: a) Within a one or two pipe copper system b) Within a one or two pipe low carbon steel system c) To a microbore or minibore system
4.15	Identify the insulation requirements of central heating system components: a) Pipework b) Cisterns

4.16	Specify the positioning and fixing requirements of components in underfloor central heating systems: a) Manifolds b) Pipework arrangements (cabling) c) Pipework installation techniques: d) Solid floor e) Suspended timber floor
4.17	Specify the positioning, fixing and connection requirements of new central heating components for sealed central heating systems: a) Connections to a boiler b) Fully pumped central heating control components – mid position or 2 x two port valve arrangement c) Sealed system components d) Connections to panel radiators or underfloor heating manifold e) Connections to hot water cylinder
4.18	Specify the positioning and fixing requirements of multiple boiler installations with low loss headers

LO5 - Be able to install central heating systems and components	
Assessment Criteria and Range	
5.1	Assemble heat emitter components
5.2	Make pipework fixings to copper and low carbon steel central heating system pipework
5.3	Joint central heating pipework systems: a) LCS threaded joints b) Capillary solder joints c) Compression joints
5.4	Position, fix and connect new central heating pipework to components: a) Heat emitters b) Boilers c) Control components d) Hot water storage cylinders e) Filling and venting components
5.5	Apply insulation to central heating system pipework
5.6	Demonstrate that central heating components and pipework systems cannot be brought into operation by the end user before the work has been fully completed
5.7	Connect pipework to an underfloor central heating system
5.8	Position, fix and connect new central heating components for a sealed central heating system: a) Connections to a boiler b) Fully pumped central heating control components – mid position or 2 x two port valve arrangement c) Sealed system components d) Connections to panel radiators or underfloor heating manifold e) Connections to hot water cylinder

LO6 - Know the service and maintenance requirements of central heating systems and components	
Assessment Criteria and Range	
6.1	Identify how to use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of system components
6.2	Identify how to carry out routine checks on central heating components and pipework systems as part of a periodic maintenance programme: a) Visual inspection of pipework for leakage and adequate support b) Poor circulation in heat emitters c) Poor flow rate through heating systems d) Venting of gas build up within heat emitters e) Operation of control components f) Effective operation of thermostats g) Operation/ adjustment – system filling and venting components
6.3	State the procedures for dealing with defects in central heating components and pipework: a) Failure of control components b) Leakage in system pipework c) Leakage from heat emitters d) Replacement of control valves e) Replacement of heat emitters f) Replacement of hot water storage cylinders
6.4	Identify the types of information to be provided on a maintenance record for central heating systems

LO7 - Be able to service and maintain central heating systems and components	
Assessment Criteria and Range	
7.1	Use manufacturer instructions and job maintenance schedules to establish the periodic servicing requirements of system components
7.2	Carry out routine checks on central heating components and pipework systems as part of a periodic maintenance programme: a) Visual inspection of pipework for leakage and adequate support b) Venting of gas build up within heat emitters c) Operation of control components d) Effective operation of thermostats e) Operation/ adjustment – system filling and venting components
7.3	Carry out repairs to defects in central heating system components a) Replacement of a radiator valve on a heat emitter b) Replacement of a radiator in an existing system
7.4	Complete the required details contained in a simple maintenance record for a central heating system

LO8 - Know the fault diagnosis and rectification procedures for central heating systems and components	
Assessment Criteria and Range	
8.1	Specify the periodic servicing requirements of central heating systems
8.2	State the methods of obtaining details of system faults from end users
8.3	Interpret manufacturer instructions and industry standards to establish the diagnostic requirements of central heating system components
8.4	Propose routine checks and diagnostics on central heating system components as part of a fault-finding process: a) Checking components for correct operation – pressure settings, temperature and circulation b) Cleaning system components (including dismantling and reassembly) c) Checking for blockages in heat emitters and pipework d) Checking for correct operation of system components: • Circulating pumps • Control components • Expansion vessels • Pressure relief valves • Feed and expansion cisterns
8.5	Specify methods of repairing faults in central heating system components: a) Sealed and open vented – fill and vent pipework and components b) Circulating pumps c) Central heating control components: • Motorised valves • Timing devices • Thermostats • Specialist controls – weather compensation, delayed and optimum start d) Blockages in heat emitters and pipework by power flushing
8.6	Specify methods of safely isolating central heating systems or components to prevent them being brought into operation before the work has been fully completed
8.7	Define procedures for carrying out diagnostic tests to locate faults in central heating system components: a) Replacement of circulating pumps b) Sealed heating system components c) Control components

LO9 - Be able to diagnose and rectify faults in central heating systems and components	
Assessment Criteria and Range	
9.1	Use manufacturer instructions and industry standards to establish the diagnostic requirements of central heating system components
9.2	Isolate central heating systems or components to prevent them being brought into operation before the work has been fully completed

9.3	Carry out diagnostic tests to locate faults in central heating system components and carry out repair work: a) Replacement of a circulating pump b) Sealed heating system components c) Control components d) Clean system components using power flushing equipment
9.4	Carry out the periodic service of a central heating system

