

# Specification for the installation and maintenance of open- flued, non-domestic gas-fired laundry appliances

ICS 97.060

## 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:

Boiler and Radiator Manufacturers' Association Ltd  
British Flue and Chimney Manufacturers Association  
BSI Consumer Policy Committee  
Catering Equipment Suppliers' Association  
Centrica plc  
Council for Registered Gas Installers  
Department of Trade and Industry  
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  
L P Gas Association  
Society of British Gas Industries  
Co-opted members

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## Foreword

This British Standard has been prepared by Technical Committee GSE/30 and comes into effect on 15 August 2005.

This standard reflects, where applicable, BS 7624:2004.

This specification has been prepared to address industry concerns about the safety of open-flued, non-domestic gas-fired laundry installations.

Attention is drawn to the hazards that exist in certain locations where the atmosphere or drying load can contain flammable vapours.

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.**

In particular, attention is drawn to the following statutory regulations:

- The Health and Safety at Work, etc, Act 1974 [1]
- The Management of Health and Safety at Work Regulations 1999 [2]
- The Dangerous Substances and Explosive Atmospheres Regulations 2002 [3]
- The Gas Safety (Installation and Use) Regulations 1998 [4]
- The Gas Safety (Installation and Use) (Northern Ireland) Regulations 2004 [5]
- The Gas Safety (Management) Regulations 1996 [6]
- The Electricity at Work Regulations 1989 [7]
- The Control of Substances Hazardous to Health Regulations 2002 [8]
- The Control of Asbestos at Work Regulations 2002 [9]
- The Gas Appliances (Safety) Regulations 1995 [10]
- The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 [11]
- The Provision and Use of Work Equipment Regulations 1998 [12]
- The Confined Spaces Regulations 1997 [13]
- The Construction (Design and Management) Regulations 1994 [14]
- The Construction (Health, Safety and Welfare) Regulations 1996 [15]
- The Pressure Systems Safety Regulations 2000 [16]
- The Building Regulations 2000, as amended [17]
- The Building (Scotland) Regulations 2004 [18]
- The Building Regulations (Northern Ireland) Statutory Rules 2000 [19]
- The Gas Safety (Application) Order 1996 (Isle of Man) [20]

### Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 19 and a back cover.

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## 1 Scope

This British Standard specifies the installation (see note) of non-domestic gas-fired tumble dryers and rotary ironers burning 2nd and 3rd family gases. This standard is applicable to both fixed and tilting tumble dryers.

The standard applies to open-flued laundry appliances only.

NOTE For the purposes of this standard, installation includes design, inspection and commissioning. It is recognised that each of these tasks can be performed by the same person.

## 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, *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 6891, *Specification for installation of low pressure gas pipework of up to 28 mm (R1) in domestic premises (2nd family gas).*

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.*

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

BS EN ISO 10380, *Pipework — Corrugated metal hoses and hose assemblies.*

## 3 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

### 3.1

#### **2nd family gas**

natural gases

### 3.2

#### **3rd family gas**

liquefied petroleum gases (LPG), including compressed propane and butane

### 3.3

#### **appliance flexible connector**

pipe with appropriate connector ends, designed to have a considerable degree of flexibility to facilitate the connection of a gas appliance to an installation pipe and allow the appliance to be moved a short distance without the need for disconnection [BS 669–1]

### 3.4

#### **braid**

layer(s) of cylindrically woven wires covering the hose

### 3.5

#### **commissioning**

process carried out to place and/or put a gas-fired appliance into operation, according to the manufacturer's specification

### 3.6

#### **cover**

any tubular outer cover used to improve the cleanliness and identification of an appliance flexible connector

**3.7**

**dilution**

mixture of air, products of combustion and lint

**3.8**

**direct gas-fired tumble dryer**

appliance in which textile material is dried by tumbling in a rotating drum through which heated air and products of combustion are forced or induced by mechanical means

**3.9**

**direct gas-fired rotary ironer**

appliance in which textile material is ironed by being passed across a rotating roller through which heated air and products of combustion are forced or induced by mechanical means

**3.10**

**dry cleaner**

appliance in which laundry is processed using solvents, e.g. perchloroethane

**3.11**

**drying load capacity**

maximum weight that a gas-fired laundry appliance is capable of accepting for each load, as specified by the manufacturer

**3.12**

**end fitting**

threaded component factory-fitted permanently to a flexible hose that allows gas-tight connections to other threaded pipework

**3.13**

**exhaust duct**

pipe used to transmit products of combustion and lint, together with the supersaturated warm drying air, to the outside atmosphere

**3.14**

**exhaust products**

gaseous mixture of air, water vapour, products of combustion and lint removed as a result of exhaust venting

**3.15**

**exhaust venting**

process of removing moist air, including products of combustion and lint, from an appliance in a room or internal space directly to the outside atmosphere

**3.16**

**lint**

fluff drawn off laundry fabrics being processed in the appliance

**3.17**

**make-up air**

permanent, non-closable air supply, specified by the manufacturer, that is required to replace that used by a laundry appliance during its operation

**3.18**

**open flue system (type B)**

flue system that evacuates the products of combustion to the outside air

NOTE The combustion air is drawn directly from the room or space containing the appliance.

**3.19**

**open-flued appliance (type B)**

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

**3.20****ventilation**

process of supplying fresh air to, and/or removing air, from a room, internal space, compartment or garage

**4 Competence**

Persons who carry out the work shall be competent.

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), as required by the Gas Safety (Installation and Use) Regulations [4 and 5].

Persons who design the system or installation shall 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.

**COMMENTARY AND RECOMMENDATIONS ON CLAUSE 4**

*At the 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). Therefore, it is essential that all businesses or self-employed gas installers are registered with CORGI.*

*Guidance on the individual competency required for gas work are those who, either hold a certificate of gas safety competence acceptable to CORGI which include (without limitation) the Accredited Certification Scheme (ACS) and/or the Gas Services S/NVQ that has been aligned to ACS.*

**5 Planning considerations and risk assessment****5.1 Design and planning**

The following shall be ascertained before planning of the installation begins:

- a) the availability of gas supplies;
- b) the availability of adequate ventilation;
- c) the proposed location of the laundry appliance in relation to doors, external walls (outside air) and to the probable position of fixtures, furniture and curtains;
- d) the electrical supplies available;
- e) the method of installation recommended in the laundry appliance manufacturer's literature;
- f) the availability of a stable and rigid base on which to site the laundry appliance;
- g) the likely proximity of the laundry appliance to other appliances;
- h) the best location for the make-up air inlet and exhaust grilles.

**COMMENTARY AND RECOMMENDATIONS ON 5.1**

*Collaboration is essential between those concerned with the design of laundry appliance installations and those responsible for installing the appliances, both at the planning stage and during the execution of the work.*

**5.2 Risk assessment**

Prior to the installation of any non-domestic laundry appliance, a risk assessment shall be carried out to ascertain the most appropriate location for the appliance.

