

Specification for installation of gas-fired overhead radiant heaters for industrial and commercial heating (2nd and 3rd family gases)

ICS 97.100.20

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee GSE/30, Gas installations (1st, 2nd and 3rd family gases), upon which the following bodies were represented:

- British Flue and Chimney Manufacturers Association
- Boiler and Radiator Manufacturers Association Ltd.
- BSI Consumer Policy Committee
- Catering Equipment Suppliers Association (CESA)
- Centrica plc
- Council for Registered Gas Installers (CORGI)
- Department of Trade and Industry — Consumer Safety Unit
- Health and Safety Executive
- Heating and Ventilating Contractors' Association
- ICOM Energy Association
- Institute of Domestic Heating and Environmental Engineers
- Institution of Gas Engineers and Managers
- LP Gas Association
- Society of British Gas Industries
- Co-opted members

The following body was also represented in the drafting of the standard, through subcommittees and panels:
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Foreword

This British Standard has been prepared by Technical Committee GSE/30. It is a revision of BS 6896:1991, which is withdrawn.

This standard allows manufacturer's instructions to specify a method of installation, testing, commissioning or maintenance which differs in points of detail from this standard. This reference to manufacturer's instructions is allowed only where it will result in at least an equivalent level of safety. In such circumstances, it is important that the manufacturer's instructions are followed.

In particular, attention is drawn to the following regulations which may be amended from time to time. The commentary in this British Standard reflects the state of the regulations in 2004.

- a) The Gas Appliances (Safety) Regulations [1];

This standard only applies to appliances falling within the scope of these regulations.

- b) The Gas Safety (Installation and Use) Regulations [2];

These control all aspects of the ways in which gas-fired appliances and systems may be installed, maintained and used, mainly in domestic and commercial premises, and the classes of persons who may undertake gas work.

NOTE These regulations currently do not apply to industrial premises, except those parts used for domestic purposes and sleeping accommodation.

- c) The Building Regulations [3], [4], [5] (for the appropriate legislative region);

These control work carried out in the construction of new buildings or the extension of existing buildings. Detailed advice for England and Wales is given in approved documents [6], [7] and for Northern Ireland, in technical booklets [4]. The Building Standards (Scotland) [5] are accompanied by methods that are deemed to satisfy them.

- d) The Water Supply (Water Fittings) Regulations [8];

- e) The Health and Safety at Work etc. Act [9];

- f) The Electricity at Work Regulations [10];

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

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.

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1 Scope

This British Standard specifies the installation requirements for gas-fired overhead radiant heaters and systems for the environmental heating of premises other than domestic dwellings to which the Gas Appliances (Safety) Regulations 1995 [1] apply.

This standard applies to the installation of heaters that are designed to utilize gases of group H of the second family (e.g. natural gas), gases of group P of the third family (e.g. propane) as well as gases of group B of the third family (e.g. butane) (see BS EN 437:2003).

NOTE 1 This standard does not specifically cover LPG/air for which additional requirements might be necessary.

This standard applies to the installation of gas-fired overhead luminous radiant heaters within the scope of BS EN 419-1:2000, single burner gas-fired overhead radiant heaters within the scope of BS EN 416-1:1999 and multi-burner gas-fired overhead radiant tube heater systems within the scope of BS EN 777-1:1999, BS EN 777-2:1999, BS EN 777-3:2000 and BS EN 777-4:1999.

NOTE 2 For the purposes of this standard, installation includes design, inspection and commissioning. It is recognized that each of these tasks can at times be performed by the same persons.

NOTE 3 The heat inputs, and ventilation rates in cm^3/kW of heat input given in this standard are based on the net calorific value.