LO10 - Know the commissioning and decommissioning requirements of central heating systems and components	
Assessment Criteria and Range	
10.1	Interpret information sources required to complete commissioning work on central heating systems
10.2	State the checks to be carried out during a visual inspection of a central heating system to confirm that it is ready to be filled with water
10.3	State how to fill central heating pipework with water at normal operating pressure and check for leakage
10.4	Identify how to conduct a soundness test on central heating systems: a) Metallic systems b) Plastic pipework systems
10.5	Specify the flushing requirements including the use of chemical treatments for new and existing central heating systems: a) Cold and hot flushing b) Power flushing c) System additives: d) Neutralisers e) Control components f) Cleansers g) Corrosion inhibitors
10.6	Specify the method required to balance a central heating system during commissioning activities
10.7	Specify the actions that must be taken when commissioning reveals defects in central heating systems: a) Dealing with systems that do not meet correct installation requirements b) Defects in the connection of components in systems c) Unbalanced systems – poor circulation d) Poor boiler connection into a low loss header e) Remedial work associated with defective components
10.8	Propose the range of information that would be detailed on a commissioning record for a central heating system
10.9	State the procedure for notifying works carried out to the relevant authority
10.10	Propose the points to be covered when handing over a completed system to the end-user

10.11	Identify working methods that reduce the periods during which central heating systems are not available to building users
10.12	State the information that needs to be provided to other persons before decommissioning work takes place
10.13	State how to temporarily decommission central heating and connecting pipework systems
10.14	Identify the work sequences for permanently decommissioning central heating and pipework systems
10.15	Identify the procedures for safely draining and disposing of central heating system contents
10.16	Identify the methods used during the decommissioning process to prevent the end-user from operating the appliance or system: a) Isolation of the fuel/electricity supply to the system b) Temporary capping of pipework sections c) Use of warning notices and signs

LO11 - Be able to commission and decommission central heating systems and components	
Assessment Criteria and Range	
11.1	Carry out a visual inspection of a central heating system to confirm that it is ready to be filled with water
11.2	Charge central heating components with water at normal operating pressure and check for leakage
11.3	Flush and treat a central heating system with appropriate additives: a) System cleanser/neutraliser b) System inhibitor
11.4	Balance a central heating system to meet design requirements
11.5	Advise appropriate persons before central heating components or pipework are isolated in order to undertake work
11.6	Carry out temporary decommissioning of central heating system components and connecting pipework systems
11.7	Check to ensure that the decommissioning procedures carried out prevent the end-user from operating the appliance or system: a) Isolation of the fuel/electricity supply to the system b) Temporary capping of pipework sections c) Use of warning notices and signs

LO12 - Know the inspection and soundness testing requirements of central heating systems and components	
Assessment Criteria and Range	
12.1	State the checks to be carried out during a visual inspection of a central heating system to confirm that it is ready to be filled with water
12.2	State how to fill central heating systems with water at normal operating pressure and check for leakage

12.3	Identify how to carry out a soundness test to industry requirements on central heating systems pipework and components
12.4	Identify the actions that must be taken when inspection and testing reveals defects in central heating systems: a) Dealing with systems that do not meet correct installation requirements b) Remedial work associate with defective pipework bracketing c) Remedial work associated with defective control valves d) Remedial work associated with leakage from pipework systems

LO13 - Be able to inspect and soundness test central heating systems and components	
Assessment Criteria and Range	
13.1	Carry out a visual inspection of a central heating system to confirm that it is ready to be filled with water
13.2	Fill central heating systems with water at normal operating pressure and check for leakage
13.3	Perform a soundness test to industry requirements on central heating systems pipework and components

Unit 12 – Water Supply (Water Fittings) Regulations and Water Byelaws in the UK

UAN – Y/617/9482
GLH - 8
AIM This knowledge unit provides 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 and existing workers in the occupation to develop their professional competence and extend their range of work. Upon completion of the unit the learners will:

LO1 - Understand the requirements of the Water Supply (Water Fittings) Regulations and Water Byelaws	
Assessment Criteria and Range	
1.1	Explain the requirements of the Water Regulations/Byelaws (Part 1): a) The domestic environment and the commercial, industrial environment
1.2	Explain the requirements of the Water Regulations/Byelaws (Part 2): a) Approved contractors b) The restriction on installation of water fittings, requirements for water fittings, notification requirements relating to any person who proposes to install a water fitting
1.3	Explain the requirements of the Water Regulations/Byelaws (Part 3): a) Penalties for contravening the Water Regulations, relaxation of the Water Regulations, dispute with a water undertaker

LO2 - Understand terminology used to confirm requirements of the Water Regulations	
Assessment Criteria and Range	
2.1	Explain the meanings of the key factors within the interpretations of the Water Regulations: b) Backflow c) Cistern d) Combined feed and expansion cistern e) Combined temperature and pressure relief f) Contamination g) Distributing pipe h) Expansion cistern/vessel i) Expansion valve j) Flushing cistern k) Overflow pipe l) Pressure relief valve m) Primary circuit n) Secondary circuit o) Secondary system p) Servicing valve q) Stop valve r) Storage cistern s) Temperature relief valve t) Terminal fitting u) Vent pipe
2.2	Identify the different types of water treatment apparatus available to dwellings

LO3 - Know the suitability of materials and substances in contact with water	
Assessment Criteria and Range	
3.1	Describe situations where materials or substances either alone or in combination are likely to cause contamination of water: a) Different classes of steel pipes b) Copper tubes and their connections above and below ground c) Unplasticised PVC d) Polyethylene pipes e) Stainless steel pipes
3.2	Identify suitable fittings for use above and below ground: a) Stop valves b) Drain-off valves c) Servicing valves
3.3	Identify suitable jointing materials and compounds