**COMMENTARY AND RECOMMENDATIONS ON 5.2**

*The duty of an employer to carry out a risk assessment is imposed by The Management of Health and Safety at Work Regulations 1999 [2]. The risk assessment should cover, but not necessarily be limited to:*

- a) all matters described in this standard regarding installation requirements;
- b) matters affecting the health and safety of employees, self-employed and others during operation, maintenance, cleaning and installation.

*It might be necessary for persons with knowledge of different areas to be involved in the risk assessment, e.g. the gas installer or the laundry operator.*

*For more information, reference should be made to IGE/SR/24: Risk Assessment Techniques [21].*

## 6 Selection of laundry appliances

### 6.1 New laundry appliances

Any new laundry appliance selected for installation shall be one that has been marked by the manufacturer as being suitable for the gas with which it is to be used. It shall also be suitable for its intended location (see Clause 7).

The installer shall ensure that any new laundry appliance selected for installation is CE marked.

### 6.2 Used laundry appliances

Only used laundry appliances with which the manufacturers' instructions are supplied or are otherwise available shall be selected for installation.

#### COMMENTARY AND RECOMMENDATIONS ON CLAUSE 6

*For a tumble dryer, the drying load capacity should be borne in mind during selection, together with the intended location and the provision of make-up air (see Clause 10) and exhaust venting, being particularly mindful of manufacturer's maximum permitted exhaust runs (see Clause 12).*

*For rotary ironers, the size of the laundry to be ironed through the roller should be borne in mind during the selection, together with the intended location, the requirements for space to feed and return the laundry from the iron, and the provision of make-up air (see Clause 10) and exhaust ducting, being particularly mindful of manufacturer's maximum permitted exhaust runs (see Clause 12). A typical rotary ironer is illustrated in Figure 1.*

*The laundry appliances covered by this standard are generally stand-alone. Appliance flexible connectors, ducting and make-up air grilles are not supplied with these laundry appliances.*

*The installer should check the data given with a laundry appliance to establish the basis on which the heat input is quoted.*

*For the purposes of this standard the ratio of gross: net heat input is 1:1.11. For example, to convert a 5kW input appliance, gross c.v. to the equivalent net c.v. heat input, the following equation is used.*

*$5/1.11 = 4.504 \text{ kW heat input.}$*

#### **New laundry appliances**

*Of the laundry appliances covered by this standard, new laundry appliances fall within the scope of the European Gas Appliances Directive [22], implemented in the UK by the Gas Appliances (Safety) Regulations [10], which require new laundry appliances to be CE marked. Accordingly, the installer should check that the laundry appliance is CE marked.*

*The installer should ensure that the packaging and the laundry appliance itself are marked with at least the following information:*

- a) The letters "GB";
- b) The type of gas and appliance inlet pressure as follows:
  - 1) for an appliance adjusted for natural gas, G20 and/or natural gas 20 mbar plus the designation  $I_{2H}$ ;
  - 2) for an appliance adjusted for butane, G30 and/or butane 29 mbar plus the designation  $I_{3B}$ ;
  - 3) for an appliance adjusted for propane, G31 and/or propane 37 mbar plus the designation  $I_{3P}$ ;
  - 4) for an appliance which will burn either butane or propane gas at the correct pressure, G30/G31 and/or butane/propane 29/37 mbar plus the designation  $I_{3+}$ .

*Where a laundry appliance's data plate carries the letters CAT I or CAT II followed by gas type designations, (i.e.  $_{2H}$ ,  $_{2P}$ ,  $_{2B}$ ), then the laundry appliance may be used for different types of gases when adjusted to do so.*

*In such a case, the installer should ensure that the laundry appliance is correctly adjusted.*

**Used laundry appliances**

*The original packaging is generally not available with used laundry appliances. These might or might not carry the “CE” mark. Where the manufacturer’s instructions are not available, these have to be obtained from the manufacturer or his agent before installation of the laundry appliance begins.*

*Where the laundry appliance carries the “CE” mark, the appliance data plate is likely to carry the information on type of gas and appliance inlet pressure. In such a case, the installation should proceed in accordance with the laundry appliance manufacturer’s instructions.*

*Where the laundry appliance does not carry a “CE” mark, it has to be borne in mind that other criteria could apply, such as surface temperatures, appliance stability, ventilation, etc., and these need to be taken into account in the method of installation. The installer should satisfy himself that the laundry appliance is safe in construction and condition, and can be used without constituting a danger.*

*A used laundry appliance has to be sold with a set of manufacturer’s instructions for safe installation.*

**All laundry appliances**

*The installer should, in all cases, refer to the data plate and/or take other steps to ensure that the laundry appliance is suitable for the pressure and type of gas to be burnt. Conversion to another gas, if necessary, should be carried out strictly in accordance with the manufacturer’s instructions using the manufacturer’s kit of parts.*

*If there is any doubt as to the suitability of a laundry appliance for a particular gas, then the laundry appliance manufacturer should be consulted.*