The provisions of this standard do not apply to the installation of gas-fired overhead radiant heaters and systems:

- a) to which the Gas Appliances (Safety) Regulations 1995 [1] do not apply;
- b) that are designed for use in domestic premises;
- c) that are intended for outdoor use;
- d) that are supplied with a heated fluid from a separate source; or
- e) that are portable or transportable.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 669-2:1997, *Flexible hoses, end fittings and sockets for gas burning appliances — Part 2: Specification for corrugated metallic flexible hoses, covers, end fittings and sockets for catering appliances burning 1st, 2nd and 3rd family gases.*

BS 1363-1:1995, *13 A plugs, socket-outlets, adaptors and connection units — Part 1: Specification for rewirable and non-rewirable 13 A fused plugs.*

BS 1363-2:1995, *13 A plugs, socket-outlets, adaptors and connection units — Part 2: Specification for 13 A switched and unswitched socket-outlets.*

BS 5440-1:2000, *Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) — Part 1: Specification for installation and maintenance of flues.*

BS 6501-1:1991, *Metal hose assemblies — Part 1: Guidance on the construction and use of corrugated hose assemblies.*

BS 7671:2001, *Requirements for electrical installations — IEE Wiring Regulations — Sixteenth edition.*

BS EN 416-1:1999 including Amendment 1:2001, Amendment 2:2002, Amendment 3:2002, *Single burner gas-fired overhead radiant-tube heaters for non-domestic use — Part 1: Safety.*

BS EN 419-1:2000 including Amendment 1:2001, Amendment 2:2001, Amendment 3:2002, *Non-domestic gas-fired overhead luminous radiant heaters — Part 1: Safety.*

BS EN 777-1:1999 including Amendment 1:2001, Amendment 2:2002, Amendment 3:2002, Corrigendum 1:2002, *Multi-burner gas-fired overhead radiant tube heater systems for non-domestic use — Part 1: System D, safety.*

BS EN 777-2:1999 including Amendment 1:2001, Amendment 2:2002, Amendment 3:2002, *Multi-burner gas-fired overhead radiant tube heater systems for non-domestic use — Part 2: System E, safety.*

BS EN 777-3:2000 including Amendment 1:2001, Amendment 2:2002, Amendment 3:2002, *Multi-burner gas-fired overhead radiant tube heater systems for non-domestic use — Part 3: System F, safety*.

BS EN 777-4:1999 including Amendment 1:2001, Amendment 2:2002, Amendment 3:2002, *Multi-burner gas-fired overhead radiant tube heater systems for non-domestic use — Part 4: System H, safety*.

BS EN 13410, *Gas-fired overhead radiant heaters — Ventilation requirements for non-domestic premises*.

BS EN 60079-10:2003, *Electrical apparatus for explosive gas atmospheres — Part 10: Classification of hazardous areas*.

EH 40, *Occupational exposure limits*. Sudbury: HSE Books¹⁾, 2002.

IGE/UP/2, *Gas installation pipework, boosters and compressors on industrial and commercial premises, 1994 (amended in 1995)*. London: Institution of Gas Engineers and Managers²⁾.

Code of practice No. 22, LPG Piping, System Design and Installation. LP Gas Association, 1996³⁾.

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN 416-1:1999, BS EN 419-1:2000, BS EN 777-1:1999, BS EN 777-2:1999, BS EN 777-3:2000, BS EN 777-4:1999 and the following apply.

3.1

hazardous area

space in which explosive gas-air mixtures are present or are expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus and fuel-fired appliances

NOTE See BS EN 60079-10:2003 which also defines hazardous areas.

3.2

high-level ventilation

ventilation above the level of the heater

3.3

low-level ventilation

ventilation below the level of the heater

3.4

overhead radiant heater

gas-fired appliance intended for overhead installation and designed to heat, mainly by radiation, the space in which it is installed

3.5

overhead radiant tube heater

overhead radiant heater in which a tube or series of connected tubes are heated by the internal passage of combustion products

3.6

overhead luminous radiant heater

overhead radiant heater in which the heat is produced by means of burning the fuel gas at or near the outer surface of a material such as a ceramic plaque or metal gauze

¹⁾ Obtainable from HSE Books, PO Box 1999, Sudbury, Suffolk, CO10 2WA.

²⁾ Obtainable from Publications Sales, IGEM, Charnwood Wing, Ashby Close, Loughborough, Leicestershire, LE11 3GR.

³⁾ Obtainable from the LP Gas Association, Pavilion 16, Headlands Business Park, Salisbury Road, Ringwood, Hampshire, BH24 3PB.

