BRITISH STANDARD

BS 6173:2001
Incorporating Corrigendum No. 1 and Amendment No.1

Specification for

Installation of gas-fired catering appliances for use in all types of catering establishments (2nd and 3rd family gases)

ICS 97.040.20

BSI British Standards

Committees responsible for this British Standard

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

BG Plc

British Flue and Chimney Manufacturer's Association

Centrica

Combustion Engineers' Association

Consumer Policy Committee of BSI

Council for Registered Gas Installers

Department of Trade and Industry

Gas Consumers Council

Health and Safety Executive

Institute of Domestic Heating and Environmental Engineers

Institution of Gas Engineers

Liquified Petroleum Gas Industry Technical Association

Society of British Gas Industries

Co-opted members

This British Standard, having been prepared under the direction of the Gas Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 15 May 2001

First published June 1982
Second edition June 1990
Third edition May 2001

The following BSI references relate to the work on this British Standard:
Committee reference GSE/30
Draft for comment 97/707313 DC

ISBN 0 580 33275 6

Amendments issued since publication

Amd. No.	Date	Comments
14740 Corrigendum No. 1	16 February 2004	Reference [12] deleted.
15205	6 August 2004	Revision of subclause **6.1.3**, 3rd paragraph

Contents

Foreword

This British Standard has been prepared by Technical Committee GSE30/11. It supersedes BS 6173:1990, which is withdrawn. This revision has been undertaken because of the need to cover current practices and changes to gas installation regulations. The standard now includes all gas-fired catering appliances including gas-fired tandoori ovens and gas-fired woks and new technology such as gas-fired micro-wave ovens. Information has been included on kitchen ventilation, hygiene and safety protection devices. A period of three months has been allowed for users of the old standard to convert to the new standard.

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

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

[1] Statutory Instrument No. 2451:1998. The Gas Safety (Installation and Use) Regulations.

[2] Statutory Instrument No. 2768:1991. Building Regulations (as amended).

[3] Statutory Instrument No. 2179:1990. The Building Standards (Scotland) Regulations (as amended).

[4] Statutory Rules of Northern Ireland No. 243:1994. The Building Regulations (Northern Ireland) (as amended).

[5] Statutory Instrument No. 635:1989. Electricity at Work Regulations.

[6] Statutory Instrument No. 2306:1998. Provision and Use of Work Equipment Regulations.

[7] Statutory Instrument No. 1629:1995. The Gas Appliance (Safety) Regulations.

[8] Statutory Instrument No.1148:1999. The Water Supply (Water Fittings) Regulations (as amended).

[9] Health and Safety at Work etc. Act 1974.

[10] Fire Precautions Act 1971.

[11] Statutory Instrument No. 1763:1995. Food Safety (General Food Hygiene Regulations)

It should be noted that persons working in catering establishments need to be aware of Food Hygiene Regulations before they enter the establishment. In many cases, chefs/managers will not permit entry until all persons are trained and instructed under these Regulations.

Summary of pages

This document comprises a front cover, an inside front cover, page i and ii, pages 1 to 17 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

1 Scope

This British Standard specifies the installation requirements of new and second-hand gas-fired appliances used in catering establishments burning 2nd or 3rd family gases.

This Specification does not apply to the installation of domestic hot water (DHW) boilers and air heaters in catering establishments.

NOTE 1 This specification also applies to the installation of typical domestic cookers or leisure appliances when installed in commercial catering sites or establishments. It is not intended to apply to primarily domestic premises, e.g. those supplying a small number of clients on a "bed and breakfast" basis. However, the general rules for hygiene and personal safety should be applied.

NOTE 2 This specification is intended to apply to new appliances conforming to BS 5809 or BS EN 203-3 as appropriate.

NOTE 3 This specification covers a wide range of appliances such as cookers, fish and chip frying ranges, fryers, ovens, cafe boilers and urns, bain-marie units, tandoori ovens, kebab grills, steamers, barbecues etc.

NOTE 4 It is essential that second hand appliances conform to **5.1.2**.

In addition to the definitive requirements, this standard also requires the items detailed in Clause **4.1** and Clause **4.2** to be documented. For compliance with this standard, both the definitive requirements and the documented items have to be specified.

2 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at all appropriate places in the text and cited publications are listed on the inside back cover. For dated references, only the cited edition applies; any subsequent amendments to or revisions of the cited publications apply to the British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

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

BS 1179-6, *Glossary of terms used in the gas industry. Combustion and utilization including installation at consumers' premises.*

BS 1363, *Specification for 13 A fused plugs and switched and unswitched socket-outlets.*

BS 5546, *Specification for installation of hot water supplies for domestic purposes, using gas-fired appliances of rated input not exceeding 70 kW.*

BS 5809, *Specification for safety and efficiency of the gas heating equipment of commercial dishwashing machines.*

BS 6700, *Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.*

BS 7461, *Specification for electrically operated automatic gas shut-off valves fitted with throughput adjusters, proof of closure switches, closed position indicator switches or gas flow control.*

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

BS 7838, *Specification for corrugated stainless steel semi-rigid pipe and associated fittings for low-pressure gas pipework of up to 28 mm.*

BS 8313, *Code of practice for accommodation of building services in ducts.*

BS EN 161, *Automatic shut-off valves for gas burners and gas appliances.*

BS EN 60309, *Plugs, socket-outlets and couplers for industrial purposes. General requirements.*

BS EN 60529, *Specification for degrees of protection provided by enclosures (IP code).*

CP 342-2, *Code of practice for centralized hot water supply. Buildings other than individual dwellings.*

3 Definitions

For the purposes of this British Standard, the definitions of BS 1179:1967 and BS 1179-6:1980 apply together with the following.

3.1
appliance restraint
a device that prohibits movement of the appliance away from the wall beyond the maximum extension of the device

NOTE Appliance restraints are normally fitted with a protective hygienic cover and used in conjunction with an appliance flexible connection.

3.2
flexible connection
a corrugated metallic flexible hose with braid, where fitted, with a protective hygienic cover and appropriate end fittings. It facilitates the connection of an appliance to an installation pipe which permits the appliance to be moved a short distance in order to ease connection and disconnection

3.3
downstream
a position after the outlet of a device or component

3.4
upstream
a position before the outlet of a device or component

3.5
second-hand appliance
one that has changed ownership (with or without payment) or one that has changed location from one site to another, e.g. a used appliance. It does not include an appliance moved within a kitchen

4 Information and requirements to be agreed and documented

4.1 Information to be supplied by purchaser

To ensure a safe and satisfactory installation, it is essential that collaboration should take place between those concerned with the design, selection, layout and installation of equipment, both at the planning stage and during the execution of the work. It is essential that attention is given to catering and food hygiene and any need for appliance mobility for cleaning purposes. To ensure that good ventilation practices are applied reference should be made to HVCA DW/171 Standard for Kitchen Ventilation systems with respect to good ventilation practice [13].