*Further information on the labelling of gas appliances is given in DD 221.*

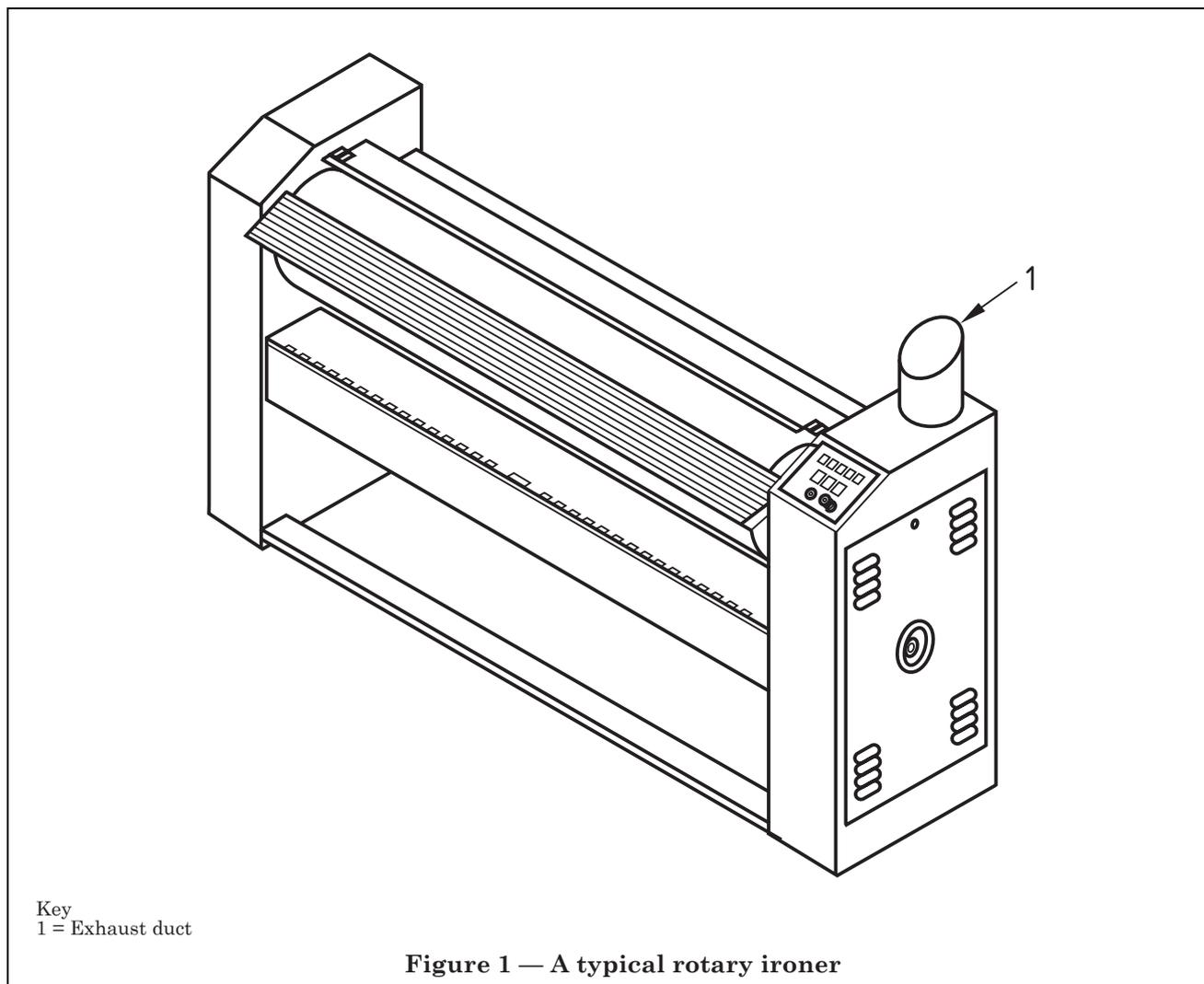


Figure 1 — A typical rotary ironer

## 7 Location of laundry appliances

### 7.1 General installation

**7.1.1** A laundry appliance shall be installed in accordance with the manufacturer's instructions.

**7.1.2** A laundry appliance shall not be installed in a room containing a bath or shower.

**7.1.3** Where a laundry appliance is to be installed in the same location as a dry cleaner, it shall be separated by a minimum distance of 5 m or installed in a separate room.

#### COMMENTARY AND RECOMMENDATIONS ON 7.1.3

*This is intended to prevent the production of phosgene gas from the interaction of the dry-cleaning chemicals with the burner flame within the laundry appliance.*

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

#### COMMENTARY AND RECOMMENDATIONS ON 7.1.4

*This does not preclude the installation of such appliances in rooms or internal spaces which are below ground level with respect to one side of the building but open to ground level on the opposite side.*

## 7.2 Siting of laundry appliances

**7.2.1** Siting shall be in accordance with the manufacturer's instructions, taking account of the intended user's needs.

### COMMENTARY AND RECOMMENDATIONS ON 7.2.1

*Aspects to consider with regard to siting are as follows.*

- a) The laundry appliance should be conveniently positioned in relation to other appliances and allow adequate access for maintenance.*
- b) Locations that restrict the use of the laundry appliance's doors and other doors, furniture or utensils should be avoided. It should be noted that some vertically hinged loading doors are reversible, i.e. capable of left- or right-hand hinge selection.*

**7.2.2** Clearance around the laundry appliance or within an enclosure shall be in accordance with the manufacturer's instructions regarding the supply of air, the method of venting and protection against excessive temperatures.

### COMMENTARY AND RECOMMENDATIONS ON 7.2.2

*Where the laundry appliance is within an enclosure, ventilation openings should not be obstructed and ease of appliance maintenance should be unimpaired. Both the ventilation and the exhaust should terminate directly to the outside atmosphere. Protective cladding, which is insulating material that can be specified by the appliance manufacturer and is fitted between the appliance case and any adjacent combustible material, can reduce the amount of clearance required.*

**7.2.3** To ensure safe operation of a tumble dryer when fully loaded or a rotary ironer at full roller speed, the laundry appliance shall be sited on a rigid and stable base of non-combustible materials. Space shall be provided around the laundry appliance in accordance with the manufacturer's installation instructions to facilitate maintenance and correct and safe operation.

### COMMENTARY AND RECOMMENDATIONS ON 7.2.3

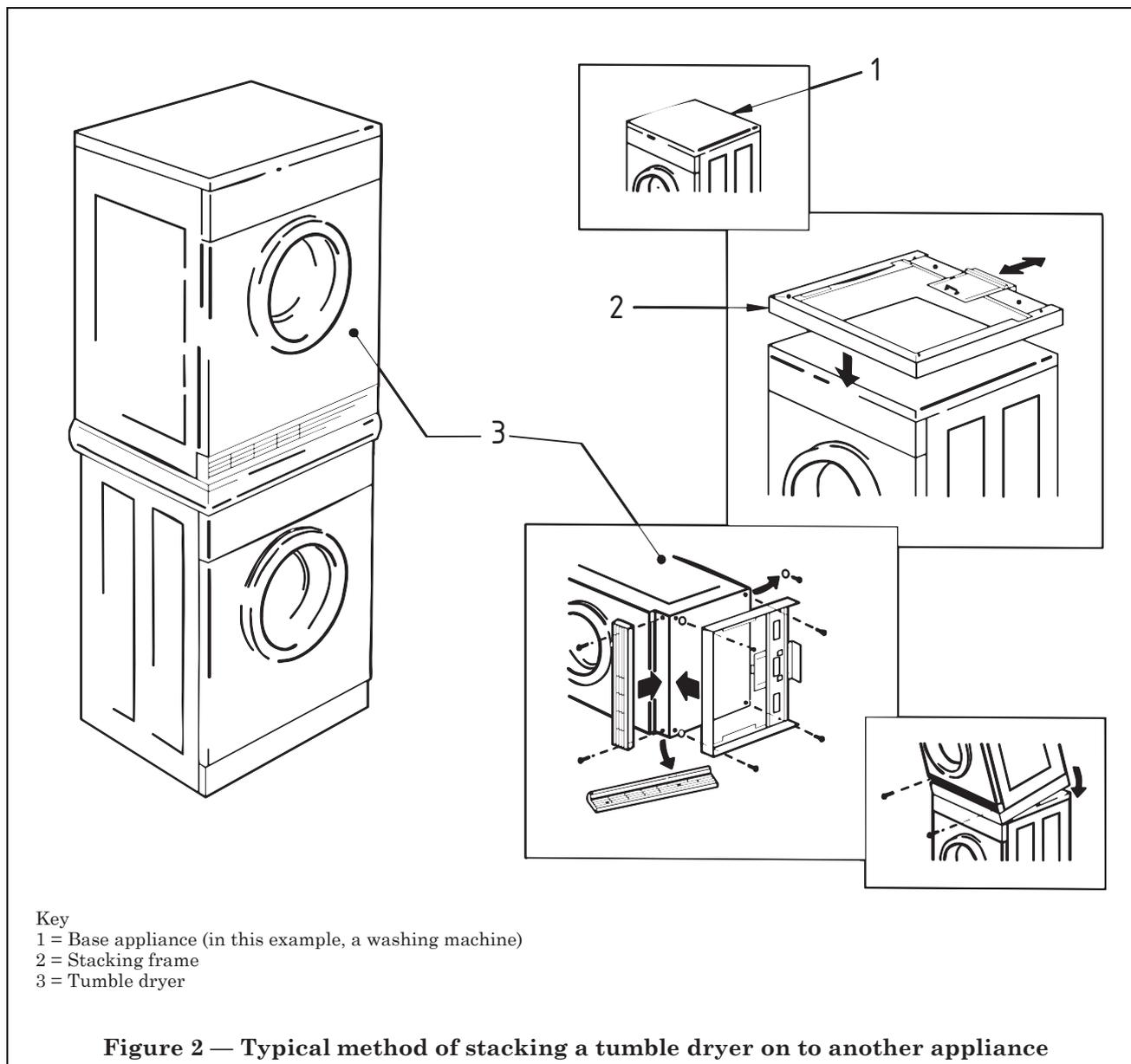
*The bottom of the laundry appliance should be levelled on the base in accordance with the appliance manufacturer's instructions.*

