

Specification for

Installation of low pressure gas pipework of up to 28 mm (R1) in domestic premises (2nd family gas)

ICS 11.140.40

Committees responsible for this British Standard

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

- British Flue and Chimney Manufacturers' Association
- British Gas plc
- Centrica plc
- 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
- Liquefied Petroleum Gas Industry Technical Association
- Power Generation Contractors Association ((PGCA) BEAMA Ltd.)
- Society of British Gas Industries
- Co-opted members

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 April 1998

© BSI 14 February 2003
First published February 1988
Second edition April 1998

The following BSI references relate to the work on this standard:
Committee reference GSE/30
Draft for comment 95/709853 DC

ISBN 0 580 29512 5

Amendments issued since publication

Amd. No.	Date	Comments
13046	March 2001	
14028	14 February 2003	Indicated by a sideline

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Foreword

This British Standard has been prepared by Technical Committee GSE/30.

It supersedes BS 6891:1988 which is withdrawn.

This revision has been undertaken because of the need to:

- a) cover developments concerning semi-rigid stainless steel pipe;
- b) clarify the requirements concerning quick release and push-fit type fittings;
- c) up date requirements for construction practice regarding flooring and walls;
- d) clarify the tests for soundness;
- e) clarify the requirements for electrical safety;
- f) provide sample calculation methods for pipe sizes and pressure losses;
- g) include additional types of gas meter;
- h) amplify the requirements for multi-storey dwellings;
- i) clarify the requirements for external installation pipe work.

NOTE This standard has been written in the form of a practice specification. To comply with this specification, the user has to comply with all its requirements. The user may depart from recommendations, but this would be the user's own responsibility who would be expected to have good reasons for doing so.

It is essential that the appropriate specification/codes of practice are consulted on all aspects of pipework installation.

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. Attention is drawn to the following statutory regulations.

The Gas Safety (Installation and Use) Regulations, 1994 SI 1886 as amended by the Gas Safety (Installation and Use) (Amendment) Regulations, 1996 SI 550 and the Gas Safety (Installation and Use) (Amendment) (No. 2) Regulations, 1996 SI 2541 [1]

The Building Regulations, 1991 SI 2768 as amended by the Building (Amendment) Regulations, 1994 SI 1850 [2]

Building Regulations (Northern Ireland), 1994 SI 243 [3]

The Building Standards (Scotland) Regulations, 1990 SI 2179 [4]

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 28, an inside back cover and a back cover.

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1 Scope

This British Standard specifies design parameters, materials and methods of installing steel, copper or corrugated stainless steel semi-rigid pipe, in sizes not exceeding DN 25 for steel and DN 28 for corrugated stainless steel or copper, low pressure gas pipework, for the supply of 2nd family gas in domestic dwellings.

This standard applies to gas installation pipework where the nominal working pressure is 21 mbar.¹⁾

COMMENTARY AND RECOMMENDATIONS ON CLAUSE 1. *Steel pipework to BS 1387 of nominal size DN 25 is that size which is threaded to R1 in accordance with BS 21.*

The provision of service pipes to the consumer's gas meter is covered by the Institution of Gas Engineers Recommendation IGE/TD/4: Edition 3 [5].

The installation of low pressure gas meters (2nd family gases) is covered in BS 6400.

3rd family gas (liquefied petroleum gas) installations in permanent dwellings are covered in BS 5482:Part 1.

Installation pipework in larger sizes or at higher gas pressures is detailed in the Institution of Gas Engineers Recommendation IGE/UP/2 [6].

Gas, as defined in BS 1179, is normally supplied to the public in accordance with statutory requirements. The provisions of this standard apply to installations supplied with 2nd family gases including natural gas and mixtures of liquefied petroleum gases (LPG) and air.

