Non-Domestic Training Specification - Utilisation Sector

IGEM/IG/1 Edition 2 Supplement 1 Edition 2
Communication 1909

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Founded 1863
Royal Charter 1929
Patron: His Majesty the King

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SECTION1 : INTRODUCTION

1.1 This Specification supersedes IGEM/IG/1 Supplement 1 published in 2016, which is now obsolete.

1.2 This Specification provides for the application of IGEM/IG/1 Standards of training in gas work under the Health and Safety at Work Act and Regulation 3(1)-(2) of the Gas Safety (Installation and Use) Regulations (GS(I&U)R), as detailed in the supporting Safety in the installation and use of gas systems and appliances; Approved Code of Practice (ACoP) L56.

1.3 IGEM/IG/1 sets out the requirements for training in gas work for new entrants to the gas industry working under the scope of the Gas Safety (Installation and Use) Regulations (GS(I&U)R), those persons currently or previously registered seeking re-registration as a 'class of persons' (or have a relevant gas qualification) and those persons working at premises or on equipment outside the scope of GS(I&U)R.

1.4 This non-domestic training Specification relates to:

- **new entrants** into the gas industry wishing to become a 'class of persons' who will be required to undertake **an industry recognised** training course before being able to take an assessment under the Nationally Accredited Certification Scheme for Individual Gas Fitting Operatives (ACS) or where an ACS assessment has not been developed, a suitable ACoP would be required to be undertaken to become Gas Safe registered.

Note: Examples of installations which will need an ACoP are incinerators, crematorium, firefighting simulators and railway point heaters.

1.5 The relevant parts of this Specification are also applicable to persons wishing to extend range or scope (as defined in Guidance Note 8 (GN8)).

Note: Guidance Note is available from Energy & Utility Skills (E&US) by visiting https://www.euskills.co.uk/about/our-industries/gas/.

1.6 This Specification has been facilitated by IGEM and E&US and has been approved by IGEM's Gas Utilisation Committee, Gas Measurement Committee, Gas Transmission & Distribution Committee and IGEM's Technical Coordinating Committee and published by the authority of the Council of IGEM. The Specification has also been approved by the Standards Consultation Forum (SCF) and the Strategic management Board (SMB). Those industry bodies who contributed include the Large Business Forum, EUA, ICOM, CEDA, Energy & Utility Skills (EU&S), Liquid Gas UK (LGUK), Gas Safe Register (GSR) and organisations including Energy Assets, UK Certification, Blue Flame Associates, Cert-ain Certification, Court Catering, JLA, Armstrong Fluid technology, ERS Certification, NICEIC, Gas Assessment and Training Centre, LCL Awards, Equans, BPEC, Bring Energy, CMS Ltd.

1.7 This Specification is designed to provide the criteria for training to be developed for a new entrant to the industry of the non-domestic gas industry and proceed to a sector specialisation course, for example pipework, metering, heating, catering, laundry or process/plant.

1.8 Training courses that have been designed to meet this Specification and have acquired industry recognition will enable those that successfully complete that training to apply to an ACS centre for an appropriate assessment(s) of competence. Passing such assessment(s) will enable that person to apply to Gas Safe Register to become a 'class of persons' to allow them to work in those premises covered by GS(I&U)R.

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1.9 This training may equally be appropriate for those persons working at premises or on equipment outside the scope of GS(I&U)R.

1.10 This Standard makes use of the terms "shall" and "should" when prescribing requirements:

- the term "shall" prescribes a requirement which, it is intended will be complied with in full and without deviation
- the term "should" prescribes a requirement which, it is intended will be complied with unless, after prior consideration deviation is considered to be acceptable.

1.11 Requests for interpretation of this Standard in relation to matters within their scope, but not precisely covered by the current text, are to be either:

- addressed to Technical Services, IGEM, IGEM House, 26 & 28 High Street, Kegworth, Derbyshire, DE74 2DA; or
- emailed to technical@igem.org.uk.

These will be submitted to the relevant Committee for consideration and advice.

1.12 This Specification was published in April 2026.

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SECTION 2 : SCOPE

2.1 This training Specification covers training for:

- new entrants to the gas industry wishing to work in the non-domestic utilisation sector within the scope of the Gas Safety (Installation & Use) Regulations (GS(I&U)R))
- those persons currently or previously registered seeking re-certification (optional)
- those persons wishing to extend their range or scope (refer to GN8 for onsite experience requirements).

2.2 This Specification is designed to cover the wide range and breadth of the industry needs, including the legal requirements, knowledge and understanding and performance criteria typically completed at a Training Centre 'Off-site' , also 'On-site' work experience that will be undertaken in a work placement supervised by a mentor, related to non-domestic gas installations and appliances.

Note 1: Some learning on equipment provisions in the non-domestic range gas-fired engines and not situated in a training centre could be evaluated on site if that would be beneficial to the learner.

Note 2: There are some limited scope activities in the non-domestic industry where aspects of this specification can be used.

2.2.1 The Gas Safety (Installation & Use) Regulations (GS(I&U)R) states that training should be of a Standard to enable a gas engineer to achieve competence in the safe installation, purging, commissioning, testing, servicing, maintenance, repair, disconnection, modification and dismantling of the gas systems, fittings and appliances with which they are working.

This should include an adequate knowledge of:

(a) relevant associated services such as water and electricity

(b) the potential for exposure to asbestos

(c) the dangers these may give rise to

(d) the precautions to take.

Note: This Specification can be used to cover Natural Gas (NG) and Liquid Petroleum Gas (LPG) installations.

2.3 The requirements will include the minimum time spent on each subject along with the job activities that are required to be undertaken and the maximum time spent to complete the training is expected to be two years.

Note: There may be exceptions where programmes have been designed for longer than two years.

2.4 Italicised text is informative and does not represent formal requirements.

2.5 Appendices are informative and do not represent formal requirements unless specifically referenced in the main sections via the prescriptive terms "should" or "shall".

2.6 This training may equally be appropriate for those persons working at premises or on equipment outside the scope of GS(I&U)R.

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SECTION 3 : SPECIFICATION FOR NON-DOMESTIC TRAINING

This Specification is designed to cover the specific sector requirements of the industry including the legal requirements, theoretical and practical knowledge and understanding related to those particular gas sector installations for example, heating, catering, laundry, process/plant, metering and pipework.

3.1 A learning agreement shall be entered into between the training provider and learner

3.2 This agreement shall set out all training expectations, aspirations and goals to becoming gas safe registered. It is a good practice to provide a possible estimate of timing schedules which would be set out before training begins.

3.3 Arrangements shall be in place to ensure that the new entrant and the mentor know what is expected of them.

3.4 The marking scheme for the evaluation shall be open and transparent to the new entrant and the trainer.

3.5 Arrangements shall be in place for moderation and an independent review.

3.6 The Legislative, Normative Informative Documents list (LNIDL) should be made available in Training Centres, (Recognisers can approve other similar reference material). Every effort should be made to provide the learner with access to the relevant Standards or learning material required to reference throughout the learner's training.

Note : Gas Safe registered gas engineers can view the relevant LNIDL on the engineer's section of the GSR website.

Reference documents in the LNIDL may not be exhaustive.

3.7 Manufacturer's instructions (MIs) appropriate to the appliances used for the off-site training shall be provided in the Training Centre.

Note: If manufacturer's instructions are not available, suitable instructions are to be prepared.

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SECTION 4 : TRAINING AND EVALUATION

4.1 GENERAL

4.1.1 The training programme shall be developed to consist of broad theoretical and practical subjects in the non-domestic utilisation sector.

- 'Off-site' training is that which the new entrant is trained in a classroom environment for theory input and practical workshop areas (which simulate the on-site environment) for demonstration and skills practice. The balance between theory and practical work will be dependent on the content of the subject.
- 'On-site' training is that which enable the learning to be enhanced in a work environment.
- Training and experience shall be gained from work undertaken under the direct supervision of a mentor. On-site training shall cover the scope and range of the technical specification. Records of the work carried out, the methods undertaken, and any other relevant information shall be retained to build a portfolio of evidence to be verified by the training provider under the direct supervision of a competent engineer employed by a Gas Safe registered business.

4.1.2 Arrangements shall be in place to ensure that the new entrant and the competent person, a suitably qualified registered Gas Safe engineer, who will be mentoring the new entrant knows what is expected of them. An interview shall be conducted with the new entrant and the responsible parties to confirm and ensure that everyone understands their role and responsibilities.

4.1.3 Written and practical tests shall be completed at the end of the programme to check the authenticity of the portfolio content and off-site training. The tests shall sample key safety aspects relevant to the utilisation sector. To prevent predictability, a selection of written and practical tests across the scope of the specific disciplines are to be available.

4.2 TRAINING

4.2.1 Minimum 'Off-site' duration

The minimum guided learning hours (GLH) for the generic competencies shall be 264 hours (see Appendix 1). In addition, the minimum guided learning hours for the sector specific pathways competencies shall be as Table 1 (see Appendix 2, 3, 4, 5, 6 and 7).

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PATHWAY	GENERIC MINIMUM GUIDED LEARNING HOURS	SPECIFIC PATHWAY MINIMUM GUIDED LEARNING HOURS
Heating	264	63
Catering	264	48
Laundry	264	33
Plant/equipment (including engines)	264	48
Metering	264	47
Pipework limited scope*	NA	83

***** *Note: The following pathway has been added to this Specification for those who create a limited scope pathway for pipework-only engineers, which is therefore not included in the generic elements*.

TABLE 1 – MINIMUM GUIDED LEARNING HOURS FOR GENERIC AND SECTOR SPECIFIC PATHWAYS

For the purpose of minimum guided learning hours, for consecutive learning days:

- each day shall be no longer than 7.5 hours
- each week shall be no longer 37.5 hours
- in the instance of day release, each day shall be no longer than a maximum of 10 hours.

The subjects covered in the Off-site training generic competencies are set out in Appendix 1 and the training shall cover both the theoretical and practical aspects of the work.

The subjects covered in the Off-site training sector specific competencies are set out in Appendices 2 to 7 and the training shall cover both the theoretical and practical aspects of the work.

Note: Where a candidate provides verifiable evidence of prior learning (matching the requirements in Appendix 1 and Appendix 2 to 7), a reduction in learning hours may be applied. The prior learning is to be cross-referenced to the qualification held and the learning hours reduced accordingly. The candidate is to undertake a 'documented technical review' to confirm their current knowledge level prior to any reduction being applied. Results of the technical review are to be retained in the candidate's file along with details of the subjects not covered within the programme due to the prior learning. Any reduction in learning hours is to be agreed with the Recogniser of Training.

4.2.2 Minimum 'On-site' tasks and duration

The portfolio of On-site experience shall provide evidence representative of a minimum of 18 weeks (based on 37.5 hours per week) industry experience and be relevant to the elements in the training/technical specification Appendix 8, as appropriate.

Evidence recorded shall meet the requirements of Appendix 8 and is to be:

- work completed by the learner unassisted
- observed and endorsed by the mentor
- cross-referenced to an evidence matrix to indicate where within the portfolio specific activities have been successfully completed on the required number of occasions.

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4.2.3 Evidence of the work carried out by the new entrant shall include the following information:

- site address
- postcode
- date of work
- description of work and sufficient supplementary evidence to allow the work to be verified.

The new entrants may also document the time spent supporting the mentor or witnessing the mentor undertaking work relevant to the training/technical specification. This information shall not be included as part of the work evidence and is just informative of the work experience. This may include any activities relevant to Appendix 8.

Note: It is accepted that not all of the time spent by the new entrant gaining experience will be directly related to 'gas work' but will assist the new entrant in gaining 'whole job' competencies.

4.3 VERIFICATION OF TRAINING

4.3.1 The training provider shall undertake and document an evaluation of the learning.

4.3.2 The evaluation of the learning at the training centre shall be a mixture of verbal, written and practical tests that need to be conducted during and/or at the end of the training.

4.3.3 The evaluation shall confirm that new entrants have a full understanding of all matters of gas safety (relating to the competency being undertaken) prior to a certificate being issued.

4.3.4 The evaluation shall include a review of the portfolio evidence that the new entrant has submitted to establish that they have undertaken the required tasks (under direct supervision).