**7.2.4** A tumble dryer shall only be stacked on another stable appliance where the manufacturer's instructions permit such a practice and provided the stacking kit recommended by the manufacturer is used.

### COMMENTARY AND RECOMMENDATIONS ON 7.2.4

*The method of fixing the stacking frame included with the manufacturer's recommended stacking kit should be followed. Care should be taken to ensure that no existing wall ventilator is blocked or obstructed by the stacking of the laundry appliance. Attention is drawn to 8.1 regarding the need to fit a restraining device to a stacked laundry appliance. Figure 2 illustrates a typical method of stacking a tumble dryer on another appliance using a stacking kit.*

*Some models of dryer can be marketed as a "stacker", "stack dryer" or similar. This refers to an arrangement where one tumble dryer is mounted on top of another. Sometimes, to highlight this, the individual units are called "pockets". For installation purposes, each "pocket" should be considered an individual tumble dryer, and the make-up air should be allowed for each "pocket".*



## 8 Gas connections

### 8.1 General

Only gas installation pipes and an appliance flexible connector of sufficient size to maintain the heat input of the laundry appliance, as specified by the manufacturer, shall be used.

A laundry appliance shall have its own readily accessible isolation valve for servicing purposes. Where several gas-fired appliances are installed in the same room, a readily accessible means of isolating all the gas in the room shall be provided: this shall not be located inside a locked enclosure.

Final connection shall be by means of an appliance flexible connector conforming to BS 669-2 or an armoured hose conforming to BS EN ISO 10380, sheathed or unsheathed, dependent on location, and marked by the manufacturer as suitable for the family of gas to be utilised.

The flexible connector used shall be sized to deliver the minimum gas input specified by the appliance manufacturer for the correct and safe operation of the laundry appliance. A means of restraining the

laundry appliance shall be fitted so as to prevent the appliance flexible connector being subjected to unnecessary strain.

The location of the termination point and appliance flexible connector shall be in accordance with the manufacturer's instructions. The termination point and the hose shall be installed such that they cannot suffer mechanical damage or undue forces either in anticipated normal use or whilst being disconnected

Testing and purging of the gas pipework shall be in accordance with the Institution of Gas Engineers and Managers publications, IGE/UP/1 [23], IGE/UP/1A [24], IGE/UP/1B [25] and/or LP Gas Association (LPGA) TM:62 [26], dependent on pipe volume.

#### COMMENTARY AND RECOMMENDATIONS ON 8.1

*Means of restraining a laundry appliance can involve a suitably sized restraining wire or physically anchoring the chassis of the laundry appliance to the floor. If the laundry appliance is anchored to the floor, a notice to this effect should be attached to the appliance.*

*In general, the installation pipework to each laundry appliance need not exceed 28mm, in which case the gas installation, tightness testing and purging should be carried out in accordance with BS 6891, IGE/UP/1B [25] and LPGA TM/62 [26], respectively.*

*Where the installation pipework does exceed 28 mm diameter, additional certificates of competence to those listed in the Commentary and Recommendations on Clause 4 are required.*

*The laundry appliance installation, gas tightness testing and purging should be carried out in accordance with IGE/UP/2 [27] and IGE/UP/1 [23], IGE/UP/1A [24] or LPGA TM/62 [26] (dependent on pipe volume), respectively.*

*There is no dedicated British or European standard specifying the selection of armoured hoses intended for connection to non-domestic laundry appliances. Hoses which may be regarded as suitable for non-domestic laundry appliances are those which conform to BS EN ISO 10380 and have the following characteristics:*

- a) pressure rating of PN 2.5;
- b) stainless steel grade: 1.451, 1.4404, or 1.4306;
- c) braided armouring;
- d) flexing class: Type 1;
- e) where an outer plastic cover is fitted, this should:
  - 1) be a tight fitting, smooth, non-chlorinated outer cover that extends over all parts of the flexible metallic hose;
  - 2) be capable of being bent or flexed and fit tightly on the end connections;
  - 3) have no adverse impact on the performance of the metallic hose (see BS 669-2);
  - 4) have a minimum wall thickness of 0.5mm after fitting;
  - 5) be coloured yellow ochre in accordance with BS 4800:1989, colour code 08C35 or 10E53.

*The hose assembly used should be of welded construction, with fittings manufactured from materials conforming to BS EN ISO 10380.*

*Where the operational conditions require, as perhaps identified by a risk assessment (see 5.2), the hose selected should be one that is fitted with additional protection. One method of achieving this would be to specify a hose with a metallic outer protection coil running down the length of the assembly.*

#### 8.2 Connections for 2nd family gases

The gas installation pipe selected for connection to the termination point shall conform to BS 6891 or IGE/UP/2 [27], as appropriate.

#### 8.3 Connections for 3rd family gases

The gas installation pipes to the termination point shall be installed in accordance with BS 5482-1 or the LP Gas Association's (LPGA) Code of Practice 22, "LPG Piping System Design and Installation" [28], or IGE/UP/2 [27], as appropriate.

Testing and purging of the gas pipework shall be in accordance with the LPGA publication, "TM/62: Gas Soundness Testing of LPG Service Pipework, Installation Pipework and Appliances" [26] or IGE/UP/1 [23].

#### **8.4 Emergency isolation system**

A manually operable valve shall be fitted to the gas supply for a non-domestic laundry installation to enable it to be isolated in an emergency. Wherever reasonably practicable this valve shall be located either outside the laundry installation 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 an emergency stop button or control in a readily accessible position near the exit. An electric isolation valve shall either conform to BS EN 161 or, if it has an integral free handle reset facility, to BS 7461.

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.

The gas supply system shall be positively interlocked with any fan-assisted make-up air supply or extract system. The decision shall then be taken as to whether an automatic valve is to be fitted.

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:

“WARNING: IN THE EVENT OF AN EMERGENCY, THE GAS ISOLATION VALVE MUST BE CLOSED.”

Where an electrical isolation valve isolates areas outside of the immediate location in which the laundry appliance is installed, the details of other areas affected and the procedures for reinstating the gas supply shall also be given in the notice.

### **9 Electrical connections**

Each laundry appliance requiring a mains electrical supply shall be connected in accordance with BS 7671.

