
British Standard

Gas burning appliances

Part 5. Specification for gas burning instantaneous
water heaters with automatic output variation
(2nd and 3rd family gases)

Appareils utilisant les combustibles gazeux — Spécifications

Partie 5. Chauffe-eau instantanés à gaz avec variateur automatique de débit

Gasgeräte

Teil 5. Durchlauf-Wasserheizer mit selbsttätiger Regelung des Gasdurchflusses

Foreword

This Part of BS 5386 has been prepared under the direction of the Gas Standards Committee.

A European standard for gas burning instantaneous water heaters with automatic output variation is in course of preparation by a European Committee for Standardization (CEN) committee but, by agreement of that committee, this Part of BS 5386 has been prepared to meet an immediate demand for such a standard in the UK. When the work in Europe eventually results in a standard being accepted by CEN, this Part of BS 5386 will be withdrawn.

Because of the impending European Standard and in the spirit of the CEN Internal Regulations, this Part of BS 5386 has been written in the format of and, where possible, adopts the requirements of the draft European Standard. The European and hence the British Standard have been developed from the specification 'Gas burning appliances for instantaneous production of hot water for domestic use' first accepted by CEN as EN 26 and subsequently published as BS 5386 : Part 1.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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Specification

1 General

1.1 Scope and field of application

This Part of BS 5386 specifies requirements for the safety, fitness for purpose, efficient use of energy, classification and marking of gas burning instantaneous water heaters where the heating of the water depends directly upon the water flow. It also describes appropriate test methods.

This Part of BS 5386 applies to instantaneous water heaters:

- (a) with automatic output variation as defined in 1.2.1.1;
- (b) that have a rated heat input not exceeding 60 kW based on gross calorific value;
- (c) that are capable of operating on one or more of the 2nd and 3rd family gases specified in 1.3.1.1 at the corresponding inlet pressures specified in 4.0.4, and belong to one of the categories specified in 1.3.1.2;
- (d) that employ a means of evacuating the combustion products that is defined in 1.3.2;
- (e) that have a heat-sensitive flame supervision device and a permanent pilot.

This Part of BS 5386 does not apply to instantaneous water heaters:

- (a) within the scope of BS 5386 : Part 1 and BS 5386 : Part 2, i.e. appliances that are intended to operate only at the nominal useful output, as defined in those standards, or, where a manually operated gas tap specifically designed for that purpose is provided on the appliance, at lower useful outputs also;
- (b) of type A, i.e. flueless (see 1.3.2);
- (c) intended exclusively for use with showers without mixer valves;
- (d) designed to provide boiling water;
- (e) incorporating a fan to assist combustion or evacuation of the combustion products;
- (f) having full sequence automatic ignition; i.e. a system that, in response to an external demand, brings the appliance into operation from a completely shutdown condition without manual intervention;
- (g) that make use of the latent heat of condensation of the water vapour in the combustion products;
- (h) designed to be connected to a system providing mechanical extraction of the combustion products;
- (i) providing space heating as well as hot water for sanitary uses;
- (j) fitted with a device intended to shut off the gas supply to the burner if the room atmosphere becomes seriously vitiated.

1.2 Definitions

1.2.1 Automatic output variation

1.2.1.1 instantaneous water heater with automatic output variation. An instantaneous water heater where the gas rate, and hence the heat output, is varied automatically within a designed range by the single action of operating the water delivery tap.

NOTE. Two distinct methods of automatic control are recognized, see 1.2.1.2 and 1.2.1.3.

1.2.1.2 thermostatic appliance. An appliance where the gas rate is varied by a thermostatic device controlling the water temperature.

1.2.1.3 proportioning appliance. An appliance where the gas rate is varied proportionally to the water rate.

1.2.2 Gas characteristics

1.2.2.1 calorific value (CV). The quantity of heat produced by the complete combustion, at a constant pressure of 1013 mbar*, of unit volume or mass of gas, the constituents of the combustible mixture being initially at 15 °C, 1013 mbar and the combustion products being brought back to the same conditions.

In practice the water vapour is not usually condensed, in which case the latent heat in the combustion products is not recovered. This leads to a distinction between two types of calorific value (at constant pressure):

- (a) gross calorific value : the water produced by combustion is assumed to be condensed;
- (b) net calorific value : the water produced by combustion is assumed to be retained in the vapour state.