4.4 CERTIFICATE

A certificate shall be presented to each successful new entrant, detailing, as a minimum:

- name of the new entrant
- name of the training provider and their Training Provider Code National Insurance number (or unique identification number)
- title of the training programme, listing the range and scope undertaken and the appliance categories the training relates to
- date the certificate was awarded
- name of the organisation issuing the certificate.

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APPENDIX 1: OFF-SITE TRAINING (GENERIC COMPETENCIES)

A1.1 NON-DOMESTIC UTILISATION

A1.1.1 Generic non-domestic competencies are gained through the minimum guided learning hours assigned to each subject which are detailed in Table 2.

The performance criteria, knowledge and understanding for these subjects is set out from A1.1.2:

GENERIC NON-DOMESTIC COMPETENCIES	MINIMUM GUIDED LEARNING HOURS
Safety, Legislation and Standards	14
Gas emergency actions and procedures	14
Products and characteristics of combustion	28
Operation and checking of appliance gas safety devices and controls	21
Ventilation for non-domestic gas burning appliances	21
Installation of pipework and fittings	35
Tightness Testing and Purging (IGEM/UP/1B)	21
*Tightness testing and purging • IGE/UP/1A or • IGE/UP/1 • both options include covering the appliance connection testing	19.5
Understanding pressure and flow	14
Meter regulators and regulators appropriate to industry equipment	6.5
Unsafe situations procedures	21
Operation and positioning of emergency controls and valves	7
Chimney/flue systems and termination types and positioning	14
Chimney installation, inspection and testing	14
Re-establish existing gas supply and re-light appliances	7
Basic electrical safety	7
TOTAL GUIDED LEARNING HOURS	**264**

TABLE 2 – MINIMUM GUIDED LEARNING HOURS FOR GENERIC COMPETENCE

**Note 1: IGE/UP/1A can be substituted with IGE/UP/1 with an adjustment in GLH (additional 7.5 hours)*

**Note 2: If both procedures are learnt a reduction of 7.5 GLH can be applied to IGE/UP/1.*

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TESTING AND PURGING (Optional)	MINIMUM GUIDED LEARNING HOURS
Strength/tightness testing and purging in accordance with Standards (IGE/UP/1)	26
TOTAL GUIDED LEARNING HOURS	**26**

TABLE 3 – OPTIONAL LEARNING HOURS FOR COMPETENCIES NOT TAKEN IN PATHWAY

Note: These timings can be cross-referenced if the gas operative goes into that range and scope of work.

A1.1.2 **SAFETY, LEGISLATION AND STANDARDS**

A1.1.2.1 **Performance Criteria**

In relation to all electrical supplies, tools and components you will need to:

P1 Visually inspect electrical power tools for safe condition before use.

A1.1.2.2 **Knowledge and Understanding**

In relation to working on downstream non-domestic gas installations you will need to know and understand:

K1 Application of the GS(I&U)R

K2 Building Regulations or their equivalents in the devolved administrations including but not limited to:

- gas supplies and appliances in multi occupancy buildings (IGEM/G/5)
- Notifications (Building Regulations)
- fire safety
- fire compartments.

K3 Safety precautions when other hazardous materials (COSHH- Control of Substances Hazardous to Health) are encountered whilst working in the downstream gas industry.

K4 Your responsibilities regarding health, safety and the environment. This includes an adequate knowledge of:

- relevant associated services such as water and electricity
- the potential for exposure to asbestos
- the dangers these may give rise to
- the precautions to take.

K5 Equipotential bonding

K6 Use of personal protective equipment

K7 Information available to Gas Safe registered operatives:

- Legislative Normative and Informative Document List
- Industry Standard updates
- Safety Alerts
- Technical Bulletins.

K8 Also have a working knowledge and an awareness of the following information available on the Health and Safety Executive (HSE) & GOV.UK websites:

- Health and Safety at Work etc. Act (HSWA)
- Manual Handling Operations Regulations

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- Clean Air Act
- Medium Combustion Plant Directive (MCPD)
- Dangerous Substances and Explosive Atmospheres Regulations (DSEAR)
- Work at Height Regulations
- Risk assessment controlling the risks in the workplace
- First aid awareness at work: Safety information and signs
- Fire precautions and actions to be taken in the event of a fire
- Fire safety in construction (HSG168)
- The Provision and Use of Work Equipment Regulations (PUWER)
- Workplace exposure limits EH40
- Permit to work systems
- Safe isolation techniques (gas and electrical) Regulations. (HSG253).

A1.1.3 GAS EMERGENCY ACTIONS AND PROCEDURES

A1.1.3.1 Knowledge and Understanding

In relation to emergency actions, you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 Priorities and actions when dealing with gas escapes and incidents

K3 The advice to be given to customers/general public (to include where to find the emergency telephone number and how to isolate in the event of a gas escape)

K4 The role of the gas emergency service provider

K5 Properties of gases.

A1.1.4 PRODUCTS AND CHARACTERISTICS OF COMBUSTION

A1.1.4.1 Performance Criteria

In relation to complete and incomplete combustion, you will need to be able to:

P1 Identify correct flame pictures

P2 Identify signs of incomplete combustion within and in the locality of an appliance installation

In relation to combustion performance analysis, you will need to be able to:

P3 Undertake combustion performance analysis on a range of appliances.

A1.1.4.2 Knowledge and Understanding

In relation to complete and incomplete combustion, you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 Characteristics and combustion of gases

K3 Combustion equations for complete and incomplete combustion

K4 Air requirements for complete combustion

K5 Causes of incomplete combustion

In relation to carbon monoxide (CO) detectors and indicators, you will need to know and understand:

K6 CO poisoning and detection

K7 The different types of CO detectors and their installation requirements

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K8 Symptoms of CO poisoning

K9 Sources of CO

K10 Migration of CO

In relation to combustion performance analysis, you will need to know and understand:

K11 Actions to take when a satisfactory combustion performance analysis reading cannot be obtained

In relation to combustion and its controls, you will need to know and understand:

K12 Effects of CO and carbon dioxide (CO_2) in the atmosphere

K13 Flame characteristics

K14 Burner types

K15 Fault diagnosis.

A1.1.5 VENTILATION FOR NON- DOMESTIC GAS BURNING APPLIANCES

A1.1.5.1 Performance Criteria

In relation to providing ventilation for gas burning appliances, you will need to be able to:

P1 Measure the free area of a range of different types of air vents and grilles

P2 Identify correct ventilation provision.

A1.1.5.2 Knowledge and Understanding

In relation to providing ventilation for gas burning appliances, you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 Factors affecting ventilation

K3 Design, materials and types of ventilation provision

K4 Calculating ventilation requirements

K5 Ventilation labels and notices

K6 Air supply requirements for cooling and combustion

K7 Mechanical ventilation and extraction including:

- interlocks
- fire and smoke dampers.

K8 Free area and position

K9 Route and ducting

K10 Maintenance.

A1.1.6 INSTALLATION OF PIPEWORK AND FITTINGS

A1.1.6.1 Performance Criteria

In relation to the installation of pipework and fittings, you will need to be able to:

P1 Join pipework (as appropriate to the types included in the list below) using soldered, threaded, washer, union, mechanical and press fit fittings:

a. Copper

b. Steel

c. Corrugated Stainless Steel Tubing (CSST).

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P2 Form copper pipework

P3 De-commission downstream pipework on a gas installation, tee into existing pipework and re-commission installation on completion

P4 Demonstrate correct use of a temporary continuity bond

P5 Demonstrate correct use of Flexible connections.

A1.1.6.2 **Knowledge and Understanding**

In relation to the installation of pipework and fittings, you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 Pipework design, routes, installation, commissioning and maintenance including pipework line diagrams

K3 Copper, mild steel, CSST, medium density polyethylene pipe and fittings Standards, suitability and use

K4 Jointing and cleaning agents for jointing copper and threaded pipework fittings

K5 Restrictions on use of mechanical fittings

K6 Requirements for supporting and clipping gas installation pipework

K7 Pipework protection, fire stopping, fire seals, sleeving and sheathing requirements

K8 Pipe sizing

K9 Connecting to medium pressure (MP) fed gas supplies

K10 Installations in timber framed buildings

K11 Hot working and when to use alternative methods

K12 The effects of flux on pipework

K13 Pipework in ducts

K14 Gas boosters, compressors and pre-mix plant

K15 Methods for pipework using flange, spools, expansion and flexible joints

K16 Use of filters and strainers

K17 Purge and Test Points.

A1.1.7 **TIGHTNESS TESTING AND PURGING (IGEM/UP/1B)**

A1.1.7.1 **Performance Criteria**

In relation to testing and purging installations, you will need to be able to:

P1 Test low pressure (LP) gas installations for tightness using air

P2 Test LP gas installations for tightness using gas

P3 Purge LP gas installations

P4 Trace and repair a gas escape

P5 Test existing installations for tightness with an MP fed gas supply without a meter inlet valve.

A1.1.7.2 **Knowledge and Understanding**

In relation to testing and purging installations, you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 Tightness testing Standards and limitations

K3 Types of pressure gauge and perceptible movement

K4 Application of permissible pressure loss

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K5 Impact of electronic meter tamper devices and other components

K6 Dealing with let by

K7 Actions to take when a smell of gas persists after a satisfactory test or after the emergency control valve (ECV) has been turned off

K8 Calculating installation and purge volumes

K9 Testing before working on an installation.

A1.1.8 TIGHTNESS TESTING AND PURGING (in accordance with IGEM/UP/1A)

A1.1.8.1 Performance Criteria

In relation to tightness testing and direct purging of small, low-pressure natural gas non-domestic gas installations, you will need to be able to:

P1 Prepare for pneumatic strength testing – new installation and extensions (air or nitrogen)

P2 Carry out pneumatic strength test – new installation and extensions (air or nitrogen)

P3 Prepare for tightness testing – existing installations (gas)

P4 Carry out tightness test – existing installations (gas)

P5 Carry out tightness test immediately following strength test on new installations (air or nitrogen)

P6 Prepare for direct purging

P7 Determine purge volume, purge flow rate and purge time

P8 Direct purging - venting to outside - from air to gas (commissioning)

P9 Direct purging from gas to air (de-commissioning).

A1.1.8.2 Knowledge and Understanding

In relation to tightness testing and direct purging of small, low-pressure natural gas non-domestic gas installations you will need to know and understand:

K1 Acronyms and symbols

K2 Determination of maximum operating pressure (MOP) and maximum incidental pressure (MIP)

K3 Identifying volumes of differing meter types

K4 Procedure where it is not possible to calculate installation volume or estimate with any confidence

K5 By-passing system components during tightness test

K6 Effects of variations of temperature and atmospheric pressure

K7 Terms and acronyms applying to non-domestic medium pressure regulators

K8 Requirements for hazardous areas surrounding meter installation fittings and components

K9 Safety and environmental requirements to be considered prior to purging

K10 Procedures to adopt when purging into an internal area

K11 Purging branched pipework

K12 Purging replacement meters

K13 Purging procedures for taking pipework out of service

K14 Purging with air through compressed air cylinders

K15 Planning and procedures for carrying out a purge

K16 Procedures when required flow rate of purge is not achieved

K17 Identification of purge gas cylinders used to carry out purge.

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A1.1.9 STRENGTH, TIGHTNESS TESTING AND PURGING TO IGE/UP/1

A1.1.9.1 Performance Criteria

In relation to strength, tightness testing and purging of natural gas non-domestic gas installations you will need to be able to:

P1 Prepare for pneumatic strength testing – new installation and extensions (air or nitrogen)

P2 Carry out pneumatic strength test – new installation and extensions (air or nitrogen)

P3 Carry out tightness test immediately following strength test on new installations (air or nitrogen)

P4 Prepare for tightness testing – existing installations (fuel)

P5 Carry out tightness test – existing installations (fuel)

P6 Prepare for a commission purge

P7 Determine purge volume, purge flow rate and purge time

P8 Undertake purge - venting to outside - from air to fuel (commissioning)

P9 Undertake purge from fuel to air (de-commissioning).