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

Any flexible electrical cable used shall conform to the voltage and current requirements of the laundry appliance and be long enough for the laundry appliance to be withdrawn for cleaning, servicing, etc.

Any electrical connection shall be made in accordance with the laundry appliance manufacturer's instructions regarding connection method, fuse rating, earth connection and voltage range.

Only electrical components designed for use with the electrical supply voltage and of a rating sufficient to carry the electrical current required by the operation of the equipment shall be used.

#### **COMMENTARY AND RECOMMENDATIONS ON CLAUSE 9**

*Examples of electrical connections are as follows.*

- a) A fused double pole switch fitted with a correctly rated fuse suitable to the environment and conforming to BS EN 60529.*
- b) A heavy duty switched plug and socket assembly conforming to BS EN 60309-1 and BS EN 60309-2 protected by a fuse rated according to the laundry appliance manufacturer's instructions.*
- c) A fused 13 Amp plug and socket, switched or un-switched, or a fused switched spur conforming to BS 1363 and fitted with a fuse rated according to the laundry appliance manufacturer's instructions. This might not be suitable for wet and humid environments.*

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

### **10 Exhaust system**

The exhaust system to be installed shall:

- a) discharge to the outside atmosphere (see Clauses 11, 12, 13 and 14);
- b) present a minimal resistance to airflow;
- c) be of smooth bore metal construction, as short as possible and have a minimum number of bends and changes in direction;

- d) include provision for internal access for cleaning and maintenance;
- e) be capable of withstanding temperatures up to 80 °C for tumble dryers and 110 °C for rotary ironers.

Where the laundry appliance is to be fixed to an existing exhaust system, it shall only be fixed to a system which has these characteristics.

#### COMMENTARY AND RECOMMENDATIONS ON CLAUSE 10

*The exhaust ducting is intended to remove the products of combustion, lint and the water vapour formed during the operation of the laundry appliance. The dilution of products of combustion to air commonly exceeds 1:40.*

*The method and design of the ducting for the exhaust has a major effect on the efficiency of the installed laundry appliance(s). Table 1 and Table 2 demonstrate that laundry appliances require a substantial amount of fresh air for correct operation, which should be removed through the exhaust duct and discharged to the outside atmosphere in a safe and satisfactory position.*

**Table 1 — Air flow and minimum free air ventilation requirements according to drying load capacity for tumble dryers**

Dry loading capacity kg (lb)	Air flow m <sup>3</sup> /min (ft <sup>3</sup> /min)	Make-up air free cross-sectional area cm <sup>2</sup> (in <sup>2</sup> )
13 (30)	9.9–19.8 (350–700)	1 000 (155)
23 (50)	19.8–22.7 (700–800)	1 500 (233)
34 (75)	22.7–32.6 (800–1150)	2 250 (349)

**Table 2 — Air flow and minimum free air ventilation requirements according to drying load capacity for rotary ironers**

Ironer bed length m	Air flow m <sup>3</sup> /min (ft <sup>3</sup> /min)	Make-up air free cross-sectional area cm <sup>2</sup> (in <sup>2</sup> )
0.8–2.1	4.17–16.7 (147–589)	1 000 (155)
2.2–3.6	5–20 (177–706)	1 500 (233)

## 11 Flexible exhaust ducting connections for tumble dryers

The exhaust duct connection shall be as specified by the tumble dryer manufacturer. It shall not exceed 2m in length and shall be capable of withstanding the maximum known output temperature [see item 10e)]. However, the internal bore of the flex section of the exhaust duct connection shall be maintained throughout its length, i.e. it shall not be kinked or deformed. There shall be no direction changes.

#### COMMENTARY AND RECOMMENDATIONS ON CLAUSE 11

*A very short length flexible ducting specified by the appliance manufacturer may be utilised to make the final connection to the laundry appliance.*

## 12 Ductwork

The exhaust duct shall be supported throughout its length, and all joints shall be sealed. Sections of ductwork shall be joined with mechanical fixings, e.g. screws or rivets, and sealed with self adhesive tape suitable for the type of surface to which it is to be affixed and capable of maintaining its seal throughout the range of temperatures to which it is expected to be subjected.

In the case of single duct designs for multiple tumble dryer installations, the minimum overall cross sectional area of the duct shall be equal to or greater than the total sum of the cross sectional areas of all the dryer exhaust outlets.

Inspection openings shall be provided along the ductwork where appropriate, and be sized such as to facilitate maintenance of the duct, e.g. manual removal of lint.

Ancillary equipment shall not be added to the ducting unless this is required by the manufacturer's instructions.

Ductwork shall only serve one type of laundry appliance installation, and shall be of the single skin type.

Filters shall not be fitted to any ductwork.

Fire dampers shall be fitted within the ductwork, as appropriate. Where these are fitted these shall be positively interlocked with the gas supply.

#### COMMENTARY AND RECOMMENDATIONS ON CLAUSE 12

*Other acceptable forms of sealing ductwork include high temperature silicon sealants. The advice of the ductwork manufacturer should be sought before using such sealing materials.*

*Where sections are joined intrusions into the airflow should be minimized, i.e. any self-tapping screws or rivets should be as short as possible so as not to restrict airflow or act as an obstruction or gathering lint. Small quantities of lint move with the air flow and, for this reason, neither filters nor grilles should be fitted.*

*The ideal design is a straight, short, smooth-bore duct pipe from the outlet of the laundry appliance directly to the outside atmosphere at the outlet level of the dryer, with a down-turned terminal and no grille. In all cases, the manufacturer's installation instructions should be followed.*

*The characteristics of ductwork for laundry appliance exhausts vary between appliance types. Therefore, laundry appliance ducts should serve only one type of appliance.*

*The maximum length of ductwork should never exceed that specified by the ductwork manufacturer.*

*Fire dampers might be required by local bylaws, regulations, fire authorities, etc. Where fire dampers are required, the size of the duct should be increased to overcome the pressure-loss arising therefrom.*

### 13 Termination

**13.1** An unrestricted, open-ended termination that prevents ingress of weather whilst protecting the airflow from prevailing winds shall be used.

The termination shall be free of all filters and, where the termination is fitted with integral louvres, i.e. a plenum box, the termination shall be upsized to minimize resistance to the airflow and prevent lint build-up.

The termination shall:

- a) allow the exhaust and all its components to clear to the outside atmosphere;
- b) not allow a build up of lint to occur;
- c) prevent ingress of the weather; and
- d) not impair the operation of the laundry appliance(s).