4 Selection of equipment and pre-installation

4.1 Exchange of information and planning

4.1.1 General

Where this is required under the provisions of the Gas Safety (Installation and Use) Regulations the installation work shall be carried out by a business or self-employed person, who is a “member of a class of persons approved for the time being by the Health and Safety Executive (HSE)”.

Persons carrying out the work shall be competent.

COMMENTARY AND RECOMMENDATIONS ON 4.1.1. *At the time of publication, the body with HSE approval to operate and maintain a register of businesses who are a “member of a class of persons” is the Council for Registered Gas Installers (CORGI).*

Persons deemed competent to carry out gas work are those who hold a certificate of gas safety competence acceptable to CORGI, which includes (without limitation) the Accredited Certification Scheme (ACS) and the Gas Services S/NVQ that has been aligned with ACS. However, some ACOP certification for industrial installations might continue for some time.

4.1.2 Design considerations

The design shall be such that the installation is in accordance with the heater or system manufacturer’s instructions.

NOTE 1 It is essential that persons who design the system or installation have a knowledge and understanding of the standards and regulations that apply to ensure that the completed plans will produce a safe and satisfactory installation.

NOTE 2 In case of doubt contact the manufacturer.

NOTE 3 Collaboration is essential between those concerned with the design and installation both at the planning stage and during the execution of the work. Particular matters to be taken into account are as follows:

- a) the heater or system manufacturer’s installation instructions;⁴⁾
- b) type of building and form of construction;
- c) sizes, layout and purposes of rooms and working areas;
- d) size, height and route of flue (if any);
- e) provision of adequate air for combustion and ventilation;
- f) correct assessment of heat losses and heat gains;
- g) gas types, pressures and availability of supplies;
- h) electricity requirements;
- i) liaison between the various trades carrying out the work;
- j) liaison with fire insurers;
- k) transmission of noise and vibration;
- l) any hazardous area classification of the location for the heater or system;
- m) the position of any drains for condensate.

Attention is drawn to statutory regulations and local byelaws.

Installers should make customers aware, by providing them with the following list in writing, that it is their responsibility to ensure that:

- 1) the local authority is consulted with regard to planning application requirements;
- 2) the fire authority and/or the enforcing authority under the Health and Safety at Work etc. Act 1974, as appropriate, is consulted in respect of fire precautions;
- 3) the fire insurers are notified of any proposed changes in the means of heating;
- 4) the responsible gas conveyor is advised of the proposed installation of any gas booster or compressor which is either part of the heater, or an addition to it.

Main contractors might need to draw their customers’ attention to 1), 2), 3) and 4). Attention is drawn to the relevant building regulations [3], [4], [5] and The Health and Safety at Work etc. Act [9].

⁴⁾ The manufacturer of the appliance or system should be contacted if there is any doubt about whether the design conforms to the installation instructions.

4.2 Selection of heater or multi-burner system

4.2.1 General

In order to verify that the heater or multi-burner system is appropriate for installation in accordance with this standard it shall be ensured that it either carries a CE mark together with the identification number of the notified body carrying out EC Quality Surveillance (see Figure 1) or has the CE mark affixed upon installation.

NOTE Attention is drawn to the EC unit verification procedures in the Gas Appliances (Safety) Regulations 1995 [1].

The heater or multi-burner system shall only be connected to and supplied with the gas for which it was designed.

Before installation the installer shall ensure that the heater or multi-burner system is correctly adjusted in accordance with the manufacturer’s instructions. Conversion to another gas, if necessary, shall be carried out strictly in accordance with the heater or multi-burner system manufacturer’s instructions, using the manufacturer’s supplied kit of parts.

The heater or multi-burner system shall only be fitted with external control devices approved by the heater or multi-burner system manufacturer.

COMMENTARY AND RECOMMENDATIONS ON 4.2.1. The HSE publication “L 56: Safety in the installation and use of gas systems and appliances” [11] should be consulted.

In particular the installer should ensure that the heater or multi-burner system and the packaging, if any, are marked with at least the following:

- a) the letters “GB”;
- b) the type of gas and the pressure of utilization indicated as follows:
 - 1) “G20 — natural gas — 17.5 mbar (or 17.5–20 mbar)” for a heater or multi-burner system adjusted for natural gas;
 - 2) “G31 — propane — 37 mbar (or 50 mbar)” for a heater or multi-burner system adjusted for propane;
 - 3) “G30 — butane — 29 mbar (or 28–30 mbar)” for a heater or multi-burner system adjusted for butane.