The following information to be supplied by the purchaser shall be fully documented. For compliance with the standard both the definitive requirements specified throughout the standard and the following documented items shall be satisfied.

a) The means of providing adequate dispersal of combustion and cooking fume products, supply of combustion air and ventilation for all of the appliances and cooking processes. Adequate fresh air is also required in kitchens to provide air for combustion to limit the effects of heat and humidity. Reference should be made to Clause **10** of BS 5720, BS 5925, Annex B, HSE Catering Sheet and HVCA publication DW 171 [13].

b) For new and refurbished kitchens, the provision of plans to indicate the termination points of all services, connection points, the positions of meters, the means of gas isolation, fuse boxes, electrical controls and water and waste isolation and termination.

COMMENTARY AND RECOMMENDATIONS ON **4.1**.

Those involved in the collaboration process should consider, amongst other things, the following.

a) *Food service:*

1) *the number of meals required and peak time loads;*

2) *the nature of meals required and types of foods to be cooked.*

b) *Whether unprepared or convenience foods are to be used.*

c) *Installation:*

1) *the method of food service and food storage (hot and cold), and the time over which service is to be provided;*

2) *peak energy requirements, whether the appliances are to be permanently fitted in a kitchen, moved from site to site or fitted within a mobile vehicle or vessel;*

3) *the location of the appliance;*

4) *hygiene, health and safety, where advice may be sought from the Local Environmental Officer;*

5) *appliances should not be located adjacent to customer services where hot surfaces may cause burns;*

6) *the location of gas meters, gas cylinders and other gas supply equipment in well ventilated positions where they will not suffer corrosion or damage;*

7) *the strength of floors and supports;*

8) *the width, depth and length of appliances to enable compact groups to be formed;*

9) *the need for flush (easy clean) panels to accessible sides, fronts and backs;*

10) *the need to avoid crevices between and behind appliances and pipework where spillage might lodge but where crevices are unavoidable, appliances should be removable for cleaning.*

NOTE Sealing methods and sealants should be vermin proof, waterproof, flexible and be food-safe grade.

11) *provision of other services should take account the requirements given in BS 5997, BS 8313 and BS 8206-1.*

d) *Ventilation:*

Frying, grilling and roasting produces greasy cooking odours and vapours and cleanable grease filters or sumps shall be provided in extract ducts.

This is especially important on fryers and fish and chip ranges.

These filters or sumps will normally need attention at least every month.

Inevitably some grease vapour will pass through the filters and it will then settle on any surface with a temperature below 150°C and for this reason duct interiors need to be easily accessible with doors and panels.

NOTE See also BSRIA Report 78610 Specification for Ventilation Hygiene [14] *and HVCA DW/143* [15], *DW/144* [16], *DW/TM2* [17] *and TR/17* [18].

4.2 Requirements subject to agreement

The following items to be agreed between the contracting parties are specified in the clauses referred to and shall be fully documented.

For compliance with this standard both the definitive requirements specified throughout the standard and the following documented items shall be satisfied.

a) Ensuring that an adequate supply of gas and electricity is available to agreed positions at the appropriate time in the project (**5.2**).

b) Ensuring that satisfactory transport access to the kitchen and preparation of the floor and of any special bases is completed before appliances are delivered to the site. Delivery of the appliances should be at a time as near to occupation of the premises as possible when the site is clean (**5.2**).

5 Pre-installation checks

5.1 Appliances

5.1.1 *New appliances*

The installer shall ensure that the packaging and appliance are marked with at least the following information:

a) the letters "CE" with the registration number of the surveillance Notified Body; and

b) the letters "GB" indicating that the appliance is suitable for installation in the UK; and

c) that the gas type and gas pressure-are consistent with the gas supply appliance.

Conversion from one gas to another shall be carried out strictly in accordance with the manufacturer's instructions by a competent person using the manufacturer's supplied kit of parts. If there is any doubt about the suitability of an appliance for use with a particular gas, further advice shall be sought from the manufacturer of the appliance.

If appliances are not suitable for the gas being supplied, they shall not be installed or connected to the gas supply.

COMMENTARY AND RECOMMENDATIONS ON **5.1**.

"CE marking" signifies that an appliance conforms to the Gas Appliance (Safety) Regulations, and has been tested and approved by a Notified Body.

The appliance data plate and packaging will show one of the following:-

"20 mbar[1)] pressure for Cat I_{2H}"	*— the appliance is designed exclusively for the use of gases of Group H of the 2nd family at the prescribed pressure i.e. for G 20 natural gas only;*
"37 mbar pressure for Cat I_{3P}"	*— the appliance is designed exclusively for the use of gases of Group P of the 3rd family at the prescribed pressure i.e. for G 31 propane gas only;*
"30/37 mbar pressure for Cat I_{3+}"	*— the appliance is designed for the use of gases of the 3rd family i.e. G 30 or G 31 propane or butane at the correct pressure.*

NOTE Cat I and Cat II indicates an appliance can be used for gases of a single or of two families, respectively. The suffixes 2 or 3 indicate the family (2nd or 3rd respectively). The extra suffices H,P or + indicate the group of gas within that family, 2H being natural gas, 3P being high wobbe number propane gas and + being all 3rd family gases. For example, a Cat II_{2H3+} appliance is capable of burning any of the three gases when adjusted to do so. The pressure corresponding to the current adjustment will be shown on the data plate.

Appliances selected should, where appropriate conform to BS EN 203-1 or BS 5890 and be suitable for the gas supplied.

It is highly desirable when selecting appliances to select those that meet the appropriate rational use of energy and safety requirements of BS EN 203-1 or EN 203-2 as appropriate.

Appliances with "CE marking" should be supplied with installation, maintenance and user instructions.

[1)] 1 Pa = 1 N/m^2 = 10^{-5} bar.

5.1.2 ***Second-hand appliances***

Second hand appliances shall only be installed if they are in a serviceable and safe condition, suitable for the gas being supplied and are fitted with a readable data plate.