LO4 - Understand the requirements for water fittings	
Assessment Criteria and Range	
4.1	State the fitness for purpose of water fittings: a) British Standards or equivalent b) Immunity and protection from galvanic action
4.2	State the requirements for installed water fittings: a) Water tightness b) Prevention of ingress from contaminants c) Prevention from damage by freezing and other causes d) Prevention from deterioration by permeation e) The supporting pipework f) The fixings for water fittings
4.3	Describe the requirement for pressure testing pipework systems: a) Metallic b) Plastic
4.4	Explain how surges within a pipework system can affect system performance: a) Water hammer b) Relief valve discharge c) Pneumatic accumulators
4.5	State the connection requirements for the installation of a pump on a supply pipe: a) Permissible pump output capacity b) Permitted siting of a pump
4.6	State the connection requirements for the installation of a pumped shower: a) Permissible pump output capacity b) Recommended siting of a pump
4.7	State the installation requirements for pipes and operational fittings: a) Located in the cavity of a cavity wall b) Embedded in any wall or solid floor c) Located below a suspended floor d) Below a solid floor at ground level e) Location and accessibility to operational fittings
4.8	State the installation requirements for pipes entering a building: a) Depth of pipework b) Insulation requirements c) Protection of pipework
4.9	State the installation requirements for underground pipework: a) Pipes laid underground b) Pipes laid over an underground obstruction c) Pipes under an underground obstruction d) Pipes supplying water to a building below street level e) Pipes beneath a stream
4.10	Explain the terms ‘concealed fitting’ and ‘dezincification resistant material’

LO5 - Know the design and installation requirements for a water supply system	
Assessment Criteria and Range	
5.1	State factors to be taken into consideration in the design of a water supply system: a) Total daily consumption b) Maximum and average flows required c) Availability of mains supply d) Mains pressure variance e) Water storage capacity where needed f) Transient or surge pressures g) Environmental issues surrounding area and supply
5.2	Describe types of distribution system available within a dwelling: a) Direct fed system b) Indirect fed system c) Combination of direct and indirect fed systems
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: a) Individual property b) Location within premises supplied with water c) Block of flats supplied from a common supply pipe d) Block of flats with separate supply pipes to each flat
5.6	State the installation requirements for the provision, operation and location of servicing valves: a) Inlet to Float Operated Valve (FOV) b) Outlet of storage cisterns c) Inlet to appliances d) Accessibility of servicing valves e) Methods of operation
5.7	State the installation requirements for the provision of draining taps: a) Location b) Accessibility c) Types 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: a) Systems that do not include any plastic b) Systems that include plastic pipes
5.10	Explain the reason for the flushing of a system installation
5.11	State when system disinfection is required

LO6 - Know the requirements for the prevention of cross connection to unwholesome water	
Assessment Criteria and Range	
6.1	State the meaning of unwholesome water In relation to: a) Rainwater b) Recycled water c) Any fluid not supplied by a water undertaker
6.2	State the requirements for identifying an unwholesome water system so that it is readily distinguishable from a wholesome system to include: a) Colour coding for pipes and fittings b) Labelling for pipes and terminal fittings
6.3	Identify the correct arrangement for connecting a wholesome water supply to a re-use

LO7 - Know the backflow prevention fluid categories	
Assessment Criteria and Range	
7.1	Define the five fluid categories

LO8 - Know the requirements for backflow prevention	
Assessment Criteria and Range	
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

LO9 - Understand the guidance clauses relating to backflow prevention	
Assessment Criteria and Range	
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: a) Accessibility of the mechanical backflow protection device b) Location within the premises c) Not to be buried in the ground d) Vented and verifiable or devices with relief outlets not to be installed in chambers below ground or where liable to flooding e) The installation of line strainers f) The lowest point of discharge from the ground and termination with a Type AA air gap
9.5	State the requirements for appliances supplied through or incorporating a pump

9.6	State the requirements of a bidet or appliance using a hand-held spray: a) Ascending spray type b) Over rim type c) Spray handset fittings used with bidets and WC's
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: a) Single outlet taps b) Combination tap assembly outlets c) Fixed shower heads over basins d) Baths and bidets e) Explain the requirements for a sink in a non-domestic environment
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: a) Direct fed sprinkler systems with no additives b) Direct fed sprinkler systems with additives c) Elevated storage cisterns with or without additives by gravity d) Elevated storage cisterns with pumped outlet with or without additives e) Dual feed cisterns with water from the water undertaker and from another source
9.16	State the requirements when applied to miscellaneous commercial and industrial applications: a) Pumped supply to laboratory fittings b) Separation of wholesome water from supplementary sources c) Separation of wholesome water from water that has been used d) Water supply taken directly from a supply pipe to a ship e) Water supply taken by gravity from storage on a quayside f) Water supply pumped from storage on a quayside g) Water taken from a hose union tap on a quayside

LO10 - Know the installation requirements for cold water services	
Assessment Criteria and Range	
10.1	Describe the installation requirements and methods of connection for water fittings: a) Float operated valves b) Inlets to cisterns c) Outlets from cisterns d) Warning and overflow pipes e) Cold water storage cisterns

LO11 – Know the installation requirements of hot water services	
Assessment Criteria and Range	
11.1	Describe the installation requirements and methods of connection for water fittings: a) Directly heated unvented hot water systems b) Indirectly heated unvented hot water systems c) Independent water heaters d) Methods of accommodating expanded water in a hot water system e) Maximum temperature within a hot water system f) Hot water distribution temperatures g) Temperature of hot water at terminal fittings h) Surfaces of hot water pipes
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