The data plate of a CE marked heater or multi-burner system will carry one of the following designations, CAT: I_{2H}, I_{3P}, I_{3B}, I₃₊, II_{2H3P} or II_{2H3+} to identify the heater or multi-burner system category.

Full details on the appliance category scheme are given in BS EN 437:2003.

In all, four items of information should be given, which, dependent on the heater or system category and the heater or system adjustment or state of conversion, should be one of the alternatives listed in Table 1.



NOTE The CE mark consists of the “CE” symbol followed by the identification number of the notified body involved in the production control (i.e. ongoing surveillance) phase. Examples are shown above.

Figure 1 — The CE Mark

Table 1 — Heater (system) categories/adjustment for UK gas supply conditions

Alternatives ^a	Country code	Type of gas	Gas pressure ^b mbar	Heater category
a)	GB	G 20, natural gas	17.5 or 17.5 to 20	I _{2H}
b)	GB	G 20, natural gas	17.5 or 17.5 to 20	II _{2H3P} or II _{2H3+} (when adjusted to use natural gas)
c)	GB	G 31, propane	37 or 50	I _{3P} or II _{2H3P} (when adjusted to use propane)
d)	GB	G 31, propane	37	I ₃₊ or II _{2H3+} (when adjusted to use propane)
e)	GB	G 30, butane	29 or 28 to 30 ^c	I _{3B} or I ₃₊ or II _{2H3+} (when adjusted to use butane)
^a If the information on the appliance, its packaging or the data plate is not in accordance with alternatives a), b), c), d) or e), or if there is any doubt about the suitability of the appliance or multi-burner system for a particular gas, the manufacturer should be consulted prior to installation. ^b If the gas pressure is not as indicated in Table 1, the gas conveyor should also be consulted prior to installation. ^c Appliances or multi-burner systems in categories I ₃₊ or II _{2H3+} , when adjusted for butane, may be used without adjustment at the specified supply pressures of 28 mbar to 30 mbar.				

If the “Unit Verification” procedure is utilized, the appropriate information from Table 1 should be affixed to the heater (or multi-burner system) and/or its data plate after commissioning the appliance or system.

The installer should check the data provided with the heater or multi-burner system to confirm that the heater or multi-burner system is appropriate for the installation, and should confirm the basis on which the nominal heat input, or heat input rating, is quoted, i.e. gross or net. The ratio of gross to net heat input is approximately 1.11:1 for group H (natural gas), 1.09:1 for group P (propane) and 1.08:1 for group B (butane).

Further information on the labelling of gas appliances is given in CR 1472:1997.

4.2.2 Flued heaters and systems

4.2.2.1 Where vapours/gases or airborne dusts are present in the air which degrade to components that are potentially damaging to the heater/flue or the multi-burner system/flue when passed through the combustion zone of a flame, a heater or heaters or multi-burner system or systems shall be selected which, when installed in accordance with the manufacturer's instructions, are such that all air supplied to the burner(s) is outside air that is free from such contaminants (e.g. room-sealed type C heaters).

COMMENTARY AND RECOMMENDATIONS ON **4.2.2.1**. In case of doubt as to whether the vapours/gases or airborne dusts are present in sufficient concentrations to put the heater/flue or the multi-burner system/flue at risk, the heater or multi-burner system manufacturer should be contacted prior to installation (see **5.1.1.2**).

4.2.2.2 Where a heater or system is intended to incorporate a means for the disposal of condensate, this means shall be installed in accordance with the manufacturer's installation instructions.

COMMENTARY AND RECOMMENDATIONS ON **4.2.2.2**. When siting the heater or multi-burner system, early consideration should be given to the following.

a) The siting of any flue terminal.

If condensing conditions exist for long periods, the terminal should be sited such that the wet combustion products are unlikely to cause damage or nuisance. The effect of wind conditions and the dispersal of the plume relative to adjacent wall surfaces, openable windows and neighbouring buildings should be considered.