The calorific values are expressed in units of heat, either:

- (a) per unit volume of dry gas taken at 15 °C, 1013 mbar; it is then expressed in MJ/m³; or
- (b) per unit mass of dry gas; it is then expressed in MJ/kg.

1.2.2.2 relative density. The ratio of the masses of equal volumes of gas and air (dry, at 0 °C and 1013 mbar).

1.2.2.3 Wobbe number. The ratio of the calorific value of a gas to the square root of the relative density of the same gas.

The Wobbe number is said to be gross or net according to whether the calorific value considered is the gross or net calorific value. It is expressed in the same units as calorific value.

1.2.2.4 gas supply pressure: test pressure. The relative static pressure measured at the gas inlet connection of the appliance, with the appliance in operation.

1.2.2.5 burner pressure. The relative static pressure measured at the downstream pressure test point of the appliance, with the appliance in operation.

*1 mbar = 100 N/m² = 100 Pa.

1.2.3 Appliance construction

1.2.3.1 Gas circuit

1.2.3.1.1 gas circuit. The part of an appliance conveying or containing the gas between the gas inlet connection and the burner(s).

NOTE. The circuit may comprise several components, e.g. restrictors, gas rate adjusters, gas taps, injectors.

1.2.3.1.2 mechanical joint. A connection device assuring soundness in an assembly of several parts, generally of metal, e.g. cone seated joint, O-ring joint, flat faced washered joint.

1.2.3.1.3 restrictor. A device with an orifice, which is placed in the path of the gas flow between the appliance inlet connection and the burner to create a pressure drop and thus reduce the gas pressure at the burner to a predetermined value for a given supply pressure and rate.

1.2.3.1.4 gas rate adjuster. A component that allows the installer to set the gas rate to a burner at a predetermined value according to the supply conditions.

NOTE 1. The adjustment may be progressive (screw adjuster) or discontinuous (changing restrictors).

NOTE 2. The adjuster of an adjustable governor is regarded as a gas rate adjuster.

1.2.3.1.5 gas tap. A component allowing manual interruption of the gas supply to the burner and/or pilot.

1.2.3.1.6 injector. A component that admits the gas into an aerated burner.

1.2.3.2 Burner

1.2.3.2.1 main burner. A burner that assures the thermal function of an appliance.

1.2.3.2.2 ignition device. A device that ignites one or more burners. Examples of such a device are as follows:

ignition burner (pilot). A small burner, usually called a pilot, that ignites the main burner by means of a flame. When this pilot burner also actuates a flame detection device, it is called a 'safety pilot'.

auxiliary ignition device. A device that ignites the ignition burner, e.g. spark igniter.

1.2.3.3 Combustion products circuit

1.2.3.3.1 flue outlet. The part of a type B appliance (see 1.3.2) that connects with a flue to evacuate the combustion products.

1.2.3.3.2 draught diverter. A device placed in the combustion products circuit of a type B appliance to reduce the influence of flue-pull and to prevent that of down-draught on the burner performance and combustion.

1.2.3.3.3 appliance with a sealed combustion circuit (room-sealed appliance). An appliance in which the combustion circuit (air intake, combustion chamber, heat exchanger, products outlet) is sealed in relation to the room in which the appliance is installed.

The appliance is connected with the air outside the building either:

- (a) directly by means of a balanced flue (type C₁ appliance, see 1.3.2); or
- (b) indirectly by means of a common duct supplying the combustion air and evacuating the products of combustion (Se-duct) (type C₂ appliance, see 1.3.2).

1.2.3.4 Water circuit

1.2.3.4.1 automatic valve. A device that controls the gas supply to the main burner in response to water flow through the appliance.

1.2.3.4.2 water governor. A device, fitted upstream of the automatic valve, that provides a controlled water pressure or rate independent of fluctuations in the supply pressure.

1.2.3.4.3 water rate adjuster. A device that allows the installer to preset the water rate to a predetermined value according to supply conditions.

1.2.3.4.4 water supply pressure. The relative static pressure measured at the water inlet connection of the appliance with the appliance in operation.

1.2.3.4.5 temperature selector. A manually operated device that allows the user to vary the delivered water temperature.

1.2.3.4.6 summer-winter switch. A device on a proportioning appliance that enables the user to compensate for the seasonal difference in the cold water temperature.

1.2.3.5 auxiliary equipment. The accessory devices of an appliance, e.g. taps, flame supervision and ignition devices, governors, etc.

