

## Standards of Training in Safe Gas Work

### Metering/ESP Natural Gas Training Specification

This training specification represents the minimum requirement for a new entrant into the gas industry.

#### Off-the-Job Training Requirements

The performance criteria (PC), knowledge and understanding (K&U) requirements for off-the-job training are structured to be consistent with the core competencies found in the ACS metering core units CESP/CMA1.

The PC and K&U are based on that specified in CESP/CMA1 with additional criteria (other than matters of gas safety) to cover situations that may be encountered when working in the downstream gas industry.

The minimum guided learning hours assigned to each unit are detailed below.

Metering/ESP Core Unit	Minimum Guided Learning Hours
Safety, Legislation and Standards	35
Gas Emergency Actions and Procedures	14
Products and Characteristics of Combustion	28
Ventilation for Domestic Gas Burning Appliances	21
Installation of Pipework and Fittings	21
Tightness Testing and Purging	21
Checking and/or Setting Meter Regulators	14
Unsafe Situations, Emergency Notices and Warning Labels	21
Operation and Positioning of Emergency Isolation Controls and Valves	7
Checking and Setting Appliance Burner Pressures and Gas Rates	14
Chimney Standards	14
Chimney Installation, Inspection and Testing	14
Re-establish Existing Gas Supply and Re-light Appliances	14
<b>Total:</b>	<b>238</b>

Optional Units (At least one unit must be selected)	Minimum Guided Learning Hours
Domestic Gas Meters and Regulators	7
Non-Domestic Medium Pressure Regulators	7
Non Domestic Diaphragm Gas Meters	7
Non-Domestic Low Pressure RPD Gas Meters	7
Non-Domestic Medium Pressure RD and Turbine Gas Meters	7
Non Domestic Pipework	14
Non Domestic Tightness Testing and Purging to IGEM/UP/1A	21
Non Domestic Tightness Testing and Purging to IGEM/UP/1	28

## **On-the-Job Work Experience**

Off-the-job training must be complemented by gaining real world experience under the supervision of a qualified Gas Safe registered engineer who will be required to provide witness testimony to the work experience entered into the candidate's portfolio of evidence. This must include (but not be limited to) the following elements:

- Testing for tightness.
- Purging.
- Pipework installation.
- Re-establishing gas supplies and re-lighting appliances.
- Identification of appliance or pipework faults/defects.
- Meter installation relevant to the work categories undertaken.

The portfolio of work experience must provide evidence representative of a minimum of 6 weeks work experience for domestic meters and 10 weeks for non-domestic meters and cover the elements specified above.

Where all the elements of the specified work experience have been met on more than one occasion and this has been endorsed by a suitable quality management system the minimum time element can be reduced to 6 weeks (domestic) and 8 weeks (non-domestic).

If after this time period some elements have not been met, with the consent of the training provider up to 2 elements could be covered in a simulated environment.

# **Safety, Legislation and Standards**

## **Knowledge and Understanding**

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

- K1 Application of the Gas Safety Installation and Use Regulations.
- K2 Asbestos related hazards and application of adequate safety measures.
- K3 Safety precautions when other hazardous materials are encountered whilst working in the downstream gas industry.
- K4 Your responsibilities regarding health, safety and the environment.
- K5 Use of personal protective equipment.
- K6 Information available to Gas Safe registered operatives:
  - Legislative Normative and Informative Document List.
  - Industry Standard Updates.
  - Safety Alerts.
  - Technical Bulletins.

# **Gas Emergency Actions and Procedures**

## **Knowledge and Understanding**

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

- K1 Priorities and actions when dealing with a gas escape.
- K2 Properties of Natural Gas.

# Products and Characteristics of Combustion

## Performance Criteria

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

- P1 Identify correct and incorrect flame pictures.
- P2 Identify signs of incomplete combustion within and in the locality of an appliance installation.

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

- P3 Identify, install and commission different types of CO detectors.

## Knowledge and Understanding

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

- K1 Combustion equations for complete and incomplete combustion.
- K2 Air requirements for complete combustion.
- K3 Causes of incomplete combustion.

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

- K4 CO poisoning and detection.

# Ventilation for Domestic Gas Burning Appliances

## Performance Criteria

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

- P1 Measure the free area of a range of different types of ventilation air vents and grilles.
- P2 Identify correct and incorrect ventilation provision.
- P3 Calculate ventilation requirements for domestic appliances/installations
- P4 Calculate ventilation requirements for non-domestic appliances/installations
- P5 Calculate ventilation requirements for non-domestic laundry applications

## Knowledge and Understanding

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

- K1 Factors affecting ventilation.
- K2 Design and types of ventilation provision.
- K3 Calculating domestic and non-domestic ventilation requirements.
- K4 Ventilation of kitchens in catering establishments
- K5 Ventilation labels and notices.

