

Specification for

Installation of gas hot water supplies for domestic purposes (1st, 2nd and 3rd family gases)

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Gas Standards Policy Committee (GSE/-) to Technical Committee GSE/30, upon which the following bodies were represented:

- British Flue and Chimney Manufacturers' Association
- British Gas plc
- Confederation for the Registration of Gas Installers
- Consumer Policy Committee of BSI
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
- Health and Safety Executive
- Institute of Domestic Heating and Environmental Engineers
- Institution of Gas Engineers
- Liquefied Petroleum Gas Industry Technical Association (UK)
- Society of British Gas Industries
- Trades Union Congress

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Water Research Centre
- Water Services Association of England and Wales

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Foreword

This British Standard has been prepared under the direction of the Gas Standards Policy Committee and supersedes BS 5546:1979 which is withdrawn.

NOTE In the preparation of this revision the opportunity has been taken to present this standard in the format of a practice specification as defined in PD 6501-1. This format allows the requirements of the specification to be supported by recommendations. To comply with this specification, the user has to comply with all its requirements. He may depart from recommendations, but this would be on his own responsibility and he would be expected to have good reasons for doing so.

In the preparation of this standard the opportunity has been taken to include references to combination boilers, showers and 3rd family gases.

The following British Standards are relevant to this British Standard: BS 6798 and BS 6700.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with this British Standard does not of itself confer immunity from legal obligations. In particular, attention is drawn to the following.

- a) **Statutory Instrument 1358:1984: The Gas Safety (Installation and Use) Regulations 1984;**
- b) **Statutory Instrument 1065:1985 (as amended): Building Regulations 1985;**
- c) **Statutory Instrument 1596:1981 (as amended): The Building Standards (Scotland) Regulations 1981;**
- d) **The Water Byelaws;**
- e) **The Health and Safety at Work, etc. Act 1974.**

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 22, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

1.1 This British Standard specifies the installation requirements for the selection and installation of water heating appliances which supply hot water for domestic purposes in individual dwellings and in other premises where a similar service is required and 1st, 2nd and 3rd family gases are burned.

1.2 This British Standard does not apply to large scale hot water supply systems such as those in multiple dwellings supplied from a central source.

NOTE The titles of the publications referred to in this standard are listed on page 24.

2 Definitions

For the purpose of this British Standard the definitions given in BS 1179:1967 and in BS 1179-6 apply, together with the following.

2.1

air vent

a non-adjustable purpose-made opening or duct that is designed to allow the passage of air at all times

2.2

back circulator unit

a circulator designed to be installed in a fireplace opening behind a gas fire

2.3

boiler

an enclosed vessel in which water is heated by the direct application of heat

NOTE It is primarily designed to provide central heating and hot water, but if used solely for supplying hot water, it is capable of supplying a hot water service with a rapid recovery rate.

2.4

combination boiler

an appliance designed to provide central heating hot water and domestic hot water without the need for additional secondary storage

2.5

circulator

a boiler with a rated input not exceeding 8 kW designed primarily for the supply of domestic hot water in conjunction with a separate storage vessel

2.6

circulation pipe

a pipe forming part of the primary circuit of a hot water system

2.7

cistern

a fixed container for holding water at atmospheric pressure

2.8

cold feed pipe

a pipe that connects from a feed cistern to a cylinder, storage vessel, or primary side of a closed circuit

2.9

combination hot water storage unit

1) A hot water supply apparatus comprising of a hot water storage vessel with a cold water feed cistern immediately above it, the two being fabricated together as a compact unit.

2) A hot water supply apparatus comprising a hot water storage vessel with a cold water feed cistern beside it or inside it.

2.10

compartment

an enclosure specifically designed or adapted to house a water heater

2.11

condensing appliance

an appliance designed to make use of the latent heat in the combustion products' water vapour by condensing the water vapour within the appliance

2.12

direct cylinder

a closed hot water storage vessel in which the stored hot water has been directly heated in a boiler or circulator

2.13

distributing pipe

any pipe other than an overflow pipe or flush pipe conveying water from a storage cistern or from a hot water apparatus supplied from a feed cistern, and under pressure from that cistern or apparatus

2.14

domestic water

water supplied by the water supplier for drinking, washing, cooking and sanitary purposes including hot water supplied through any outlet

2.15

double-feed indirect cylinder

any indirect cylinder that requires a separate feed cistern to both the primary and the secondary circuit

2.16

draining tap

a tap fitted to drain off the contents of a water system pipe or vessel

2.17

feed cistern

any storage cistern used for supplying cold water to a hot water apparatus, cylinder or tank