1.2.3.5.1 gas governor. A device that provides a sensibly constant pressure or gas rate downstream when the upstream pressure is variable.

1.2.3.5.2 flame supervision device. A device, incorporating a sensing element, that permits or prevents gas flow to a burner according to the presence or absence of the flame that activates the sensing element.

1.2.3.5.3 control knob. A component designed to be moved by hand in order to operate an appliance control (tap, thermostat, etc).

1.2.4 Immobilizing an adjuster or a control

1.2.4.1 setting an adjuster. If, after the manufacturer or installer has adjusted an adjuster, it is immobilized in this position by some means such as a screw etc., it is said that the adjuster is 'set' in this position.

1.2.4.2 sealing an adjuster. If the setting of an adjuster is achieved by a material such that any attempt to change this setting breaks the sealing material and makes the interference with the adjuster apparent, then the adjuster is said to be sealed in its adjustment position.

NOTE 1. A factory sealed adjuster is considered to be non-existent.

NOTE 2. A governor is considered to be non-existent if it has been factory sealed in the fully opened position.

1.2.4.3 putting a control out of service. A control (of temperature, pressure, etc.) is said to be 'put out of service' if it is put out of action and sealed in this position. The appliance then functions as if this device has been removed.

1.2.5 Appliance performance

1.2.5.1 Gas rates

1.2.5.1.1 volumetric rate. The volume of gas consumed by the appliance in unit time, the gas being dry and measured at a temperature of 15 °C and a pressure of 1013 mbar. Practical unit: m³/h

1.2.5.1.2 mass rate. The mass of gas consumed by the appliance in unit time. Practical units: kg/h and, if necessary, g/h.

1.2.5.1.3 corrected gas rate. The gas rate that would be obtained if the appliance were supplied with reference gas at the normal supply pressure and a temperature of 15 °C, with an ambient atmospheric pressure of 1013 mbar.

1.2.5.2 Input

1.2.5.2.1 heat input. The product of the volumetric or mass rate and the calorific value (gross or net) of the gas brought to the same reference conditions. Practical unit: kW

1.2.5.2.2 rated heat input. The maximum of the manufacturer's claimed range of heat input (see 5.1).

1.2.5.2.3 minimum heat input. The minimum of the range of heat input over which the appliance is claimed by the manufacturer to operate with automatic output variation, i.e. to provide water outlet temperatures that comply with 3.4.5.

1.2.5.3 Output

1.2.5.3.1 useful output. The quantity of heat transmitted to the water in unit time during operation of the appliance. Practical unit: kW

1.2.5.3.2 rated useful output. The useful output that the manufacturer claims (see 5.1) is obtained when the appliance is operated at the rated heat input and nominal water rate.

1.2.5.4 nominal water rate. The water rate corresponding to a temperature rise of 40 °C when the appliance is operated at the rated heat input.

1.2.5.5 efficiency. The ratio of the useful output to the heat input, these two quantities being expressed in the same units.

1.2.5.6 Gas combustion

1.2.5.6.1 flame stability. State of the flames resting in a stable manner on the burner ports or the flame contact area provided by the design with no danger of flame lift or light-back.

1.2.5.6.2 flame lift. The total or partial lifting of the base of the flame from the burner port or the flame contact area provided by the design.

1.2.5.6.3 light-back. The entry of a flame into the body of a burner.

1.2.5.6.4 light-back at the injector. Ignition of the gas at the injector, either as a result of the flame entering the burner or by the propagation of a flame around the outside of the burner.

1.2.5.6.5 sooting. Deposits of soot on the surfaces or parts of the appliance in contact with the combustion products or with the flame.

1.2.5.6.6 yellow tipping. The appearance of yellow colouring at the top of the blue cone of an aerated flame.

1.2.5.6.7 aerated flame, blue flame. The flame obtained by the combustion of gas previously mixed with air.

1.2.5.6.8 non-aerated flame, diffuse flame. The flame obtained by the combustion of gas when none of the required air has been previously mixed with the gas.

1.2.5.7 Flame supervision times

1.2.5.7.1 ignition opening time. The time interval between the ignition of the supervised flame and the instant at which the force generated is sufficient to keep the valve open.

1.2.5.7.2 extinction safety time. The time interval between the extinction of the supervised flame and the closing of the gas supply to the main burner and to the ignition burner (total control).

1.3 Classification of appliances

Appliances are classified according to the:

- (a) nature of the gases used (categories);
- (b) method of evacuating the combustion products (types);
- (c) supply water pressure.