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

BS 143 & 1256:1986, *Specification for malleable cast iron and cast copper alloy threaded pipe fittings.*

BS 476, *Fire tests on building materials and structures.*

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

BS 669-2:1995, *Flexible hoses, end fittings and sockets for gas burning appliances — Part 2: Specification for corrugated metallic flexible hoses.*

BS 864-2:1983, *Capillary and compression tube fittings of copper and copper alloy — Part 2: Specification for capillary and compression fittings for copper tubes.*

BS 1179:1967, *Glossary of terms used in the gas industry.*

BS 1179-6:1980, *Glossary of terms used in the gas industry — Part 6: Combustion and utilization including installation at consumers' premises.*

BS 1387:1985, *Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads.*

BS 1552:1995, *Specification for open bottomed taper plug valves for 1st, 2nd and 3rd family gases up to 200 mbar.*

BS 1710:1984, *Specification for identification of pipelines and services.*

BS 1723-1:1986, *Brazing — Part 1: Specification for brazing.*

BS 1845:1984, *Specification for filler metals for brazing.*

BS 2779:1986, *Specification for pipe threads for tubes and fittings where pressure-tight joints are not made on the threads (metric dimensions).*

¹⁾ 1 mbar = 100 N/m² = 100 Pa.

BS 3601:1987, *Specification for carbon steel pipes and tubes with specified room temperature properties for pressure purposes.*

BS 3604-1:1990, *Steel pipes and tubes for pressure purposes: ferritic alloy steel with specified elevated temperature properties — Part 1: Specification for seamless and electric resistance welded tubes.*

BS 3604-2:1991, *Steel pipes and tubes for pressure purposes: ferritic alloy steel with specified elevated temperature properties — Part 2: Specification for longitudinally arc welded tubes.*

BS 3605-1:1991, *Austenitic stainless steel pipes and tubes for pressure purposes — Part 1: Specification for seamless tubes.*

BS 3605-2:1992, *Austenitic stainless steel pipes and tubes for pressure purposes — Part 2: Specification for longitudinal welded tubes .*

BS 4127:1994, *Specification for light gauge stainless steel tubes, primarily for water applications.*

BS 5114:1975, *Specification for performance requirements for joints and compression fittings for use with polyethylene pipes.*

BS 5292:1980, *Specification for jointing materials and compounds for installations using water, low-pressure steam or 1st, 2nd and 3rd family gases.*

BS 6004:1995, *Specification for PVC-insulated cables (non-armoured) for electric power and lighting.*

BS 6007:1993, *Specification for rubber-insulated cables for electric power and lighting.*

BS 6172:1990, *Specification for installations of domestic gas cooking appliances (1st, 2nd and 3rd family gases).*

BS 6173:1990, *Specification for installation of gas-fired catering appliances for use in all types of catering establishments (1st, 2nd and 3rd family gases).*

BS 6231:1990, *Specification for PVC-insulated cables for switchgear and controlgear wiring.*

BS 6400:1997, *Specification for installation of domestic sized gas meters (2nd and 3rd family gases).*

BS 6956-5:1992, *Jointing materials and compounds — Part 5: Specification for jointing compounds for use with water, low pressure saturated steam, 1st family gases (excluding coal gas) and 2nd family gases.*

BS 7281:1990, *Specification for polyethylene pipes for the supply of gaseous fuels.*

BS 7336:1990, *Specification for polyethylene fusion fittings with integral heating elements for use with polyethylene pipes for the conveyance of gaseous fuels.*

BS 7624:1993, *Specification for installation of domestic direct gas-fired tumble dryers of up to 30 kW heat input (2nd, and 3rd family gases).*

BS 7671:1992, *Requirements for electrical installations — IEE wiring regulations — Sixteenth edition.*

BS 7838:1996, *Specification for corrugated stainless steel semi-rigid pipe and associated fittings for low-pressure gas pipework of up to 28 mm.*

BS EN 331, *Manually operated ball valves.*

BS EN 751-1:1997, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 1: Anaerobic jointing compounds.*

BS EN 751-2:1997, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 2: Non-hardening jointing compounds.*

BS EN 751-3:1997, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 3: Unsintered PTFE tapes.*

BS EN 1057:1996, *Copper and copper alloys — Seamless round copper tubes for water and gas in sanitary and heating applications.*

BS EN 29453:1994, *Soft solder alloys — Chemical composition and forms.*

INSTITUTION of GAS ENGINEERS. IGE/UP/1B, 2002 *Tightness testing and purging of domestic sized Natural Gas installations.*²⁾

²⁾ Published and available from the Institution of Gas Engineers, 12 York Gate, London NW1 4QG.