LO12 - Know the installation requirements for WCs, flushing devices and urinals approved for use	
Assessment Criteria and Range	
12.1	Identify the installation methods and requirements for the operation of WC pans: a) Single flush cisterns, dual flush cisterns b) Single flush siphonic outlet c) Dual flush siphonic outlet d) Drop and flap valve e) Dual flush cistern capacities f) Operating instructions for dual flush cisterns g) Pressure flushing valves h) Cistern water line mark i) Requirements for warning pipes j) Internal overflows

12.2	Explain methods for flushing urinals: a) Manually operated cistern b) Automatically operated cistern c) Pressure flushing valves
12.3	Describe methods for filling a urinal cistern: a) Manual infill b) Electronic sensor c) Pressure pad d) Time switch e) Frequency of flushing
12.4	State the requirements for urinal cistern filling rates for: a) A single urinal bowl b) A urinal stall or slab serving two or more urinals
12.5	State the requirements for the renewal of a WC cistern installed before 1 July 1999

LO13 - Know the types of bath, sink, showers taps location and installation requirements	
Assessment Criteria and Range	
13.1	State the requirements for drinking water points in premises
13.2	State the requirements for drinking water supplies: a) Water supplied from a supply pipe b) Water supplied from a pumped supply pipe c) Water supplied from a storage cistern d) Water that has been softened used for drinking purposes
13.3	State the requirements for waste outlets from appliances

LO14 - Know the design and installation requirements for a water supply system	
Assessment Criteria and Range	
14.1	State the upper limits of water consumption for domestic: a) Horizontal axis washing machines b) Washer – driers c) Dish washers

LO15 - Know the requirements for water supplied for outside use	
Assessment Criteria and Range	
15.1	State the installation requirements for animal drinking troughs or bowls in relation to: a) Methods of controlling the inflow to a trough or bowl b) The siting of servicing valves c) Backflow protection
15.2	State the installation requirements for ponds, fountains and pools in relation to: a) Impervious liners and water tightness b) Temporary connections to ponds, pools and fountains

9. Assessment Methods and Arrangements

This qualification will be assessed as identified below.

Assessment Component	Set By	Marked By	Quality Assurance	
			Internal	External
Centrally Set Online Assessments	BPEC	BPEC (online)	Examination invigilation and IQA monitoring	Moderation of exam results and EQA monitoring of process during visits
Centrally Set Offline Assessments	BPEC	Centre Assessor	Examination invigilation and IQA monitoring	EQA checks of exam results and EQA monitoring of process during visits
Centrally Set Practical Performance Assessments	BPEC	Centre Assessor	IQA checks of assessment documentation and observation of assessments	EQA checks of assessment documentation and observation of assessment processes
Learner portfolio of evidence	BPEC	On-site Assessor	IQA checks of assessment documentation and observation of site assessments	EQA checks of assessment documentation, processes to include observation of on-site assessments

9.1 Arrangements for Centrally Set Online Assessments

Marking Knowledge Assessments

9.1.1 Online exam

- The learner will complete the online exams
- Providing the learner achieves the specified mark of 60% , the exam will be passed
- Learners not achieving the specified mark will be deemed to have failed the exam
- Learners wishing to retake the assessment will be required to re-attempt the full theory exam. It will not be possible to reschedule the exam until a period of 24 hours has passed since failed attempt.

There are three multiple choice tests:

- **L3 Diploma in Gas Engineering - Health and safety in gas utilisation** – **Mandatory Unit** – all pathways – 40 questions – 80 minutes – closed book
- **L3 Diploma in Gas Engineering - Unit 2, 3 and 4 combined** – **Mandatory Unit** – all pathways – 40 questions – 80 minutes – open book
- **L3 Diploma in Gas Engineering - Central heating install, service and maintain** – **Optional Unit** – pathways 1 and 2 – 40 questions – 80 minutes – open book

9.1.2 Off-line summative exams (MoGS specific, Hot Water)

- The learner will complete the first attempt
- If the learner does not achieve the 100% pass mark, they will be given a new answer sheet to complete a second off line attempt at answering any questions answered incorrectly on their first attempt
- Providing a level of achievement of between 80 to 99% for the second attempt has been attained, at the assessors discretion, the learner will be given Oral questioning for the questions answered incorrectly in an attempt to establish competence in all remaining areas
- Learners who have not achieved the 80% pass mark after their second attempt will be deemed to have failed the knowledge assessment. Learners wishing to retake the assessment will be required to re-attempt the full theory exam in its entirety.

9.1.3 Water Regulations

- The learner is required to achieve an 80% pass rate in both Section A and Section B to be successful. They must achieve 70% or above in each section on their first attempt
- Learners who achieve less than 70% in the first attempt in one or both sections have failed the assessment
- Learners who achieve 70% or more in each section in the first attempt have a second attempt to achieve 80% in both sections. Learners who do not achieve 80% in each section in their second attempt have failed the assessments.

9.2 Permitted Documents

- The Assessment Pack will indicate if the Learner is permitted to refer to documents during the assessment. These should be provided by the Centre.
- If the assessment is designated as 'Closed Book' the learner is not permitted to refer to any documentation. This includes dictionaries.

9.3 Arrangements for Centrally Set Practical Performance Assessments

Domestic gas pipework (≤ 35 mm)

UNIT ASSESSMENT REQUIREMENTS:

- Assessments must be carried out as documented in this table
- Learners must demonstrate sufficient evidence of competence through experience of satisfactorily undertaking the work activities documented across the full range. This shall be evidenced via the Learners Portfolio and be assessed as meeting the minimum documented requirements.