#### COMMENTARY AND RECOMMENDATION ON 13.1

*The termination in the outside atmosphere can have a detrimental effect on the overall efficiency of the laundry appliance(s) if this impairs the airflow.*

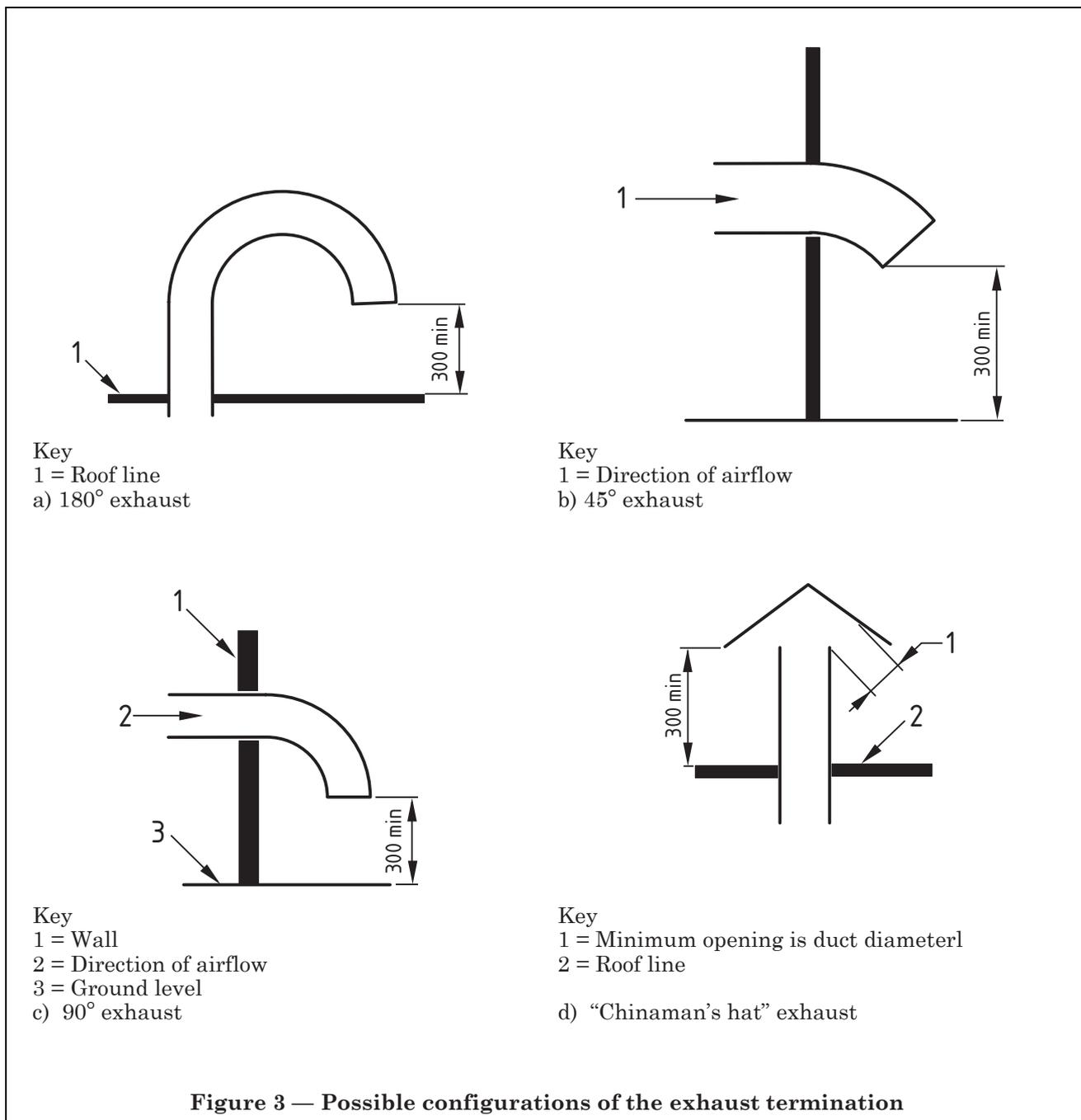
*There are many different styles of termination. Any design is acceptable, provided it conforms to 13.1.*

**13.2** The termination shall be at least 300 mm from any opening or fresh air inlet into the building. The configuration of the exhaust termination in respect of the make-up air inlet grille shall not allow re-circulation of the exhausted damp, warm air back into the make-up air vent.

#### COMMENTARY AND RECOMMENDATIONS ON 13.2

*The termination should ideally be 2m away from any opening or fresh air inlet into the building.*

*A 45°, 90° or 180° elbow (as per Figure 3) may be used to prevent re-circulation of exhausted air back into the make-up air vent. A minimum clearance of 300 mm from ground level should be provided.*



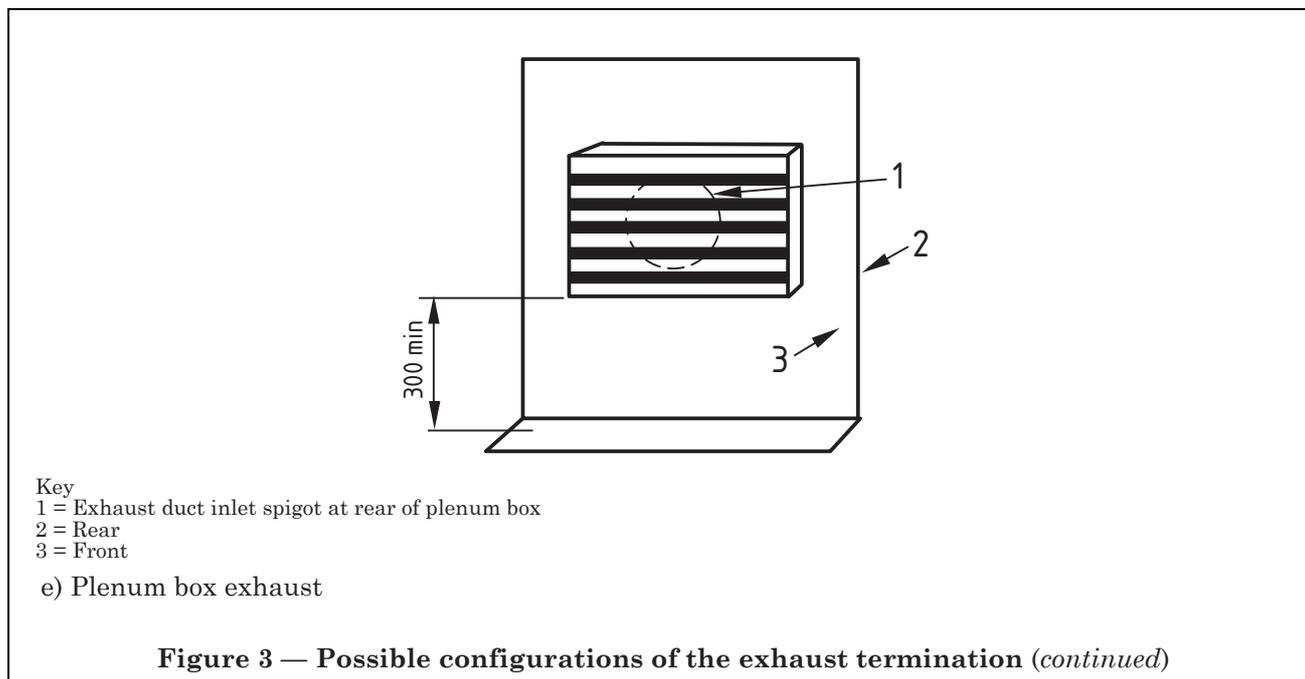


Figure 3 — Possible configurations of the exhaust termination (continued)

## 14 Exhaust testing

Airflow testing shall be carried out to check that the ducting is within the parameters specified by the laundry appliance manufacturer. The exhaust system shall be tested to ensure that all exhaust products are being removed to the outside air. When tested in the exhaust ducting within 500 mm of the laundry appliance operating at its normal running temperature, the airflow pressure measured shall be less than 1.25 mbar.