3 Terms and definitions

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

3.1

installation pipework

any pipework or fitting from the first fitting or joint after the primary meter outlet union connection to points at which appliances are to be connected

COMMENTARY AND RECOMMENDATIONS ON 3.1. *This definition varies from that given in the Gas Safety (Installation and Use) Regulations 1994 [1].*

3.2

duct

a purpose designed enclosure to contain gas pipes

COMMENTARY AND RECOMMENDATIONS ON 3.2. *This definition is in accordance with BS 8313.*

3.3

emergency control valve

a valve for shutting off the supply of gas in an emergency, being a valve intended for use by a consumer of gas

COMMENTARY AND RECOMMENDATIONS ON 3.3. *The application of such valves is given in 8.11.2.*

3.4

meter control valve

the valve fitted upstream of, and adjacent to, a meter to shut off the supply of gas to it

NOTE In most cases the meter control valve may act as an emergency control as required by the Gas Safety (Installation and Use) (Amendment) Regulations 1996 [1].

3.5

primary meter

the meter nearest to and downstream of a service pipe for ascertaining the quantity of gas supplied through that pipe

3.6

protected shaft

a shaft which enables persons, air or objects to pass from one compartment to another, and which is enclosed with fire-resisting construction

NOTE For the purposes of this standard the following apply.

a) A compartment is a building or part of a building, comprising one or more rooms, spaces or storeys, constructed to prevent the spread of fire to or from another part of the same building. A roof space above the top storey of a compartment is included in that compartment.

b) Fire-resisting is the ability of a component or construction of a building to satisfy for a stated period of time, some or all of the appropriate criteria specified in the relevant Part of BS 476.

3.7

service pipe

a pipe connected to a distribution main to provide a supply of gas to one or more consumers and terminating at and including the meter control valve at a primary meter

3.8

sleeve

a tubular case inserted in a prepared hole in a structure for the reception of an installation pipe

4 Exchange of information and time schedule

4.1 The installation work shall be carried out by a business or self-employed person who is a “member of a class of persons approved for the time being by the Health and Safety Executive” (HSE).

Persons carrying out the work shall be competent.

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 4.1. *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). Guidance on the individual competency required for gas work is given in the Health and Safety Commission’s Approved Code of Practice (ACOP) — Standards of training in safe gas installation [7].*

Persons deemed competent to carry out gas work are those who hold a current certificate of competence in the type of activity to be conducted issued under the ACOP arrangements, or by a certification body accredited by the United Kingdom Accreditation Service (UKAS).

4.2 At the initial stages of building design and planning the interested parties shall verify that the installation pipes will be adequate for both immediate and probable future requirements.

A time schedule for fixing the installation pipes shall be agreed as early as possible and any subsequent changes be notified to interested parties at the earliest opportunity.

4.3 All necessary information regarding the routing of installation pipes and positions of valves and installation points to serve the appliances shall be made available to those concerned as early as possible by means of drawings, specifications and consultations.

COMMENTARY AND RECOMMENDATIONS ON 4.2. *The drawings should also include:*

- a) the position of ducts, and channels when installation pipes are to be concealed;*
- b) special requirements of a precautionary nature, e.g. limitations on proximity to other services;*
- c) sizes, and materials and position of all installation pipes and valves.*

4.4 Any installation pipe fitted as erection of a building progresses, and which will subsequently be inaccessible, shall be tested for soundness before being buried, covered or wrapped.

4.5 Any work to be done by the gas installer that requires attendance by other trades shall be clearly defined.

5 Pipe sizing

5.1 When designing an installation, the sizes of all installation pipes shall be determined from the maximum gas rate of the appliances to be connected.

COMMENTARY AND RECOMMENDATIONS ON 5.1. *Allowance should also be made for the possibility of future extensions, especially if the pipes are to be buried. Annex A gives a method of calculating pipe sizes in a system.*

5.2 The pressure drop between the outlet of the meter and the points to be connected shall not exceed 1 mbar at maximum flow conditions (see Table 1 and Table 2).