# Installation of Pipework and Fittings

## Performance Criteria

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

- P1 Joint pipework using soldered, threaded, washer, union, compression and flange fittings.
- P2 De-commission metered gas installations, tee in to existing copper pipework and re-commission installation on completion.
- P3 Demonstrate correct use of temporary continuity bond.
- P4 Identify a range of installation pipework safety defects.

## Knowledge and Understanding

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

- K1 Factors to consider when installing gas installation pipework.
- K2 Copper and mild steel pipe and fittings standards, suitability and use.
- K3 Jointing and cleaning agents for jointing copper, threaded, washered and PE pipework fittings.
- K4 Restrictions on use of union and compression fittings.
- K5 Requirements for supporting and clipping gas installation pipework.
- K6 Pipework protection, sleeving and sheathing requirements.
- K7 Medium pressure gas supplies.



# **Tightness Testing and Purging**

## **Performance Criteria**

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

- P1 Test domestic low pressure gas installations for tightness using air.
- P2 Test domestic low pressure gas installations for tightness using gas.
- P3 Purge domestic low pressure gas installations.
- P4 Trace and repair a gas escape.
- P5 Test existing domestic natural gas installations for tightness with a medium pressure gas supply without a meter inlet valve.
- P6 Test existing domestic natural gas installations for tightness with a medium pressure gas supply with a meter inlet valve.

## **Knowledge and Understanding**

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

- K1 Types of pressure gauge and perceptible movement.
- K2 Application of permissible pressure drops.
- K3 Electronic token meter tamper devices.
- K4 Dealing with let by.
- K5 Actions to take when a smell of gas persists after a satisfactory test or after the ECV has been turned off.
- K6 Calculating installation and purge volumes.
- K7 Testing pipework of diameter > 35 mm or total IV > 0.035 m<sup>3</sup>.
- K8 Testing before working on an installation.

# Checking and/or Setting Meter Regulators

## Performance Criteria

In relation to checking and/or setting domestic meter regulators on natural gas installations, you will need to be able to:

- P1 Measure and record the installation standing pressure.
- P2 Measure and record the installation working pressure.
- P3 Determine if the installation working pressure is correct or incorrect.
- P4 State the actions to take if the working pressure is incorrect.

## Knowledge and Understanding

In relation to checking and/or setting domestic meter regulators on natural gas installations, you will need to know and understand:

- K1 The effects of low and high flow rates on a meter regulator.
- K2 The effects of pressure absorption across primary meter installation.
- K3 The operation of a gas meter regulator.
- K4 Identifying a medium pressure meter/regulator installation.
- K5 How to read a range of pressure gauges
- K6 The Gas Installation and Use Regulations applying to regulators

# **Unsafe Situations, Emergency Notices and Warning Labels**

## **Performance Criteria**

In relation to unsafe situations, emergency notices and warning labels, 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/advisory notices.

## **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 (GIUSR).
- K2 Situations reportable under RIDDOR.
- K3 Correct use of notices and labels.

# **Operation and Positioning of Emergency Isolation Controls and Valves**

## **Performance Criteria**

In relation to the operation and positioning of emergency isolation controls and valves, you will need to be able to:

- P1 Identify incorrectly positioned emergency isolation controls and valves.
- P2 Identify correctly positioned emergency isolation controls and valves.
- P3 Demonstrate dealing with incorrectly positioned emergency isolation controls and valves.
- P4 Identify the correct labels to attached emergency isolation controls and valves.

## **Knowledge and Understanding**

In relation to the operation and positioning of emergency isolation controls and valves, you will need to know and understand:

- K1 Inside and outside meter positions.
- K2 Multi-occupancy building installations
- K3 The Gas Safety Regulations applying to emergency controls

## **Chimney Standards**

### **Knowledge and Understanding:**

In relation to chimney standards you will need to know and understand the requirements for installing gas appliances to the following flue systems:

- K1 Visually inspection of solid fuel chimneys without removal of an appliance.
- K2 Chimneys for individual open flue natural draught appliances.
- K3 Condensing flues.
- K4 Pre-cast flue systems.
- K5 Room sealed natural draught and fanned draught chimney configurations for appliances.
- K6 Non-domestic heating appliance chimney requirements.
- K7 Laundry exhaust duct requirements.