1.3.1 Nature of the gases used (categories)

1.3.1.1 Classification of gases. Gases likely to be used are classified into two families according to the value of their Wobbe number.

(a) *2nd family* (natural gas of group H). Wobbe number between:

- (i) 45.6 MJ/m³ and 55.0 MJ/m³ based on gross CV;
- (ii) 41.1 MJ/m³ and 49.7 MJ/m³ based on net CV.

(b) *3rd family* (liquefied petroleum gases (LPG)). Wobbe number between:

- (i) 73.4 MJ/m³ and 87.6 MJ/m³ based on gross CV;
- (ii) 68.3 MJ/m³ and 80.9 MJ/m³ based on net CV.

NOTE. Two distinct types of 3rd family gas are distributed in the UK. These are described in BS 4250 : Part 1 as commercial propane (Wobbe number approximately 77.5 MJ/m³ (gross)) and commercial butane (Wobbe number approximately 85.8 MJ/m³ (gross)).

1.3.1.2 Categories of appliance. Appliances are classified in categories according to the gases that they are designed to use.

1.3.1.2.1 Categories I. Appliances designed exclusively to use gases of a single family and possibly only gases of a single group:

(a) *Appliances designed for use with 2nd family gases*

category I_{2H} : An appliance for use with gases in group H of the 2nd family only.

(b) *Appliances designed for use with 3rd family gases*

category I_3 : An appliance capable of using all 3rd family gases.

category I_{3P} : An appliance designed for use with propane only.

1.3.1.2.2 Categories II. Appliances designed to use gases of two families:

category II_{2H3} : An appliance capable of using gases in group H of the 2nd family and 3rd family gases.

category II_{2H3P} : An appliance capable of using gases in group H of the 2nd family and propane.

1.3.2 Method of products evacuation (types). Appliances are classified into several types, according to the method of evacuating the combustion products and admitting the combustion air.

Type A: An appliance not connected to a flue or other device for evacuating the combustion products.

NOTE. This type of appliance is not covered by this Part of BS 5386.

Type B: An appliance designed to be connected to an open flue system, its combustion air being drawn from the room or space in which it is installed.

Type C: An appliance with a sealed combustion circuit (room-sealed appliance), see **1.2.3.3.3**.

Type C_1 , (balanced flue): A room-sealed appliance connected to a special device to admit fresh air to the burner and discharge the combustion products to the outside air through ducts that are either concentric or adjacent.

Type C_2 , (Se-duct): A room-sealed appliance connected to a duct that is used both for supplying the combustion air and for evacuating the combustion products.

1.3.3 Water pressure. Appliances are classified according to the water pressure in the appliance as in **1.3.3.1** to **1.3.3.4**.

1.3.3.1 Inlet control appliance. The delivery tap is placed upstream of the appliance which is designed to deliver a free flow of water.

1.3.3.2 Low pressure appliance. The delivery tap is placed downstream of the appliance which is designed to be connected to a water supply at a pressure not exceeding 2.5 bar.

1.3.3.3 Normal pressure appliance. The delivery tap is placed downstream of the appliance which is designed to be connected to a water supply at a pressure not exceeding 10 bar.

1.3.3.4 High pressure appliance. The delivery tap is placed downstream of the appliance which is designed to be connected to a water supply at a pressure not exceeding 13 bar.

2 Constructional requirements

2.1 General

2.1.1 Conversion to different gases. The operations that are essential or allowable when an appliance, in accordance with its category as defined in **1.3.1.2**, is converted from a gas of one family to a gas of the other family, are given in table 1.

These operations shall be possible without having to disconnect the appliance from the gas or water supplies or the flue system.

Table 1. Conversion operations

Conversion from gas	Conversion to gas	
	2H	3 or 3P
2H	—	a-b-c-d
3 or 3P	b-c-d-e	—

NOTE. The essential operation is:

(a) putting the governor and any pilot gas rate adjusters out of service.

The allowable operations are:

(b) change of injectors or restrictors for the burner and pilot;

(c) complete change of the pilot or of some of its parts;

(d) change of the automatic valve;

(e) putting the governor and pilot gas rate adjusters, if any, back into service.

2.1.2 Materials and method of construction. The quality and thickness of the materials used in the construction of the appliance, and the method of assembling the various parts, shall be such that the safety, constructional and performance characteristics do not alter significantly during a reasonable life under normal conditions of installation and use.