**2.18
float-operated valve**

a valve for controlling the flow of water into a cistern, the valve being operated by the vertical movement of a float riding on the surface of the water

**2.19
flow pipe**

a pipe in a primary hot water circuit in which water moves away from the boiler or circulator

**2.20
flueless appliance**

an appliance designed for use without connection to a flue, the products of combustion being allowed to mix with the air of the room or space in which the appliance is situated

**2.21
hot water storage vessel**

a vessel for storing hot water under pressure greater than atmospheric pressure

**2.22
indirect cylinder**

any hot water cylinder in which the stored water is heated by the primary heater through which hot water is circulated from a boiler or circulator without mixing of the primary or secondary water taking place

**2.23
indirect-heated water-jacketed tube heater**

a water-jacketed tube heater which requires a separate water heating appliance, e.g. boiler or circulator

**2.24
instantaneous water heater**

an appliance in which water is heated only as it flows to the point of delivery

**2.25
open-flued appliance**

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

**2.26
primary circuit**

a circuit in which water circulates between a boiler or circulator and a hot water storage vessel

**2.27
return pipe**

a pipe in a primary hot water circuit in which water moves back to the boiler or circulator

**2.28
room-sealed appliance**

an appliance which, when in operation, has the combustion air inlet and the combustion products outlet isolated from the room or space in which the appliance is installed

**2.29
safety valve**

a pressure relief valve fitted on or close to a boiler or circulator

**2.30
servicing valve**

a valve for shutting off the flow of water in a pipe connected to a water fitting to facilitate the maintenance or servicing of that fitting

**2.31
single-feed indirect cylinder**

an indirect cylinder which has only one cold feed pipe connection to supply both the primary and secondary circuits

NOTE It is so designed that the formation of an air seal during filling prevents mixing and accommodates the expansion of the primary circuit.

**2.32
stopvalve**

a valve, other than a servicing valve, fitted in a pipeline for controlling or stopping the flow of water when necessary

**2.33
storage water heater**

an appliance in which a volume of water is heated under thermostatic control and stored for use when required

**2.34
warning pipe**

an overflow pipe so fixed that its outlet, whether inside or outside a building, is in a conspicuous position where the discharge of any water from it can readily be seen

**2.35
water service pipe**

any pipe that supplies water from a main to any premises, and that is subject to water pressure from that main, or would be so subject but for the closing of a stopvalve

**2.36
direct storage system**

a system in which the hot water supplied from a storage vessel to the draw-off taps has been heated directly in a boiler or circulator

2.37**indirect storage system**

a system in which the hot water supply to the draw-off taps has been heated and stored in an indirect cylinder and has not passed through the boiler or circulator

2.38**large instantaneous water heater**

a water heater with a heat input exceeding 12 kW intended to supply hot water to a bath or a comprehensive service to a number of draw-off points

2.39**large storage water heater**

a storage system with an integral storage vessel that is intended to supply hot water to a bath or a comprehensive service to a number of draw-off points

2.40**storage system**

a system in which water is heated and held in a storage vessel

2.41**small instantaneous water heater**

a water heater with a heat input not exceeding 12 kW intended to supply hot water to a sink or basin

2.42**small storage water heater**

a storage system with an integral storage vessel that is intended to supply water to a sink or basin

2.43**water-jacketed tube heater**

an appliance in which the primary hot water, which may be used for heating purposes, is stored and the water for domestic use is drawn off after being heated inside a coil sited within the stored hot water

2.44**vent pipe**

a pipe connected to an open water system and communicating with the atmosphere

3 Materials and components

All materials and components used shall comply with the relevant requirements of the appropriate British Standards. Where no appropriate British Standard exists, materials and components shall be designed, constructed and installed so that the safety of persons is not put at risk, and the materials and components shall be acceptable to the gas supplier and the water supplier. Materials containing asbestos shall not be used.

When used under the conditions for which they are designed, materials in contact with or likely to come into contact with potable water shall not constitute a toxic hazard, shall not support microbial growth and shall not give rise to unpleasant taste or odour, cloudiness or discoloration of the water.

COMMENTARY AND RECOMMENDATIONS ON CLAUSE 3. *Copper tubing in accordance with BS 2871-1 and capillary or compression fittings to BS 864-2 should be used for all water supply pipes subject to the approval of the local water supplier. Other materials may be used, but only in consultation with the water supplier (see also BS 6920).*

Products for installation and use in the United Kingdom which are verified and listed under the U.K. Water Fittings Byelaws Scheme, administered by W.R.C. Water Byelaws Advisory Service, 660, Ajax Avenue, Slough, SL1 4BG, are deemed to satisfy the requirements of this clause.