# **Re-establish Existing Gas Supply and Re-light Appliances**

## **Performance Criteria**

In relation to re-establishing an existing domestic 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/plant and identify any unsafe situations.
- P5 Confirm satisfactory operation of user controls.

## **Knowledge and Understanding**

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

- K1 Actions to take when an un-commissioned appliance/plant is identified.
- K2 Actions to take if pipework and appliance(s)/plant are not tested (commissioned) when the gas supply is re-established.
- K3 The Gas Safety Regulations applying to testing of appliances

# Domestic Gas Meters and Regulators

## Performance Criteria

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

- P1 Install a domestic gas meter and regulator.
- P2 Commission a domestic meter installation incorporating a domestic low pressure regulator.
- P3 Commission a domestic meter installation incorporating a domestic medium pressure regulator.

## Knowledge and Understanding

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

- K1 Factors to consider when installing a domestic meter.
- K2 Gas Safety Regulations applying to domestic meters.
- K3 Safety notices and labels.
- K4 Additional types of MP regulators used on MP installations, where tests are required.
- K5 Regulator lock up pressure on MP regulator where an additional LP regulator is installed.
- K6 Pressure at which relief valve will operate on MP regulator when an additional LP regulator is installed.
- K7 Pressure at which SSV will operate when an additional LP regulator is installed
- K8 Types of meter housing suitable for MP meter installations
- K9 Minimum distance of relief valve vent tip from openings into property
- K10 Sealing MP and LP meter regulators
- K11 Terms and acronyms

# **Non-Domestic Medium Pressure Regulators**

## **Performance Criteria**

In relation to non-domestic medium pressure regulators you will need to be able to:

- P1 Prepare to install a non-domestic medium pressure regulator
- P2 Install a non-domestic medium pressure regulator
- P3 Commission a non-domestic medium pressure regulator

## **Knowledge and Understanding**

In relation to non-domestic medium pressure regulators you will need to know and understand:

- K1 Terms and acronyms applying to non-domestic medium pressure regulators
- K2 The use of temporary filters and strainers for commissioning
- K3 Impulse and auxiliary pipework
- K4 Specific requirements for MP fed diaphragm and rotary displacement meter installations
- K5 Commissioning instrumentation
- K6 Handover to a responsible person
- K7 Regulated network standard operating conditions
- K8 Maintenance requirements of regulators and safety controls on meter installations
- K9 Set points and tolerances for twin stream meter installations
- K10 Requirements for hazardous areas surrounding meter installation fittings and components



# Non-Domestic Low Pressure Diaphragm Gas Meters

## Performance Criteria

In relation to non-domestic low pressure diaphragm gas meters you will need to be able to:

- P1 Install a non-domestic diaphragm meter of badged capacity  $>6 \text{ m}^3/\text{h} \leq 40 \text{ m}^3/\text{h}$ .
- P2 Commission a non-domestic diaphragm meter of badged capacity  $>6 \text{ m}^3/\text{h} \leq 40 \text{ m}^3/\text{h}$ .

## Knowledge and Understanding

In relation to non-domestic low pressure diaphragm gas meters you will need to know and understand:

- K1 Badged capacity of a gas meter
- K2 Calculate purge volumes of non- domestic diaphragm meter of badged capacity  $>6 \text{ m}^3/\text{h} \leq 40 \text{ m}^3/\text{h}$
- K3 Provision of Meter Outlet Valves
- K4 Meters supplying mobile dwellings and boats
- K5 ECV/MIV when meter is installed remotely from dwelling
- K6 Requirements for a number of primary meters grouped together and serving a multi-occupancy building
- K7 Criteria for installation of secondary meters
- K8 Safety notices and labels
- K9 Criteria for providing a gas supply to installation pipework and/or appliances for first time
- K10 Application of the GIUSP
- K11 Application of the Gas Safety Installation and Use Regulations

# **Non-Domestic Low Pressure RPD Gas Meters**

## **Performance Criteria**

In relation to non-domestic low pressure RPD gas meters, you will need to be able to:

- P1 Install a non-domestic low pressure RPD gas meter with bypass
- P2 Commission a non-domestic low pressure RPD gas meter with bypass

## **Knowledge and Understanding**

In relation to low pressure RPD gas meters, you will need to know and understand:

- K1 Completion of commissioning reports
- K2 Recognition of meter installations not in scope of current IGEM/GM/6
- K3 Obtaining GT authorisation to connect a meter installation and for the location and design of any purpose-built housing
- K4 Labelling
- K5 Cross bonding for meter installations
- K6 Routine maintenance of meters, filters and strainers
- K7 Recognition of meter faults
- K8 Safety requirements for removal of meters
- K9 Documentation when opening by-pass valves
- K10 Sealing meter regulators
- K11 Provision of meter outlet valve

