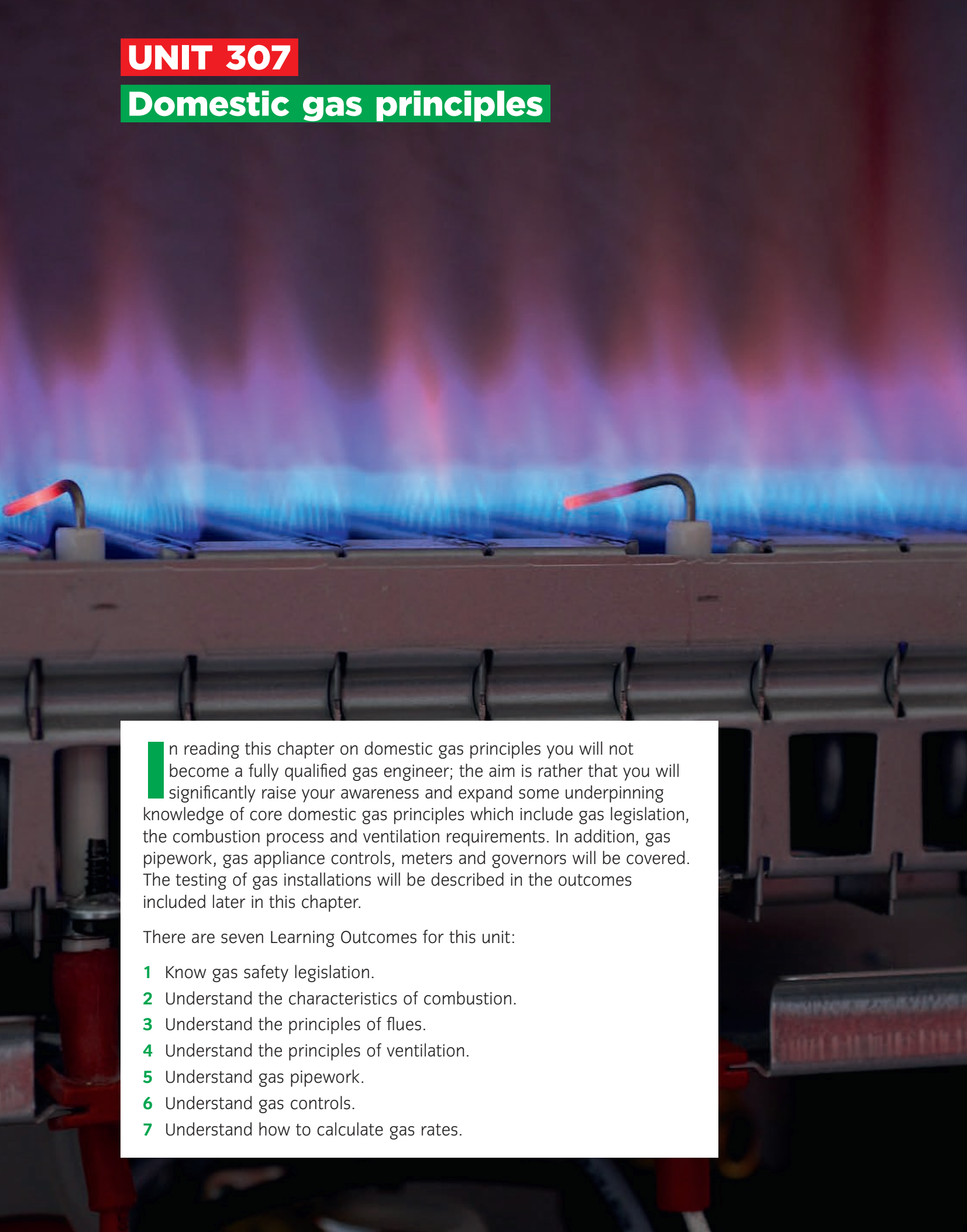


UNIT 307

Domestic gas principles



In reading this chapter on domestic gas principles you will not become a fully qualified gas engineer; the aim is rather that you will significantly raise your awareness and expand some underpinning knowledge of core domestic gas principles which include gas legislation, the combustion process and ventilation requirements. In addition, gas pipework, gas appliance controls, meters and governors will be covered. The testing of gas installations will be described in the outcomes included later in this chapter.

There are seven Learning Outcomes for this unit:

- 1 Know gas safety legislation.
- 2 Understand the characteristics of combustion.
- 3 Understand the principles of flues.
- 4 Understand the principles of ventilation.
- 5 Understand gas pipework.
- 6 Understand gas controls.
- 7 Understand how to calculate gas rates.