4 Selection of system

4.1 The choice of system shall be made to suit the requirements of the user, bearing in mind locations, quantities, temperature, cost (including maintenance and fuel costs) water delivery rate and the characteristics of the different systems.

COMMENTARY AND RECOMMENDATIONS ON 4.1. *Combination boilers with no water storage capacity have typical hot water delivery rates between 6 L/min and 9 L/min with a 45 °C rise. Where the combination boiler incorporates primary water storage the delivery rate depends on the pressure and flowrate available to the appliance, e.g. from the water mains, and the pipework resistance.*

The water for domestic draw-off purposes may not be heated directly in a gas/water heat exchanger but via an intermediate water circuit and a water/water heat exchanger. There are broadly two categories, with or without primary water storage. In the former, water for draw-off purposes passes through a coil immersed in the stored hot water as a water-jacketed tube heater. This gives a rapid response but initially at a temperature close to the stored water which could be the central heating flow temperature of 82 °C. In such cases, in hard water areas, it may be necessary to take precautions against scaling.

In some gas appliances without a thermal store, primary water is heated and circulated through a heat exchanger which in turn heats the water to be drawn off. As a consequence there may be a delay, typically 2 min to 3 min, between the demand for hot water and its delivery.

Collaboration between the designer, installer, the gas supplier and the local water supplier is desirable at the planning stage of every installation and at appropriate stages during the execution of the work. Particular consideration should be given to the following aspects of installation.

- a) *Suitability of any existing gas supply and meter or installation, where necessary, of a new gas supply and meter.*
- b) *Suitability of any existing water supply or installation, where necessary, of a new water supply. Consideration may need to be given to available water supply pressure at times of peak demand.*
- c) *Location of appliance(s).*
- d) *Design, location and construction of a flue system.*
- e) *Provision of air for combustion and ventilation.*
- f) *Electrical requirements.*

4.2 The water heaters shall comply with BS 5258-1, BS 5258-7, and BS 5258-8 and BS 5386-1, BS 5386-2 and BS 5386-5 as appropriate.

4.3 A small instantaneous water heater shall be flued where it is likely to be in continuous operation for more than 5 min at any one time.

Where a small instantaneous water heater is used for a shower it shall be flued.

A flueless water heater shall not be used to supply a draw-off tap outside the room or space in which the appliance is installed.

COMMENTARY AND RECOMMENDATIONS
ON 4.3. Small instantaneous water heaters are normally flueless and supply hot water through a swivel spout. Some models may have the additional facility for making a direct connection to a draw-off. They have an output of between 8 kW and 10 kW which will provide approximately 2.6 L/min raised through 50 °C.

4.4 Where an instantaneous water heater is used to supply a bath a large instantaneous water heater shall be used.

COMMENTARY AND RECOMMENDATIONS
ON 4.4. Large instantaneous water heaters have an output within the range of 17 kW to 28 kW which will provide approximately 5 L/min to 8 L/min respectively raised through 50 °C.

4.5 Where a water storage system is used the water capacity shall be sufficient for its intended use (see BS 6700).

COMMENTARY AND RECOMMENDATIONS

ON 4.5. Where only a sink or basin is to be supplied, a small storage capacity water heater may be used. This will normally supply hot water through a swivel spout or a fixed open draw-off pipe. The water storage capacity does not normally exceed 10 L.

Where a bath is to be supplied or a comprehensive service to a number of draw-off points is required a water heater having a large storage water capacity should be used.

Typical storage capacities range from 45 L to 120 L.

Where a suitable hot water storage vessel exists already a circulator or back circulator unit may be most appropriate.

4.6 When a water storage system is used and a rapid recovery rate is required, consideration shall be given to the use of a boiler.

COMMENTARY AND RECOMMENDATIONS
ON 4.6. The rated heat input of a boiler is not normally less than 8 kW and it is therefore capable of providing a faster recovery rate than a circulator. This type of appliance is frequently used to provide a combined space heating and hot water service (see BS 6798).

4.7 Where a high flowrate or delivery pressure is sought then direct connection to the mains, pump-assisted systems or a high head cistern shall be considered. Before any water heating device is connected directly to the mains it shall be ascertained that the water mains supplying the property has adequate size and pressure to satisfy the intended demand.

Where a pump-assisted system connected to the water mains is being considered the local water supplier shall be consulted and written permission obtained before any installation commences.