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Copper Tube b) Steel Tube c) Corrugated Stainless Steel Tube (CSST) d) Polyethylene Tube (PE) Secondary Range: a) Through Walls b) Under Wooden Floors c) Surface Mounted d) Capillary Joints e) Compression Joints f) CSST Joints g) Screwed Joints h) Formed Bends	One Successful Assessment	Evidence of experience undertaking the satisfactory tightness testing and purging is required across the documented ranges. At least 5[1] separate installation occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[1] of the installation occasions must be from the workplace.	One Successful Assessment

Table Notes: The documented numbers required to be evidenced do include the assessment occasions.

Gas tightness testing and direct purging (IGEM/UP/1B)

UNIT ASSESSMENT REQUIREMENTS:

- Assessments must be carried out as documented in this table
- Learners must demonstrate sufficient evidence of competence through experience of satisfactorily undertaking the work activities documented across the full range. This shall be evidenced via the Learners Portfolio and be assessed as meeting the minimum documented requirements.

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Natural Gas Installations b) LPG Installations Secondary Range: a) Purge Natural Gas b) Installation with Volume ≤ 0.02 m3 c) Purge Natural Gas Installation with Volume > 0.02 m3 d) ≤ 0.035 m3 e) Including a Meter f) New Installation g) Existing Installation	One Successful Assessment	Evidence of experience undertaking the satisfactory tightness testing and purging is required across the documented ranges. At least 5[1] separate installation occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[1] of the installation occasions must be from the workplace.	One Successful Assessment[2]

Table Notes: The documented numbers required to be evidenced do include the assessment occasions.
The assessment must be of a different 'Primary Range' type than that the one utilised as part of the RWE Assessment.

Installation of gas water heating and wet central heating appliances

UNIT ASSESSMENT REQUIREMENTS:

- Assessments must be carried out as documented in this table
- Learners must demonstrate sufficient evidence of competence through experience of satisfactorily undertaking the work activities documented across the full range. This shall be evidenced via the Learners Portfolio and be assessed as meeting the minimum documented requirements.

Installation of a gas fired boiler

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Traditional Boiler [1] b) System Boiler [2] c) Combination Boiler [3] Secondary Range: a) Room Sealed Fanned Draught Appliance (Horizontal Chimney) (Appliance Type C12 or C13) b) Room Sealed Fanned Draught Appliance (Vertical Chimney) (Appliance Type C32 or C33) c) Condensing Appliance d) New Installation e) Installation Exchange	One Successful Assessment	Evidence of experience undertaking the satisfactory installation of gas fired boilers is required across the documented ranges. At least 5[4] separate installation occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[4] of the installation occasions must be from the workplace.	One Successful Assessment[5]

Table Notes:
A 'Traditional Boiler' for the purpose of this document is deemed to be a boiler where the central heating system controls such as the pump, zone valves and other auxiliary controls are external to the appliance casing as supplied by the manufacturer.
A 'System Boiler' for the purpose of this document is deemed to be a boiler where one or more of the central heating system controls such as the pump, zone valves and other auxiliary controls are internal to the appliance casing as supplied by the manufacturer.
A 'Combination Boiler' for the purpose of this document is deemed to be a boiler that provides instantaneous hot water to single or multiple hot water outlets, such as taps, with no water storage capacity (other than small quantities that may, by manufacturers design, be stored internally to prevent any delay in hot water delivery).
The documented numbers required to be evidenced do include the assessment occasions.
The appliance must be of a different 'Primary Range' type than that the one utilised as part of the RWE Assessment.

Maintenance of gas water heating and wet central heating appliances

UNIT ASSESSMENT REQUIREMENTS:

- Assessments must be carried out as documented in this table
- Learners must demonstrate sufficient evidence of competence through experience of satisfactorily undertaking the work activities documented across the full range. This shall be evidenced via the Learners Portfolio and be assessed as meeting the minimum documented requirements.

Routine full service of a gas fired boiler

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Traditional Boiler [1] b) System Boiler [2] c) Combination Boiler [3] d) Gas Fire and Back Boiler [4] Secondary Range: a) Open-Flued Natural Draught Appliance (incl. Draught Diverter) (Appliance Type B11) b) Room Sealed Natural Draught Appliance c) (Appliance Type C11) d) Room Sealed Fanned Draught Appliance e) (Appliance Type C12 or C13 or C32 or C33 or C52 or C53) f) Condensing Appliance g) Non-Condensing Appliance	One Successful Assessment	Evidence of experience undertaking the satisfactory installation of gas fired boilers is required across the documented ranges. At least 5[5] separate installation occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[5] of the installation occasions must be from the workplace.	One Successful Assessment[6]

Routine full service of a gas fired instantaneous water heater

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: • Multipoint Water Heater	One Successful Assessment	N/A	N/A

Identify and repair faults on gas fired boilers and instantaneous water heaters

UNIT ASSESSMENT REQUIREMENTS:

- Assessments must be carried out as documented in this table
- Learners must demonstrate sufficient evidence of competence through experience of satisfactorily undertaking the work activities documented across the full range. This shall be evidenced via the Learners Portfolio and be assessed as meeting the minimum documented requirements.