## **Non-Domestic Medium Pressure RD and Turbine Gas Meters**

### **Performance Criteria**

In relation to non-domestic medium pressure RD and turbine gas meters, you will need to be able to:

- P1 Install a non-domestic medium pressure RD or Turbine gas meter with bypass
- P2 Commission a non-domestic low pressure RD and Turbine gas meter with bypass

### **Knowledge and Understanding**

In relation to non-domestic medium pressure RD and turbine gas meters, you will need to know and understand:

- K1 Completion of commissioning reports
- K2 Gas flow straightening devices
- K3 Positioning of impulse line take offs
- K4 Sizing of impulse take off lines
- K5 Labelling
- K6 Cross bonding
- K7 Routine maintenance of turbine meters
- K8 Filtration for all types of meter of MOP  $\leq 7$  bar
- K9 Routine maintenance of filters and strainers
- K10 Recognition of meter faults
- K11 Safety requirements for removal of meters
- K12 Hydrostatic testing and precautions
- K13 Routine maintenance of relief valves and pressure protection devices
- K14 Determining operating pressure of appliances

# Non-Domestic Pipework

## Performance Criteria

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

- P1 Joint pipework (including semi rigid) using soldered, threaded, washer, union, compression and flange fittings
- P2 Connect PE pipe to steel pipe using appropriate transitional fittings, methods and agents
- P3 Connect thermal expansion bellows between two pieces of steel pipework, supported with restraining and alignment ties
- P4 Join stainless steel pipe/copper pipe with appropriate pressed joints and tools
- P5 Install bonding strap or permanent continuity bond correctly across an appropriate flange/adaptor or semi rigid coupling
- P6 Select correct isolation valves to MIs and for application
- P7 Identify a range of non-domestic installation pipework safety defects

## Knowledge and Understanding

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

- K1 Factors to consider when installing gas installation pipework.

# **Tightness Testing and Purging to IGEM/UP/1A**

## **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) Install a non-domestic medium pressure regulator
- 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)

## **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 Terms and acronyms applying to non-domestic medium pressure regulators
- K7 Requirements for hazardous areas surrounding meter installation fittings and components
- K8 Safety and environmental requirements to be considered prior to purging
- K9 Procedures to adopt when purging into an internal area
- K10 Purging branched pipework
- K11 Purging replacement meters
- K12 Purging procedures for taking pipework out of service
- K13 Purging with air through compressed air cylinders
- K14 Planning and procedures for carrying out a purge
- K15 Procedures when required flow rate of purge is not achieved
- K16 Identification of purge gas cylinders used to carry out purge

# **Tightness Testing and Purging to IGEM/UP/1**

## **Performance Criteria**

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

- P1 Prepare for pneumatic strength testing – new installation
- P2 Carry out pneumatic strength test – new installation
- P3 Prepare for tightness testing – new or extension installations
- P4 Carry out tightness test – new or extension existing installations using air
- P5 Prepare for tightness testing – existing installations using gas
- P6 Carry out tightness test – existing installations using gas
- P7 Prepare for direct purging
- P8 Determine purge volume, minimum purge rate, purge time
- P9 Directly purge from air to gas
- P10 Directly purge from gas to air – de-commissioning

## **Knowledge and Understanding**

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

- K1 Acronyms and symbols
- K2 Determination of MOP and MIP
- K3 Strength testing – pneumatic and hydrostatic
- K4 Strength testing PE pipework
- K5 Tightness testing PE pipework where TTP exceeds 1 bar (creep factors)
- K6 Identifying volumes of differing meter types
- K7 Dealing with installations containing sections at differing MOP
- K8 Extended tightness testing
- K9 Awareness of basic categories of pipework locations for existing installations
- K10 By-passing system components during tightness test
- K11 Effects of variations of temperature and atmospheric pressure
- K12 Combining strength testing and tightness testing
- K13 Safety and environmental considerations prior to purging
- K14 Venting or flaring purge
- K15 Procedures for purging branched pipework
- K16 Procedures for purging large replacement meters
- K17 Purging when taking large pipework out of service
- K18 Purging with air through compressed air cylinders
- K19 Planning and procedures for carrying out purge
- K20 Procedures when required flow rate of purge is not achieved
- K21 Identifying requirements of purge gas cylinders used to carry out purge
- K22 Purging small volumes of pipework and appliance trains directly into well ventilated internal areas without use of a purge hose and vent stack