5 Planning the installation

5.1 Air supply

Water heaters specified in this standard shall have an air supply in accordance with BS 5440-2¹⁾.

5.2 Flueing

5.2.1 Flued water heaters shall be flued in accordance with BS 5440-1²⁾.

5.2.2 The following water heaters shall be flued:

- a) large instantaneous;
- b) large storage;
- c) circulator;
- d) boiler;

¹⁾ In preparation.

²⁾ In preparation.

- e) small instantaneous used for a special purpose, e.g. to supply a shower;
- f) any water heater supplying a bath.

5.3 Access for servicing

Adequate provision shall be made on installation for access to all components that require servicing, adjustment or exchange. Any relevant instructions given by the appliance manufacturer shall be followed.

5.4 Condensing appliance

Where a gas appliance designed to be used in a condensing mode is to be fitted a condensate drain shall be provided.

COMMENTARY AND RECOMMENDATIONS ON 5.4. *The condensate drain should be installed in accordance with the appliance manufacturer's instructions. Where no specific instruction is provided, the following recommendations are given. The condensate drain pipe may run into an internal soil stack or waste water pipe, an external gully, hopper or soakaway. A trap may be required, and it should comply with the Building Regulations. Care should be taken that two traps are not installed in line unless a break to atmosphere (e.g. a tundish) is incorporated. Any internal pipework should be of the diameter specified in the appliance manufacturer's instructions. In the absence of any reference in the appliance manufacturer's instructions, the condensate drain pipe should be made of a corrosion-resistant non-permeable pipe of at least 19 mm internal diameter (22 mm nominal outside diameter). Any external pipework should be kept to a minimum to avoid freezing. The condensate pipe should have a fall of at least 1 in 20.*

It should be noted that the connection of the condensate pipe to the drain may be subject to local building control requirements (see BS 5440-1).

5.5 Location

5.5.1 General

Any room or internal space, the use of which is specified in more than one of the subclauses, 5.5.2 to 5.5.9 shall be treated according to the more stringent requirements of the relevant subclause.

A flueless water heater shall not be fitted in any room of volume less than 5 m³.

5.5.2 Bathrooms and shower rooms

Only room-sealed appliances shall be installed in any room containing a fixed bath or shower. The installer shall ensure that where a room-sealed appliance is located in a room containing a fixed bath or a shower, the installation complies with the Institution of Electrical Engineers' "Regulations for Electrical Installations" (see clause 8).

5.5.3 Private garages

Where a gas water heater is to be installed in a private garage it shall be of the room-sealed type.

5.5.4 Bedrooms and bed-sitting rooms

Where a gas appliance is to be installed in a bedroom or bed-sitting room of room volume not exceeding 20 m³, it shall be of the room-sealed type.

COMMENTARY AND RECOMMENDATIONS ON 5.5.4. *Where the room volume exceeds 20 m³ and provided the ventilation requirements are in accordance with BS 5440-2 one of the following is acceptable.*

- a) *A flueless small instantaneous water heater with heat input not exceeding 12 kW, serving a wash basin or sink only in the room in which it is fitted, provided that it will not be in use for periods in excess of 5 min.*
- b) *A flueless small storage heater with a storage capacity not exceeding 9 L and a heat input not exceeding 3 kW serving a wash basin or sink only.*
- c) *An open-flued circulator with a heat input not exceeding 4.5 kW.*

When planning a bedroom or bed-sitting room installation, consideration should be given to factors affecting amenity, such as noise of operation, and the need for servicing.

5.5.5 Cloakrooms and/or toilets

Flueless water heaters shall not be installed in cloakrooms and/or toilets where the volume of the room is 5 m³ or less.

COMMENTARY AND RECOMMENDATIONS ON 5.5.5. *Any air vent in a toilet or cloakroom should communicate directly with the outside air.*

5.5.6 Basement rooms

An appliance for use with 3rd family gases shall not be installed in a room or internal space below ground level, e.g. in a basement or a cellar.

COMMENTARY AND RECOMMENDATIONS ON 5.5.6. *This does not preclude the installation of such appliances into rooms or internal spaces which are basements with respect to one side of the building but open to ground level on the opposite side.*

5.5.7 Living rooms, kitchens, utility rooms, halls and passageways

All types of water heater are permitted.

COMMENTARY AND RECOMMENDATIONS ON 5.5.7. *When a living room installation is planned, careful consideration should be given to factors affecting amenity, such as noise of operation, condensation, appearance and the need for servicing.*