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Traditional Boiler [1] b) System Boiler [2] c) Combination Boiler [3] d) Multipoint Water Heater Secondary Range: a) Open-Flued or Room Sealed Natural Draught Appliance b) (Appliance Type B11 or C11) c) Open-Flued or Room Sealed d) Fanned Draught Appliance e) (Appliance Type B12 or B13 or B14 or C12 or C13 or C32 or C33) f) Gas Safety Control Defect[7] g) Electrical Control Defect [7] h) Water Control Defect [7]	One Successful Assessment	Evidence of experience undertaking the identification and repairing of faults on gas fired boilers and instantaneous water heaters is required across the documented ranges. At least 5[5] separate fault rectification occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[5] of the fault rectification occasions must be from the workplace.	N/A

Table Notes:
A 'Traditional Boiler' for the purpose of this document is deemed to be a boiler where the central heating system controls such as the pump, zone valves and other auxiliary controls are external to the appliance casing as supplied by the manufacturer.
A 'System Boiler' for the purpose of this document is deemed to be a boiler where one or more of the central heating system controls such as the pump, zone valves and other auxiliary controls are internal to the appliance casing as supplied by the manufacturer.
A 'Combination Boiler' for the purpose of this document is deemed to be a boiler that provides instantaneous hot water to single or multiple hot water outlets, such as taps, with no water storage capacity (other than small quantities that may, by manufacturers design, be stored internally to prevent any delay in hot water delivery).
A 'Gas Fire and Boiler' for the purpose of this document is deemed to be a boiler, not a back circulator, that is connected to a flexible flue liner and has a gas fire connected to the front of the appliance.
The documented numbers required to be evidenced do include the assessment occasions.
The appliance must be of a different 'Primary Range' type than that the one utilised as part of the RWE Assessment.
The defects listed are 'Appliance Defects' and relate to controls within the appliance casing and do not refer to defects on controls on the heating or hot water systems.

Installation of domestic gas cookers, tumble dryers and leisure appliances

UNIT ASSESSMENT REQUIREMENTS:

- Assessments must be carried out as documented in this table
- Learners must demonstrate sufficient evidence of competence through experience of satisfactorily undertaking the work activities documented across the full range. This shall be evidenced via the Learners Portfolio and be assessed as meeting the minimum documented requirements.

Installation of a gas fired cooker

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Free Standing Cooker [1] b) Hob [2] Secondary Range: a) Flueless b) (Appliance Type A1) c) Flexible Connection [3] d) Rigid Connection [4]	One Successful Assessment	Evidence of experience undertaking the satisfactory tightness testing and purging is required across the documented ranges. At least 5[5] separate installation occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[5] of the installation occasions must be from the workplace.	One Successful Assessment

Table Notes:
A 'Free Standing Cooker' for the purpose of this document is deemed to be a cooking appliance resting directly on the floor and comprising a gas fired hotplate, gas fired oven and possibly a grill and / or griddle.
A 'Hob' for the purpose of this document is deemed to be independent gas fired hotplate designed to be installed into the kitchen work top.
A 'Flexible Connection' for the purpose of this document is deemed to be a connection of the appliance between the termination point on the installation pipework and the appliance itself by means of a flexible connector and self-sealing plug in device.
A 'Rigid Connection' for the purpose of this document is deemed to be a connection of the appliance between the termination point on the installation pipework and the appliance itself by means of rigid pipework incorporating an appliance isolation valve.
The documented numbers required to be evidenced do include the assessment occasions.

Maintenance of domestic gas cookers, tumble dryers and leisure appliances

UNIT ASSESSMENT REQUIREMENTS:

- Assessments must be carried out as documented in this table
- Learners must demonstrate sufficient evidence of competence through experience of satisfactorily undertaking the work activities documented across the full range. This shall be evidenced via the Learners Portfolio and be assessed as meeting the minimum documented requirements.

Routine full service of a gas fired cooker

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Free Standing Cooker [1] Secondary Range: a) Flueless b) (Appliance Type A1)	One Successful Assessment	Evidence of experience undertaking the satisfactory tightness testing and purging is required across the documented ranges. At least 5[2] separate installation occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[2] of the installation occasions must be from the workplace.	One Successful Assessment

Identify and repair faults on gas fired cookers

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Free Standing Cooker [1] Secondary Range: a) Flueless b) (Appliance Type A1) c) Gas Safety Control Defect d) Electrical Control Defect	One Successful Assessment	Evidence of experience undertaking the identification and repairing of faults on gas fired cookers is required across the documented ranges. At least 5 [2] separate fault rectification occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 2[2] of the fault rectification occasions must be from the workplace.	N/A

Table Notes:
A 'Free Standing Cooker' for the purpose of this document is deemed to be a cooking appliance resting directly on the floor and comprising a gas fired hotplate, gas fired oven and possibly a grill and / or griddle.
The documented numbers required to be evidenced do include the assessment occasions.

Installation of domestic gas space heating appliances

UNIT ASSESSMENT REQUIREMENTS:

- Assessments must be carried out as documented in this table
- Learners must demonstrate sufficient evidence of competence through experience of satisfactorily undertaking the work activities documented across the full range. This shall be evidenced via the Learners Portfolio and be assessed as meeting the minimum documented requirements.