In particular, when the appliance is installed according to the instructions and accepted practice, all components shall withstand the mechanical, chemical and thermal conditions to which they may be submitted during service.

Sheet metal parts not made of corrosion-resistant material shall be coated with an effective protection against corrosion.

2.1.3 Design. The appliance shall be designed so that condensate from the products of combustion cannot drip on to the floor.

2.1.4 Ease of use and servicing. All markings intended for the user shall be visible and shall be legible and indelible. In particular, gas taps and equivalent devices shall be marked with the following symbols, as appropriate:

- Off:  a full disc
- Full rate:  a stylized large flame
- Pilot:  a stylized small flame

Any special button that has to be operated to cause ignition shall be marked with a stylized spark () or stylized star (★); however, where a single tap position provides the pilot and causes its ignition, then a spark, star or small flame symbol shall be used.

Parts which are required to be inspected or removed for servicing shall be easily accessible, after removing the case if necessary. Such parts shall include the automatic valve.

Removable parts shall be designed or marked so that they are difficult to reassemble incorrectly. In particular, the combustion chamber shall remain sound after it has been reassembled following servicing or cleaning.

It shall be possible to clean the burner, combustion chamber and surfaces which come into contact with combustion products without difficulty, by mechanical or chemical means, in accordance with the manufacturer's instructions. This shall not involve disconnection of the appliance from the gas or water supplies, or the use of other than commercially obtainable tools.

An appliance intended to be wall-mounted shall be provided with a simple means of mounting it securely on the wall. Removable parts, for example the burner and the heating body, shall be dismantlable for servicing, using ordinary tools, such as a screwdriver or spanner, without removing the complete appliance from the wall.

2.1.5 Gas and water connections

2.1.5.1 Gas connections. The gas inlet connection shall permit a rigid connection to be made.

If the inlet connection is threaded, the threads shall be taper threads complying with BS 21.

If the inlet connection is a plain copper tube, this shall terminate in a straight section at least 50 mm long that complies with BS 2871 : Part 1. If the inlet connection terminates in a compression fitting, this fitting shall be suitable for the direct connection of copper tube complying with BS 2871 : Part 1.

2.1.5.2 External water connections. If the external water connections are threaded, the threads shall be either taper threads complying with BS 21 or parallel threads complying with BS 2779.

If the external water connections are plain copper tubes, these shall terminate in a straight section at least 50 mm long that complies with BS 2871 : Part 1. If the external

water connections each terminate in a compression fitting, these fittings shall be suitable for the direct connection of copper tube complying with BS 2871 : Part 1.

If an appliance is fitted with both hot and cold water delivery taps, the hot water tap (marked in red) shall be on the left and the cold water tap (marked in blue) on the right of the appliance when viewed from the front.

2.1.5.3 Supplementary requirements for gas and water connections. The connecting points shall be sufficiently far from the wall and from each other to allow easy use of an ordinary tool.

2.1.6 Soundness

2.1.6.1 Soundness of the gas circuit. Holes for screws, studs, etc., intended for the assembly of components shall not open into gasways, nor shall it be possible for water to enter the gasways. The wall thickness between holes and gasways shall be at least 1 mm.

The soundness of components and assemblies making up the gas circuit and likely to be dismantled for routine maintenance in situ shall be achieved by means of mechanical joints, i.e. joints not requiring the use of any sealing material such as tape, paste or liquid.

However, for permanent assemblies it is permissible for the sealing materials previously mentioned to be used, provided that they remain effective under normal conditions of appliance use.

The mechanical strength of gas circuit assemblies shall not be achieved by means of solder that after application melts below 450 °C or by means of adhesives.

2.1.6.2 Soundness of the combustion circuit

2.1.6.2.1 Type B appliances. Any means used to achieve soundness of the combustion circuit up to the draught diverter shall be such that it does not deteriorate under normal conditions of use and maintenance.

In particular, the soundness of parts likely to be removed in the course of routine maintenance shall be achieved by mechanical means.

2.1.6.2.2 Type C appliances. The soundness of the heating body and of the connection of the appliance to the combustion air inlet and products outlet ducts shall be achieved by mechanical means only.

However, it is permissible for those parts of the assembly that do not require to be dismantled for routine maintenance to be joined by other means provided that soundness is assured in continuous service under normal conditions of use.

2.1.7 Supply of combustion air and evacuation of combustion products

2.1.7.1 All appliances. The cross sections of the air passage to the combustion chamber and of the combustion products passage from it shall not be adjustable.

The appliance shall be constructed so that the supply of combustion air is assured under normal conditions of use and maintenance.

2.1.7.2 Type B appliances. The appliance shall be provided with a draught diverter either as an integral part within the appliance case or fitted above the case.

The draught diverter flue connection shall be female and shall allow, if necessary by means of an adaptor supplied with the appliance, connection to a flue pipe complying with BS 715 or BS 567.

It shall be possible to insert the flue pipe to a depth of at least 15 mm, but not so far that the evacuation of the combustion products is impaired.

2.1.7.3 Type C₁ appliances. The design of the various parts shall be such that no work is necessary during their assembly other than adjusting or cutting the air inlet and combustion products ducts to suit the thickness of the wall.

It shall be possible to connect these ducts to the appliance by the use of ordinary tools. All the necessary connecting parts and fitting instructions shall be supplied by the manufacturer.

No opening in the external surfaces of the terminal shall permit the entry of a 16 mm diameter ball applied with a force of 5 N.

It shall not be possible to see the flames directly through the terminal.

The terminal shall be designed in such a way that any condensate is discharged clear of the wall.

The manufacturer shall specify, in the installation instructions, a protective guard for the terminal, for when required. The guard shall be supplied to the laboratory for tests and shall comply with the following.

(a) Its dimensions shall be such that, when fitted in accordance with the manufacturer's instructions, it shall be at least 50 mm from any part of the terminal, not including the wall plate.

(b) It shall not have any sharp edges likely to cause injury nor shall any opening permit the entry of a ball of 16 mm diameter applied with a force of 5 N.

Where the combustion products duct is not contained within the combustion air duct, both outlets shall fit inside a square of side 500 mm.

2.1.7.4 Type C₂ appliances. The width of the connection ducts for combustion air and combustion products, measured horizontally, shall not exceed 300 mm for an appliance with a rated heat input of less than or equal to 36 kW (gross CV basis).

The appliance shall be designed so that it is possible to obtain the distances specified by the manufacturer for the projection of the ends of the combustion air duct and the combustion products duct into the common duct, whatever the total thickness (flue and cladding) of the common duct.

2.1.8 Checking performance. It shall be possible for the installer to check the length of the pilot flame and that the main burner lights correctly. It is permissible for a door to be opened or the case removed for this purpose, provided that the soundness of the combustion circuit as specified in 3.1.2 is maintained.

It shall be possible for the user to check at any time that the pilot is alight.

If mirrors, viewing windows, etc., are used, their optical properties shall not deteriorate with time.

2.1.9 Drainage. It shall be possible to drain the appliance easily when required, without using any tool other than a screwdriver or spanner.

2.2 Requirements for particular components

2.2.1 Gas taps. The appliance shall have a gas tap or taps (or equivalent device) allowing the user to shut off the gas supply to the burner and pilot. The tap shall be designed and positioned so that it is easy to operate, and shut-off shall be effected without delay, e.g. it shall not be subject to the closing time of a flame supervision device.

If the appliance has two separate gas taps, one for the burner and one for the pilot, their operation shall be interlocked in such a way that it is impossible for the main burner to be supplied before the pilot. If a single gas tap serves both burner and pilot, the pilot ignition position shall have a stop or notch making this position clearly perceptible to the user, but it shall be possible to move the tap from the pilot position to another position using one hand only.

A tap handle that operates by turning shall turn off in a clockwise direction as seen by an observer facing the handle.

All control knobs shall be designed and placed so that they can neither be replaced incorrectly where this would cause a hazard to the user, nor move of their own accord, e.g. through the action of gravity.

2.2.2 Gas governor. Appliances in categories I₃ and I_{3P} shall not have a governor. Provision of a governor is optional for appliances in the other categories. It shall be possible to put the governor out of service when appliances in categories II_{2H3} and II_{2H3P} are supplied with 3rd family gases.

2.2.3 Gas rate adjusters

2.2.3.1 For the main burner. No appliance shall have gas rate adjusters for the main burner.

2.2.3.2 For the pilot. If the pilot is not governed, it is permissible to fit pilot gas rate adjusters to all appliances except those in categories I₃ and I_{3P}. It shall be possible to put these adjusters out of service when the appliances are supplied with a 3rd family gas.

A gas rate adjuster shall be designed so that it is protected against accidental movement by the user: it shall be possible to seal the adjuster after it has been set.

An adjuster shall be made so that it can be easily manipulated after a prolonged period of normal use without a tool other than a screwdriver or spanner. For type C appliances, access to an adjuster shall be from outside the room-sealed circuit.

A screw adjuster shall be located so that it cannot fall into the gasways. Its threads shall not deteriorate during normal use.

The presence of an adjuster shall not affect the soundness of the gas circuit.

2.2.4 Flame supervision device. The appliance shall have a flame supervision device controlling the supply of gas to the main burner and to the pilot.

The device shall be of the 'fail-safe' type, i.e. the gas supply shall be shut-off if the sensing element is damaged or if the connection between the sensing element and the shut-off valve is broken.

2.2.5 Ignition devices. The appliance shall be fitted with a permanent pilot.

For a type B appliance, it shall be possible to light the pilot easily with a match or by using an auxiliary ignition device (if fitted). Type C appliances shall be provided with an auxiliary ignition device to enable the pilot to be lit when the combustion chamber is closed. For all appliances it shall only be possible to light the pilot when the gas supply to the main burner is shut off.

The pilot shall be positioned so that its combustion products are not discharged into the room where the appliance is installed. The relative positions of the pilot and main burner shall not change during operation of the appliance.

If different pilots or injectors are used for the different gases, they shall be marked and easy to substitute for one another.

Any filter in the pilot gas circuit shall be easy to remove and replace.

2.2.6 Water rate adjustment devices. The appliance shall be provided with either a water rate adjuster or a water governor.

Adjusting screws shall be located so that they cannot fall into the waterways. Their threads shall not deteriorate during normal use.

2.2.7 Control of outlet water temperature. Proportioning appliances shall be fitted with either a temperature selector or a summer-winter switch.

NOTE. A thermostatic appliance may be fitted with a temperature selector.

2.2.8 Overheat cut-off device. An overheat cut-off device to prevent the water being overheated in the event of failure of the thermostat shall be fitted to thermostatic appliances except when the appliance does not allow a temperature rise of more than 75 °C when tested with the thermostat out of action under the conditions of the second test of 4.4.4.

This device shall either shut off the gas supply to the burner or to the burner and pilot by operating a shut-off valve independent of that operated by the thermostat. Restoration of the gas supply shall not be possible without manual intervention but shall not require replacement of any parts, e.g. a fusible link.

2.2.9 Automatic valve. The appliance shall incorporate an automatic valve.

There shall be an air space between gas and water carrying parts of the automatic valve and the space shall be vented to atmosphere.

The total aperture area of a vent or vents shall be not less than 19 mm² and every vent aperture shall be capable of accepting a 4 mm diameter pin gauge.

2.2.10 Main burner. The section of the flame ports shall not be adjustable.

When conversion from one gas to another is achieved by a change of injectors, they shall carry an indelible means of identification preventing any confusion.

Removal and replacement of the burner shall be possible without having to dismantle a major part of the appliance. The burner position shall be well defined and its method of fixing such that it is difficult to position it incorrectly. In particular the burner shall be correctly centred in relation to the heating body.

The primary aeration of the burner shall be fixed.

An injector shall not have an adjustable orifice.

2.2.11 Pressure test points. The appliance shall be fitted with two pressure test points. One shall be upstream of the first gas control and safety device, the other downstream of the last gas flow rate control. For a type C appliance, access to these pressure test points shall be from outside the room-sealed circuit.

Each test point shall have an outside diameter at its widest point of 9⁺⁰_{-0.5} mm and a useful length of at least 10 mm for fitting a rubber tube. The diameter of the bore shall not exceed 1 mm at its narrowest point.

2.3 Electrical equipment

2.3.1 General. This subclause applies only to circuits intended for connection to the domestic electrical supply at voltages not exceeding 250 V of standard frequency 50 Hz single phase with a maximum rated current of 13 A. It does not apply to spark ignition or other circuits operating at high voltage.

The appliance and its electrical circuits and components shall comply with the appropriate requirements of BS 3456 : Part 101 and BS 3955 and with the additional requirement given in 2.3.2.

NOTE. Attention is drawn to the Electrical Equipment Safety Regulations available from HMSO.

2.3.2 Supply voltage tolerance. The electrical circuits and components of the appliance shall function safely when the appliance is connected to a supply of 0.90 times the minimum rated voltage and 1.10 times the maximum rated voltage.