Gas safety legislation (LO1)

There are six assessment criteria for this outcome:

- 1 State hierarchical responsibilities for the gas industry in Great Britain, Northern Ireland, the Isle of Man and Guernsey.
- 2 State the date the Gas Safety (Installation and Use Regulations) 1998 came into force.
- 3 State the competent persons citation.
- 4 Describe the three families of gas.
- 5 Describe the meaning of the term 'gas fitting'.
- 6 Define what constitutes work on a gas fitting.

Gas safety organisations



A gas holder overlooking a cricket match

In the past, qualified gas engineers were requested to be members of an organisation called CORGI. This organisation was originally established in 1970 and operated a voluntary register of gas installers. The letters of the name CORGI stood for Confederation for the Registration of Gas Installers. The organisation was set up because of a gas explosion in 1968 which contributed to the partial collapse of a tower block in London called Ronan Point. When the Gas Safety (Installation and Use) Regulations were introduced on 31 October 1998, they stated that registration with CORGI was a legal requirement for any person or company that carried out work in relation to a gas fitting – Regulation 3(3).

CO

Chemical formula of carbon monoxide.

Ventilation

The process of supplying air to and removing air from a room, internal space, appliance, compartment or garage.

Even though gas explosions do occur, the greatest danger to the public when using gas is from carbon monoxide (**CO**) and, as a result, much of the concern of gas safety legislation focuses on preventing appliances producing excessive amounts of CO because of inadequate **ventilation**, which can affect the complete combustion of gases. In addition the regulations also focus on the safe dispersal of products of combustion by effective flue systems.

On 1 April 2009 the **Gas Safe** Register became the new official gas registration body for the United Kingdom. On 1 April 2010 it became the official register for the Isle of Man and Guernsey. The Health and Safety Authority for each area requires by law that all gas engineers must be on the Gas Safe Register.

The Gas Safe Register aims to improve and maintain gas safety to the highest standards. The Gas Safe Register will make sure that all gas engineers on the Gas Safe Register endeavour to protect the public from any unsafe gas work through the national investigations team which tracks down anyone working illegally on gas work. It also carries out regular inspections of Gas Safe-registered engineers and offers advice and guidance to installers as well as assessing the

quality of individual work. Gas Safe also has a goal to educate consumers and help raise their awareness of gas safety. In addition it investigates reports of unsafe gas work.

It produces a magazine called the *Registered Gas Engineer* which provides excellent technical articles and updates for registered installers. It also highlights bad practice and illegal activities that have been identified by its own investigation team, and examples of court cases are published. There are also photographs supplied by engineers who encounter illegal and dangerous examples of work carried out by unqualified persons, which could put the public at risk.

Gas Safety (Installation and Use) Regulations 1998 (GSIUR)

The Gas Regulations lie at the heart of all decisions that engineers will make when working on gas appliances and on pipework installations, and should be referred to throughout their working life. Everything comes back down to the regulations and, wherever possible, references will be made here to help contextualise the regulations within every-day working experiences and encounters of an engineer.

This outcome deals with the Gas Regulations and it is advisable to have a copy of the Gas Regulations to hand when reading this section. However, the breakdown in the brief description of each regulation is given as follows.

‘The Gas Safety Installation and Use Regulations (GSIUR) 1998 deals with the safe installation, maintenance and use of gas systems, which include fittings, appliances and flues mainly in domestic and commercial premises. They generally apply to any gas as defined in the Gas Act 1986. The requirements include both natural gas and liquid petroleum gas subject to regulations and place responsibilities on a wide range of people including those who install, service, maintain or repair gas appliances as well as other gas fittings. Suppliers and certain landlords also come under the scope of the regulations.

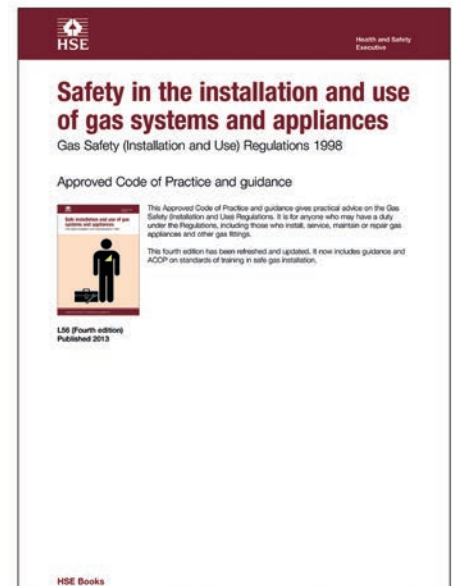
The enforcing authority for the GSIUR and other Gas Regulations in Great Britain, Northern Ireland, the Isle of Man and Guernsey is the Health and Safety Executive (the **HSE**).’