A1.1.9.2 Knowledge and Understanding

In relation to tightness testing and direct purging of small, low-pressure natural gas non-domestic gas installations you will need to know and understand:

K1 Acronyms and symbols

K2 Determination of maximum operating pressure (MOP) and maximum incidental pressure (MIP)

K3 Calculation of strength test pressure (STP) and strength test duration (STD)

K4 Requirement to remove components that cannot withstand the STP

K5 When to undertake strength test, tightness test and commission or de-commission purge

K6 Identifying volumes of differing meter types

K7 Method of calculating new tightness test duration (TTD) with consideration to installation volume, gauge type and test medium

K8 Method of calculating existing tightness test duration (TTD) with consideration to installation volume, gauge type, pipework area and test medium

K9 Procedure where it is not possible to calculate installation volume or estimate with any confidence

K10 By-passing system components during tightness test

K11 Effects of variations of temperature and atmospheric pressure

K12 Calculation of purge volumes, minimum purge flow rates and maximum purge times for an installation

K13 Determination of commission and de-commission and safe end point gas readings

K14 Correct size, configuration and positioning of purge equipment

K15 Safety and environmental requirements to be considered prior to purging and the potential for undertaking a flare-off

K16 When it will be acceptable and the procedures to adopt when purging into an internal area

K17 Purging replacement meters

K18 Purging procedures for taking pipework out of service

K19 Purging with air using either air blower or compressed air cylinders

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K20 Procedures when required flow rate of purge is not achieved

K21 Identification of purge gas cylinders used to carry out purge.

A1.1.10 APPLIANCE CONNECTION TIGHTNESS TESTING AND PURGING

A1.1.10.1 Performance Criteria

In relation to appliance connection tightness testing and purging, you will need to be able to:

P1 Test valve used for let-by

P2 Ensure installation is compliant

P3 Use of leak detector on connections downstream of appliance isolator.

A1.1.10.2 Knowledge and Understanding

In relation to appliance connection tightness testing and purging, you will need to know and understand:

K1 Apply applicable Standards techniques to this subject area

K2 Prevention of lock up during testing.

A1.1.11 UNDERSTANDING PRESSURES AND FLOW

A1.1.11.1 Performance Criteria

In relation to checking and setting appliance operating pressures and gas flow rates, you will need to be able to:

P1 Measure an appliance operating pressure and gas rate

P2 Determining an appliance heat input.

A1.1.11.2 Knowledge and Understanding

In relation to checking and setting appliance operating pressures and gas rates, you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 Requirements for range rated appliances

K3 Requirements for variable-rated appliances

K4 Causes and effects of pressure loss

K5 Use of types and range of pressure gauges

K6 Measuring heat inputs

- traditional & smart meter index.

A1.1.12 METER REGULATORS (AND REGULATORS APPROPRIATE TO INDUSTRY EQUIPMENT)

A1.1.12.1 Performance Criteria

In relation to checking meter regulators on meter installations, you will need to be able to:

P1 Measure and record the standing pressure at the outlet of the regulator

P2 Measure and record the regulator and meter outlet working pressure

P3 Determine if the regulator outlet working pressure is correct or incorrect

P4 State the actions to take if the working pressure at the outlet of the regulator is incorrect.

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A1.1.12.2 **Knowledge and Understanding**

In relation to checking meter regulators (and regulators appropriate to industrial equipment) on installations, you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 The effects of low and high flow rates on a regulator

K3 The effects of pressure absorption across primary meter installation

K4 The operation of a gas regulator

K5 Identification of an MP and IP (intermediate pressure) meter/regulator installation

K6 Meter types and design

K7 Meter box, housing and enclosures

K8 Safety notices and labels

K9 The different pressure tiers

K10 Suitable meter locations

K11 Meter installations.

A1.1.13 **UNSAFE SITUATIONS PROCEDURE (IGEM/G/11)**

A1.1.13.1 **Performance Criteria**

In relation to unsafe situations, you will need to be able to:

P1 Identify and classify different categories of unsafe situations

P2 Demonstrate the procedure to follow for each classification of unsafe situation

P3 Complete, explain and issue appropriate warning labels and notices

P4 Identify signs of spillage/leaking products of combustion.

A1.1.13.2 **Knowledge and Understanding**

In relation to unsafe situations, emergency notices and warning labels, you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 Gas Industry Unsafe Situations Procedure (GIUSP) (IGEM/G/11)

K3 Situations reportable under Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)

K4 Situations reportable to GSR and/or HSE which are not RIDDOR reportable

K5 Actions and correct use of notices and labels

K6 In relation to re-establishing an existing gas supply and re-lighting the appliances, you will need to know and understand:

- actions to take when an un-commissioned appliance is identified
- actions to take if pipework and appliance(s) are not tested (commissioned) when the gas supply is re-established.

A1.1.14 **OPERATION AND POSITIONING OF EMERGENCY CONTROLS AND VALVES**

A1.1.14.1 **Performance Criteria**

In relation to the operation and positioning of ECVs and AECV (additional emergency control valve), you will need to be able to:

P1 Identify correctly positioned ECVs and AECV

P2 Identify the correct labels to attached ECVs and AECV.

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A1.1.14.2 **Knowledge and Understanding**

In relation to the operation and positioning of ECVs and AECV, you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 Inside and outside meter positions

K3 Multi-occupancy building installations

K4 Additional ECVs including automatic isolation valves

- re-establishing gas supplies including proving systems.

K5 Services into buildings

K6 How to deal with incorrectly positioned ECVs and AECV.

A1.1.15 **OPERATION AND CHECKING OF APPLIANCE GAS SAFETY DEVICES AND CONTROLS**

A1.1.15.1 **Performance Criteria**

In relation to all relevant gas safety devices and controls you will need to be able to:

P1 Identify gas safety devices and controls

P2 Check gas safety devices and controls for correct operation and carry out any corrective action where necessary

P3 Explain the operation of gas safety devices and controls.

A1.1.15.2 **Knowledge and Understanding**

In relation to gas safety devices and controls you will need to know and understand:

K1 Legislation & Standards applicable to this subject area

K2 The principles of operation of gas safety devices and controls

- manually operated
- automatic operated
- safety shut-off valves (SSOV).

K3 The sequence of operation of gas safety devices and controls

K4 Information required for authentic spare part identification.

A1.1.16 **CHIMNEYS AND FLUE SYSTEMS**

A1.1.16.1 **Knowledge and Understanding**

In relation to chimneys you will need to know the operating principles of chimney systems and factors affecting their performance, including the requirements for installing gas appliances to the following chimney systems:

K1 Legislation & Standards applicable to this subject area

K2 Existing solid fuel chimney

K3 Flue dilution systems

K4 Individual natural draft open flue chimneys

K5 Fanned draft open flue chimneys

K6 Shared open flue chimneys

K7 Room sealed natural draft chimneys

K8 Room sealed fanned draft chimneys

K9 Balanced compartments for open flue appliances

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K10 Communal flue systems (CFS)
K11 Chimneys systems for condensing appliances
K12 Flue dampers & stabilisers
K13 Catering extract systems
K14 Laundry exhaust duct requirements
K15 Chimney design
K16 Materials, construction and route
K17 Securing and supporting
K18 Termination & terminal guards
K19 Clean Air Act & management of products of combustion
K20 Fire stopping precautions
K21 Safety devices (interlocks).

A1.1.17 CHIMNEY INSTALLATION, INSPECTION AND TESTING

A1.1.17.1 Performance Criteria

In relation to chimney testing for singular/modular systems, you will need to be able to:

P1 Visually inspect chimney systems to confirm correct and incorrect installation (including securing and supporting where appropriate)
P2 Perform a flue flow test on an open flue system
P3 Perform a spillage test on an appliance connected to an open flue system
P4 Inspect a concealed fan assisted chimney installation.

A1.1.17.2 Knowledge and Understanding:

In relation to chimney installation inspection and testing you will need to know and understand:

K1 Legislation & Standards applicable to this subject area
K2 Causes of leakage of combustion products from boiler sections or chambers
K3 Installation and testing appliances when manufacturer's instructions (MIs) are not available
K4 Actions to take when inspection hatches are not available for flues in voids
K5 Chimney information requirements, including labelling
K6 Chimneys/flues in voids, testing, commissioning, and maintenance
K7 The requirement to inspect chimneys throughout their length (including in partitioning and lofts)
K8 Responsibilities for checking shared flues
K9 Modular systems and flue testing
K10 Recognition of when pressure testing of flues is appropriate (leak testing see IGEM/UP/10).

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A1.1.18 RE-ESTABLISH EXISTING GAS SUPPLY AND RE-LIGHT APPLIANCES

A1.1.18.1 Performance Criteria

In relation to re-establishing an existing gas supply and re-lighting the appliances, you will need to be able to:

P1 Check the installation is gas tight

P2 Purge the installation and appliances of air

P3 Establish a stable flame on each appliance

P4 Visually inspect each appliance and identify any unsafe situations

P5 Confirm satisfactory operation of user controls.

A1.1.19 BASIC ELECTRICAL SAFETY

A1.1.19.1 Performance Criteria

In relation to electrical testing, you will need to be able to:

P1 Carry out the safe to touch procedure

P2 Carry out safe electrical isolation for single and multi-phase supplies.

A1.1.19.2 Knowledge and Understanding

In relation to electrical testing, you will need to know and understand:

K1 The Electricity at Work Regulations

K2 Basic electrical principles:

- voltage
- current
- resistance
- Ohm's law
- earthing and basic protection methods
- simple electrical calculations.

K3 The safe to touch procedure

K4 Safe electrical isolation

K5 The risks associated with dual supplies and pump overruns.

Note: TB 118 gives the industry preferred procedure for safe to touch and safe isolation.

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APPENDIX 2: OFF-SITE TRAINING (HEATING PATHWAY)

A2.1 SECTOR APPLIANCES GENERIC REQUIREMENTS

A2.1.1 Performance Criteria

In relation to gas appliances, for each appliance you will need to be able to:

P1 Install the appliance to a prepared isolation valve & point to MIs

P2 Commission the appliance to MIs (including dry and live run check)

P3 Service the appliance to MIs

P4 Confirm correct operation of safety devices and controls

P5 Undertake combustion performance analysis or atmosphere testing (where applicable)

P6 Where applicable, check the air/gas ratio valve is set correctly at high and low limits in accordance with MIs and adjust if permitted

P7 Burner Systems and their control adjustment where required.

A2.1.2 Knowledge and Understanding

The differences (if any) between the variation of appliances:

K1 How to identify and diagnose gas safety faults

K2 Suitable and unsuitable room/space locations

K3 Clearances – proximity of combustible materials – fireproofing of compartments

K4 Operation of gas safety control devices

K5 Condensate removal and disposal (where applicable)

K6 When to carry out combustion performance analysis or atmosphere testing

K7 Chimney/exhaust requirements for the appliance

K8 Ventilation, cooling and combustion requirements for the appliance

K9 The principle of adjustment of gas controls, air/gas ratio valves, where applicable

K10 The information included on the appliance data badge

K11 Legislations and Standards applicable to appliance types.

The additional minimum guided learning hours assigned to each specific sector pathway are detailed in Appendix 2 to 7 inclusive along with the additional performance criteria, knowledge and understanding.

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A2.2 **HEATING PATHWAY**

HEATING PATHWAYS	MINIMUM GUIDED LEARNING HOURS
The following appliance types are included within the heating pathway: • indirect fired heating including hot water boilers, warm air systems, heat pumps and controls and/or • direct fired heating including warm air ducted air heaters and/or • radiant heating including tubes and plaque	21
Heating Systems, Design and Control • basic control systems fault finding	35
Chimney/Flue/ Ventilation Standards • testing • ventilation • sizing	7
TOTAL GUIDED LEARNING HOURS	**63**

TABLE 4 – GUIDED LEARNING HOURS FOR HEATING PATHWAY

A2.3 **INDIRECT FIRED HEATING (hot water boilers, warm air systems, heat pumps and controls)**

In addition to the generic appliance criteria

A2.3.1 **Knowledge and Understanding**

In relation to indirect fired heating appliances, for each appliance you will need to know and understand:

K1 Different types of heaters available and burner application

K2 Design, heat loss and comfort conditions including:

- safety system protocols
- comfort conditions
- heat transfer/emitters
- calculation of heat losses
- sizing the system
- air monitoring and sampling.

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A2.4 DIRECT FIRED HEATERS (warm air/ducted air heaters)

In addition to the generic appliance criteria

A2.4.1 Knowledge and Understanding

In relation to direct fired heaters, for each appliance you will need to know and understand:

K1 Different types of heaters available and burner application

K2 Design, heat loss and comfort conditions including:

- safety system protocols
- comfort conditions
- heat transfer/emitters
- calculation of heat losses
- sizing the system
- air monitoring and sampling.