Table 1 — Discharge in a straight horizontal steel pipe with 1.0 mbar differential pressure between the ends, for gas of relative density 0.6 (air = 1)

a) Piping in accordance with Table 4 (medium) of BS 1387:1985									
Nominal size		Length of pipe m							
		3	6	9	12	15	20	25	30
mm	in	Discharge m ³ /h							
6	¼	0.29	0.14	0.09	0.07	0.05	—	—	—
8	¼	0.8	0.53	0.49	0.36	0.29	0.22	0.17	0.14
10	⅜	2.1	1.4	1.1	0.93	0.81	0.70	0.69	0.57
15	½	4.3	2.9	2.3	2.0	1.7	1.5	1.4	1.3
20	¾	9.7	6.6	5.3	4.5	3.9	3.3	2.9	2.6
25	1	18	12	10	8.5	7.5	6.3	5.6	5.0
NOTE When using this table to estimate the gas flow rate in pipework of a known length, this length should be increased by 0.5 m for each elbow and tee fitted, and by 0.3 m for each 90° bend fitted.									
b) Piping in accordance with Table 5 (heavy) of BS 1387:1985									
Nominal size		Length of pipe m							
		3	6	9	12	15	20	25	30
mm	in	Discharge m ³ /h							
6	¼	0.11	0.055	0.037	0.028	0.022	0.017	0.013	0.011
8	¼	0.56	0.43	0.28	0.21	0.17	0.13	0.10	0.085
10	⅜	1.6	1.1	0.85	0.79	0.77	0.59	0.47	0.40
15	½	3.5	2.3	1.9	1.6	1.4	1.2	1.0	0.92
20	¾	8.3	5.6	4.5	3.8	3.3	2.8	2.5	2.2
25	1	15	11	8.4	7.1	6.3	5.3	4.7	4.2
NOTE When using this table to estimate the gas flow rate in pipework of a known length, this length should be increased by 0.5 m for each elbow and tee fitted, and by 0.3 m for each 90° bend fitted.									

Table 2 — Discharge in a straight horizontal copper or corrugated stainless steel tube with 1.0 mbar differential pressure between the ends, for gas of relative density 0.6 (air = 1)

Copper piping in accordance with BS EN 1057 or corrugated stainless steel tube to BS 7838								
Size of tube mm	Length of pipe m							
	3	6	9	12	15	20	25	30
	Discharge m ³ /h							
10	0.86	0.57	0.50	0.37	0.30	0.22	0.18	0.15
12	1.5	1.0	0.85	0.82	0.69	0.52	0.41	0.34
15	2.9	1.9	1.5	1.3	1.1	0.95	0.92	0.88
22	8.7	5.8	4.6	3.9	3.4	2.9	2.5	2.3
28	18	12	9.4	8.0	7.0	5.9	5.2	4.7
NOTE When using this table to estimate the gas flow rate in pipework of a known length, this length should be increased by 0.5 m for each elbow and tee fitted, and by 0.3 m for each 90° bend fitted.								

6 Materials

6.1 General

Materials used for gas installation pipes and fittings shall conform to the British Standards listed in **6.2**, **6.3**, **6.4**, **6.5**, **6.6** and **6.7**, where appropriate.

NOTE When selecting materials for use as installation pipes, consideration should be given to strength, appearance, cost and to the need for protection against corrosion (see Clause 9).

COMMENTARY AND RECOMMENDATIONS ON 6.1. *The Gas Safety (Installation and Use) Regulations [1] state that lead or lead alloy pipes supplying gas are not to be installed. However, in bygone years, lead pipes were used to install gas meters and lead alloy pipes (known as lead composition pipes) were installed as installation pipes and can still be found in old housing stock. Providing this material is in good condition, sound, well supported and is of adequate size, connection may be made to steel or copper pipework using appropriate fittings (see Clause 7).*

6.2 Steel

Steel pipes and fittings shall conform to BS 1387 (medium or heavy grade), BS 3601 and BS 3604.

Rigid stainless steel pipes shall conform to BS 3605 or BS 4127.

Corrugated stainless steel pipes shall conform to BS 7838.

COMMENTARY AND RECOMMENDATIONS ON 6.2. *Medium grade tubes conforming to BS 1387 will normally suffice but for special applications and for external below ground pipework the use of the heavy grade should be considered.*

6.3 Malleable iron

Malleable iron fittings shall conform to BS 143 & 1256.

6.4 Copper

Copper tube shall conform to BS EN 1057.

Capillary and compression fittings shall conform to BS 864:Part 2.

COMMENTARY AND RECOMMENDATIONS ON 6.4. *Brazed joints should be made in accordance with BS 1723 using BS 1845 filler metals.*

Soft solder should conform to BS EN 29453.