Background

The approved code of practice (ACOP) and guidance gives the user practical advice under the GSIUR. They have been drawn up in consultation with the Confederation of British Industry, the Trade Union Congress, local authorities, government departments, consumer organisations and the HSE. In the GSIUR publication, each

Gas Safe

Gas Safe is the official gas registration body for the United Kingdom, Isle of Man and Guernsey approved by the HSE.



GSIUR book cover

HSE

HSE (Health and Safety Executive) is the enforcing body for the GSIUR.



SmartScreen Unit 307

Handout 1

of the regulations is followed by the ACOP and then by guidance. The regulations are written in italic type, the ACOP in bold and any accompanying guidance in normal type.

The following summary will help give a synopsis of each of the regulations but the Gas Regulations (GSIUR 1998) must be referred to in detail throughout to give the reader a more thorough understanding of each of the regulations and to help them assess their particular application to gas work.

Summary of the regulations

Regulation 1 – Gives the date the regulations came into force which was:

31 October 1998

Regulation 2 – Defines important terms used in the regulations:

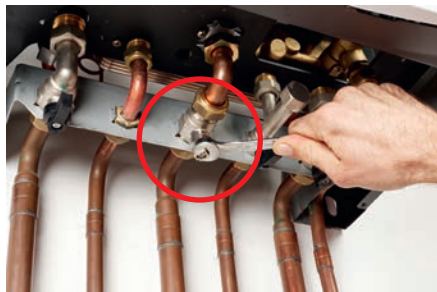
There are many important terms such as ‘disconnecting and reconnecting a gas fitting’. (Only HSE-approved engineers should carry out this task.) For a qualified gas engineer the term ‘work’ in relation to a gas fitting includes any of the following activities:

Installing or reconnecting the fitting, maintaining, servicing, permanently adjusting, disconnecting, repairing, altering or renewing the fitting or purging it of gas. Where the fitting is not readily removable, changing its position and removing the fitting is considered work. However, there is an exclusion with regard to cookers inasmuch as a user can connect and disconnect the appliance hose connection from the self-sealing bayonet fitting in order to clean behind the appliance.

The definition of the gas fitting as stated by IGEM/G/4 Edition 2 is:

‘Gas pipework, valves (other than the emergency control valve – **ECV**), regulators, meters, fittings, apparatus and appliances designed for use by consumers of gas for heating, lighting, cooking or other purposes for which gas can be used but it does not mean:

- Any part of the distribution main or service pipe
- Any part of the pipeline **upstream** of a distribution main or service pipe
- A gas storage vessel
- A gas cylinder or cartridge designed to be disposed of when empty.’



Adjusting a gas pipe fitting

KEY POINT

Removing or adjusting fittings on gas appliances is considered as work according to the GSIUR.

KEY POINT

Disconnecting a cooker hose to clean behind the appliance does not constitute work according to the GSIUR.

ECV

ECV is an emergency control valve used for the isolation of gas in an installation.

Upstream

This means before a given point which could for example be a gas meter. Therefore if an isolation valve were located upstream of a meter, it would mean it was situated on the pipework before the meter inlet.

The same document continues, stating that:

‘The definition of work in relation to a gas fitting is any of the following activities carried out by any person whether they are an employee or not.

- Installing a fitting
- Maintaining, servicing, permanently adjusting, repairing, altering or renewing a fitting, or purging it of gas
- Changing the position of the fitting when it is not readily removable
- Removing a fitting.’

Regulation 3 – Requires that any gas engineer should be Gas Safe-registered.

Previously engineers and operatives had to be CORGI-registered but Gas Safe is the new organisation that registers gas engineers. Regulation 3(3) states that gas fitters are required to be a class of persons approved by the Health and Safety Executive to carry out gas work and be on the Gas Safe Register. In any event, people working on gas fittings must be competent to do so and this depends on a combination of training and experience. Needless to say, this regulation mentions that it is an offence for any person to pretend to be a registered member, ie the required class of person to carry out gas work.

The *Registered Gas Engineer* often highlights legal cases where people have falsified documents to claim they are Gas Safe-registered. The discovery of such offences often comes about when very poor and incompetent workmanship results in the public being endangered by exposure to the products of combustion, gas escapes and even fire.