A2.5 RADIANT HEATING (Tube and plaque)

In addition to the generic criteria

A2.5.1 Knowledge and Understanding

In relation to radiant heating appliances, for each appliance you will need to know and understand:

K1 Suitability and principles of types of radiant heater B1, B2, including burner applications

- location
- operation
- complete documentation & handover to consumer.

A2.6 HEATING SYSTEMS DESIGN AND CONTROLS

A2.6.1 Performance Criteria

In relation to wet central heating controls, you will need to be able to:

P1 Measure and interpret resistance readings to ensure that it is safe to establish/re-establish the electrical supply

P2 Measure and interpret voltage readings to ensure safe electrical operation

P3 Wire in a central heating system component and complete the appropriate testing, including the following components exchanges:

- motorised valves
- room thermostats
- time and temperature controls
- pump over-run requirements (where appropriate)
- basic control systems fault finding.

Note 1: This may be carried out on a 'wiring board'.

Note 2: This does not give candidates the ability to install new wiring in a customer's property.

Note 3: Multi-phase appliances can be simulated but learning captured as evidence.

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A2.6.2 **Knowledge and Understanding**

In relation to heating system design, you will need to know and understand:

K1 The component parts of:

- an open vented system
- unvented sealed system.

K2 Awareness of different heating circulating system designs

- zoning

K3 Low surface temperature heat emitters

K4 Expansion Vessel and pressurization plant

K5 System isolation, drain valves, air separators

K6 Pump by-passes, over-run requirements including safety precautions

K7 Energy efficiency requirements relating to heating and boiler installations

K8 Weather compensation and load compensation and time control systems

K9 Building Regulation requirements (Part L) in England or their equivalents in the devolved administrations) affecting boiler installations

K10 Hot water storage types e.g., direct, indirect, twin coil – possibly connected to solar thermal

K11 Unvented hot water systems

- component part
- maintenance tasks (that can be carried out without certification).

K12 System water cleansing, flushing and treatment including draining and refilling systems

K13 Design, heat loss and comfort conditions including:

- comfort conditions (occupancy, desired usage patterns, room temperatures)
- optimum start and stop
- weather compensation
- calculation of heat losses
- heat transfer/emitters/coils
- sizing the system (including system pipework, layouts, any intermittent heating allowance, pump duty)
- low loss headers
- mixing valves
- thermostatic radiator valves (TRVs)
- system by-pass
- pressure relief
- low temperature systems
- low carbon heating systems – interactions with gas boilers
- different hot water storage systems and controls.

K14 Pre-commissioning

- pneumatic and hydraulic testing.

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K15 Commissioning the system including:

- hydronic balancing
- Building Regulations
- co-operation and liaison with other trades and clients/customers may be required
- completion of commissioning documentation (note this may be benchmark or equivalent as required by the manufacturer's instructions).

K16 Fault diagnosis.

A2.7 CONTROL SYSTEMS FAULT FINDING

A2.7.1 Performance Criteria

In relation to control systems and fault finding, you will need to be able to:

P1 Identify electrical and mechanical safety devices; spark igniter, low- and high-pressure switches, thermocouples, UV (ultraviolet) sensors, high limit thermostats, proving systems, control thermostats, etc.

P2 Ensure controls are functioning correctly

P3 Fault finding of the controls

P4 Complete a commission check on equipment along with documentation.

A2.7.2 Knowledge and Understanding

In relation to control system fault finding, you will need to know and understand:

K1 Function description of all devices, including burner control and how they interact with each other and the equipment

K2 Sequence of controls

K3 Fault finding techniques.

A2.8 CHIMNEYS/FLUES/VENTILATION STANDARDS

A2.8.1 Performance Criteria

In relation to chimneys/flues/ventilation you will need to be able to demonstrate:

P1 Heating appliances final connection to flues/chimneys

P2 Testing of flues/chimneys.

A2.8.2 Knowledge and Understanding

In addition to the generic requirements of chimney systems and factors, and reasons for affecting their performance, this is additional learning for installing gas appliances:

K1 Size, suitability and correct operation of chimney system

K2 Calculating ventilation requirements

- plant & boiler rooms
- heated space
- balanced compartments.

K3 Mechanical ventilation and extraction including interlocks

K4 Free area and position

K5 Route

K6 Fire precautions intumescent air vents

K7 Maintenance.

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APPENDIX 3: OFF-SITE TRAINING (CATERING PATHWAY)

The additional minimum guided learning hours assigned to each specific sector pathway are detailed in Appendix 2 to 7 inclusive along with the additional performance criteria, knowledge and understanding.

A3.1 CATERING PATHWAY

CATERING PATHWAY	MINIMUM GUIDED LEARNING HOURS
Catering appliances, systems requirements • including siting and locations • control systems fault finding	33
Chimney/Flues/ventilation/system design • extracts • make up air • ambient and performance testing	15
TOTAL GUIDED LEARNING HOURS	**48**

TABLE 5 – GUIDED LEARNING HOURS FOR CATERING PATHWAY

A3.2 SECTOR SPECIFIC SAFETY, LEGISLATION AND STANDARDS

A3.2.1 Knowledge and Understanding

In relation to working on downstream non-domestic gas installations you will need to know and understand:

K1 Information available to Gas Safe registered operative specific to catering sector

- DW 172
- BS 6173
- EH 40
- IGEM/UP/19
- IGEM/UP/11.

A3.3 CATERING APPLIANCES ,SYSTEM REQUIREMENTS INCLUDING SITING AND LOCATION

A3.3.1 Performance Criteria

In relation to catering appliances, you will need to be able to:

P1 Apply atmosphere testing for catering oven under an existing ventilation system.

A3.3.2 Knowledge and Understanding

In relation to working on downstream non-domestic commercial catering gas installations you will need to know and understand:

K1 Suitability for purpose, principles of operation and location

K2 Domestic appliances in a commercial setting

K3 Dealing with legacy installations without interlocks

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K4 Interlocks with by-passes

K5 Educational establishments domestic and commercial appliances

K6 Ventilation/exhaust types and design calculating requirements discharge rates

K7 Atmosphere testing of kitchens

K8 Canopies/extract/filtration types

K9 Awareness of kitchen design and suitability MIs

K10 Siting and location.

A3.4 CHIMNEYS AND FLUES STANDARDS (Exhaust Systems)

A3.4.1 Performance Criteria

In relation to exhaust systems, you will need to be able to:

P1 Visually inspect exhaust systems to confirm correct and incorrect installation (including securing and supporting where appropriate).

A3.4.2 Knowledge and Understanding

In relation to exhausts you will need to know the operating principles of chimney/flue systems and factors affecting their performance, including the requirements for installing gas appliances to the following chimney/flue systems:

K1 Exhaust/chimneys systems

K2 Exhaust system design

- for condensing appliance

K3 Exhaust catering extract system operation and controls

K4 Materials, construction and route

K5 Securing and supporting

K6 Termination

K7 Fire precautions

K8 Safety devices (interlocks).

A3.5 VENTILATION SYSTEMS AIR MAKE-UP REQUIREMENTS

A3.5.1 Knowledge and Understanding

In relation to providing ventilation for gas burning appliances, you will need to know and understand:

K1 Factors affecting ventilation

- in catering establishments
- in educational establishments.

K2 Calculating ventilation requirements

K3 Catering ventilation labels, notices and data badges

K4 Natural & make-up air supply requirements for cooling and combustion

K5 Mechanical ventilation including interlocks

K6 Free area and position

K7 Route

K8 Maintenance.

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A3.6 VENTILATION SYSTEMS AMBIENT AND PERFORMANCE TESTING

A3.6.1 Performance Criteria

In relation to ventilation systems ambient and performance testing, you will need to be able to:

P1 Visually inspect ventilation systems to confirm correct and incorrect installation (including securing and supporting where appropriate)

P2 Carry out air ambient performance tests of the kitchen.

A3.6.2 Knowledge and Understanding:

In relation to ventilation/extraction installation inspection and testing you will need to know and understand:

K1 Causes of leakage of combustion products from catering appliances

K2 Installation and testing appliances when MIs are not available

K3 Ventilation/extraction information requirements along with labelling

K4 Ventilation/extraction maintenance.

A3.7 CONTROL SYSTEMS FAULT FINDING

A3.7.1 Performance Criteria

In relation to control systems and fault finding, you will need to be able to:

P1 Identify electrical and mechanical safety devices: spark igniter, low-and high-pressure switches, thermocouples, high limit thermostats, proving systems, control thermostats including interlocks, etc.

P2 Ensure controls are functioning correctly

P3 Fault finding of the controls

P4 Complete a commission check on equipment along with documentation.

A3.7.2 Knowledge and Understanding

In relation to commercial catering control systems, you will need to know and understand:

K1 Function description of all control devices and how they interact with each other and the equipment

K2 Sequence of controls

K3 Fault finding techniques.

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APPENDIX 4: OFF-SITE TRAINING (LAUNDRY PATHWAY)

The additional minimum guided learning hours assigned to each specific sector pathway are detailed in Appendix 2 to 7 inclusive along with the additional performance criteria, knowledge and understanding.

A4.1 LAUNDRY PATHWAY

LAUNDRY PATHWAY	MINIMUM GUIDED LEARNING HOURS
Laundry Appliances, System Requirements • siting and locations • ventilation systems ambient and performance testing • control systems fault finding • interlocks	18
Chimneys/Flues/ventilation • exhaust systems • make up air • ambient performance testing	15
TOTAL GUIDED LEARNING HOURS	**33**

TABLE 6 – GUIDED LEARNING HOURS FOR LAUNDRY PATHWAY

A4.2 SECTOR SPECIFIC SAFETY, LEGISLATION AND STANDARDS

A4.2.1 Knowledge and Understanding

In relation to working on downstream non-domestic gas installations you will need to know and understand:

K1 Laundry sector appliances and burner applications

K2 Information available to Gas Safe registered operatives: specific or relevant to the laundry sector for example,

- BS 8446
- Approved Document B (Fire Safety) or Devolved Nations Equivalents.

A4.3 LAUNDRY EQUIPMENT AND SYSTEM REQUIREMENTS (including siting and locations, commissioning ventilation systems, ambient and performance testing)

A4.3.1 Performance Criteria

In relation to laundry equipment and systems, you will need to be able to:

P1 Disconnect/reconnect an appliance with an existing exhaust system commission in accordance with MIs

- confirm and record ventilation system are in accordance with the MIs
- apply exhaust testing are in accordance with MIs.

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A4.3.2 **Knowledge and Understanding**

In relation to working on laundry equipment and system requirements, you will need to know and understand:

K1 Suitability, location, operation

K2 Reducing risk & assessment of location

K3 Requirement for make-up air

K4 Dealing with legacy installations

K5 Discharge arrangement

K6 Extract/filtration types

K7 Exhaust systems

K8 Interlocks

K9 Siting and location.

A4.4 CHIMNEYS, FLUES AND EXHAUST SYSTEMS

A4.4.1 **Performance Criteria**

In relation to chimneys, flues and exhaust systems, you will need to be able to:

P1 Visually inspect chimney/exhaust systems to confirm correct and incorrect installation (including securing and supporting where appropriate).

A4.4.2 **Knowledge and Understanding**

In relation to chimney/exhaust you will need to know the operating principles of chimney/exhaust systems and factors affecting their performance, including the requirements for installing gas appliances to the following chimney/exhaust systems:

K1 Laundry exhaust duct requirements

K2 Chimney/exhaust sizing and design

K3 Materials, construction and route

K4 Securing and supporting

K5 Termination

K6 Fire precautions

K7 Safety devices (interlocks).

A4.5 VENTILATION SYSTEMS AIR MAKE-UP REQUIREMENTS

A4.5.1 **Knowledge and Understanding**

In relation to providing ventilation for gas burning appliances, you will need to know and understand laundry specific ventilation requirements:

K1 Factors affecting laundry room/establishment ventilation

K2 Design, materials and types of ventilation provision

K3 Calculating laundry make up air requirements

K4 Natural and mechanical ventilation provisions

K5 Exercise in free area and position

K6 Route

K7 Maintenance.