Ovens and similar enclosed burner equipment such as steamers shall be provided with flame protection and appropriately upgraded gas controls. Upgrading of safety controls shall only be carried out by a competent person using the appliance manufacturer's instruction and parts. Where reasonably practicable, all burners shall be fitted with flame safeguards.

Appliances which are not "CE" marked shall be secured, as necessary, to keep them stable. Narrow appliances shall not be located at the free end of a row of appliances.

A set of appropriate user's instructions shall be supplied with the appliance.

COMMENTARY AND RECOMMENDATIONS ON **5.1.2**.

It is important that a set of user's instructions is prepared for each appliance if not readily available. In any event, these should be consistent with any instructions necessary as a result of any upgrading of controls. For information on upgrading of safety controls, see HSE Catering Information Sheet No. 3 [19].

5.1.3 ***Fryers and fish and chip ranges***

Fryers and ranges shall not be located adjacent to appliances where water may lead to a hazard unless purpose built splash panels are installed.

5.2 Site conditions [walls and floors]

The client shall confirm, to the installer, that any special bases withstand the weight of fully laden appliances at temperatures up to 65 °C, and that all wall and floor finishes are capable of withstanding temperatures of at least 65 °C and are non-combustible.

Floors shall have a firm and smooth finish.

Installers shall ensure that there is already satisfactory transport access to a clean and clear site with finished floors and special bases before appliances are delivered to the site.

The installer shall ensure that all required services are available to operate the appliances and of the correct size and quality before commencing installation or commissioning.

6 Installation of services

6.1 Gas

6.1.1 The installation and location of appliances shall be in accordance with this standard together with any additional manufacturer's instructions. Only persons having the required competence shall carry out the work. Any "work" on gas appliances, including their installation, that is within the scope of the Gas Safety (Installation and Use) Regulations shall be carried out by a business which is a "member of a class of persons" approved for the time being by the Health and Safety Executive (HSE) [20].

COMMENTARY AND RECOMMENDATIONS ON **6.1.1**.

Guidance on the individual competency required for gas work generally is given in the Health and Safety Commission's Approved Code of Practice (ACoP) — Standards of training in safe gas installation.

Persons deemed competent to carry out gas work under the Gas Safety (Installation and Use) Regulations are those who have been adequately trained and who hold a current certificate of competence in the type of activity to be conducted, issued under the above ACoP arrangements, or by a certification body accredited by the United Kingdom Accreditation Service (UKAS).

The Gas Safety (Installation and Use) Regulations [1] *apply to work in a wide range of domestic and non-domestic premises, however there are certain exclusions, including for some industrial premises such as factories, and certain boats and vehicles. Further information on the Regulations, including scope, is given in HSC.*

Publication L56 2nd Edition "Approved Code of Practice and Guidance: Safety in the installation and use of gas systems and appliances" [21].

At this time of publication, the body with HSE approval to operate and maintain a register of businesses who are "members of a class of persons" is the Council for Registered Gas Installers (CORGI).

6.1.2 Gas installation pipes and final connections shall be installed in accordance with the Institution of Gas Engineers publication UP/2 [22] "Gas installation pipework, boosters and compressors in industrial and commercial premises". Gas pipework is required by UK legislation to be installed in a sound and workman-like manner and to be constructed of materials suitable for its purpose.

Each fixed (non-mobile) appliance shall have a single manual means of isolation for servicing or cleaning purposes.

Pipes shall be located to leave a space of 25 mm minimum between the pipe and the wall in order to assist cleaning.

Semi-rigid pipe shall at least conform to BS 7838 and only be fitted on the installation pipework in a ventilated environment where it cannot be damaged.

All pipe ducting shall be ventilated at high level for lighter than air gases, e.g. natural gas and also at low level for heavier than air gases, e.g. propane or butane.

Where copper gas pipework is fitted, those parts of the pipework connected to flexible or semi-rigid connections shall be securely supported in order to prevent damage to the pipework during the withdrawal of appliances.

The design and operation of LPG cylinder systems should be such as to ensure that the gas supply is not interrupted in normal use, e.g. by the use of automatic changeover valves in cylinder installations.

LPG fixed piped installations shall conform to LPGA CoP 1 Bulk LPG Storage at Fixed Installations Part 1: Design, Installation and operation of Vessels Located above Ground [23], CoP 1 Part 2 (small bulk installations) [24] and Part 4 (below ground installations) [25], CoP 22 LPG Piping System Design and Installation [26], CoP 24 Part 3 The use of LPG in Mobile Catering Vehicles and Similar Commercial Vehicles [27], CoP 24 Part 4 The use of LPG for Catering and Outdoor functions [28], as appropriate.

6.1.3 ***Emergency isolation systems***

A manually operable valve shall be fitted to the gas supply to a catering area to enable it to be isolated in an emergency. Wherever reasonably practicable this valve shall be located either outside the catering area or near an exit in a readily accessible position. Where it is not reasonably practicable to locate the manual valve in a readily accessible position near an exit, an automatic electric isolation valve system shall be fitted with a shielded emergency stop button or control in a readily accessible position near the exit from the catering area. Electric isolation valves shall either conform to BS EN 161 or the relevant requirements of BS 7461 if it has an integral free handle reset facility.

Whenever an automatic electric isolation valve system is used, an automatic system of proving that all downstream gas supplies to the burners and pilots have been turned off shall be employed prior to the valve being energized to re-open.

NOTE A proving system may not be needed if all burners are protected by a full flame safeguard system.

The gas supply system shall be interlocked with both a mechanical ventilation supply and an extract system where appropriate, and this will normally require the fitting of an automatic valve.

At locations where either the manual gas isolation valve is fitted or where an automatic electric gas valve system can be reset, a notice shall be affixed stating:

"IN THE EVENT OF AN EMERGENCY,
THE GAS ISOLATION VALVE MUST BE CLOSED.
ALL DOWNSTREAM BURNERS AND PILOT VALVES ON APPLIANCES
MUST BE TURNED OFF PRIOR TO ATTEMPTING TO RESTORE THE SUPPLY
AFTER EXTENDED SHUT-OFF, PURGE BEFORE RESTORING GAS".

COMMENTARY AND RECOMMENDATIONS ON **6.1.3**.