6.5 Plastics

6.5.1 Polyethylene pipes shall conform to BS 7281. Polyethylene fittings shall conform to BS 5114 or BS 7336, as appropriate. Pipework and fittings shall be yellow in colour.

6.5.2 Polyethylene installation pipework and fittings shall only be used for exterior installation pipework.

6.5.3 Polyethylene pipe and fittings shall only be used above ground where it is necessary to extend underground polyethylene installation pipe above ground level for entry into a building. The polyethylene pipework above ground level shall rise vertically to the point of entry into the building, which shall be as close as practicable to the external ground level. The length of pipework above ground level shall be protected against daylight and mechanical damage.

6.5.4 Solvent welding shall not be used.

6.5.5 Fusion or electrofusion welding shall be carried out only by persons trained and competent to do so. Advice shall be sought from the pipe manufacturers.

COMMENTARY AND RECOMMENDATIONS ON 6.5. *The use of polyethylene installation pipework and fittings may be beneficial where it is necessary for installation pipework to be run underground externally from one location to another.*

It is essential that care be taken to ensure that pipes conforming to BS 6572 and BS 6730 designed for carrying water are not used for gas installations. Also, plastics pipes designed to distribute water in both domestic hot/cold water and central heating systems, whether or not they contain a metallic barrier, are not suitable for use for gas installation.

6.6 Valves

Ball valves shall conform to BS EN 331.

6.7 Thread sealing

Sealing materials shall conform to BS EN 751 or BS 6956:Part 5, as appropriate.

7 Joints

7.1 Capillary fittings

Capillary fittings for copper tube shall conform to BS 864:Part 2. Pipe ends shall be square cut and deburred. Finished joints shall be visually examined to confirm that the solder has run.

Any flux used shall only remain active during the heating process.

Flux and flux residues shall not come into contact with stainless steel.

COMMENTARY AND RECOMMENDATIONS ON 7.1. *Copper pipes may be jointed without conventional fittings by the use of purpose-made tools that form the pipe ends in accordance with BS 864:Part 2.*

Attention is drawn to the need to remove any remaining flux after the joint is made. Should any flux come into contact with stainless steel (e.g. meter flexible connectors) it should be removed and the pipework thoroughly cleaned.

7.2 Compression fittings

Compression fittings shall conform to BS 864:Part 2 and shall only be used where they will be readily accessible and allow the nut to be tightened to make a sound joint.

COMMENTARY AND RECOMMENDATIONS ON 7.2. *The ends of any pipe to be joined by a compression fitting should be square cut and deburred. Pipes underfloor or in ducts without removable covers are not considered to be readily accessible.*

Type A (non-manipulative) fittings conforming to BS 864:Part 2 should not be used on annealed copper tube unless the copper tube manufacturer is consulted and jointing is carried out in accordance with the manufacturer's recommendations.

7.3 Push-fit fittings

With the exception of fittings conforming to BS 669 installed in accordance with BS 6172, BS 6173 or BS 7624, quick-release fittings shall not be used for gas installations.

With the exception of fittings conforming to BS 7838 for use with corrugated stainless steel semi-rigid pipe, push type fittings shall not be used for gas installations.

7.4 Union joints

Union joints shall be located in readily accessible positions and shall be of the ground faced or compression type.

COMMENTARY AND RECOMMENDATIONS ON 7.4. *Pipes under floor and in ducts without removable covers are not considered to be readily accessible.*

7.5 Screwed joints

All malleable cast iron and cast copper alloy fittings used in screwed joints shall conform to BS 143 & 1256. Threads on long screws shall be parallel conforming to BS 21. Threads on other fittings, except those conforming to BS 864:Part 2 or BS 2779, shall be in accordance with BS 21.

All threads shall be clean prior to the application of any thread sealing material.

Hemp shall not be used on any threaded joint except in conjunction with thread sealing compounds for long screw back-nut seals.

COMMENTARY AND RECOMMENDATIONS ON 7.5. *When jointing paste is used it should only be applied to the external threads and any excess paste should be removed on completion of the joint. Jointing compound should not be used in conjunction with PTFE tape.*

PTFE tape should be wound with a 50 % overlap starting from the thread runout in a direction counter to the thread form (see Figure 1).