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A4.6 CONTROL SYSTEMS AND FAULT FINDING

A4.6.1 Performance Criteria

In relation to control systems and fault finding, you will need to be able to:

P1 Identify electrical and mechanical safety devices (including fire dampers): spark igniter, low- and high-pressure switches, thermocouples, UV sensors, high limit thermostats, proving systems, control thermostats, etc.

P2 Ensure controls and interlocks are functioning correctly

P3 Fault finding of the controls

P4 Complete a commission check on equipment along with documentation.

A4.6.2 Knowledge and Understanding

In relation to laundry control systems, you will need to know and understand:

K1 Function description of all control devices and how they interact with each other and the laundry equipment for safe functioning

K2 Sequence of controls

K3 Fault finding techniques.

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APPENDIX 5: OFF-SITE TRAINING (PLANT/EQUIPMENT INCLUDING ENGINES PATHWAY)

The additional minimum guided learning hours assigned to each specific sector pathway are detailed in Appendix 2 to 7 inclusive along with the additional performance criteria, knowledge and understanding.

A5.1 PLANT/EQUIPMENT (including engines) PATHWAY

PLANT/EQUIPMENT (including engines) PATHWAY	MINIMUM GUIDED LEARNING HOURS
Plant/equipment (including engines), systems • siting and locations (plant room and remote enclosures) • control systems fault finding	18
Exhaust and ventilation systems • exhaust systems including MCPD and heat recovery • ventilation/make up air	4
Tightness Testing and Purging (IGE/UP/1)	26
TOTAL GUIDED LEARNING HOURS	**48**

TABLE 7 – GUIDED LEARNING HOURS FOR PLANT/EQUIPMENT (including engines) PATHWAY

A5.2 SECTOR SPECIFIC SAFETY, LEGISLATION AND STANDARDS

A5.2.1 Knowledge and Understanding

In relation to working on downstream non-domestic gas installations you will need to know and understand the application & specific to the plant and engine sector for example:

K1 IGEM/UP/3

K2 Approved Document B (Fire Safety)/F (Ventilation) or Devolved Nation Equivalents

K3 Information available to Gas Safe registered operatives who also have the awareness of the following, sector specific to plant and equipment:

- Pressure Equipment (Safety) Regulations (PE(S)R)
- Provision and Use of Work Equipment Regulations (PUWER) Medium Combustion Plant Directive (MCPD) sector specific
- Dangerous Substances and Explosive Atmospheres Regulations (DSEAR)
- risk assessment-controlling the risks in the workplace.

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A5.3 PLANT AND EQUIPMENT INCLUDING ENGINES

A5.3.1 Performance Criteria

In relation to plant and equipment, you will need to be able to:

P1 Exchange, install, commission an engine

P2 Complete the service of the gas system in accordance with MIs

- include completing all the necessary documentation.

P3 Following MIs

- complete a component change of the gas system in accordance with MIs.

A5.3.2 Knowledge and Understanding

In relation to plant and equipment, you will need to know and understand:

K1 Gas engine, basic design concept and its purpose

K2 Siting of an engine

- engine enclosures and other locations
- installations methods for the gas system.

K3 Gas safety systems

- controls including valves, pressure switches, proving systems, regulators and other safeguards.

K4 Gas supplies, boosted, or using compressors

- pipework including flexible and anti-vibration devices
- operating pressure filtration, non-return valves (NRVs), under pressure protection, high pressure & relief valve setting, vents.

K5 Exhaust systems configuration and the termination of exhausts

- combustion of gas in a gas fuelled engine and the products of combustion produced
- single exhausts, shared exhausts, flue dilution systems suitability
- heat recovery.

K6 Air supply/ventilation for different purposes including

- combustion
- cooling.

K7 Enclosure installations

- safety precautions labels and notices
- ventilation checks when supplied by mechanical means
- exhaust connection and termination
- engine mounts & anti vibration measures
- gas system, isolation valves, valve proving, filters, switches, safety shut- offs and NRVs
- testing and purging
- pre and post purges
- spit backs
- checking and setting of pressure reliefs & vents.

K8 Documentation, including hand over to end user.

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A5.4 SITING AND LOCATION

Manufacturer's instructions and relevant Standards, if applicable.

A5.5 VENTILATION SYSTEMS AND COMPARTMENT VENTILATION

A5.5.1 Knowledge and Understanding

In relation to plant and engines, in addition of providing ventilation for gas burning appliances, you will need to know and understand:

K1 Factors affecting ventilation

K2 Calculating ventilation requirements for enclosures

K3 Ventilation labels and notices

K4 Mechanical ventilation including interlocks.

A5.6 EXHAUST SYSTEMS INCLUDING MEDIUM COMBUSTION PLANT DIRECTIVE (MCPD) AND HEAT RECOVERY

A5.6.1 Knowledge and Understanding

In relation to working on downstream non-domestic gas installations you will need to know and understand:

K1 Application of the MCPD

K2 Application of heat recovery

K3 Siting of exhaust and its implication on the environment.

A5.7 CONTROL SYSTEMS FAULT FINDING

A5.7.1 Performance Criteria

In relation to control systems and fault finding, you will need to be able to:

P1 Identify electrical and mechanical safety devices; spark igniter, low- and high-pressure switches, thermocouples, UV sensors, high limit thermostats, proving systems, control thermostats, etc.

P2 Ensure controls are functioning correctly

P3 Fault finding of the controls

P4 Complete a commission check on equipment along with documentation.

A5.7.2 Knowledge and Understanding

In relation to downstream control systems, you will need to know and understand:

K1 Function description of all devices uncounted and how they interact with each other and the equipment.

K2 Sequence of controls

K3 Plant isolation and reinstatement.

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APPENDIX 6: OFF-SITE TRAINING (METERING PATHWAY)

The additional minimum guided learning hours assigned to each specific sector pathway are detailed in Appendix 2 to 7 inclusive along with the additional performance criteria, knowledge and understanding.

A6.1 METERING PATHWAY

METERING PATHWAY	MINIMUM GUIDED LEARNING HOURS
Gas Meters, Regulators and ECVs • operation and position of emergency controls and valves	14
Understanding pressures and flow	5
Tightness Testing and Purging (IGEM/UP/1C)	7
Hazardous areas for gas metering equipment	7
Awareness of metering types: diaphragm, rotary, turbine, ultrasonic and thermal mass exceeding U40 and ancillary equipment type	14
TOTAL GUIDED LEARNING HOURS	**47**

TABLE 8 – GUIDED LEARNING HOURS FOR METERING PATHWAY

A6.2 SECTOR SPECIFIC SAFETY, LEGISLATION AND STANDARDS

A6.2.1 Knowledge and Understanding

In relation to working on downstream non-domestic gas installations, you will need to know and understand:

K1 Your responsibilities regarding health, safety and the environment including an adequate knowledge of:

- the potential for exposure to asbestos in gaskets in metering installations
- the precautions to take.

K2 equipotential bonding application and use

K3 Identification and process of reporting of tampering with gas supply and/or meter installation

K4 Industry Standard available to Gas Safe registered operatives:

- IGEM/GM/4
- IGEM/GM/6
- IGEM/GM/7 A and B
- IGEM/GM/8 parts 1-5.

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A6.3 GAS METERS AND REGULATORS

A6.3.1 Performance Criteria

In relation to gas meters and regulators you will need to be able to:

P1 Install a gas meter and regulator (diaphragm and rotary) including labelling

P2 Commission a rotary meter installation incorporating a low-pressure regulator

P3 Maintain of the metering installation

P4 Adjust the meter regulator

P5 Exchange a meter fitted to an installation with a by-pass.

A6.3.2 Knowledge and Understanding

In relation to gas meters and regulators you will need to know and understand:

K1 Factors to consider when installing a meter

K2 Reducing risk & assessment of location

K3 Legislation & Standards applying to meters

K4 Safety notices and labels

K5 Identification of MP/IP installations

K6 Types of meter housing suitable for meter installations including ventilation

K7 Performance of meter regulators

K8 Sealing meter regulators

K9 Terms and acronyms

K10 In relation to the siting and location of a meter installation, you will need to know and understand:

- type of appropriate housing
- identifying risks associated with the location of the meter installation requirements of standards for location and housing
- ventilation of metering installations
- addition support for meter installations during assembly, operation and maintenance.

A6.4 OPERATION AND POSITIONING OF EMERGENCY CONTROLS AND VALVES

A6.4.1 Knowledge and Understanding

In relation to the operation and positioning of ECVs and AECV, you will need to know and understand:

K1 An ECV is a single point of isolation for the downstream system

K2 An ECV valve type

K3 An ECV determines the end of the Network

K4 Accessibility of the ECV

K5 ECV labels

K6 Actions required when the ECV is not suitable.

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A6.5 UNDERSTANDING PRESSURES AND FLOW

A6.5.1 Performance Criteria

In relation to checking and setting operating pressures and gas flow rates, you will need to be able to:

P1 Establish the inlet pressure from the Network to confirm pressure tier

P2 Measure operating pressures and flow

P3 Determine a meter installation inlet, outlet and metering pressure.

A6.5.2 Knowledge and Understanding

In relation to checking and setting operating pressures and gas rates, you will need to know and understand:

K1 Identify the inlet and outlet of the meter installation

K2 Identify upstream Pressure Regulating Installations (PRI) as part or not of the meter installation

K3 Causes and effects of pressure loss.

A6.6 TESTING AND PURGING IN ACCORDANCE WITH IGEM/UP/1C

(example range greater than 100 mbar operating at 1 bar)

A6.6.1 Performance Criteria

In relation to strength, tightness testing and purging of Natural Gas non-domestic gas installations you will need to be able to:

P1 Prepare for pneumatic strength testing – new installation and extensions (air or nitrogen)

P2 Carry out pneumatic strength test – new installation and extensions (air or nitrogen)

P3 Carry out tightness test immediately following strength test on new installations (air or nitrogen)

P4 Prepare for tightness testing – existing installations (fuel)

P5 Carry out tightness test – existing installations (fuel)

P6 Prepare for a commission purge

P7 Determine purge volume, purge flow rate and purge time

P8 Undertake purge - venting to outside - from air to fuel (commissioning)

P9 Undertake purge from fuel to air (de-commissioning).

A6.6.2 Knowledge and Understanding

In relation to tightness testing and direct purging of small, low-pressure natural gas non-domestic gas installations you will need to know and understand:

K1 Acronyms and symbols

K2 Determination of maximum operating pressure (MOP) and maximum incidental pressure (MIP)

K3 Calculation of strength test pressure (STP) and strength test duration (STD)

K4 Requirement to remove components that cannot withstand the STP

K5 When to undertake strength test, tightness test and commission or de-commission purge

K6 Identifying volumes of differing meter types

K7 Method of calculating new tightness test duration (TTD) with consideration to installation volume, gauge type and test medium

K8 Method of calculating existing tightness test duration (TTD) with consideration to installation volume, gauge type, pipework area and test medium

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K9 Procedure where it is not possible to calculate installation volume or estimate with any confidence

K10 By-passing system components during tightness test

K11 Effects of variations of temperature and atmospheric pressure

K12 Calculation of purge volumes, minimum purge flow rates and maximum purge times for an installation

K13 Determination of commission and de-commission and safe end point gas readings

K14 Correct size, configuration and positioning of purge equipment

K15 Safety and environmental requirements to be considered prior to purging and the potential for undertaking a flare-off

K16 When it will be acceptable and the procedures to adopt when purging into an internal area

K17 Purging replacement meters

K18 Purging procedures for taking pipework out of service

K19 Purging with air using either air blower or compressed air cylinders

K20 Procedures when required flow rate of purge is not achieved

K21 Identification of purge gas cylinders used to carry out purge.

A6.7 HAZARDOUS AREAS FOR GAS METERING EQUIPMENT

A6.7.1 Knowledge and Understanding

In relation to providing ventilation for gas metering sector, you will need to know and understand:

K1 Hazardous areas (IGEM/GM/7B)

K2 Electrical connections for gas metering equipment (IGEM/GM/7A).

A6.8 AWARENESS OF METERING TYPES

A6.8.1 Knowledge and Understanding

In relation to metering types, you will need to know and understand the characteristics and installation requirements for:

K1 Diaphragm

K2 Rotary

K3 Turbine

K4 Ultrasonic

K5 Thermal mass

K6 Ancillary equipment type.