Regulation 4 – States that it is the duty of an employer or self-employed person requiring work to be done on a gas fitting to take reasonable steps to ensure that any person carrying out the work on their behalf is Gas Safe-registered. As previously mentioned, this means they are a class of person approved by the HSE and therefore deemed to be competent to carry out any such work.

Regulation 5 – Requires that installers check that any fitting is suitable for the purpose for which it is to be used, which means every part of it is of good construction, made of a sound material and of adequate strength and size to secure safe use for the gas it is designed to carry. The use of lead and non-metallic fittings is prohibited in new gas work installations although there is still some lead work in existence, especially at meter locations and, providing this pipework is still in good condition and shows no signs of damage, then it can be connected onto.



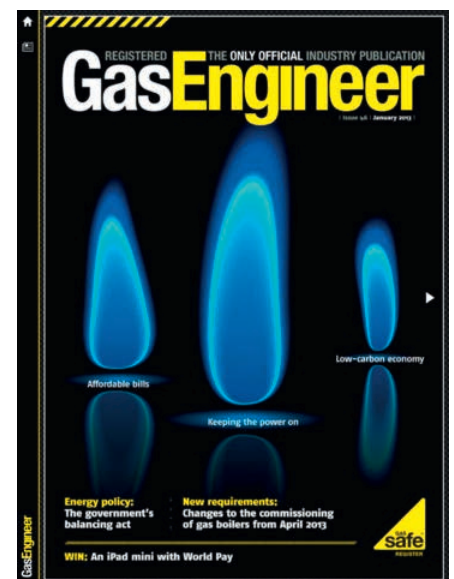
This logo can be seen on vehicles of Gas Safe engineers (Gas Safe Register is a registered trademark of the HSE and is used under licence)



Gas Safe Register card

KEY POINT

No person shall carry out any work in relation to the gas fitting or gas storage vessel unless they are competent to do so – GSIUR Reg 3(1).





Plastic push-fit cap which is not fit for purpose on gas installations and is RIDDOR reportable



Documents being checked



Lead pipe on the outlet of a meter

This regulation also emphasises that any work carried out on a gas fitting or storage vessel should comply with the appropriate standards and be carried out in a manner that does not endanger people. It emphasises that, apart from connectors to readily removable appliances such as Bunsen burners, non-metallic pipe should only be used within buildings if it is sheathed in metal to minimise the risk of gas escaping should that pipe should ever fail.

An installer must therefore ensure that any fitting installed is of a good construction, made of a sound material and of an adequate strength and size.

Regulation 6 – States measures to be taken by any engineer working on a gas fitting against the risk of gas release and the requirement to seal any gas ways and then retest for gas tightness once the work is complete. The regulation mentions the danger of searching for gas escapes with naked flames and the associated risks of ignition and explosion.

Engineers must ensure that any gas that could be released does not constitute a danger to anyone. In addition, the regulation emphasises the risks associated with smoking or sources of ignition if a gas way is exposed.

Regulation 7 – Requires any gas fittings to be protected from damage including corrosion and from any blockage by a foreign body, for example dirt or dust.



Copper capillary fittings, commonly used on domestic gas pipework



Open-ended copper gas pipe which is classified as immediately dangerous (ID) and RIDDOR reportable to the HSE



Pipework should be properly and effectively supported and installed to avoid any undue risk of damage

Regulation 8 – Prohibits any alteration to the premises by which a gas fitting or storage vessel no longer complies with the regulations. This also applies to work carried out on a gas fitting or any associated flue or ventilation systems which could result in danger to any persons.

Regulation 9 – Requires that the emergency control is provided when gas is first supplied to premises. It also requires that a notice is posted adjacent to the control whenever a control itself is not next to the meter. The notice must describe the safety procedure in the event of a gas escape.

Regulation 10 – Requires that electrical continuity is maintained during any work on a gas fitting to avoid any danger.



It is important to ensure that bonding clips are in good condition and the cross-sectional area of the bonding cable is 10mm² minimum

The usual method of connecting bonding clips is upstream first, then **downstream**.

Regulations 11–12 – Requires that gas meters are installed in such a way so as not to impede the escape of people from a premises. It also specifies requirements for the construction of certain gas meters. There are requirements to avoid electrical hazards and facilitate inspection and maintenance for pipe connections, gas **tightness testing** and purging of meters.

Downstream

This means after a given point which could for example be a gas meter. Therefore if an isolation valve were located downstream of a meter, it would mean it was situated on the pipework after the meter inlet.

Tightness test

A test to ascertain if a gas installation has any leaks.