Installation of gas fired space heating appliance

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Outset Gas Fire [1] b) Inset Live Fuel Effect Gas Fire c) Decorative Fuel Effect Appliance d) Convector Heater [2] Secondary Range: a) Flueless b) (Appliance Type A1) c) Open-Flued Natural Draught Appliance d) (Appliance Type B11 or B21) e) Room Sealed Natural Draught Appliance f) (Appliance Type C11) g) Open-Flued or Room Sealed Fanned Draught Appliance h) (Appliance Type B12 or B13 or B14 or B22 or B23 or C12 or C13)	One Successful Assessment	Evidence of experience undertaking the satisfactory tightness testing and purging is required across the documented ranges. At least 5[3] separate installation occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[3] of the installation occasions must be from the workplace.	One Successful Assessment [4]

Table Notes:
An 'Outset Gas Fire' for the purpose of this document is deemed to be a gas fire incorporating a radiating surface, either in the form of a radiant or imitation fuel, that is either hearth or wall mounted in front of a closure plate which is fitted to a fireplace opening.
A 'Convector Heater' for the purpose of this document is deemed to be an appliance that is designed to heat a room mainly by the emission of air heated by convection.
The documented numbers required to be evidenced do include the assessment occasions.
The appliance must be of a different 'Primary Range' type than that the one utilised as part of the RWE Assessment.

Maintenance of domestic gas space heating appliances

UNIT ASSESSMENT REQUIREMENTS:

- Assessments must be carried out as documented in this table
- Learners must demonstrate sufficient evidence of competence through experience of satisfactorily undertaking the work activities documented across the full range. This shall be evidenced via the Learners Portfolio and be assessed as meeting the minimum documented requirements.

Routine full service of a gas fired space heating appliance

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Outset Gas Fire [1] b) Inset Live Fuel Effect Gas Fire c) Decorative Fuel Effect Appliance d) Convector Heater [2] Secondary Range: a) Flueless b) (Appliance Type A1) c) Open-Flued or Room Sealed Natural Draught Appliance d) (Appliance Type B11 or B21) e) Room Sealed Natural Draught Appliance f) (Appliance Type C11) g) Open-Flued or Room Sealed Fanned Draught Appliance h) (Appliance Type B12 or B13 or B14 or B22 or B23 or C12 or C13)	One Successful Assessment	Evidence of experience undertaking the satisfactory tightness testing and purging is required across the documented ranges. At least 5[3] separate installation occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[3] of the installation occasions must be from the workplace.	One Successful Assessment [4]

Identify and repair faults on a gas fired space heating appliance

Range	RWE Assessment	Assessment of Experience	Workplace Assessment
Primary Range: a) Outset Gas Fire [1] b) Inset Live Fuel Effect Gas Fire c) Decorative Fuel Effect Appliance d) Convector Heater [2] Secondary Range: a) Flueless b) (Appliance Type A1) c) Open-Flued or Room Sealed Natural Draught Appliance d) (Appliance Type B11 or B21 or C11) e) Open-Flued or Room Sealed Fanned Draught Appliance	One Successful Assessment	Evidence of experience undertaking the satisfactory tightness testing and purging is required across the documented ranges. At least 5[3] separate installation occasions must occur with the Learner demonstrating experience across the Assessment Criteria (but not necessarily all the criteria) on each occasion. At least 3[3] of the installation occasions must be from the workplace.	One Successful Assessment [4]

f) (Appliance Type B12 or B13 or B14 or B22 or B23 or C12 or C13) g) Gas Safety Control Defects			
Table Notes: An 'Outset Gas Fire' for the purpose of this document is deemed to be a gas fire incorporating a radiating surface, either in the form of a radiant or imitation fuel, that is either hearth or wall mounted in front of a closure plate which is fitted to a fireplace opening. A 'Convector Heater' for the purpose of this document is deemed to be an appliance that is designed to heat a room mainly by the emission of air heated by convection. The documented numbers required to be evidenced do include the assessment occasions. The appliance must be of a different 'Primary Range' type than that the one utilised as part of the RWE Assessment.			

9.4 Realistic work environment (RWE) assessments

RWE simulated assessment may only be used as specified and, if necessary, with the prior approval of the EQA. Any approval given by the EQA must be recorded and filed in the centre Quality Manual and in the 'Learner's Portfolio' for audit purposes.

These assessments will normally be installation and maintenance activities conducted in a workshop area. These areas are considered to be a 'managed' environment because there is a degree of control over the conditions under which the activity is undertaken. The simulation activities and areas will normally include:

- Real time pressures;
- A range of appliances, applicable to the assessment types
- A variety of flue types, e.g. Type 'B', Type 'C', natural and fanned draught with a range of construction methods
- A range of potential hazards that could realistically be found in a domestic dwelling, e.g. combustible surfaces, opening windows, doors, fans, curtains etc. (Note: these hazards may be simulated)
- A range of installation conditions, e.g. surface installation, under floor installation, through wall installation etc.
- A range of building material types, e.g. brick walls, block walls, plaster board and timber walls.

The RWE must take account of health and safety requirements for risk assessments, gas safety related issues and against other activities where generating evidence is limited.

10. ACS acceptance as part of a qualification

ACS evidence can be accepted against RWE assessments and relevant knowledge and understanding criteria contained in the Matters of Gas Safety criteria (MoGS). The requirements are as follows:

a) ACS obtained prior to registration.

Where ACS is obtained prior to registration all assessments of experience and workplace assessment requirements tabulated in this document must still be adhered to.

b) ACS obtained whilst undertaking the qualification.

Where ACS is obtained whilst undertaking a qualification, all the assessment of experience and work place evidence requirements tabulated within this document must be achieved prior to the completion of the ACS.

Note: The relevant ACS assessments, must have at least 36 months remaining until the individual assessments expire at the time of claiming the full qualification.

11. Requirements for individual units

11.1 Mandatory generic units

Unit Ref: Understand and apply health and safety in gas utilisation

To achieve the completion of this knowledge unit, learners must satisfactorily complete the applicable knowledge assessment for the learning points within the unit and all practical assessments in learner's centre portfolio.

Unit Ref: Understanding scientific principles in gas utilisation

To achieve the completion of this knowledge unit, you must satisfactorily complete the applicable knowledge assessment for the learning points within the unit.

Unit Ref: Understanding combustion and properties of gas (natural gas and LPG)

To achieve the completion of this knowledge unit, you must satisfactorily complete the applicable knowledge assessment for the learning points within the unit.

Unit Ref: Understanding buildings, services and structures

To achieve the completion of this knowledge unit, you must satisfactorily complete the applicable knowledge assessment for the learning points within the unit.

Unit Ref: Understanding gas safety

To achieve the completion of this knowledge unit, you must satisfactorily complete the applicable knowledge assessment for the learning points within the unit.

Unit Ref: Specific core gas safety

To achieve the completion of this combination unit, you must satisfactorily complete the applicable summative knowledge assessment(s) for the knowledge learning outcomes within the unit. You must also complete the appropriate summative practical performance activities in RWE conditions, on-site assessments and evidence from the workplace as per the requirements for the unit as specified in the BPEC Qualification Specification.

11.2 Mandatory pathway units: (dependant on pathway selected)

Unit Ref: Install and maintain domestic gas water heaters and wet central heating appliances

To achieve the completion of this combination unit, you must satisfactorily complete the applicable summative knowledge assessment(s) for the knowledge learning outcomes within the unit. You must also complete the appropriate summative practical performance activities in RWE conditions, on-site assessments and evidence from the workplace as per the requirements for the unit as specified in the BPEC Qualification Specification.

Unit Ref: Install and maintain domestic gas cookers, tumble dryers and leisure appliances

To achieve the completion of this combination unit, you must satisfactorily complete the applicable summative knowledge assessment(s) for the knowledge learning outcomes within the unit. You must also complete the appropriate summative practical performance activities in RWE conditions, on-site assessments and evidence from the workplace as per the requirements for the unit as specified in the BPEC Qualification Specification.

Unit Ref: Install and maintain domestic gas space heating appliances

To achieve the completion of this combination unit, you must satisfactorily complete the applicable summative knowledge assessment(s) for the knowledge learning outcomes within the unit. You must also complete the appropriate summative practical performance activities in RWE conditions, on-site assessments and evidence from the workplace as per the requirements for the unit as specified in the BPEC Qualification Specification.

11.3 Optional Units

Unit Ref: Understand and apply domestic hot water system installation, commissioning, service and maintenance techniques

To achieve the completion of this combination unit, you must satisfactorily complete the applicable summative knowledge assessment(s) for the knowledge learning outcomes within the unit. You must also complete the appropriate summative practical performance activities in RWE conditions and assessments and evidence from the workplace as per the requirements for the unit as specified in the BPEC Qualification Specification.

Unit Ref: Understand and apply domestic central heating system installation, commissioning, service and maintenance techniques

To achieve the completion of this combination unit, you must satisfactorily complete the applicable knowledge assessment(s) for the knowledge learning outcomes within the unit. You must also complete the appropriate practical performance activities in RWE conditions and assessments and evidence from the workplace as per the requirements for the unit as specified in the BPEC Qualification Specification.

Unit Ref: Water Supply (Water Fittings) Regulations and Water Byelaws in the UK

To achieve the completion of this Knowledge Unit, you must satisfactorily complete the applicable knowledge assessment for the learning points within the unit.

12. Scheme Documentation

The following documentation will also be supplied by BPEC Certification Ltd. to support the delivery of the L3 Diploma in Gas Engineering qualification.

- Qualification assessment manual, including:
  - In centre practical performance assessment guidance
  - In centre practical performance assessment material
  - On the job workplace performance assessment guidance
  - On the job workplace performance guidance material
- Knowledge assessment papers and question specifications (centre only).

12.1 Tutor delivery support materials

- Schemes of work
- Gas theory workbook
- Gas practical workbook
- Supporting PowerPoint presentations are available from www.bpec.org.uk
- Domestic gas safety training manual covering NG/ LPG and appliances are available from www.bpec.org.uk.

12.2 Learner result submission form

A learner result submission form has been produced for this qualification. This document shall be used to record that the learner has completed each unit and the whole qualification in a satisfactory manner. The document shall be completed and signed by the centre assessor and the internal verifier. Tracking documents detailing individual assessment/task completion dates should be devised by the centre.

The completed learner result submission form shall be sent to BPEC Certification Ltd. for certification. Copies of the learner result submission form shall also be retained in the learner's centre portfolio.

12.3 Evidence Forms

BPEC Certification Ltd. has designed evidence forms which may be used to capture evidence relating to a learners performance in the workplace. Such evidence may include:

- Assessor feedback to the learner
- Records of supplementary questions posed by the assessor and the learner responses
- Learner feedback – statements made by the learner to clarify their competence
- Witness testimony – statements made by witnesses e.g. supervisor, customer etc. relating to the competence of the learner.

12.4 Portfolio Contents

The table below identifies the contents to be retained within the learner and the centre portfolios:

	Centre Portfolio	On-site Portfolio
Learner result submission form	✓	
Evidence collected e.g. work records, evidence forms		✓
Knowledge assessment documentation	✓	
Performance assessment documentation	✓	✓