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APPENDIX 7: OFF-SITE TRAINING (PIPEWORK, VALVES AND CONTROLS PATHWAY)

A7.1 PIPEWORK, VALVES AND CONTROLS PATHWAY

The following pathway is for those doing pipework only. No requirements to complete the generic training prior to this Section.

PIPEWORK PATHWAY	MINIMUM GUIDED LEARNING HOURS
Legal Requirements and Standards	7
Pipe materials	7
Forming and jointing different materials in accordance with Standards	40
Installation of pipework and fittings	14
Ventilation requirements	4
* Strength/tightness testing and purging (IGE/UP/1A)	19.5
Ancillaries, valves, meters, flexible expansion devices etc.	7
Gas Industry Unsafe Situations Procedure	4
TOTAL GUIDED LEARNING HOURS	**83**

*Note 1: *Testing and Purging is an option for this learning element.*

TABLE 9 – GUIDED LEARNING HOURS FOR PIPEWORK, VALVES AND CONTROLS PATHWAY

A7.2 SAFETY, LEGISLATION AND STANDARDS

A7.2.1 Knowledge and Understanding

In relation to working on downstream non-domestic gas installations you will need to know and understand:

K1 Application of the GS(I&U)R

K2 Equipotential bonding

K3 Information available to Gas Safe registered operatives:

- Legislative Normative and Informative Document List
- Industry Standard Updates
- Safety Alerts
- Technical Bulletins.

K4 Also have an awareness of the following information available on the Health and Safety Executive (HSE) website:

- Risk assessment-controlling the risks in the workplace
- Safe isolation techniques (gas and electrical) Regulations (HSG 253).

A7.3 PIPE MATERIALS

A7.3.1 Knowledge and Understanding

In relation to the installation of pipework and fittings, you will need to be able to know and understand:

K1 Knowledge of pipe materials and fittings

K2 Use and restrictions for their application.

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A7.4 FORMING AND JOINTING DIFFERENT MATERIALS IN ACCORDANCE WITH STANDARDS

A7.4.1 Performance Criteria

In relation to the installation of pipework and fittings, you will need to be able to:

P1 Join pipework (as appropriate to the types included in the list below) using soldered, threaded, washer, union, mechanical, press-fit fittings and fusion joints:

a. Copper
b. Steel
c. Corrugated stainless steel tubing (CSST)
d. PE.

A7.5 INSTALLATION OF PIPEWORK AND FITTINGS

A7.5.1 Performance Criteria

In relation to the installation of pipework and fittings, you will need to be able to:

P1 De-commission downstream pipework on a gas installation, tee into existing pipework and re-commission installation on completion

P2 Demonstrate correct use of a equipotential bond

P3 Demonstrate correct use of Flexible connections

A7.5.2 Knowledge and Understanding

In relation to the installation of pipework and fittings, you will need to know and understand:

K1 Pipework design, installation, commissioning and maintenance including pipework line diagrams

K2 Copper, mild steel, stainless steel, CSST, medium density polyethylene pipe and fittings Standards, suitability and use

K3 Jointing and cleaning agents for jointing copper and threaded pipework fittings

K4 Restrictions on use of mechanical fittings

K5 Requirements for supporting and clipping gas installation pipework

K6 Pipework protection, fire stopping, sleeving and sheathing requirements

K7 Pipe sizing

K8 Connecting to medium pressure (MP) fed gas supplies

K9 Installations in timber framed buildings

K10 Hot working and when to use alternative methods

K11 The effects of flux on pipework

K12 Pipework in ducts

K13 Gas boosters, compressors and pre-mix plant

K14 Methods for pipework using flange, spools, flexible connections, expansion joints.

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A7.6 VENTILATION

A7.6.1 Performance Criteria

In relation to providing ventilation for gas burning appliances, you will need to be able to:

P1 Measure the free area of a range of different types of air vents and grilles

P2 Identify correct ventilation provision.

A7.6.2 Knowledge and Understanding

In relation to providing ventilation for gas burning appliances, you will need to know and understand:

K1 Factors affecting ventilation

K2 Design, materials and types of ventilation provision

K3 Calculating ventilation requirements

K4 Ventilation labels and notices

K5 Air supply requirements

K6 Free area and position

K7 Route

K8 Maintenance.

A7.7 TIGHTNESS TESTING AND PURGING (in accordance with IGEM/UP/1A)

A7.7.1 Performance Criteria

In relation to tightness testing and direct purging of small, low-pressure natural gas non-domestic gas installations, you will need to be able to:

P1 Prepare for pneumatic strength testing – new installation and extensions (air or nitrogen)

P2 Carry out pneumatic strength test – new installation and extensions (air or nitrogen)

P3 Prepare for tightness testing – existing installations (gas)

P4 Carry out tightness test – existing installations (gas)

P5 Carry out tightness test immediately following strength test on new installations (air or nitrogen)

P6 Prepare for direct purging

P7 Determine purge volume, purge flow rate and purge time

P8 Direct purging - venting to outside - from air to gas (commissioning)

P9 Direct purging from gas to air (de-commissioning).

A7.7.2 Knowledge and Understanding

In relation to tightness testing and direct purging of small, low-pressure natural gas non-domestic gas installations you will need to know and understand:

K1 Acronyms and symbols

K2 Determination of maximum operating pressure (MOP) and maximum incidental pressure (MIP)

K3 Identifying volumes of differing pipes and fittings including meter types

K4 Procedure where it is not possible to calculate installation volume or estimate with any confidence

K5 By-passing system components during tightness test

K6 Effects of variations of temperature and atmospheric pressure

K7 Terms and acronyms applying to non-domestic medium pressure regulators

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K8 Requirements for hazardous area classification

K9 Safety and environmental requirements to be considered prior to purging

K10 Procedures to adopt when purging into an internal area

K11 Purging pipework

K12 Purging procedures for taking pipework out of service

K13 Purging with air through compressed air cylinders and other equipment

K14 Planning and procedures for carrying out a purge

K15 Procedures when required flow rate of purge is not achieved

K16 Identification of purge equipment to carry out purge.

A7.8 ISOLATION VALVES, SECONDARY METERS, FLEXIBLE EXPANSION DEVICES

Knowledge and Understanding

In relation to isolation valves, secondary meters, flexible expansion devices, you will need to know and understand:

K1 Characteristics and installation requirements for

- isolation valves
- secondary meters
- flexible expansion devices.

A7.9 OPERATION AND POSITIONING OF EMERGENCY CONTROLS AND VALVES

A7.9.1 Performance Criteria

In relation to the operation and positioning of ECVs and AECV, you will need to be able to:

P1 Identify correctly positioned ECVs and AECV

P2 Identify the correct labels to attached ECVs and AECV.

A7.9.2 Knowledge and Understanding

In relation to the operation and positioning of ECVs and AECV, you will need to know and understand:

K1 Accessibility of the ECV

K2 ECV labels

K3 Actions required when the ECV is not suitable

K4 Inside and outside meter positions

K5 Multi-occupancy building installations

K6 Additional ECVs including automatic isolation valves

- reestablishing gas supplies including proving systems.

K7 Services into buildings

K8 How to deal with incorrectly positioned ECVs and AECV.

A7.10 UNSAFE SITUATIONS PROCEDURE (IGEM/G/11)

A7.10.1 Performance Criteria

In relation to unsafe situations. you will need to be able to:

P1 Identify and classify different categories of unsafe situations

P2 Complete and issue appropriate warning labels and notices.

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A7.10 .2 **Knowledge and Understanding**

In relation to unsafe situations, emergency notices and warning labels, you will need to know and understand:

K1 Gas Industry Unsafe Situation Procedure (GIUSP) (IGEM/G/11)

K2 Situations reportable under Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)

K3 Situations reportable to Gas Safe Register and/or HSE which are not RIDDOR reportable.

K4 Actions and correct use of notices and labels

K5 In relation appliances, you will need to know and understand:

- actions to take when an un-commissioned appliance is identified
- actions to take if pipework and appliance(s) are not tested (commissioned) when the gas supply is re-established.

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APPENDIX 8: ON-SITE EVIDENCE REQUIREMENTS

This Appendix outlines the on-site requirements that are to be evaluated through performance. Evidence is gathered through activities carried out by the new entrant (under the observation of a mentor) for a customer at their premises.

COLOR CODE	DESCRIPTION	CODES FOR EVALUATION
Green	**Directly observed**	**DOC** – Directly observed simulated realistic activity in centre
Orange	**Observation on-site with a mentor**	**RAS** – Reflective Account Site from site with supporting evidence. Suggest that this is the preferred option for Managed Learning Programme portfolios. **RAC** – Reflective Account Centre from simulation completed at a Training Centre with supporting evidence

TABLE 10 – EVALUATION CODES

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A8.1 GENERIC ON-SITE EVIDENCE

For installation of gas pipework, the on-site evidence may be on either or both of:

- not exceeding 35 mm diameter and low pressure (LP) in accordance with BS 6891
- exceeding 35 mm diameter and pressures not exceeding 60 bar in accordance with IGEM/UP/2.

INSTALLATION OF GAS PIPEWORK			
Candidates are to be observed on the minimum number of accounts of evidence over the range as identified below.			
The candidate has covered necessary training/mentoring required prior to the observation.			
Mentor signature		Date	
Candidate signature		Date	
Observation Requirements			
Total - 5 accounts of evidence for installation gas pipework; these may be related directly to the installation requirements of an appliance.			
Observation 1	**Directly observed/DOC** In centre		
Observation 2	**Reflective Account/RAS** From site		
Observation 3	**Reflective Account/RAS** From site		
Observation 4	**Reflective Account/RAS-RAC** From site/centre		
Observation 5	**Reflective Account/RAS-RAC** From site/centre		
Installation to include • new or replacement pipework • associated pipework fixings and joints.			

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Range - at least 2 of the following	**Secondary Range** – at least 3 of the following
• copper tube • steel • stainless steel • PE.	• capillary joints** • threaded joints • compression joints • press fit joints • CSST • fabricated bending using mechanical tools • PE joints. ** mandatory

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INSTALLATION OF GAS PIPEWORK (MANDATORY FOR PATHWAY) (exceeding 35 mm and pressures up to 60 bar in accordance with IGEM/UP/2)			
Candidates are to be observed on the minimum number of six accounts of evidence over the range as identified below.			
The candidate has covered necessary training/mentoring required prior to the observation.			
Mentor signature		Date	
Candidate signature		Date	

Observation Requirements	
Total - 6 accounts of evidence for installation gas pipework	
Assessment 1	**Directly observed/DOC** In centre
Observation 2	**Reflective Account/RAS** From site
Observation 3	**Reflective Account/RAS** From site
Observation 4	**Reflective Account/RAS** from site
Observation 5	**Reflective Account/RAS** from site
Observation 6	**Reflective Account/RAS** from site

Installation to include

- new or replacement pipework to include:
  - below 35 mm (minimum of two onsite)
  - above 35 mm (minimum of two onsite).

Range - at least 2 of the following	**Secondary Range** – at least 3 of the following
• copper tube • steel • stainless steel • PE.	• capillary joints** • threaded joints • compression joints • press fit joints • CSST • fabricated bending using mechanical tools • PE joints. ** mandatory

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GAS TIGHTNESS TESTING, DIRECT PURGING (IGE/UP/1A and IGEM/UP/1B)			
Candidates are to be observed on the minimum number of five accounts of evidence over the range as identified below.			
The candidate has covered necessary training/mentoring required prior to the observation.			
Mentor signature		Date	
Candidate signature		Date	

Observation Requirements	
Total - 5 accounts of evidence for tightness testing and purging	
Assessment 1	**Directly observed/DOC** In centre, IGE/UP/1A and IGEM/UP/1B
Observation 2	**Reflective Account/RAS** From site
Observation 3	**Reflective Account/RAS** From site
Observation 4	**Reflective Account/RAS-RAC** From site/centre
Observation 5	**Reflective Account/RAS-RAC** From site/centre

Observation to include

- strength test
- tightness test
- purge.

Range:

- two examples from onsite for IGE/UP/1A
- two examples from onsite for IGEM/UP/1B.

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OPPORTUNITY FOR IDENTIFICATION OF UNSAFE SITUATIONS			
Candidates may use this section to record any unsafe situations encountered.			
Mentor signature		Date	
Candidate signature		Date	
Observations			
Observations – Unsafe situations			
Observation 1	**Reflective Account/RAS** From site		
Observation 2	**Reflective Account/RAS** From site		
Observation 3	**Reflective Account/RAS** From site		
Observation 4	**Reflective Account/RAS** From site		
Observation 5	**Reflective Account/RAS** From site		
Observations may include Gas appliances/installations classified as either: • immediately Dangerous (ID), or • at Risk (AR).			