Low-pressure cut-off valves and safety proving systems are detailed in Publication BG IM/20 [29] *"Weep by-pass low-pressure proving systems" available from the IGE. Free handle valves and systems conforming to BG IM/20 are recommended as they do not automatically re-open upon power restoration.*

See also Clause ***13*** *for purging.*

6.1.4 *Corrosion*

To prevent corrosion, pipework shall be corrosion resistant or painted with a finish, impervious to greases and cleaning chemicals. In addition, where pipework passes through a sleeve to enter the catering area, the sleeve shall protrude not less than 25 mm from the finished surface where water or chemical cleaning materials may be used.

6.1.5 *LPG*

An appliance for use with 3rd family gases shall not be installed in a room having no means of low level natural ventilation direct to the outside, e.g., in a basement or a cellar. In the special case of boats, where there is no alternative to a low level appliance location, a combustible gas detector(s) shall be installed, interlocked with the gas supply, see **6.1.3** and **11.2**.

Low level ventilation shall always be provided where gas appliances, using gas which is heavier than air (e.g. LPG and LPG mixtures), are installed in buildings.

COMMENTARY AND RECOMMENDATIONS ON **6.1.5**.

The installation of such appliances is not precluded in rooms which are low level with respect to one side of the building but open to ground level on the opposite side. In all cases, adequate low level ventilation to the outside is essential. Before such installations are carried out, advice should be sought from the HSE.

6.2 Electricity

All electrical work should be performed by competent persons. Electrical installation and testing shall be in accordance with BS 7671.

6.3 Water

NOTE All work on water supplies should be performed by competent persons.

Appliances requiring water supplies shall be connected to the water supply in accordance with BS 5546, BS 6700 and CP 342-2.

NOTE Attention is drawn to national water regulations and byelaws.

7 Final gas appliance connections

7.1 Fixed appliances

Each appliance shall have a single manual means of isolation for servicing or cleaning purposes. Where each appliance in a group is fitted with flexible connection each having self-sealing plug and socket connections, a single manual valve to that group of appliances or to each appliance shall also be fitted.

Each gas appliance shall have no more than one connection.

Semi-rigid connections shall at least conform to BS 7838 and shall be supplied with wall or floor mounting hardware, as necessary, suitable for solid structures.

Semi-rigid tubing shall be installed in accordance with the manufacturer's installation instructions to prevent damage to the connection and the appliance shall be disconnected before it is moved.

Where appliances are fixed rigidly to the installation pipework a union or similar means of disconnection shall be provided between the appliance isolation valve and the appliance. When an appliance is disconnected other than for short term maintenance, open ends of all pipework shall be plugged or capped.

COMMENTARY AND RECOMMENDATIONS ON **7.1**.

A fixed appliance should be released from its fixings and disconnected from the gas supply before it is withdrawn.

Any semi-rigid connection should be as short as practicable and should not touch the floor when installed, or be exposed to excessive heat or to naked flames.

7.2 Mobile appliances

7.2.1 Each appliance shall be connected with a flexible connection having a self-sealing plug and socket conforming to BS 669-2:1997.

A 90° manual isolating valve shall be fitted to each appliance or group of appliances on a common gas supply header.

Each gas appliance shall have no more than one connection.

7.2.2 The flexible connection shall be installed in accordance with the manufacturer's installation instructions to prevent bending or stretching damage to the connection. A smooth U-shaped curve of the flexible connection shall be achieved in any appliance position during withdrawal for cleaning etc. Disconnection should always take place before withdrawing the appliance.

COMMENTARY AND RECOMMENDATIONS ON **7.2.2**.

The flexible connection should not touch the floor when installed, or be exposed to excessive heat or to naked flames.

7.2.3 Appliance restraints shall be of such length as to prevent excess movement of the appliance causing damage to the pipework or the connection assembly. Appliance restraints shall not be fixed to gas supply pipes or to any point not sufficiently anchored. Restraints shall be firmly fixed to a secure part of the building structure and the appliance frame.

COMMENTARY AND RECOMMENDATIONS ON **7.2.3**.

The location of the supply connection in relation to the appliance connection should be checked carefully.

The use of a securing restraint similar to that used with a flexible connection conforming to BS 669-2 should also be used for moveable tables and benches on which appliances are situated.

7.2.4 Where wheels, castors or rollers are used, they shall be fitted with a brake or locking device, which shall, except for mobile servery counters, be accessible from the front/operators side.

Where a customer requires add-on wheels, castors or rollers they shall not increase the overall declared height of the appliance unless agreed in writing with the appliance manufacturer and the customer.

COMMENTARY AND RECOMMENDATIONS ON **7.2.4**.

Appliances containing hot liquids should preferably have castors with locking devices rather than brakes.

7.2.5 Where appliance restraints need to be removed in order to remove the appliance, a notice shall be affixed near the restraint reminding the user to reconnect the restraint and any electrical earth bond.

COMMENTARY AND RECOMMENDATIONS ON **7.2.5**.

Where necessary for electrical safety, each appliance should be fitted with an earth bond, if not provided by other means.

The use of tools should not be necessary to disconnect and reconnect the earth bond.

8 Electrical connections

8.1 The final connection wiring to the appliance isolation/isolator shall be in accordance with BS 7671.

COMMENTARY AND RECOMMENDATIONS ON **8.1**.

Electrically continuous gas pipework connections on appliances may provide adequate bonding, particularly to non-electric appliances. Appliance earth continuity checks should always be made.

8.2 Each appliance requiring a mains electrical supply shall be connected in accordance with BS 7671 by a means appropriate to the environment.

For example:

a) a fused 13 Amp plug and socket, switched or un-switched, or a fused switched spur in accordance with BS 1363, fitted with a correctly rated fuse;

b) a fused double pole switch fitted with a correctly rated fuse suitable to the environment and to conform to BS EN 60529;

c) a heavy duty switched plug and socket assembly conforming to BS EN 60309 protected by a suitably rated fuse.

The point of connection to the mains supply shall be readily accessible and adjacent to the appliance or group of appliances.

Any flexible cable shall conform to the voltage and current requirements of the appliance and be of adequate length to enable the appliance to be withdrawn for cleaning, etc.

COMMENTARY AND RECOMMENDATIONS ON **8.2**.

Where there is a risk of mechanical damage, the use of braided, armoured, flexible or abrasion-resistant cable should be used.

The example given in a) may not be suitable for wet and humid environments.

9 Water connections and drainage

9.1 The installer shall check that the water supply pressure and water quality (e.g. potable water or tank fed) is suitable for the appliance.

Appliances requiring water supplies shall be connected to the water supply in accordance with BS 5546, BS 6700 and CP 342-2.