Where more than one laundry appliance is to be connected to a common duct, the system shall first be tested for its exhaust capabilities with one appliance in operation and all non-permanent openings closed, i.e. doors, windows, etc. The test shall then be repeated with all laundry appliances in operation.

During the test(s), any other air extraction systems in the premises shall operate at maximum. Where air-extraction systems can be operated in induce modes, the tests shall be carried out in both this and the extract mode, i.e. in “worst case” conditions.

### COMMENTARY AND RECOMMENDATIONS ON CLAUSE 14

*The tests seek to confirm that the design of the ductwork allows exhaust products to be dispersed to the outside atmosphere and that there are no areas where there can be a potentially dangerous build-up of exhaust products. It is recommended that the ductwork is visually checked for sizing, construction, fabrication, distance, direction and termination. If the length of the ductwork exceeds that specified by the manufacturer for unaided air movement the laundry appliance exhaust system might have been designed with a fan integral to the ductwork to assist the airflow to atmosphere. In such a case, the interlock should be positive and prevent combustion by cessation of the gas supply in the event that the fan is switched off or faulty.*

*If a visual inspection indicates that the ductwork is satisfactory in all respects, the airflow should then be proved. The recommended method is to light a smoke tablet and place it in the duct-way within the laundry appliance and then turn the appliance on, but without the heating being operated. If all the pungent smoke is not observed to exit the ductwork at the termination or if the smoke exits elsewhere, the ductwork should be further examined, and rectification work organized, before the visual and airflow tests are repeated. The airflow test might need to be carried out several times to simulate worst case scenarios, i.e., with one laundry appliance operating and then all appliances operating, and with doors and windows open and then closed to ensure the airflow within the duct. This test should always be carried out with the duct cold.*

*Once the visual and airflow tests have been completed satisfactorily the backflow pressure should be checked to ensure that it is at an acceptable level as indicated in the laundry appliance manufacturer’s*

instructions. This check should be carried out with the ductwork at normal working temperature and again using worst case scenario, i.e. one appliance operational then all operational, with doors and windows open then shut.

**WARNING** The build-up of lint is a fire risk. While the airflow meets the parameters specified in this clause, lint will remain airborne and exit to the outside atmosphere. However, where new appliances are added to existing ductwork, assuming that the ductwork is adequately sized and terminated, it might be necessary to clean the ductwork thoroughly before putting the laundry appliance through the visual and airflow tests.

## 15 Make-up air

A permanent, non-closable supply of make-up air shall be provided for the laundry appliance in accordance with the manufacturer's instructions.

The make-up air inlet vent shall be at least 300 mm away from any exhaust termination.

Where fans or similar are installed, the installer shall ensure that these do not adversely affect the operation of the laundry appliance or the safety of other combustion and cooling equipment, either in that room or in adjacent rooms. Where the make-up air supply utilises input fans or similar, these devices shall be positively interlocked with a manual reset in the gas supply so as to prevent combustion taking place in the dryer in the event of a failure

Any obstructions, such as louvres or grilles, shall be deducted from the overall size of a vent and the vent increased in physical size until the minimum size specified by Table 1 or Table 2, as appropriate, is achieved.

Where tumble dryers are stacked they shall be regarded as separate appliances.

### COMMENTARY AND RECOMMENDATIONS ON CLAUSE 15

*It is acceptable to oversize the make-up air.*

*Ideally, the make-up air inlet grille should be 2 m away from any exhaust point to prevent damp, warm air being re-introduced into the system.*

*When operating, laundry appliances move large amounts of air as can be seen in Table 1 (see Commentary and Recommendations on Clause 10). Means should be provided to ensure that clean, cool air is introduced directly from the outside atmosphere to allow the drying process to occur whilst providing sufficient air for combustion. Air for combustion of the gas commonly takes around 2–6 % of the total air volume required for the operation of a laundry appliance.*

## 16 Inspection and commissioning

### 16.1 Inspection

An initial inspection shall be carried out prior to commissioning to ensure that the installation has been completed in accordance with the system designer's specification. In particular, this shall include verification that the following design parameters have been satisfied:

- a) the provision of adequate ventilation;
- b) the construction and design of the flue system;
- c) the location of the exhaust termination;
- d) the sizing and installation of gas and electrical supplies;
- e) the stability of laundry appliance installation(s) and method of restraint.

## 16.2 Commissioning

**16.2.1** The laundry appliance shall be commissioned in accordance with the laundry appliance manufacturer's instructions to check the correct operation of all safety controls, safety-shut off valves, pressure/flow-sensing valves, etc.

**16.2.2** All gas fittings forming part of the installation shall be tested for tightness and purged in accordance with either IGE/UP/1 [23], IGE/UP/1A [24], IGE/UP/1B [25] or the LPGAs TM/62 [26], as appropriate.

**16.2.3** The gas rate or burner pressure shall be adjusted, where necessary, to the correct setting as specified in the laundry appliance manufacturer's instructions, or as indicated on the laundry appliance's data plate.

**16.2.4** Testing shall be carried out to ensure that the operation of the tumble dryer or rotary ironer does not adversely affect the safe operation of any open-flued gas appliance(s) located in the same room or internal space or in an adjacent room or internal space. The testing shall be conducted in a worst case scenario with all appliances operating at normal working temperatures, any fan assisted ventilation or exhaust operating, and all doors and windows closed in the room of the installation. In the case of an open-flued laundry appliance located in an adjacent room, this test shall be repeated with the connecting door open.

### COMMENTARY AND RECOMMENDATIONS ON 16.2.4

*In some installations, e.g. those in which the room of the installation, and/or an adjacent room have been subject to draught proofing, double glazing etc., the operation of the laundry appliance fan might depressurise the room(s). This might adversely affect the correct operation of an open-flued appliance, leading to spillage. Where spillage is detected under such circumstances, additional ventilation should be provided. The need for additional ventilation can usually be established by opening a window and re-checking for spillage.*

*Further advice on the effects of extract fans and on the spillage testing of multi-appliance gas installations involving fanned appliances can be found in BS 5440-1 and BS 5440-2. The manufacturer's instructions for the other open-flued appliances referred to in 16.2.4 should be consulted for full details of the method of spillage testing for each appliance.*

## 17 Information to be given to the user

**17.1** The commissioning engineer shall ensure that wiring diagrams for the laundry appliance and any ancillary controls are either given to the operator (e.g. via the appliance instructions) or attached to the appliance.

**17.2** If a computer program has been written in support of the intended method of laundry appliance operation, a record of this shall be given to the operator.

**17.3** The installer shall demonstrate to the operator, or his representative, the correct and safe operation of the appliance, including the isolation of gas and electricity supplies.