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A8.2 HEATING PATHWAY

INSTALL, SERVICE, COMMISSION AND FAULT FIND ON A NON-DOMESTIC HEATING APPLIANCE(S) > 70 kW AND RADIANT APPLIANCES			
New entrants are to be observed on the minimum number of fourteen accounts of evidence over the range identified below.			
The candidate has covered necessary training/mentoring required prior to the observation.			
Mentor signature		Date	
Candidate signature		Date	

Portfolio Evidence Requirements				
Total – 14 accounts of evidence for installation, service and fault finding		**Install & Commission**	**Service**	**Fault Finding**
Assessment1	**Directly Observed** All three may be DO in Centre			
Observation2	**Reflective Account** Minimum of 2 accounts are to come from site 1 account may be simulated			
Observation3	**Reflective Account** Minimum of 2 accounts are to come from site 1 account may be simulated			
Observation4	**Reflective Account** Minimum of 2 accounts are to come from site 1 account may be simulated			
Observation5	**Reflective Account** Minimum of 1 account is to come from site 1 account may be simulated			

Observation to include

- installation of appliance
- commission appliance
- full service of an appliance
- fault finding on appliance
- completion of associated documentation include Building Regulations.

Range: to include two of the following

- indirect fired
- direct fired
- radiant.

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A8.3 CATERING PATHWAY

CATERING APPLIANCES, INSTALL, MAINTAIN, COMMISSION AND FAULT FINDING/REPAIR				
Candidates are to be observed on the minimum number of 14 accounts of evidence over the range as identified below. *Note*: The observations are only to be simulated where it has not been possible for the observation to be obtained on-site.*				
The candidate has covered necessary training/mentoring required prior to the observation				
Mentor signature			Date	
Candidate signature			Date	
Observation Requirements				
Total - 14 accounts of evidence for installation, service and fault finding		**Install & Commission**	**Service/ Maintain**	**Fault Finding/ Repair**
Assessment 1	**Directly Observed** All three may be DO in centre			
Observation 2	**Reflective Account** All 3 accounts are to come from site			
Observation 3	**Reflective Account** Minimum of 2 accounts are to come from site 1 account may be simulated*			
Observation 4	**Reflective Account** Minimum of 2 accounts are to come from site 1 account may be simulated*			
Observation 5	**Reflective Account** Minimum of 1 account is to come from site 1 account may be simulated*			
Observation to include • new or replacement appliance • associated pipework and connections • associated ventilation and mechanical ventilation extraction testing • commission, handover and completion of relevant documentation and test certificates.				
Range – at least two of the following • conventional range and hotplate • atmospheric steamer • warming oven • grill/salamander.				

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Options

- fish and chip range
- pressurised bulk storage water heater.

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A8.4 LAUNDRY PATHWAY

INSTALL, SERVICE AND FAULT FIND GAS LAUNDRY APPLIANCES				
Candidates are to be observed on the minimum number of 5 accounts of evidence over the range as identified below. *Note*: The observations are only to be simulated where it has not been possible for the observation to be obtained on-site.*				
The candidate has covered necessary training/mentoring required prior to the observation.				
Mentor signature		Date		
Candidate signature		Date		
Observation Requirements				
Total – 11 accounts of evidence for installation, service and fault finding of a gas fired ducted air heater		**Install & Commission**	**Service**	**Fault Finding**
Assessment 1	**Directly Observed** All three may be DO in Centre			
Observation 2	All two may be DO in Centre			
Observation 3	All two may be DO in Centre			
Observation 4	**Reflective Account** Minimum of 1 account is to come from site 1 account may be simulated*			
Observation 5	**Reflective Account** Minimum of 1 account is to come from site 1 account may be simulated*			
Observation to include • new or replacement appliance • associated pipework connections • associated flueing • commission, handover and completion of relevant documentation.				
Range – Installation to include one of the below: • laundry appliance with make-up air and exhaust connections.				

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A8.5 PLANT AND EQUIPMENT INCLUDING ENGINES PATHWAY

INSTALL, SERVICE AND FAULT FIND PLANT/EQUIPMENT/ENGINE APPLIANCE

*** Appropriate to the competency being applied for**

New entrants are to be observed on the minimum number of 14 accounts of evidence over the range identified below.

Note: The observations are only to be simulated where it has not been possible for the observation to be obtained on-site.*

The candidate has covered necessary training/mentoring required prior to the observation.

Mentor signature		Date	
Candidate signature		Date	

Observation Requirements

Total – 14 accounts of evidence for installation, service and fault finding		**Install & Commission**	**Service**	**Safety check/ Fault Finding**
Assessment 1	**Directly Observed** All three may be DO in centre			
Observation 2	**Reflective Account** All 3 accounts are to come from site*			
Observation 3	**Reflective Account** Minimum of 2 accounts are to come from site 1 account may be simulated*			
Observation 4	**Reflective Account** Minimum of 2 accounts are to come from site 1 account may be simulated*			
Observation 5	**Reflective Account** Minimum of 1 account is to come from site 1 account may be simulated*			

Observation to include

- installation of appliance
- full service of an appliance
- safety check/fault find on appliance.

Range:

- engines and plant.

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A8.6 METERING PATHWAY

INSTALL/ EXCHANGE AND COMMISSION NON_DOMESTIC METER			
Candidates are to be observed on the minimum number of 11 accounts of evidence over the range as identified below. *Note*: The observations are only to be simulated where it has not been possible for the observation to be obtained on-site.*			
The candidate has covered necessary training/mentoring required prior to the observation.			
Mentor signature		Date	
Candidate signature		Date	

Observation Requirements	
Install/Exchange & Commission	
Assessment 1	**Directly Observed** may be DO in Centre
Observation 2	**Directly Observed** may be DO in Centre
Observation 3	**Directly Observed** may be DO in Centre
Observation 4	**Reflective Account** account is to come from site
Observation 5	**Reflective Account** account is to come from site
Observation 6	**Reflective Account** account is to come from site
Observation 7	**Reflective Account** account is to come from site
Observation 8	**Reflective Account** account is to come from site
Observation 9	**Reflective Account** account is to come from site
Observation 10	**Reflective Account** account is to come from site
Observation 11	**Reflective Account** account is to come from site

Observation to include

- new or replacement
- associated pipework connections
- associated ventilation and risk assessment
- commission, handover and completion of relevant documentation and test certificates.

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Range – to include at least two of the following

- diaphragm U25 or $\geq$ U40
- rotary
- turbine
- ultrasonic
- thermal mass.

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A8.7 OPTIONAL TRAINING

GAS TIGHTNESS TESTING, DIRECT PURGING (IGEM/UP/1) AND RELIGHTING APPLIANCES			
Candidates are to be observed on the minimum of 5 occasions and range as identified below.			
The candidate has covered necessary training/mentoring required prior to the observation.			
Mentor signature		Date	
Candidate signature		Date	
Observation Requirements			
Total - 5 observations for tightness testing, purging and relighting of gas installations and appliances			
Assessment 1	**Directly Observed** may be DO in Centre		
Observation 2	**Reflective Account/RAS** From site		
Observation 3	**Reflective Account/RAS** From site		
Observation 4	**Reflective Account/RAS** From site		
Observation 5	**Reflective Account/RAS** From site		
Observation to include • strength test • tightness test • purge • relight appliances.			

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OPTIONAL TRAINING

INSTALLATION OF MP GAS METERS *Note: This task can be carried out after the disconnection of a meter for hot working.*			
Candidates are to be observed on the minimum amount of 5 occasions and range as identified below.			
The candidate has covered necessary training/mentoring required prior to the observation.			
Mentor signature		Date	
Candidate signature		Date	

Observation Requirements	
Total - 5 observations for installation of MP gas meter	
Observation 1	**Reflective Account/RAS** From site
Observation 2	**Reflective Account/RAS** From site
Observation 3	**Reflective Account/RAS** From site
Observation 4	**Reflective Account/RAS** From site
Observation 5	**Reflective Account/RAS** From site

Observation to include

- installation of a MP diaphragm meter
- installation of a MP RD meter
- installation of a MP turbine meter
- associated regulators and safety shut-off valves
- associated meter valves and installation checks.

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APPENDIX 9: EQUIPMENT LIST

A9.1 GENERIC REQUIREMENTS

Safety, Legislation and Standards
A selection of power tools and electrical equipment

Products and Characteristics of Combustion
A selection of gas appliances with a variety of burners at least one to be showing signs of incomplete combustion
An electronic flue gas performance analyser with MIs and a selection of probes An electronic Ambient Air analyser with MIs and a selection of probes Installed open flued, room sealed, and flueless appliance with MIs.

Ventilation for Gas Burning Appliances
A selection of air grilles and air bricks (including terracotta) Air vent probe.
A selection of installed ventilation air grilles and bricks with appliances installed (for candidates to calculate ventilation requirements)

Installation of Pipework and Fittings
A selection of copper fittings
Copper pipe
Bending machine (for copper)
Mild steel pipework and taper threaded fittings incorporating a flange
CSST fittings and pipework
Mechanical fittings including, compression, threaded, washer and union types
Semi and flexible connectors
Equipotential bond
A 'live' metered gas installation including Equipotential Bonding
Testing points & purge points

Tightness Testing and Purging
A LP gas installation and appliance for tightness testing and purging
A suitably sized gas installation to complete strength and tightness testing and purging
An MP fed gas supply (test rig) with a meter inlet valve
An installation with a gas escape for the candidate to trace and repair

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Checking Pressures at the Meter Regulators
A live installation including a gas meter and pipework connected to at least 2 appliances

Installing LP Meter Regulators and Valves
A live installation including a gas meter and pipework connected to at least 2 appliances

Unsafe Situations, Emergency Notices and Warning Labels
A selection of ID appliances and installations including: Signs of spillage/leaking products of combustion Gas escape.
A selection of AR appliances and installations including: Chimney defects.
A selection of warning labels and notices

Checking and Setting Appliance Operating Pressures and Heat inputs
A live installation including a gas meter & pipework connected to at least 2 appliances

Operation and Checking of Appliance Gas Safety Devices and Controls
A range of gas safety devices and controls to include: Simple gas tap Safety shut-off valves Thermo electric flame supervision device (FSD) Vapour pressure FSD Electronic FSD Solenoid Liquid expansion thermostat Electrically operated thermostat Regulator Multifunctional control Air/gas ratio valve interruptible thermo-electric valve Vitiation device Overheat device Pressure switches Interlocks. *Note: These devices may be contained within an appliance.*

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Chimney Inspection and Testing
Open flued chimney system
A room sealed appliance
A fan assisted appliance with an extended chimney that requires supporting
A chimney/flue installation requiring visual inspection
A room sealed fan assisted positive pressure appliance (can be simulated)
An open flued appliance including cement based and metallic chimney pipe, joints and adaptors

Re-establish Existing Gas Supply and Re-light Appliances
A selection of bays with a live installation including a gas meter and pipework connected to at least 2 appliances with MIs. Appliances to include:
Catering appliance
Indirect fired open flued boiler
Room sealed boiler
Direct fired heater
Radiant tube heater
Laundry appliance

Basic Electrical Safety
Appliance/Equipment connected via Single and Multi-phase supply (can be demonstrated on a wiring board)
Extraneous metalwork
Two pole voltage detector
Non-contact voltage detector
Proving unit or known source

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A9.2 PATHWAY REQUIREMENTS

APPLIANCE OPTIONS

Heating Type Appliances, Systems & Controls
A selection of installed heating appliances including: Selection of burner configurations with different flame protection and detection systems Room sealed natural draught Fan assisted chimney/flue Open flue Appliance with an air/gas ratio valve Modulating weather and TPI (Time Proportional & Integral) controls systems can be (referenced/simulated).
A heating system installation connected to an electrical supply (or wiring board) comprising of the following components: Motorised valve(s) Room thermostat Time and temperature controls Pump over-run Hot water thermostat Overheat safety controls

Direct Fired Air Heaters
A fully functioning installed unit

Radiant Heaters
A gas fired operational appliance: Flueless Flued Plaque.

Laundry
A gas fired operational appliance installed to point, which can be used for service and maintenance

Catering
Oven and Ranges fitted with gas hose Salamander Solid top* Steaming oven* Fryer. *-*Optional*
Selection of installation possibilities, stability devices and fixings

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NON DOMESTIC METER PATHWAY

Gas Meters and Regulators
A selection from diaphragm, RD (rotary displacement), turbine, ultrasonic, thermal mass gas meters, regulators, safety shut-off's interconnecting pipework & fittings, semi rigid connections, purge and test points, meter unions, meter washers, meter brackets, shelves and meter enclosures. A low-pressure gas supply with main equipotential bonding fitted. A MP/IP (simulation/test rig) supply.

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APPENDIX 10 : FURTHER GUIDANCE

Guidance for the new entrant, the training organisation and the recogniser of training is to be provided and as a minimum to include:

- Information for the new entrant about the opportunities in the industry following successful completion of the training
- Responsibilities of the training organisation
- Responsibilities of the new entrant
- Transfer of training to other recognised training organisations.

  In the event of the training organisation being unable to provide the remaining training or the new entrant advocates to use another training organisation part way through the course, for example has relocated to another part of the UK, the transfer of training is allowed. The successful completion of some of the training may be taken and used as evidence to another training organisation to allow training to continue.

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APPENDIX 11 : GLOSSARY, ACRONYMS AND ABBREVIATIONS

Industry accepted definitions are contained in IGEM/G/4 which is freely available by downloading a printable version from IGEM's website, www.igem.org.uk.

The definitions listed below are relevant to the use of this Standard.

Recommended and legacy gas metering arrangements are given in IGEM/G/1 which is freely available by downloading a printable version from IGEM's website, www.igem.org.uk.

A11.1 DEFINITIONS

authenticity	authenticity is the quality of being genuine or real. The word authenticity is the state of something being authentic, or legitimate and true.
awareness	knowledge or perception of a situation or fact, in this case a developing & growing awareness.
class of persons	all gas engineering businesses, including self-employed gas engineers, are (subject to the limited exceptions in regulation 3(4)) required to be in membership of a class of persons approved by HSE, whether they carry out such work as their main or part activity. Gas engineers who are employed by a member of an approved class of persons but who do separate work on their own behalf need to be in membership of such class of persons, e.g. Gas Safe registered, in their own right. This definition is an extract from GS(I&U)R.
competence	is a combination of practical skill, training, knowledge and experience to carry out the job in hand safely, and ensuring the installation is left in a safe condition for use.
industry recognised	the Standards Setting Body is required to recognise all training for developers/providers wishing to provide training for new entrants working under the GS(I&U)R and for training providers wishing to become recognised to offer training for those working outside the scope of GS(I&U)R.
knowledge and understanding	knowledge refers to facts and information; understanding involves grasping the meaning and significance of that information, allowing deeper comprehension and application.
mentor	a technically competent, Gas Safe registered person with suitable industry experience, holding relevant competencies, who provides on-site support and advice to the new entrant whilst building evidence for their portfolio, during the programme duration.
mentoring	a person(s) with the appropriate knowledge and experience supporting the new entrant in their training.
new entrant	a person wishing to achieve a recognised industry qualification to become eligible to sit accredited assessments required by Gas Safe Register, see IGEM/IG/1.
non-domestic utilisation sector	those premises containing gas installations which are downstream of the Natural Gas Network or LPG installation emergency control valve other than domestic premises.
`off-site training	training that is undertaken in a classroom or workshop (which may be indoor or outdoor).

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`on-site training	training that is undertaken in a workplace such as an industrial or commercial premises (it may be simulated in a workshop under certain limited conditions).
portfolio	a collection of records which will be written, copies of documents, reports or test papers and photographs that is evidence of the work experience and/or work that the new entrant has undertaken.
simulated	Real Work Evaluation for part of a scenario. Explanation: When discussing evidence gathering, when the learner is building a portfolio of evidence, and only where it is agreed by all parties, a supervised mentoring visit can be used to evaluate a specific part of a real job where no real physical work can achieved or planned to be monitored within the mentoring process or in the timescales of the learning program. i.e. install non-domestic boiler: unlike the domestic application, non-domestic boilers installations can be very difficult to arrange in some circumstance, therefore in this scenario, the mentor can evaluate how the learner would have completed the task in a real scenario or, alternatively, an extra DOC for the task could be completed in a training centre. Both would be acceptable options. i.e. available for auditing purposes, the learner will have shown and documented all the necessary steps to get an existing installation of a boiler completed to a point where the next step could continue normally, taking all or any necessary risk assessments on board. Only after satisfactory completion of in this scenario the Installation element in accordance with the MI's could the commissioning task be completed by the learner. i.e. it doesn't matter that the appliance is not new, older appliance will be used in centres. This form of evaluation can only be acceptable if the trainer/ mentor documents provide the method statement completed by the learner of the installation job, shown in the portfolio, this type of evaluation is only accepted as above and where a significant difficulty in getting an evaluation in full and part only of a On Site installation scenario is available.
Standards Consultation Forum	ensures that employers and stakeholders allied to the gas industry are appropriately consulted as an integral part of the process of competence standard setting arising from proposals to amend or introduce new assessment mechanisms and associated aspects for businesses seeking registration on the Gas Safe Register. For membership details contact Energy and Utility Skills Ltd.
Strategic Management Board	ensures that the mechanisms and processes established for the production, maintenance and implementation of competence criteria and associated assessment specifications, operate in an effective and efficient manner to align fully with the Legislative requirements of the Gas Safety (Installation and Use) Regulations 1998 and subsequent registration requirements for consumer safety. For details, contact Energy and Utility Skills Ltd.
supervised	in the context of this document means 'the work experienced by the new entrant is either being carried out by the competent person/Gas

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	Safe registered engineer and watched by the new entrant, but being explained and coached or when appropriate being undertaken by the new entrant whilst overseen and checked by the supervisor. The supervisor being responsible and in control of the work at all times'.
workplace	an industrial or commercial premises or a simulated premise within a training establishment.

A11.2 ACRONYMS AND ABBREVIATIONS

ACS	Nationally Accredited Certification Scheme for Individual Gas Fitting Operatives
ACoP	Approved Code of Practice
AECV	additional emergency control valve
AR	at risk
BPEC	British Plumbing Employers Council
CEDA	Catering Equipment Distributers Association
CO	carbon monoxide
CO_2	carbon dioxide
COSHH	Control of Substances Hazardous to Health
CSST	corrugated stainless steel tubing
CFS	communal flue systems
DSEAR	Dangerous Substances and Explosive Atmosphere Regulations
ECV	emergency control valve
EUA	Energy and Utilities Alliance
E&US	Energy and Utility Skills
FSD	flame supervision device
GLH	guided learning hours
GN	guidance note
GIUSP	Gas Industry Unsafe Situations Procedure
GS(I&U)R	Gas Safety (Installation and Use) Regulations
GSR	Gas Safe Register
HSE	Heath and Safety Executive
HSWA	Health and Safety at Work etc. Act
ICOM	The Industrial and Commercial Energy Association
IGEM	Institution of Gas Engineers and Managers
ID	immediately dangerous
IP	intermediate pressure
LNIDL	legislative, normative informative documents list
LP	low pressure
LPG	liquefied petroleum gas
MCPD	Medium Combustion Plant Directive
MI	manufacturer's instructions
MOP	maximum operating pressure
MIP	maximum incidental pressure
MP	medium pressure
NG	natural gas
NRV	non-return valve
PE(S)R	Plant Equipment Safety Regulations
PUWER	Provision and Use of Work Equipment Regulations
RD	rotary displacement
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
SCF	Standards Consultation Forum
SMB	Strategic Management Board
SSOV	safety shut off valve
STD	strength test duration
STP	strength test pressure
TB	technical bulletin
TPI	Time Proportional and Integral
TTD	tightness test duration
TRV	thermostatic radiator valves

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UKLPG	UK LPG Trade Association now known as Liquid Gas UK
UV	ultraviolet.

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APPENDIX 12 : REFERENCES

This Specification is set out against a background of Legislation in force in GB at the time of publication. The devolution of power to the Scottish, Welsh and Northern Ireland Assemblies means that there may be variations to the Legislation described below for each of them and consideration of their particular requirements to be made. Similar considerations are likely to apply in other countries and reference to appropriate national Legislation will be necessary.

Care is to be taken to ensure that the latest editions of the relevant documents are used.

Where British Standards etc. are quoted, equivalent national or international Standards etc. equally may be appropriate.

A12.1 **PRIMARY LEGISLATION**

- Health and Safety at Work etc. Act 1974 (HSWA).

A12.2 **SECONDARY LEGISLATION**

- Building Regulations 2010, as amended
- Clean Air Act 1993
- Dangerous Substances and Explosive Atmospheres Regulations 2002
- Electricity at Work Regulations 1989
- Gas Safety (Installation and Use) Regulations 1998, as amended
- Medium Combustion Plant Directive
- Pressure Equipment (Safety) Regulations 2016 as amended
- Provision and Use of Work Equipment Regulations 1998
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013
- Work at Height Regulations 2005, as amended.

A12.3 **HSE ACOPS AND GUIDANCE**

- L56 Gas Safety (Installation and Use) Regulations 1998 (GSIUR) as amended-Approved Code of Practice (ACoP)
- HSG168 Fire safety in construction
- HSG253 The safe isolation of plant and equipment.

A12.4 **IGEM STANDARDS AND GUIDANCE**

- IGEM/IG/1 Edition 2 — Standards of training in gas work
- IGEM/G/4 Edition 2 — A Standard for IGEM Standards
- IGEM/G/5 Edition 3 — Gas installations in multi-occupancy buildings
- IGEM/G/11 Edition 2 — Gas Industry Unsafe Situations Procedure
- IGEM/G/11 Supplement 1 — Responding to CO alarm activations/reports of fumes after attendance by the emergency service provider or the Liquefied Petroleum Gas supplier
- IGE/UP/1 Edition 2 — Strength testing, tightness testing and direct purging of industrial and commercial gas installations
- IGE/UP/1A Edition 2 — Strength and tightness testing and direct purging of small low pressure industrial and commercial Natural Gas Installations
- IGEM/UP/1B Edition 4 — Tightness testing and direct purging of small Liquefied Petroleum Gas/Air, NG and LPG installations

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- IGEM/UP/2 Edition4 — Installation pipework on industrial and commercial premises.
- IGEM/UP/3 Edition 3 — Gas fuelled spark ignition and dual fuel engines
- IGEM/UP/10 Edition 4 — Installation of flued gas appliances in industrial and commercial premises
- IGEM/UP/11 Edition 3 — Gas installations for educational establishments
- IGEM/UP/19 Edition 2 — Design and application of interlock devices and associated systems used with gas appliance installations in commercial Catering establishments
- IGEM/GM/4 Edition 4 — Flow metering practices. Inlet pressure exceeding 38 bar and not exceeding 100 bar
- IGEM/GM/6 Edition 3 — Non-domestic meter installations. Standard designs
- IGEM/GM/7A Edition 2 — Electrical connections for gas metering equipment
- IGEM/GM/7B Edition 2 — Hazardous area classification for gas metering equipment
- IGEM/GM/8 Part 1 Edition 2 — Non-domestic meter installations: Flow rate exceeding 6 m3h-1 and inlet pressure not exceeding 38 bar Design
- IGEM/GM/8 Part 2 Edition 2 — Locations, housings and compounds
- IGEM/GM/8 Part 3 Edition 2 — Fabrication, installation, testing and commissioning
- IGEM/GM/8 Part 4 Edition 2 — Operation and maintenance
- IGEM/GM/8 Part 5 Edition 2 — Notices and labels.

A12.5 **BSI STANDARDS**

- BS 6173 — Installation and maintenance of gas fired catering appliances for use in all types of catering establishments (2nd and 3rd family gases)
- BS 6891 — Specification for the installation and maintenance of low pressure gas installation pipework of up to 35 mm (R114) on premises
- BS 8446 — Installation and maintenance of open-flued, non-domestic gas-fired laundry appliances.

A12.6 **MISCELLANEOUS**

- DW 172 — Specification for kitchen ventilation systems
- EH 40 — Workplace exposure limits
- GN8 — ACS entry routes and changeover requirements
- TB 118 — Safe electrical isolation of gas appliances.

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