NOTE Attention is drawn to the national water regulations and byelaws.

9.2 Drainage facilities should be provided as necessary in the following cases:

— to remove water when washing down during general cleaning;

— for appliances holding water, for example, beverage equipment, steamers and boiling pans.

Where a channel is used, it should be positioned beneath any drain or emptying points in the appliance.

For tilting appliances the width of the channel should take into account the movement of any appliance drain whilst tilting takes place.

All drains and channels should be accessible for cleaning and should not obstruct moveable appliances.

Drains and channels should preferably be constructed from stainless steel.

10 Ventilation

10.1 Catering areas shall be ventilated to provide air for combustion and removal of combustion products and removal of steam etc. from the working operation. The installer shall confirm with the client that the ventilation system is able to provide adequate air for combustion and to discharge combustion products safely.

Appliances shall be interlocked with any mechanical ventilation system that is fitted to enable the safe operation of that appliance. Where appliances are not fitted with full flame safeguards, e.g. some second-hand appliances, the gas supply shall also be fitted with a system to prove the closure of all valves prior to the establishment or restoration of the gas supply. (See BG IM20) [29].

No gas-fired appliance shall be fitted (or used) in a catering area if the ventilation system could adversely affect the safe operation of the appliance or the safe discharge of its combustion products.

Appliances with natural draught flues connected directly to the outside air shall not be installed in kitchens having mechanical extract-only ventilation systems.

COMMENTARY AND RECOMMENDATIONS ON **10.1**.

This specification does not provide detailed requirements for kitchen ventilation. Such advice is of a specialist nature and can be obtained from HVCA Document DW/171 (Standard for Kitchen Ventilation Systems [13]*) or from HSE Catering Sheet 10* [33] *(see Annex B).*

Annex A provides a guide to ventilation of catering areas. For small installations, reference should be made to BS 5440-1 and BS 5440-2.

Low-pressure cut-off valves and safety proving systems are detailed in Publication BG IM/20 "Weep by-pass low-pressure cut-off systems" from IGE [29].

Where gas fired heaters are fitted to pre-heat any make-up air supplies into a kitchen, they should conform to BS 6230.

10.2 Where cleanable grease filters are fitted, they shall be accessible and shall not be obstructed by any appliance. The canopy shall be designed such that grease cannot collect and be trapped in areas that cannot be cleaned.

11 Safety precautions

11.1 Fire precautions

11.1.1 Appliances and any associated flue systems shall be separated from combustible materials in accordance with the appliance and flue manufacturer's instructions.

11.1.2 Escape routes shall not be impeded by the installation of appliances.

11.1.3 Ducts for pipework and extract/supply ventilation passing through walls, floors and ceilings shall be designed and installed in accordance with BS 8313.

11.2 Combustible gas and carbon monoxide detectors

Only detectors designed to operate in a commercial catering environment shall be fitted. They shall give an audible alarm and shall be linked with an automatic gas shut-off system. Detectors shall be installed in accordance with the manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **11.2**.

Domestic types of carbon monoxide detectors that conform to EN 50291 should not be used in commercial hospitality environments unless they are designed to work in those environments.

Carbon monoxide detectors, which may be suitable for catering environments, should reliably detect levels of CO at lower concentrations than generally considered appropriate due to the high rates of ventilation air. If fitted, they should also form part of a control system that at low concentrations sounds an alarm and initiates an increased level of ventilation followed by isolation of the gas supply if concentrations continue to rise. If additional ventilation is not fitted, gas shut off should be initiated at low concentrations.

Kitchen operators should be advised that where a flammable gas or a CO detector is fitted, a notice should be displayed in a prominent place drawing attention to the need, in the event of an alarm, to evacuate premises, to isolate the gas supply and not to use water to extinguish the flame.

12 Maintenance

12.1 Gas-fired appliances shall be installed in a safe manner maintained by a competent person (see **6.1.1**) to ensure safe and hygienic operation.

12.2 Appliances shall not be modified other than as specified by the manufacturer. All work shall be carried out by a competent person and shall not adversely affect appliance safety.

COMMENTARY AND RECOMMENDATIONS ON **12.2**.

Many older appliances are not fitted with adequate safeguards e.g. flame safeguards, water failure systems or steam safety systems, mechanical protection systems. Alternative components can only be used if so specified by the appliance manufacturer (see also HSE Catering Information Sheet 3) [19].

13 Commissioning

13.1 General

The installation shall be commissioned by a competent person (see **6.1.1**) in accordance with the manufacturer's instructions or if not available, reference shall be made to IGE UP/4 [30] for the preparation of such instructions.

13.2 Installation pipework

All new gas installation pipes upstream of the appliance or appliance group isolating valve shall be tested for soundness and purged.

COMMENTARY AND RECOMMENDATIONS ON **13.2**.

Procedures are described in IGE Publication UP/1 [31]*, Soundness Testing and Purging of Industrial and Commercial Gas Installations or UP/1A Soundness Testing and Purging of Small, Low-Pressure, Industrial and Commercial Natural Gas Installations* [32].

13.3 Appliances

13.3.1 All pipework between the isolating valve (see **13.2**) and the appliance shall be tested for leakage with no perceptible drop of a water pressure gauge over a period of two minutes at a pressure of not less than the operating pressure and not more than 1.5 times operating pressure.

Following a successful pressure test, the pipework shall be purged of air. A procedure for purging through appliance burners is given in IGE UP/1A [32]. Where this is not possible, the purge shall be through a vent stack (or flare burner in the case of LPG).

COMMENTARY AND RECOMMENDATIONS ON **13.3.1**.

Other types of pressure gauges e.g. an electronic manometer, may be used providing the sensitivity of the test is not reduced. The 2 minute test period assumes that the pipe volume is less than 0.15 m^3.

In order not to have a false pressure test due to lock-up of any appliance regulator it is recommended that either:-

a) *a by-pass using small bore rubber tubing is fitted across each appliance regulator; or*

b) *each appliance regulator is screwed down to its maximum outlet pressure setting. In this case it is essential that the gas test pressure is applied slowly to prevent regulator lock-up and that regulators are reset according to the manufacturer's instructions on completion of the test.*

Procedures are described in IGE Publication UP/1 [31]*, Soundness Testing and Purging of Industrial and Commercial Gas Installations or UP/1A* [32] *Soundness Testing and Purging of Small, Low-Pressure, Industrial and Commercial Natural Gas Installations.*

13.3.2 Each appliance shall conform to the appliance manufacturer's commissioning instructions. Commissioning shall ensure that flame failure systems, thermostats, overheat cut-off devices, fans, air flow proving devices, solenoid valves and steam and water pressure controls etc., are functioning correctly and that the burner pressure has been adjusted to that stated on the data plate.