### COMMENTARY AND RECOMMENDATIONS ON CLAUSE 17

*It should be noted that under The Gas Safety (Installation and Use) Regulations 1998 [4 and 5], the installer is required to leave with the owner or occupier of the premises, any operator instructions supplied by the laundry appliance manufacturer. These instructions might include details of the wiring diagrams referred to in 17.1.*

## 18 Servicing and maintenance

Written information shall be provided to the user on the need to have the laundry appliance regularly serviced by a competent (e.g. CORGI registered) person for continued safe and correct operation of the appliance.

Ductwork shall be regularly inspected for lint, which, if present, shall be removed.

### COMMENTARY AND RECOMMENDATIONS ON CLAUSE 18

*If the premises in which a laundry appliance is installed are tenanted, the landlord is required by the Gas Safety (Installation and Use) Regulations [4 and 5] to have a safety check carried out every 12 months. These Regulations also impose a general obligation, with certain exceptions, on landlords providing*

*laundry appliances in tenanted premises to have these checked for safety every 12 months. The same Regulations require employers and self-employed persons to ensure that gas installations under their control are maintained in a safe condition so as to prevent the risk of injury to any person.*

*If a servicing requirement is specified by the manufacturer, this should be drawn to the attention of the user. The user should also be made aware of any expected user maintenance, e.g. cleaning of the lint filter. The user should be advised of the dangers of using add-on items, e.g. condenser converters, unless these are permitted by the laundry appliance manufacturer.*

*Where any defects are identified with an existing laundry installation or appliance, reference should be made to the appropriate guidance notes in the HSE Approved Code of Practice, "L56: Safety in the installation and use of gas systems and appliances" [29].*

## Bibliography

### Standards publications

BS 21:1985, *Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions)*.

BS 669-1:1989, *Flexible hoses, end fittings and sockets for gas burning appliances. Specification for strip-wound metallic flexible hoses, covers, end fittings and sockets for domestic appliances burning 1st and 2nd family gases*.

BS 4800:1989, *Schedule of paint colours for building purposes*.

BS 7624:2004, *Installation and maintenance of domestic direct gas-fired tumble dryers of up to 6 kW heat input (2nd and 3rd family gases) — Specification*.

BS EN 60309-1:1999, *Plugs, socket-outlets and couplers for industrial purposes — Part 1 General requirements*.

BS EN 60309-2:1998, *Plugs, socket-outlets and couplers for industrial purposes — Part 2 Dimensional interchangeability requirements for pin and contact-tube accessories*.

BS EN 60529:1992, *Specification for degrees of protection provided by enclosures (IP code)*.

DD 221:1997, *General guidance for the marking of gas appliances*.

### Other publications

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

[2] GREAT BRITAIN, *The Management of Health and Safety at Work Regulations 1999*, SI 1999 No. 3242, London: The Stationery Office.

[3] GREAT BRITAIN: *The Dangerous Substances and Explosive Atmospheres Regulations 2002*, SI 2002, No. 2776, London: The Stationery Office.

[4] GREAT BRITAIN: *The Gas Safety (Installation and Use) Regulations 1998*, SI 1998, No. 2451, London: The Stationery Office.

[5] GREAT BRITAIN: *The Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004*, SR 2004, No. 63, London: The Stationery Office.

[6] GREAT BRITAIN: *The Gas Safety (Management) Regulations 1996*, SI 1996, No. 551, London: The Stationery Office.

[7] GREAT BRITAIN: *The Electricity at Work Regulations 1989*, SI 1989, No. 635, London: The Stationery Office.

[8] GREAT BRITAIN: *The Control of Substances Hazardous to Health Regulations 2002*, SI 2002, No. 2677, London: The Stationery Office.

[9] GREAT BRITAIN: *The Control of Asbestos at Work Regulations 2002*, SI 2002, No. 2675, London: The Stationery Office.

[10] GREAT BRITAIN: *The Gas Appliances (Safety) Regulations 1995*, SI 1995, No. 1629, London: The Stationery Office.

[11] GREAT BRITAIN: *The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995*, SI 1995, No. 3163, London: The Stationery Office.

[12] GREAT BRITAIN: *The Provision and Use of Work Equipment Regulations 1998*, SI 1998, No. 305, London: The Stationery Office.

[13] GREAT BRITAIN: *The Confined Spaces Regulations 1997*, SI 1997, No. 1713, London: The Stationery Office.

[14] GREAT BRITAIN: *The Construction (Design and Management) Regulations 1994*, SI 1994, No. 3140, London: The Stationery Office.

[15] GREAT BRITAIN: *The Construction (Health, Safety and Welfare) Regulations 1996*, SI 1996, No. 1592, London: The Stationery Office.

- [16] GREAT BRITAIN, The Pressure Systems Safety Regulations 2000, SI 2000 No. 128, London: The Stationery Office.
- [17] GREAT BRITAIN: The Building Regulations 2000, SI 2000, No. 2531, as amended, London: The Stationery Office.
- [18] GREAT BRITAIN: The Building (Scotland) Regulations 2004, SI 2004, No. 406, as amended, London: The Stationery Office.
- [19] GREAT BRITAIN: The Building (Northern Ireland) Regulations 2000, SR 2000, No. 389, London: The Stationery Office.
- [20] GREAT BRITAIN: The Gas Safety (Application) (Isle of Man) Order 1996, SD 326/96, London: The Stationery Office.
- [21] INSTITUTION OF GAS ENGINEERS AND MANAGERS: IGE/SR/24, *Risk Assessment Techniques*, Loughborough: 1999.
- [22] EUROPEAN COMMUNITIES: Council Directive 90/396/EEC of 29 June 1990 on the approximation of the laws of the Member States relating to appliances burning gaseous fuels, Luxembourg: Office for Official Publications of the European Communities, 1997 (OJ No. L196, 26.07.1990).
- [23] INSTITUTION OF GAS ENGINEERS AND MANAGERS: IGE/UP/1, *Soundness testing and purging of industrial and commercial gas installations (Second Edition)*, Loughborough: 2003.
- [24] INSTITUTION OF GAS ENGINEERS AND MANAGERS: IGE/UP/1A, *Soundness testing and direct purging of small low pressure industrial and commercial gas installations*, Loughborough: 1998.
- [25] INSTITUTION OF GAS ENGINEERS AND MANAGERS: IGE/UP/1B, *Tightness testing and purging of domestic sized natural gas installations*, Loughborough: 2002.
- [26] THE LP GAS ASSOCIATION: TM/62: *Gas Soundness Testing of LPG Service Pipework, Installation Pipework and Appliances*, Ringwood: 1999.
- [27] INSTITUTION OF GAS ENGINEERS AND MANAGERS: IGE/UP/2, *Gas installation pipework, boosters and compressors on industrial and commercial premises*, Loughborough: 1994 (amended January 1995).
- [28] THE LP GAS ASSOCIATION: Code of Practice 22 — *LPG Piping System Design and Installation*, Ringwood: 2002.
- [29] HEALTH AND SAFETY EXECUTIVE: L56: *Safety in the installation and use of gas systems and appliances. The Gas Safety (Installation and Use) Regulations 1998: Approved Code of Practice and Guidance*, London: 1998 (amended 2004).

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