Adjusters set and sealed in the factory shall not be adjusted by the installer or commissioning engineer, unless permitted in the manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **13.3.2**.

A duplicate copy of commissioning instructions should be obtained from the appliance manufacturer (if available) to ensure the correct procedures are applied.

If these are not available, a competent person should prepare them.

13.3.3 The installer shall provide the user or his/her representative with all instructions provided by the appliance manufacturer for each appliance.

13.3.4 The installer shall advise the user or their representative of the need for regular servicing by a competent person, of each appliance, at periods recommended by the appliance manufacturer.

13.3.5 The installer shall advise the user or their representative of the cleaning requirements of each appliance and the need to employ a competent person for any relevant gas "work" on a gas appliance, including dismantling and re-assembly of gas-fired appliances when major kitchen cleaning takes place (see Clause **6.1.1**).

COMMENTARY AND RECOMMENDATIONS ON **13.3.5**.

The definition of relevant gas "work" is given in Clause **6.1.1** *and the Gas Safety (Installation and Use) Regulations 1998* [1].

13.3.6 All newly installed second-hand appliances shall be fully re-commissioned to ensure that all gas safety and burner controls are operating correctly. This may include, amongst others, thermostats, overheat cut-off devices, fans, air flow proving devices, solenoid valves, etc.

13.3.7 The commissioning engineer shall advise the user on the correct operation and daily maintenance requirements of the gas-fired appliance, its restraints and flexible connections.

Annex A (informative)
Ventilation rates

Typical ventilation rates for gas appliances are specified in Table A.1.

Table A.1 — Typical ventilation rates

Appliance	Ventilation rate m^3/min	Ventilation rate m^3/min per m^2 of appliance
Bain-marie	12	18
Cafe boiler	15	18
Sterilizing sink	15	36
Boiling pan	18	36
Grill	27	54
Pastry oven	18	18
Single oven range	18	18
Steamer	18	36
Deep fat fryer	27	36
Char-grill	18	54

NOTE Steam producing appliances, grills, char-broilers and fryers need more ventilation when grouped together.

The areas, taken from the ventilation rate, are based on a wind speed of 1 m/s.

Annex B (informative)
Ventilation of kitchens in catering establishments

NOTE This information is provided by courtesy of the Health and Safety Executive, and is a copy of its CATERING INFORMATION SHEET No. 10, *Ventilation of Kitchens in Catering Establishments* [33].

B.1 Introduction

This guidance has been agreed by the Health and Safety in Catering Liaison Committee consisting of trade and professional associations, unions and enforcement authorities. They consider this to be some of the most important guidance produced by them. It is intended that it will be copied on through all member associations and others to reach all catering establishments and all hospitality staff. It is also available on the Internet.

This guidance provides the information a caterer will need for assessing the adequacy of existing ventilation systems and guide caterers and building owners when planning a new or refurbished kitchen. It advises on management as well as design and performance issues, specific to catering.

B.2 The importance of kitchen ventilation

The Health and Safety in Catering Liaison Committee considers the lack of adequate kitchen ventilation to be a major problem in catering. Based on their wide experience of kitchens and industry surveys, around 65 % of kitchens may have inadequate ventilation. It considers that adequate ventilation is fundamental to achieving control of health and safety risks in kitchens as well as general hygiene control and food safety. Until now (1997) no suitable guidance has been available; hence the committee considers this information sheet to contain some of the most important guidance it has produced.

This guidance is particularly important when using gas-fired appliances because of the risks from incomplete combustion and inadequate flueing, but most aspects also apply when other energy sources are used.

B.3 Ventilation objectives

Catering brings an exceptional concentration of heat and fumes into a small area. There are particular objectives which the ventilation has to achieve. Problems occur all too often in catering because these objectives are not met. The objectives include the following.

a) The general ventilation through the kitchen has to introduce sufficient clean, cool air and remove excess hot air for the occupants to breathe adequately and remain comfortable. The stressful working conditions caused if this is not achieved can contribute to safe systems of work not being followed, as well as high staff turnover.

b) The general ventilation through the kitchen has to introduce sufficient clean, cool air and remove excess hot air for the occupants to breath adequately and remain comfortable. The stressful working conditions caused if this is not achieved can contribute to safe systems of work not being followed, as well as high staff turnover.

c) The general ventilation has to provide sufficient air for complete combustion at burning appliances, otherwise chronic debilitating carbon monoxide poisoning could occur.

d) The general and local ventilation has to dilute and remove products of combustion from gas and oil-fired appliances.

e) The general and local ventilation has to dilute and remove odours, vapours and steam from the cooking processes. Local ventilation has to protect against particular hazards to health arising from some cooking fumes, such as those involving direct application of heat to the food.

f) The local ventilation has to be capable of being kept clean from fat residues to avoid loss of efficiency and fire risks.

g) The system has to be quiet and vibration free and have clean incoming air which is neither too hot nor too cold for the staff to keep it switched on.

h) Overall the caterer has to match the ventilation to the cooking load, to the amount of equipment used and to the numbers of staff and customers. The caterer and installer have to know how to utilize the information on ventilation requirements which suppliers now have to give with new gas appliances.

B.4 Features of an effective kitchen ventilation system

NOTE Existing systems should be assessed and new systems planned to meet these ventilation objectives. The guidance given below indicates the design features and criteria which have been found suitable and effective in catering kitchens.

B.4.1 *Canopies: design*

Air needs to be removed at a constant rate from cooking and subsidiary areas, to take away combustion fumes and cooking odours as close to source as possible.

It is advisable that the bulk of extraction from the kitchen is via hoods above gas-fired and all other appliances capable of generating heat, water vapour, fumes and odours.

The plan dimension of the canopy is recommended to exceed the plan area of cooking appliances. An overhang of (250 to 300) mm all round for island canopies is normally adequate. Wall-mounted canopies normally have a front overhang of 250 mm at the front and 150 mm at the ends. Greater overhangs may be required at some appliances. Canopies should not be so low as to form an obstruction.

Canopies and ductwork need to be constructed from non-combustible material and fabricated so as not to encourage accumulations of dirt and grease, nor allow condensation to drip from the canopy. The ductwork needs suitable access for cleaning and grease filters need to be readily removable for cleaning/replacement. Experience will indicate how frequently cleaning is needed.

The design and performance of canopies need to be effective in removing cooking fumes from source, and as far as possible, prevent them from passing through the breathing zone of the cook.

B.4.2 *Canopies: performance*

The amount of air to extract via the canopies is best calculated from the information supplied with the appliances within the kitchen, and not by simply using general advice on air changes alone. For example, the air velocities over the hood face specified for individual items can be added up to give the total air movement.

Where the ventilation requirements of cooking equipment are not available, an approximate air flow rate in litres per second (L/S) can be calculated from the total hood size and the following minimum hood face velocities: 0.25 m/s for light; 0.4 m/s for medium and 0.5 m/s for heavy duty cooking.

Ventilation rates are best specified as air velocities into the canopy rather than standard air changes per hour. Where canopies are not used (e.g. ventilated ceilings) the ventilation rates needed can be calculated by a competent designer taking account of room sizes and usages. As a guide, a ventilation rate of not less than 17.5 L/S per square metre of floor area and not less than 30 air changes per hour (ACH) is advisable. A lower ACH figure (e.g. 10) may be needed to avoid discomfort from draughts where the kitchen is sub-divided into separate rooms (e.g. wash-ups, vegetable preparations).

B.4.3 *Replacement air*

Air to replace that extracted and used by combustion needs to be replaced. Typically 85 % of the total air needed is supplied by a mechanical ventilation system together with 15 % make-up air drawn from adjoining areas.

This arrangement keeps the kitchen under negative pressure to prevent escape of cooking odours.

In smaller kitchens sufficient replacement air may be drawn in naturally via ventilation grilles in walls, doors or windows.

Where such incoming air is drawn in naturally some means of control over pest entry is usually required. If a fine mesh grille is used this will restrict the ventilation, but a larger overall grille size can compensate.

However, for larger installations this would require a grille so large that a mechanical system using a fan and filter would be more suitable.

The air needs to be drawn from an adjacent area where it is clean. Where smoking is allowed (e.g. in an adjoining dining room) it is advisable not to draw this air into the kitchen as make-up air.

Where make-up air is drawn via serving hatches or counters it is recommended the air velocities do not exceed 0.25 m/s to avoid complaints of draughts. However, higher velocities may be tolerated or desirable at hot serving counters. The incoming air from the ventilation system needs to be arranged so as not to adversely affect the performance of the flue at any open flued gas appliances.

The make-up air can be drawn in through permanent grilles, but they need to allow for between 1.0 and 1.5 m/s air flow velocity.

B.4.4 *Cooling air*

The effective balancing of incoming air and extracted air, together with removal at source of hot vapours as above should help prevent the kitchen from becoming too hot. The replacement air inlets from any mechanical ventilation systems can be positioned to provide cooling air over hot work positions.

If this is still not enough, some form of overhead air outlet discharging cool air or air conditioning may be required.

Local free-standing fans are not recommended. They may spread micro-organisms or set up air currents or turbulence affecting the efficiency of the designed ventilation systems. They also introduce other hazards such as tripping and electric shock hazards from the trailing cable. As part of a balanced ventilation system, fans fixed to the structure could be considered.

B.4.5 *Discharge*

High level discharge of extracted air with discharge velocities of about 15 m/s are often needed to prevent nuisance to neighbouring properties. “Chinaman’s hats” on discharge stacks are not recommended as they encourage down draught and re-entry of fumes into the building.

B.5 New ventilation systems

B.5.1 *The caterer*

Changes in catering processes will probably require ventilation changes or new systems. Competent advisors will often be needed and the caterer will need to provide detailed information for both the designer and the installer.

The caterer can tell them the maximum demands likely to be placed on the ventilation (e.g. to cope with peaks of activity): the amount and type of kitchen equipment; the menu; the number of meals; the number of staff.

The caterer should take all reasonable steps to ensure those appointed as advisors, suppliers and installers are competent with respect to health and safety. The caterer can check to see they will take the factors identified in this guidance into account and that they will refer to the technical guidance available (see later section) when designing the system.

The caterer should also consult the safety or employee representatives in good time about any significant changes.

Finally, after installation, the caterer is advised to keep records of design criteria, performance test, maintenance requirements and test and inspection. These can facilitate future maintenance, modification and testing to the original specification.

B.5.2 *The building owner or controller*

In some cases the owner or controller of the building provides the facilities such as equipment and ventilation which the caterer uses. In such cases they can follow the preceding advice in respect of ensuring adequate ventilation is provided. They can see the caterer provides the usage information and selects a competent design team as follows.

B.5.3 *The designer/design team*

The redesign of a kitchen will require a range of information, specialist knowledge and skills to ensure the interactions between usage, equipment, premises, ventilation and installation are fully taken into account. The various parties (owner, caterer, designer, supplier, installer etc.) will need to fully discuss their respective information needs and what information they can supply. This forms the design team.

The building services or ventilation design engineer will need to take account of:

— kitchen usage information (as earlier) from the caterer;

— equipment information from the caterer or supplier e.g. cleaning requirements, and the amount of air required for complete combustion and the performance of the existing installation;

— the requirements or specifications for air cleaning systems, e.g. for grease removal at the canopy and also before final discharge to outside atmosphere;

— the limitations of the building, e.g. the available room may influence the sites and routes for air inlets or discharges;

— food hygiene requirements, e.g. identify a suitable source for clean make-up air, prevent pest entry, avoid grease accumulations and ensure easy cleaning of the system;

— heat control and waste energy recovery to maximize energy efficiency;

— consider interlocking the ventilation power supply to the gas supply to ensure it will be used in practice.

Designers would then normally refer to industry technical guidance, e.g. The Heating and Ventilating Contractor's Association (Document DW/171) [13], CIBSE Chartered Institute of Building Services Engineers [34], or ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers (publications).

B.5.4 *The equipment installer*

The equipment installer will need to know the performance and capacity of the ventilation system. They can then ensure the supply and extract air will be capable of meeting the demands of the new item they are installing. This information could be available from the system designer (or for existing systems, from the caterer or building controller).

Where this information is not available (e.g. at some existing systems), measurement of the actual performance of the ventilation system may be required. That can often be provided by a heating and ventilating specialist. Or the manufacturer of the ventilation grille could give information on air flow capacity where make-up air enters via such grilles.

Before installing a gas-fired appliance the catering equipment installer will need to know the specific air inlet requirements. The manufacturer of new catering appliances has to provide this under the Gas Appliance Directive [1]. The installer can then check that the ventilation system conforms to these requirements, taking into account the other existing appliances. Information on the ventilation requirements of the existing appliances to enable this calculation could be obtained from the caterer's records, from the manufacturer's or by using the general guidance in this standard.

NOTE This information sheet contains notes on good practice which are not compulsory but which may be helpful in deciding what to do.

COMMENTARY AND RECOMMENDATIONS ON **B.5.4**.

This document may be used as a guideline for Environmental Health Officers (EHOs) to advise and enforce in catering premises.

Bibliography

Standards publications

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

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

BS 5440-2, *Installation of flues and ventilation for gas appliances of rated input not exceeding 60 kW (1st, 2nd and 3rd family gases). Specification for installation and maintenance of ventilation for gas appliances.*

BS 5720, *Code of practice for mechanical ventilation and air conditioning in buildings.*

BS 5809, *Specification for safety and efficiency of the gas heating equipment of commercial dishwashing machines.*

BS 5925, *Code of practice for ventilation principles and designing for natural ventilation.*

BS 5997, *Guide to British Standard codes of practice for building services.*

BS 6173, *Specification for installation of gas-fired catering appliances for use in all types of catering establishments (1st, 2nd and 3rd family gases).*

BS 6230, *Specification for installation of gas-fired forced convection air-heaters for commercial and industrial space heating (2nd family gases).*

BS 8206-1, *Lighting for buildings. Code of practice for artificial lighting.*

BS 8313, *Code of practice for accommodation of building services in ducts.*

BS EN 203-1, *Specification for gas heated catering equipment. Safety requirements.*

BS EN 203-2, *Specification for gas heated catering equipment. Rational use of energy.*

BS EN 203-3, *Specification for gas heated catering equipment.*

EN 50291, *Low-voltage switchgear and controlgear. Controller and device interface systems. Actuator sensor interface (AS-i)*

Other references

[1] GREAT BRITAIN Statutory Instrument 2451:1998. The Gas Safety (Installation and Use) Regulations. London: The Stationery Office.

[2] GREAT BRITAIN Statutory Instrument No. 2768:1991. The Building Regulations (as amended). London: The Stationery Office.

[3] GREAT BRITAIN Statutory Instrument No. 2179:1990. The Building Standards (Scotland) Regulations (as amended). London: The Stationery Office.

[4] GREAT BRITAIN Statutory Instrument No. 243:1994. The Building Regulations (Northern Ireland) (as amended). London: The Stationery Office.

[5] GREAT BRITAIN Statutory Instrument No. 635:1989. Electricity at Work Regulations London: The Stationery Office.

[6] GREAT BRITAIN Statutory Instrument No. 2306:1998. Provision and Use of Work equipment Regulations. London: The Stationery Office.

[7] GREAT BRITAIN Statutory Instrument No. 1629:1995. The Gas Appliances (Safety) Regulations. London: The Stationery Office.

[8] GREAT BRITAIN Statutory Instrument No. 1148:1999. The Water Supply (Water Fittings) Regulations (as amended).

[9] GREAT BRITAIN The Health and Safety at Work etc. Act 1974. London: The Stationery Office.

[10] GREAT BRITAIN Fire Precautions Act 1971. London: The Stationery Office.

[11] GREAT BRITAIN Statutory Instrument No. 1763:1995. Food Safety (General Food Hygiene) Regulations.

[12] *Reference deleted.*

[13] HVCA DW/171 Standard for Kitchen Ventilation Systems. Heating and Ventilating Contractors Association.

[14] BSRIA report 78610 Specification for Ventilation hygiene. Building Services Research and Information Association.

[15] A practical Guide to Ductwork Leakage Testing: Document DW/143. Heating and Ventilating Contractors Association.

[16] Specification for Sheet Metal Ductwork: Document DW/144. Heating and Ventilating Contractors Association.

[17] Internal Cleanliness of new Ductwork Installations: Document DW/TM2. Heating and Ventilating Contractors Association.

[18] Guide to Good Practice — Cleanliness of Ventilation Systems: Document TR/17. Heating and Ventilating Contractors Association.

[19] Workroom Temperatures in Places where Food is Handled: Document HSE F1 Sheet. Health and Safety Executive.

[20] ACOP (Advanced Code of Practice) — Standards of training in safe gas installation. Health and Safety Executive.

[21] Health and Safety in Kitchens and Food Preparation Areas: HSG/55, Safety in the installation and use of gas fittings and appliances: Document L56. Health and Safety Executive.

[22] Gas installation pipework, boosters and compressors in industrial and commercial premises: Document UP/2. Institute of Gas Engineers[2)].

[23] LPGA COP1-Pt 1 Bulk LPG Storage at Fixed Installations, Design, Installation and Operation of Vessels Located above Ground: Liquid Petroleum Gas Association.

[24] LPGA COP2-Pt 2 Bulk LPG Storage at Fixed Installations, Small Bulk Installations: Liquid Petroleum Gas Association.

[25] LPGA COP 1-Pt 4 Bulk LPG Storage at Fixed Installations, Below Ground Installations: Liquid Petroleum Gas Association.

[26] LPGA COP 22 LPG Piping System Design and Installation: Liquid Petroleum Gas Association.

[27] LPGA COP 24-Pt 3 The use of LPG in Mobile Catering Vehicles and Similar Commercial Vehicles: Liquid petroleum Gas Association.

[28] LPGA COP 24-Pt 4 The use of LPG for Catering and Outdoor Functions: Liquid Petroleum Gas Association.

[29] Weep by-pass low-pressure cut-off systems: Document IM/20. Institute of Gas Engineers.

[30] Commissioning of gas-fired plant on industrial and commercial premises Document UP/4. Institute of Gas Engineers.

[31] Soundness testing and purging of industrial and commercial gas installations Document UP/1. Institute of Gas Engineers[2)].

[32] Soundness testing and purging of small, low-pressure, industrial and commercial natural gas installations: Document UP/1A. Institute of Gas Engineers[2)].

[33] Ventilation of Kitchens in Catering Establishments: Document HSE C1 Sheet 10. Health and Safety Executive.

[34] The Chartered Institute of Building Services Engineers (CIBSE) Guide on the ventilation of kitchens.

[2)] Institute of Gas Engineers, 21 Portland Place, London W1N 3AF.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL