BS 6400-1:2016

BSI Standards Publication

Specification for installation, exchange, relocation, maintenance and removal of gas meters with a maximum capacity not exceeding 6 m^3/h –

Part 1: Low pressure (2nd family gases)

bsi.

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 44, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 6400 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 June 2016. It was prepared by Technical Committee GSE/30, *Gas installations (1st, 2nd and 3rd family gases)*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

BS 6400:2016 supersedes BS 6400-1:2006, which is withdrawn.

Relationship with other publications

BS 6400, *Specification for installation, exchange, relocation, maintenance and removal of gas meters with a maximum capacity not exceeding 6m³/h*, is published in three parts:

- *Part 1: Low pressure (2nd family gases);*
- *Part 2: Medium pressure (2nd family gases)*;
- *Part 3: Low and medium pressure (3rd family gases)*.

Terminology in this part of BS 6400 might not necessarily be consistent with BS 6400-3, which uses terminology that is consistent with that used in the liquefied petroleum gas industry.

This standard has been prepared as a supporting document to COP/1a, the Ofgas code of practice for low pressure meter installations with capacities not exceeding 6 m³/h [1].

Information about this document

This is a full revision of the standard to bring it up to date and to include a new clause on maintenance.

Hazard warnings

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

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 cannot confer immunity from legal obligations.

In particular, attention is drawn to the following specific legislation.

- The Gas Safety (Installation and Use) Regulations 1998 [2]
- Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004 [3]
- The Gas Safety (Installation and Use) Regulations 1994, as amended and applied by the Gas Safety (Application) (Isle of Man) Order 1996 [4]
- The Gas Meters (Information on Connection and Disconnection) Regulations 1996 [5]
- The Gas Safety (Management) Regulations 1996 [6]
- The Gas Safety (Management) Regulations (Northern Ireland) 1997 [7]
- The Gas (Meters) Regulations 1983, as amended [8]
- The Building Regulations 2010 (England and Wales), as amended [9]
- The Building (Scotland) Regulations 2004, as amended [10]
- The Building Regulations (Northern Ireland) 2012, as amended [11]
- The Measuring Instruments (EEC Requirements) (Gas Volume Meters) Regulations 1988, as amended [12]
- The Measuring Instruments (Gas Meters) Regulations 2006 [13]
- The Dangerous Substances and Explosive Atmopheres Regulations 2002 (DSEAR) [14]
- The Gas (Calculation of Thermal Energy) Regulations 1996, as amended [15]
- The Measuring Instruments Directive 2004/22/EU [16]
- The Measuring Instruments Directive 2014/32/EC [17]

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1 Scope

This British Standard specifies requirements for the installation, exchange, relocation, maintenance and removal of credit or prepayment diaphragm and ultrasonic gas meters with a maximum capacity not exceeding 6 m³/h.

NOTE 1 For the purposes of this British Standard, installation includes design, inspection and commissioning. It is recognized that each of these tasks can be performed by the same person.

This part of BS 6400 is applicable to primary and secondary meter installations:

a) supplied with 2nd family gases from low pressure gas distribution systems with a maximum operating pressure not exceeding 75 mbar, a design minimum pressure of 19 mbar and a design maximum incidental pressure of 200 mbar;

b) fitted downstream of the emergency control valve;

c) that utilize a primary meter regulator downstream of the emergency control valve;

d) where the operating pressure at the outlet of the meter is nominally 21 mbar. [1)]

NOTE 2 Low pressure gas networks in Great Britain operate with a maximum operating pressure not exceeding 75 mbar, a design minimum pressure of 19 mbar and a design maximum incidental pressure of 200 mbar.

NOTE 3 Installation pipework is specified in BS 6891.

NOTE 4 Service pipes (including the emergency control valve) are specified in the Institution of Gas Engineers and Managers' publication on gas services, IGE/TD/4 [18].

NOTE 5 All pressures quoted in this standard are gauge pressures and all pressure absorption values are for natural gas unless otherwise specified.

NOTE 6 Additional guidance on domestic gas systems can be found in BS EN 1775, BS EN 1776 and BS EN 12279.

NOTE 7 Additional guidance on gas installations in multi-occupancy buildings is given in IGEM/G/5 [N7].

2 Normative references

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

Standards publications

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

BS 476-7:1997, *Fire tests on building materials and structures – Part 7: Method of test to determine the classification of the surface spread of flame of products*

BS 746:2014, *Specification for gas meter unions and adaptors*

BS 6891:2015*, Specification for the installation and maintenance of low pressure gas installation pipework of up to 35 mm (R1¼) on premises*

BS 7671, *Requirements for electrical installations – IET Wiring Regulations*

[1)] 1 bar = 10^5 N/m^2 = 100 kPa.

BS 8499, *Specification for domestic meter boxes and meter bracket* [2)]

BS EN 1359, *Gas meters – Diaphragm gas meters*

BS EN 14236, *Ultrasonic domestic gas meters*

BS EN 60079-10-1, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

Other publications

[N1] INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGEM/GM/7B, *Hazardous area classification for gas metering equipment*. 2008, Kegworth: IGEM.

[N2] INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGEM/SR/25, *Hazardous area classification of natural gas installations*, Edition 2, 2010, Kegworth: IGEM.

[N3] INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGEM/GM/7A *Electrical connections for gas metering equipment*. Edition 4, 2008, Kegworth: IGEM.

[N4] ADVANTICA TECHNOLOGIES LTD. PRS 1/E: *Brass and copper fittings* (Issue 3). Loughborough: Advantica. 2002. (Available from IGEM publications.)

[N5] INSTITUTION OF GAS ENGINEERS AND MANAGERS. PRS 3/E, *Meter regulators for gas flow rates not exceeding 6 m^3/h and inlet pressures less than 75 mbar*. 2004, Kegworth: IGEM.

[N6] INSTITUTION OF GAS ENGINEERS AND MANAGERS. PRS 6/E, *Semi-rigid and flexible meter connectors*. 2004, Kegworth: IGEM.

[N7] INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGEM/G/5, *Gas installations in multi-occupancy buildings*. Edition 2. 2012, Kegworth: IGEM.

[N8] INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGEM/UP/1B, *Tightness testing and direct purging of small liquefied petroleum gas/air, natural gas and liquefied petroleum gas installations*. Edition 3 with amendments, 2012, Kegworth: IGEM.

3 Terms and definitions

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

3.1 additional emergency control valve (AECV)

valve, not being the emergency control valve (ECV), for shutting off the supply of gas in an emergency, intended for use by a consumer of gas

NOTE 1 An AECV may be located within either the meter installation or installation pipework and, as such, may not isolate all of the meter installation or consumer's pipework.

NOTE 2 An AECV does not denote the end of the Network and is always fitted downstream of the ECV. The existence of an AECV does not affect the existence of an ECV (which is always required).

[SOURCE: IGEM/G/4 Edition 2 [19]]

3.2 badged meter

meter approved by the National Measurement and Regulation Office or a metrological authority acceptable to them that is stamped prior to delivery

NOTE The capacity of such a meter is known as its stamped or badged capacity.

[2)] This standard also gives informative references to BS 8499:2009.

3.3 design maximum incidental pressure (DMIP)
maximum pressure that a system is permitted to experience under fault conditions, limited by safety devices, when the system is operated at design pressure

NOTE In the case of a low pressure gas network in Great Britain the DMIP is 200 mbar.

3.4 design minimum pressure (DmP)
minimum pressure that can occur at the end of the service pipe at the system design flow rate under extreme gas supply and maintenance conditions

NOTE 1 The DmP of a low pressure gas network in Great Britain can be obtained from the gas transporter and can be as low as 19 mbar.

NOTE 2 In the case of a meter installation the system design flow rate is the badged capacity of the meter.

3.5 design pressure (DP)
pressure on which design calculations are based

NOTE In the case of a low pressure gas network in Great Britain the DP is 75 mbar.

3.6 emergency control valve (ECV)
valve, not being an additional emergency control valve (AECV), for shutting off the supply of gas in an emergency, intended for use by the consumer of gas and being installed at the end of a service or distribution main

NOTE The outlet of the ECV terminates, and thus defines, the end of the network

[SOURCE: IGEM/G/4 Edition 2 [19]]

3.7 excess flow valve (EFV)
valve, selected to close at a predetermined flow to prevent gas from escaping in dangerous quantities once the integrity of the gas system downstream of the EFV has been significantly breached

3.8 filter
device fitted upstream of the meter regulator to capture particles in the gas stream

3.9 gas fitting
pipework, valve, regulator, meter, fitting apparatus or appliance

NOTE This definition differs from that given in Regulation 2 of the Gas Safety (Installation and Use) Regulations 1998 [2].

3.10 gas transporter (GT)
company, licensed by Ofgem, which transports gas through its network on behalf of a gas shipper

[SOURCE: IGEM/G/1 [20]]

3.11 index
series of dials or rows of figures indicating the volume of gas that has passed through the meter

3.12 installation pipework
pipework and/or fitting from the outlet of the primary meter installation to points at which appliances are to be connected

NOTE This definition differs from that given in Regulation 2 of the Gas Safety (Installation and Use) Regulations 1998 [2].

3.13 insulation joint
gas fitting, with a high electrical resistance, to minimize the flow of any stray electrical current

3.14 interconnecting pipework
pipework assembled within the meter installation, additional to the pliable connector

3.15 low pressure (LP)
maximum operating pressure of 75 mbar

3.16 lowest operating pressure (LOP)
lowest pressure at which a system can be operated under normal operating conditions

NOTE 1 The gas transporter will be able to advise on the LOP of the gas supply.

NOTE 2 The design should be based on a LOP of 25 mbar, and the meter designer will need to confirm that the network LOP is greater than or equal to this value.

3.17 maximum operating pressure (MOP)
maximum pressure at which a system can be operated continuously under normal operating conditions

NOTE In the case of a low pressure gas network in Great Britain the MOP is 75 mbar.

3.18 meter
instrument designed to measure, memorize and display the quantity of gas that has passed through it

3.18.1 credit meter
meter in which the volume registered by the index is the basis of a periodic account rendered to the consumer

3.18.2 diaphragm meter
positive displacement meter in which the measuring chambers have deformable walls

3.18.3 positive displacement meter
meter that directly measures the volume of gas passing through it

3.18.4 prepayment meter
meter fitted with a mechanism that, on the insertion of a coin, mechanical token or smartcard, or by the use of other electronic means, permits the passage of a predetermined volume of gas

3.18.5 primary meter
meter nearest to and downstream of a service pipe for ascertaining the volume of gas supplied through that pipe by a gas supplier

3.18.6 secondary meter
meter, other than a primary meter, for ascertaining the quantity of gas provided by a person for use by another person

3.18.7 semi-concealed meter
meter designed and manufactured for use in a semi-concealed meter box

3.18.8 smart meter
meter with additional functionalities one of which is data communication

[SOURCE: PD CEN/CLC/ETSI TR 50572:2011, **3.41**]

3.18.9 ultrasonic meter
meter that infers the volume passing through it by means of the behaviour of an ultrasonic beam

3.19 meter box
purpose-made compartment designed and prefabricated to accommodate a meter installation

[SOURCE: BS 8499:2009, **3.12**]

3.19.1 built-in meter box
purpose-made meter box, fitted with a meter bracket, for insetting into a building wall, normally during the construction of the wall

[SOURCE: BS 8499:2009, **3.1**]

3.19.2 semi-concealed meter box
purpose-designed meter box intended to be installed partially below ground level

NOTE This box is to be installed against a wall or existing structure.

[SOURCE: BS 8499:2009, **3.17**]

3.19.3 surface-mounted meter box
purpose-designed meter box fitted with a meter bracket and intended for attaching to the outside face of an existing wall

[SOURCE: BS 8499:2009, **3.20**]

3.19.4 universal meter box
multi-purpose meter box fitted with a meter bracket and intended to be installed either surface-mounted or partially buried into the ground

NOTE This box is to be installed against a wall or existing structure.

[SOURCE: BS 8499:2009, **3.23**]

3.20 meter bracket
purpose-made support incorporating a means of securing meter unions from which a meter can be suspended

[SOURCE: BS 8499:2009, **3.14**]

3.21 meter compound
area or room designed and constructed to contain one or more meters with their associated gas fittings

3.22 meter exchange
situation where a meter on an existing installation is replaced with another of similar capacity without modification to the associated gas fittings

3.23 meter housing
meter box or meter compound external to the building

NOTE The meter housing is not part of the meter installation.

3.24 meter installation
installation that comprises a meter, and any associated valve, filter, meter regulator and associated protection devices, pliable connector, interconnecting pipework, fitting and support

NOTE A meter installation commences at the outlet of the ECV. Depending on the type of meter installation it terminates at:

a) the outlet connection of the meter; or

b) in the case of a semi-concealed meter installation, the outlet of the meter box outlet adaptor or the outlet of the meter where no meter-box outlet adaptor is fitted.

3.25 meter liner
metal fitting with a flanged end to take a union washer

3.26 meter regulator
device located in close proximity to a primary meter, which is solely to control the pressure of the gas within the gas meter and installation pipework

3.27 non-return valve
device to prevent the reverse flow of gas, air or other extraneous gas

3.28 operating pressure
pressure at which a system is operating

3.29 pliable connector
stainless steel tube formed with annular corrugations and having factory fitted end connections

NOTE Pliable connectors are sometimes referred to as semi-rigid connectors.

3.30 pressure absorption
difference between the pressures measured at the inlet and outlet of one or more gas fittings

3.31 pressure test point
gas fitting provided for the temporary connection of a pressure gauge

3.32 protective bonding conductor
protective conductor provided for protective equipotential bonding

3.33 service pipe
pipe for distributing gas to premises from a distribution main, being any pipe between the distribution main and the outlet of the first emergency control valve downstream from that distribution main

3.34 thermal cut-off device
safety device designed to stop the flow of gas when the air temperature in the vicinity of the device has exceeded a predetermined value

3.35 Zone 0
area in which an explosive air/gas mixture is continuously present or is present for long periods

[SOURCE: IGEM/G/4 Edition 2 [19]]

3.36 Zone 1
area in which an explosive air/gas mixture is likely to occur in normal operation occasionally

[SOURCE: IGEM/G/4 Edition 2 [19]]

3.37 Zone 2
area in which an explosive air/gas mixture is not likely to occur in normal operation and, if it occurs, it will exist only for a short time

[SOURCE: IGEM/G/4 Edition 2 [19]]

4 Planning and consultation and installation of non-return valve

4.1 Consultation

4.1.1 At the initial stages of the building design and/or planning of the meter installation, the party responsible for design and planning, e.g. the architect, shall consult the relevant gas supplier or gas transporter to verify that the gas service pipe is supplied at low pressure and the supply is of sufficient capacity to meet the needs of the proposed appliances. An assessment shall be made of the potential gas load to determine the required maximum capacity of the meter installation. This assessment shall be carried out in accordance with Annex A.

4.1.2 The designer/planner shall also ensure that the proposed meter installation is capable of providing a gas supply adequate for the immediate needs of the proposed appliances.

4.1.3 The designer/planner shall establish the DmP, LOP, MOP, DP and DMIP of the gas supply. When requesting pressure and capacity information from the gas supplier or gas transporter, the request shall be made using an appropriate form obtained from the relevant gas transporter or gas supplier.

4.1.4 The gas transporter or gas supplier shall be consulted to ensure that adequate provision is made for siting, installing and housing the meter installation.

NOTE The Gas Act 1986, as amended [21] requires that the gas transporter's approval be obtained with respect to the suitability and acceptability of the proposed meter housing.

4.1.5 The relevant gas transporter's authorization shall be obtained to break the seal, set the pressure and reseal the meter regulator in accordance with Clause **7**.

4.2 Non-return valve

Where an installation uses a gas compressor, pre-mixed blown or compressed air or extraneous gas in conjunction with the gas supply, the gas meter and incoming gas supply shall be protected by a non-return valve approved by the relevant gas transporter. The non-return valve shall be fitted downstream of the meter installation.

NOTE The Gas Safety (Installation and Use) Regulations 1998 [2] place requirements on consumers intending to use gas in a way which might cause pressure fluctuations in the supply, which could endanger other consumers. For example, Regulation 38 includes a requirement for the consumer to notify the relevant gas transporter 14 days in advance of the intended activity and comply with any directions from the gas transporter.

5 Competency

Persons carrying out work covered by the scope of this standard shall have the competence relevant for the task such as not to compromise the requirements of this standard and, in particular, the safe installation, commissioning and operation of gas equipment.

*COMMENTARY ON CLAUSE **5***

Competence requires sufficient knowledge, practical skill and experience to carry out the job in hand safely, with due regard to good working practice. The installation should also be left in a safe condition for use. Knowledge should be kept up to date with changes in law, technology and safe working practice.

There are three principal aspects to competence for work associated with gas equipment; these are:

a) knowledge of the relevant Building Regulations [9], [10], [11];

b) ability to ensure that associated electrical work is to the standard required by BS 7671;

c) registration for "gas work" with an appropriate authority.

It is a statutory requirement in Great Britain, the Isle of Man, Northern Ireland and Guernsey (see Table 1) that all "gas work" [item c)] be carried out by a business or self-employed person that is a member of a "class of persons" registered with a registration body which has been approved by an approval body (see Table 1) to operate and maintain such a register.

At the time of publication, the only body with approval to operate and maintain a register of individuals/businesses who are "members of a class of persons" is the Gas Safe Register. Thus, it is essential that all businesses or self-employed gas engineers are registered with the Gas Safe Register.

The qualifications which persons need to have to be deemed competent to carry out gas work are given in Table 2.

Table 1 **Approval bodies and statutory regulations by country/territory**

Country/ territory	Approval body	Statutory regulations
Great Britain	Health and Safety Executive (HSE)	Gas Safety (Installation and Use) Regulations 1998 [2]
Isle of Man	Health and Safety at Work Inspectorate (HSWI)	Gas Safety (Installation and Use) Regulations 1994, as amended and applied by the Gas Safety (Application) (Isle of Man) Order 1996 [4]
Northern Ireland	Health and Safety Executive Northern Ireland (HSENI)	Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004 [3]
Guernsey	Health and Safety Executive for the States of Guernsey [HSE (Guernsey)]	Health and Safety (Gas) (Guernsey) Ordinance 2006 [22]

Table 2 **Competence requirements by country/territory**

Qualifications	Great Britain and Isle of Man	Northern Ireland	Guernsey
Current certificate(s) of competence in the type of gas work to be conducted, issued by an awarding body accredited by the United Kingdom Accreditation Service (UKAS) Accredited Certification Scheme (ACS)	✓	✓	✓
National/Scottish Vocational Qualification (N/SVQ accredited by Ofqual), which is aligned in matters of gas safety	✓	✓	✓
National/Scottish Vocational Qualification (N/SVQ accredited by Ofqual), which is aligned under the HSC ACoP arrangement [A)] as approved with the registration body	✓	✓	✘
Any other scheme recognized by the gas registration body for registration purposes	✓	✓	✓

[A)] Guidance on the individual competence required for gas work is given in IGEM/IG/1 [23].

There are three principal aspects to competence for work associated with gas meters. These are:

1) be competent in their installation; and

2) have an understanding of their use; and

3) have an awareness of the necessary safety actions and appropriate regulations (e.g. the Gas Safety (Installation and Use) Regulations 1998 [2]).

This competence can be demonstrated by satisfactory completion of the relevant ACS assessment(s), which cover the installation, maintenance, removal and use of domestic low pressure natural gas meters.

NOTE Under the provisions of the Gas Suppliers Licence Conditions, as specified in the Gas Act 1986, as amended [21], either an approved meter installer has to connect a gas meter, or the work has to be inspected by an approved meter installer. The authority that approves a meter installer in Great Britain is Ofgem and an approved installer is referred to as an Ofgem Approved Meter Installer (OAMI).

6 Design

6.1 General

6.1.1 Hazardous area classification

*COMMENTARY ON **6.1.1***

Domestic installations are exempt from DSEAR [14]. However, DSEAR does apply to non-domestic installations. These require that, prior to the fitting of a meter installation in a non-domestic premises, a hazardous area assessment has to be undertaken. More information on the application of DSEAR can be found in HSE document, L138 [24].

For the purposes of design, meters installed in domestic premises, in either an internal location or in a meter housing, are deemed to be in a Zone 2 hazardous area.

6.1.1.1 For any meter installation to be installed in non-domestic premises, confirmation shall be obtained from the responsible person for the site of any existing hazardous area classification for the proposed location. Prior to the fitting of such a meter installation, a hazardous area assessment shall be undertaken in accordance with BS EN 60079-10-1 or IGEM/GM/7B [N1], or, if

appropriate, IGEM/SR/25 [N2]; this might determine a hazardous area of Zone 0, Zone 1 or Zone 2. Meter installations shall not be fitted in a Zone 0 environment.

6.1.1.2 The meter and any equipment electrically connected to it shall be suitable for use in a Zone 2 area or be suitable for use in the zone in which it is to be used, whichever is the more onerous requirement. Any other equipment fitted inside the meter housing shall be suitable for use in the zone in which it is to be used and shall be connected in accordance with IGEM/GM/7A [N3].

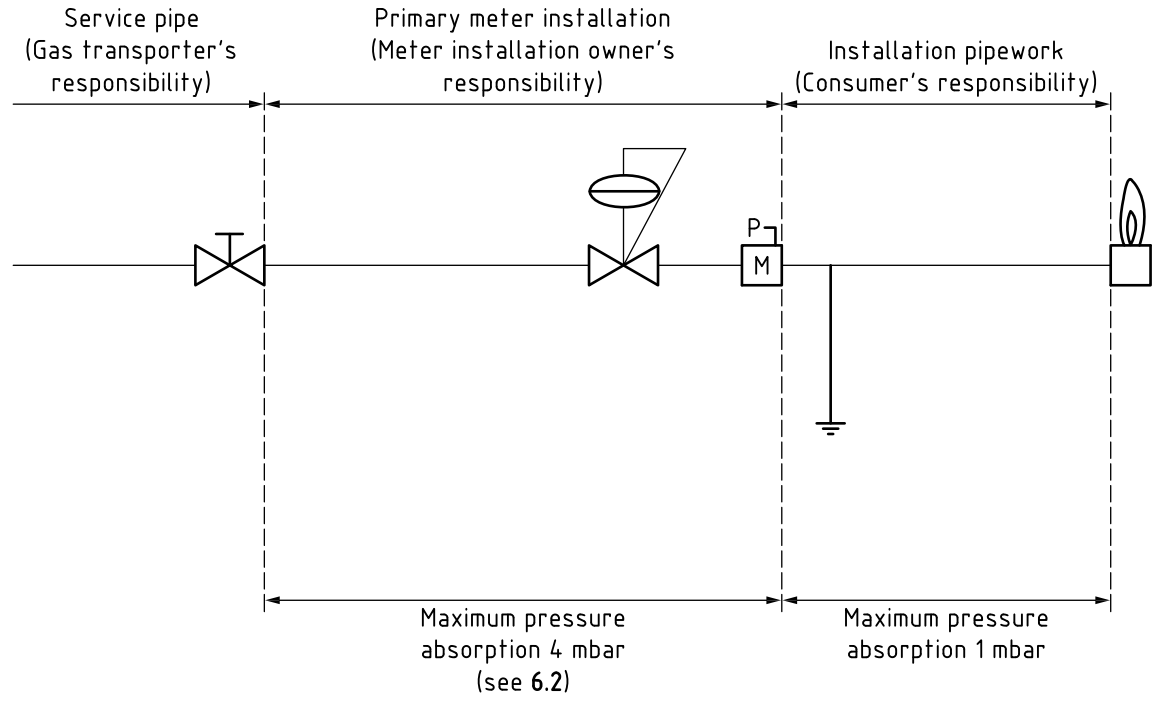
6.1.2 Arrangement of the meter installation

6.1.2.1 The meter installation shall be arranged in accordance with Figure 1.

6.1.2.2 Where an electrical insulation joint (see **3.13**) is fitted downstream of the ECV (in a legacy installation), this shall only be removed with the consent of the Network Operator and where a safe method of working has been established.

NOTE A generic consent for the removal of the insulation joint might be in place.

Figure 1 **Arrangement of a meter installation**



Key

Emergency control valve

Meter regulator

M Primary meter

P Pressure test point

Appliance

Protective equipotential bond

NOTE The following can be fitted, if required, in the meter installation prior to the meter regulator, subject to the agreement of the meter asset manager:

a) *excess flow valve;*

b) *thermal cut-off device;*

c) *filter.*

6.1.3 Gas fittings

6.1.3.1 Meter fittings shall conform to BS EN 746 or PRS 1/E [N4] as appropriate.

6.1.3.2 All gas fittings shall be suitable for use over the complete range of pressures at which they could be required to operate, including DmP, LOP, MOP and DMIP.

6.1.3.3 All gas fittings upstream of the primary meter regulator shall be capable of withstanding a DmP of 19 mbar, the LOP, an MOP of 75 mbar and a DMIP of 200 mbar.

NOTE The gas transporter will be able to advise on the LOP of the gas supply.

6.1.3.4 All gas fittings downstream of the primary meter regulator to the outlet of the meter installation shall be capable of withstanding an MOP of 75 mbar and a DMIP of 200 mbar.

NOTE Regulation 5 of the Gas Safety (Installation and Use) Regulations 1998 [2] requires all gas fittings to be of good construction and sound material, and of adequate strength and size to ensure safety when connected to either a low pressure gas service or low pressure installation pipework.

6.1.3.5 Where an exisiting gas fitting within a meter installation is to be reused, it shall be in sound condition and conform to **6.1.3.1**, **6.1.3.2**, **6.1.3.3** and **6.1.3.4**.

6.1.4 Gas family

All gas fittings shall be of a type that has been designed and manufactured for use with 2nd family gas.

NOTE 2nd family gases are defined in BS EN 437.

6.1.5 Flow rate

All gas fittings in the meter installation shall be designed and selected to pass gas at a flow rate not less than the meter's capacity.

6.2 Pressure absorption

The pressure absorption across each type of primary meter installation shall not exceed 4 mbar at a flow rate equivalent to the badged capacity of the meter, with a DmP of 19 mbar at the outlet of the ECV, and shall be demonstrated by laboratory/workshop testing.

Secondary meter installations shall be designed to ensure that any connected appliances are supplied with adequate pressure to ensure that they operate safely.

NOTE 1 It is assumed that the installation pipework (whether installed before or after the meter installation) will have a maximum pressure absorption of 1 mbar. The limit of 4 mbar pressure absorption across the meter installation is to ensure the total pressure absorption across the meter installation and installation pipework does not exceed 5 mbar at a flow rate equivalent to the capacity of the meter when a pressure of 19 mbar is present at the outlet of the ECV, so that any of the appliances can operate safely.

NOTE 2 It is a requirement of BS 6891 that the maximum pressure absorption across the installation pipework is 1 mbar. Where there is a secondary meter, this requirement applies to the pipework including the secondary meter.

6.3 Meter regulator

6.3.1 Position

6.3.1.1 All primary meter installations shall incorporate a meter regulator in close proximity to, and upstream of, the meter.

6.3.1.2 The meter regulator shall be sited as near as practicable to the outlet of the ECV.

6.3.1.3 The interconnecting pipework between the meter regulator and the primary meter shall be as short as practicable.

6.3.2 New regulator

6.3.2.1 A new regulator shall conform to PRS 3/E [N5] and be factory set to $22^{0}_{-0.5}$ mbar so as to achieve a nominal pressure at the outlet of the meter of 21 mbar when the pressure at the inlet of the regulator is 30 mbar at a gas flow rate of 3.5 m^3/h.

6.3.2.2 The regulator shall be sealed and marked with the manufacturer's specific mark, e.g. trademark or initial letters of the company name.

6.3.3 Existing/reused regulator

Where an existing regulator is to be reused, it shall be checked to ensure it is in sound condition and conforms to **10.1**.

6.4 Meters

6.4.1 Primary meter

NOTE 1 Any primary meter covered by this standard has to be:

a) approved by the National Measurement and Regulation Office or a metrological authority acceptable to the National Measurement and Regulation Office; and

b) stamped prior to delivery.

Such a meter can only be installed and used if it has been type-approved and stamped (that is, sealed in accordance with Section 17 of the Gas Act 1986, as amended [21]).

NOTE 2 Regulation 16(1) of the Gas Safety (Installation and Use) Regulations 1998 [2] prohibits the installation of a prepayment meter as a primary meter through which gas passes to a secondary meter.

6.4.1.1 The primary meter shall be downstream of, and as close as practicable to, the meter regulator.

*NOTE In most situations the meter will be installed adjacent to the meter regulator. However, there might be circumstances where it is necessary to install the meter elsewhere, e.g. under the Gas Act, as amended [21] obligation to disabled customers. Further information is given in Clause **13**.*

*Where the meter is to be sited or resited internal to the dwelling for a disabled customer, a check should be undertaken to ensure any additional gas fittings do not increase the pressure absorption above 4 mbar in accordance with **6.2**.*

6.4.1.2 The capacity of the meter shall be large enough to provide a sufficient supply of gas to meet the needs of the proposed appliances. The maximum capacity of the meter shall be determined in accordance with Annex A.

NOTE 1 A meter of 6 m^3/h capacity can be expected to meet the needs of the majority of domestic gas installations. A worked example of a calculation of the required capacity of a meter for a 2nd family gas installation is given in Annex A.

NOTE 2 If results from the calculation in Annex A show that a meter with a capacity of greater than 6 m^3/h is required, reference should be made to IGEM/GM/6 [25] for the design and method of installing the meter.

6.4.1.3 The meter shall be suitable for 2nd family gases.

6.4.1.4 The meter shall be capable of withstanding a MOP of 75 mbar.

6.4.1.5 Any meter installed inside the property shall be fire-resistant.

NOTE Meters marked with a "T" in accordance with BS EN 1359 or BS EN 14236 or refurbished meters that have no "SJ" mark conforming to BS 4161-3 or BS 4161-5 can be considered fire-resistant. BS 4161-3 and BS 4161-5 have been withdrawn, but refurbished meters made originally to these standards remain suitable for use.

6.4.1.6 New steel-cased diaphragm meters shall be designed to BS EN 1359.

NOTE BS EN 1359 superseded the British Standards for diaphragm meters, BS 4161-3 and BS 4161-5. However, refurbished meters with a capacity of 6 m^3/h made originally to BS 4161-3 or BS 4161-5 can also be installed.

6.4.1.7 New ultrasonic meters shall conform to BS EN 14236.

6.4.1.8 Where one or more secondary meters are installed, the primary meter shall not be a prepayment meter or a smart meter used in prepayment mode.

NOTE Regulation 16(1) of the Gas Safety (Installation and Use) Regulations 1998 [2] prohibits the installation of a prepayment meter as a primary meter through which gas passes to a secondary meter.

6.4.1.9 The meter shall be either a smart, credit or a prepayment type meter.

6.4.2 Secondary meter

6.4.2.1 A secondary meter shall conform to **6.4.1**, except **6.4.1.1**, and to **6.2**, and shall be installed in the installation pipework.

NOTE 1 Regulation 16(1) of the Gas Safety (Installation and Use) Regulations 1998 [2] prohibits the installation of a prepayment meter as a primary meter through which gas passes to a secondary meter.

NOTE 2 There is no legal requirement for a secondary meter to be stamped and a meter regulator is not normally fitted, but otherwise the installation requirements for secondary meters are in general the same as for primary meters.

6.4.2.2 An AECV shall be fitted as close as practicable to the inlet of every secondary meter.

NOTE In some situations this valve might be designated as an additional emergency control valve (AECV).

6.4.2.3 Meter installations that incorporate secondary meters shall be labelled in accordance with **11.3**.

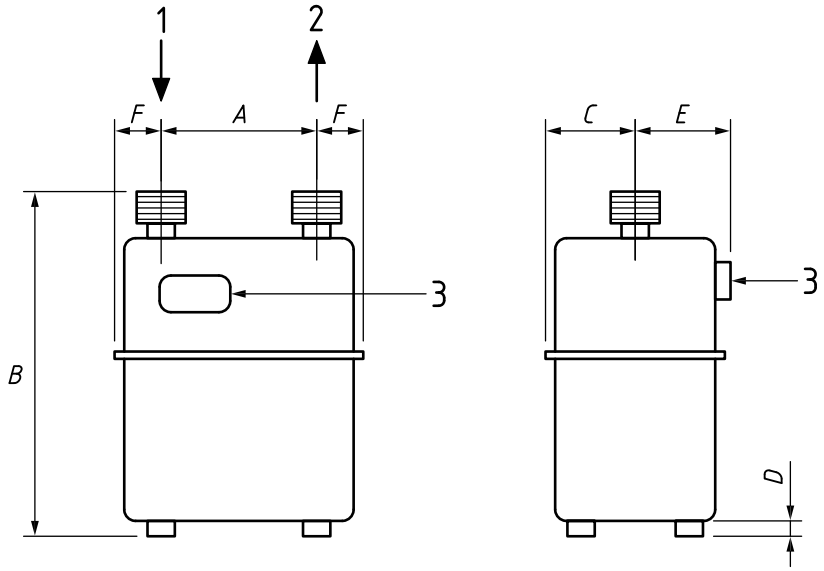
6.4.2.4 Any person who installs a secondary meter shall notify the supplier of gas to the premises that a secondary meter has been fitted.

6.4.3 Connections

6.4.3.1 Connections for steel case diaphragm or ultrasonic meters (including those intended for semi-concealed installations) shall conform to BS 746 and be positioned in accordance with Figure 2.

6.4.3.2 Connections shall comprise size 1 in bosses conforming to BS 746:2014, Table 3.

Figure 2 **Connections on a 6 m³/h metal case meter**



a) Front view b) Side view

Key

1 Inlet
2 Outlet
3 Index
A Distance between connection centres = (152.4 ±0.2) mm
B Maximum overall height of primary meter = 282 mm
C Maximum distance between rear of meter casing and the centre line of bosses = 85 mm
D Nominal height of feet at base of primary meter = 5 mm
E Maximum distance between centre line of bosses and front extremity of meter = 109 mm
F Maximum distance between centre line of bosses and left and right extremities of the meter as viewed from the front or back = 48 mm

NOTE Dimension E is not applicable to meters fitted in semi-concealed meter boxes.

6.4.3.3 Connections for plastic case diaphragm meters intended for semi-concealed installations shall have threads that conform to BS 21 and be positioned in accordance with Figure 3.

6.4.3.4 The inlet connection shall have an Rp1 thread conforming to BS 21.

6.4.3.5 The outlet shall have an Rp¾ thread conforming to BS 21.

6.5 Emergency control valve (ECV)

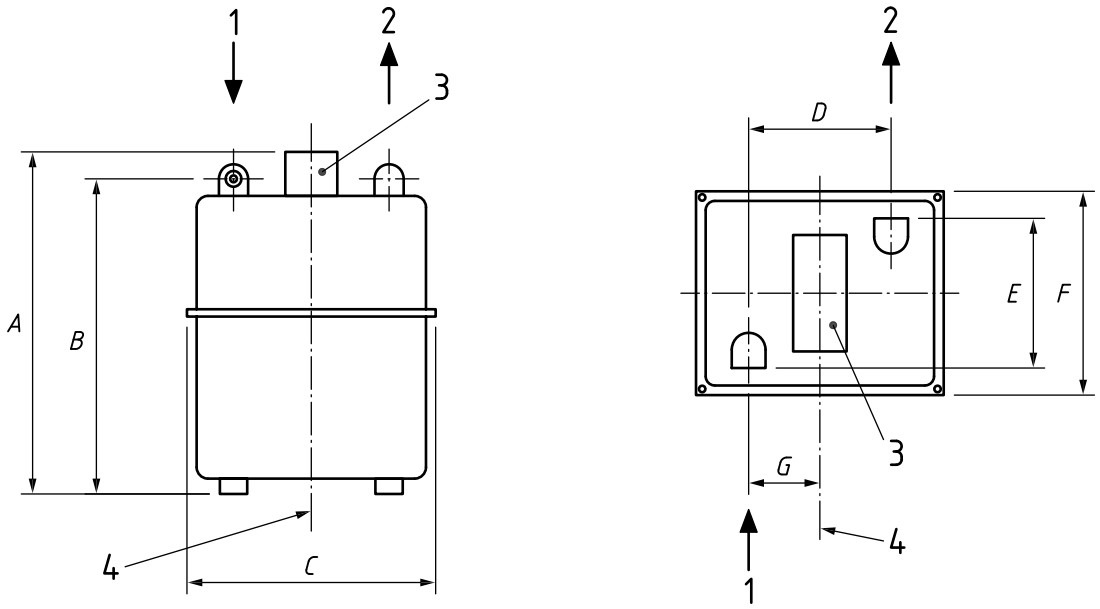
NOTE The provision of the ECV at the end of the service pipe is the responsibility of the gas transporter.

6.5.1 A primary meter installation shall be connected to the outlet of the ECV.

6.5.2 The design of the meter installation shall be such that the consumer has easy access to the ECV to isolate the gas supply and that there is access for operation, maintenance and exchange of the installation.

6.5.3 The ECV shall be of a type suitable for operating pressures within the range of the DmP and DMIP.

Figure 3 **Connections on 6 m³/h plastic case meters intended for semi-concealed installation**



a) Side view b) Top view

Key

1 Inlet
2 Outlet
3 Index
4 Centre line
A Overall height of meter <305 mm
B Height between bottom of meter and centre of inlet/outlet = (274 ±3) mm
C Overall width of meter <240 mm
D Distance between midpoint of inlet and midpoint of outlet = (125 ±5) mm
E Distance between face of inlet and face of outlet = (137 ±5) mm
F Maximum overall depth of meter = 170 mm
G Width between the centre line of the meter and the midpoint of the inlet = (52 ±1) mm

6.6 Pliable connector

A pliable connector shall conform to PRS 6/E [N6].

*NOTE The length of the pliable connector can significantly affect its pressure absorption. For further details on the use of pliable connectors refer to **8.2.7.4**.*

6.7 Pressure test point

The meter installation shall incorporate a pressure test point fitted in the meter outlet boss or meter liner at the outlet of the meter.

6.8 Interconnecting pipework

Interconnecting pipework shall be made from rigid steel or copper that conforms to BS 6891:2015, Clause **6**. It shall have a minimum number of joints and shall be adequately supported.

6.9 Location of meter installation

6.9.1 General

*NOTE See note to **6.4.1.1**.*

6.9.1.1 The meter installation shall be sited so:

a) as to enable the installation, adjustment, servicing and exchange of the regulator and the exchange of the meter itself;

b) the meter is easily accessible for inspection and meter reading;

c) as to enable easy operation of all functions of the meter.

NOTE Further guidance on accessibility is given In Approved Document M [26].

6.9.1.2 Coin-operated meters shall be inaccessible to unauthorized persons.

6.9.1.3 A meter installation shall not be sited:

a) where it might be subjected to temperatures outside the operating range of the meter as specified by the manufacturer;

b) where it might be exposed to accidental damage;

c) where it might cause an obstruction;

d) where it might be affected by a damp, (unless it is a semi-concealed meter installation) or corrosive atmosphere;

e) where it will constitute a danger to any person;

f) any nearer to an electricity meter/electrical apparatus, switchgear and electricity supply and distribution cables than the distances specified in **8.2.5**;

g) at such a low level that there is a significant risk of it being submerged in the event of flooding; or

h) in an unventilated space.

NOTE Meters should not be installed where food is normally stored.

6.9.1.4 A meter shall not be installed on the sole means of escape from the premises in the event of a fire.

NOTE 1 Regulation 12 of the Gas Safety (Installation and Use) Regulations 1998 [2] prohibits the installation of a meter in any premises unless the site where it is to be installed is such as to ensure, so far as is reasonably practicable, that the means of escape from those premises in the event of fire is not adversely affected. Guidance on Regulation 12(1) is contained in HSE Approved Code of Practice L56 [27].

NOTE 2 Further guidance on multi-occupancy buildings is given in IGEM/G/5 [N7].

6.9.1.5 The meter and its associated gas fittings shall not be in contact with any wall and shall be protected, either by design, installation or position, from contact with any cement and/or cement composition and any floor that might be wetted.

*COMMENTARY ON **6.9.1***

The following locations may be used for gas meter installations:

- *in a purpose made meter housing or compound outside the building;*
- *in a garage or outbuilding;*
- *inside the building;*
- *at the boundary of the property, in a meter housing.*

6.9.2 Location outside the building

6.9.2.1 A meter installation located outside the building shall be located in a meter housing conforming to **6.9.2.2** to **6.9.2.10**.

6.9.2.2 The housing of a meter installation shall be approved by the gas transporter in accordance with Clause **7**.

6.9.2.3 Meter housings shall be:

a) semi-concealed meter boxes;

b) surface-mounted meter boxes;

c) built-in meter boxes;

d) universal meter boxes; or

e) purpose-built housings designed for low pressure meter installations.

6.9.2.4 New meter boxes shall conform to BS 8499.

6.9.2.5 Purpose-built meter housings shall be designed such that:

a) they are impermeable to gas and do not allow escaping gas to enter the wall cavity or property;

b) they give protection against the weather and acts of vandalism;

c) they are resistant to the surface spread of flame in accordance with BS 476-7:1997, Class 2;

d) consumer access is gained only by a special key;

e) the consumer has ready access to the ECV;

f) if intended to be installed above ground, they incorporate ventilation that is a minimum of 2% of the plan area (1% at high level and 1% at low level) provided by purpose-designed vents of the non-closable type to achieve at least a Zone 2 hazardous area within the meter housings;

g) if intended to be installed partly below ground (e.g. a semi-concealed meter housing), they incorporate non-closable ventilation that is a minimum of 6% of the plan area, evenly distributed at high level to achieve at least a Zone 2 hazardous area within the meter housings.

*COMMENTARY ON **6.9.2.5** f) AND g)*

The plan area is the area of the largest internal cross section in plan view, e.g. on those semi-concealed meter boxes that have a well in the base. It is not the floor area of the well but the area at the widest point.

Attention is drawn to the Gas Safety (Installation and Use) Regulations [2].

6.9.2.6 The size of the meter housing shall be determined by the meter to be fitted and by the arrangement of the pipework and associated gas fittings.

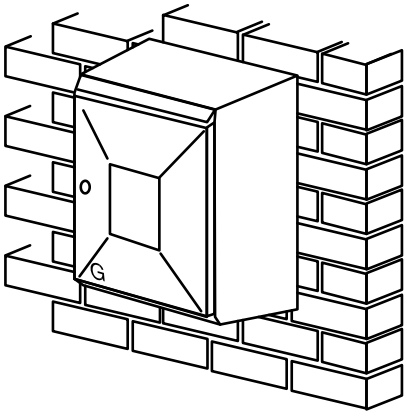
*COMMENTARY ON **6.9.2.6***

*A space measuring (550 × 550 × 300) mm can accommodate a typical 6 m^3/h meter, but if it is considered necessary to reduce these dimensions then the relevant gas transporter (see Clause **7**) should be consulted, as any reduction might restrict the choice of meter that could be installed.*

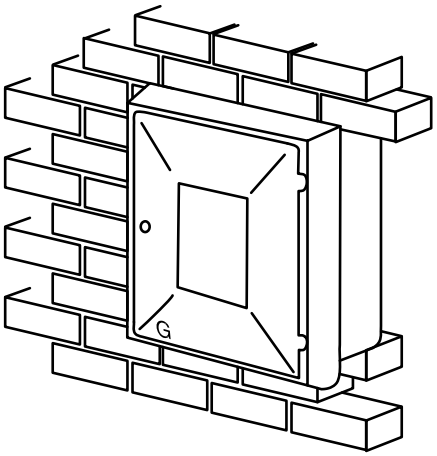
Meter boxes illustrated in Figure 4a), Figure 4b) and Figure 4d) are intended to accommodate diaphragm and ultrasonic meter installations with a capacity of 6 m^3/h. Semi-concealed meter boxes shown in Figure 4c) are intended to accommodate specifically designed diaphragm and ultrasonic credit meters or smart meters with a capacity of 6 m^3/h, and can be adapted to fit a prepayment meter.

Figure 4 **Typical examples of meter boxes**

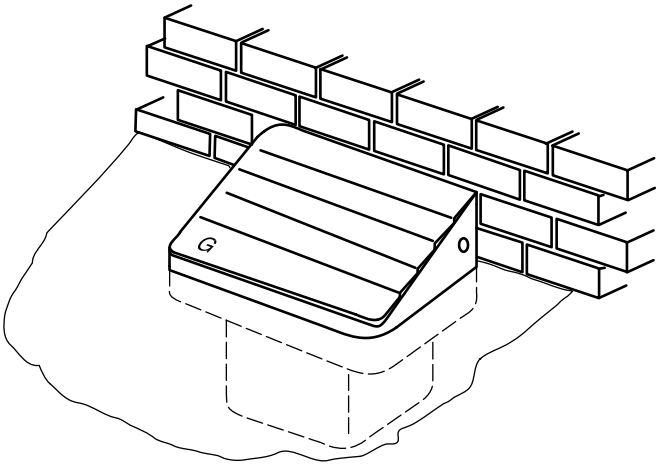
Dimension in millimetres



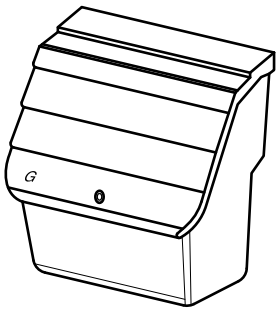
a) Surface-mounted meter box



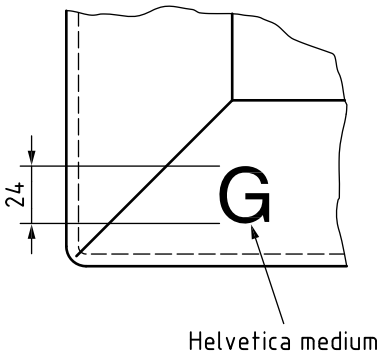
b) Built-in meter box



c) Semi-concealed meter box



d) Universal meter box



e) Identificaiton of a gas meter box

6.9.2.7 Only meters that are specified by the manufacturer as suitable for use in semi-concealed meter boxes shall be installed in such boxes.

6.9.2.8 A meter shall not be installed in a built-in meter box whose main body is damaged as there is a risk that gas could enter the cavity or fabric of the building.

*COMMENTARY ON **6.9.2.8***

Where the main body of a built-in meter box is damaged and has a small hole [10 mm^2, i.e. (3 × 3) mm approximately], the meter should not be installed unless the box is permanently repaired to achieve a gas tight seal, e.g. using glass fibre reinforced plastics (GRP).

6.9.2.9 Where the protective bonding conductor connection is made inside a built-in meter box, the cable shall leave the box either through a purpose-provided rear entry sleeve (spigot) or via the bottom exit and not by drilling or piercing the box.

6.9.2.10 The consumer shall be provided with a labelled key for the housing.

6.9.3 Location inside the building

6.9.3.1 A primary meter shall be located as near as practicable to the point where the service pipe enters the building or, in the case of a multi-occupancy building, where the service pipe enters each dwelling.

6.9.3.2 Where a new meter installation is being installed for the first time in premises with two or more floors above the ground floor, the meter installation shall not be sited on or under the stairway, or in any other part of the premises, where the stairway or that other part of the premises forms the sole means of escape in case of fire.

6.9.3.3 For all installations not covered by **6.9.3.2** (including installations in premises with fewer than two floors above the ground floor and replacement meters in premises with two or more floors above the ground floor) the meter shall, where practicable, be installed in accordance with **6.9.3.2**.

*COMMENTARY ON **6.9.3.1**, **6.9.3.2** and **6.9.3.3***

*The requirements in **6.9.3** are consistent with the guidance given in HSE Approved Code of Practice L56 [27] for Regulation 12 of the Gas Safety (Installation and Use) Regulations 1998 [2].*

NOTE 1 Attention is drawn to the Building Regulations [9], [10], [11]. If any doubt exists about determining the sole means of escape from a building, the advice of a building control officer should be sought.

NOTE 2 Further guidance on installations in multi-occupancy buildings is given in IGEM/G/5 [N7].

7 Gas transporter appraisal of primary meter installations

Prior to the installation of a primary meter installation, the gas transporter that conveys the gas to the ECV shall be contacted to:

a) approve the type of meter housing, where a housing is to be used;

   NOTE 1 Some gas transporters have already approved certain meter housings. This approval will have been marked on the meter housing, stating which transporter gave the approval.

b) agree, in conjunction with the gas service installer, the location of the installation and any housing;

c) appraise the pressure control principles to be used;

d) give authorization to an Ofgem Approved Meter Installer (OAMI) to break a seal, set the pressure and reseal the primary meter regulator to give the correct operating pressure at the outlet of the meter.

NOTE 2 Some gas transporters offer generic authorization for domestic LP meter installations covered by COP/1a [1].

8 Meter work

8.1 Risk assessment

8.1.1 Prior to undertaking any meter work, the installer shall carry out a site-specific risk assessment. Appropriate mitigating action shall be taken for any hazards identified.

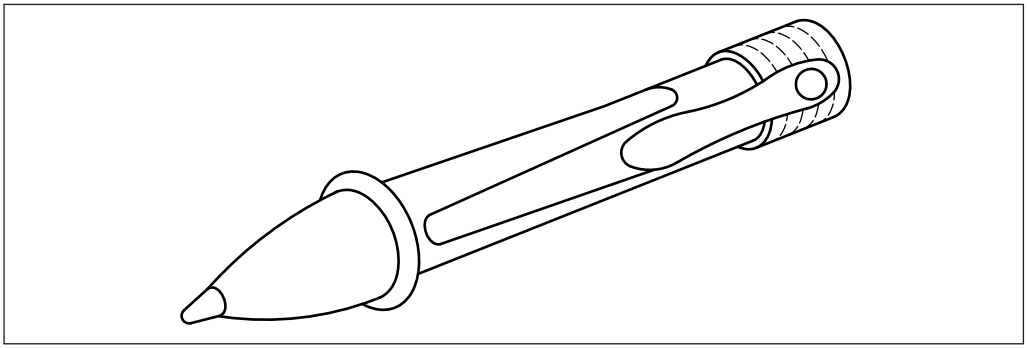
8.1.2 The installer shall be alert for any other hazards that arise during meter work and, where necessary, update the site-specific risk assessment.

8.1.3 As part of the risk assessment the installer shall ensure that any exposed metalwork is checked for stray electrical voltage with an appropriate voltage detector.

*COMMENTARY ON **8.1.3***

The use of a non-contact voltage detector (single pole) capable of indicating voltages of 50 V or greater (see Figure 5 for an example) on all exposed metalwork in the work area assists in the detection of stray voltage that might be harmful. It should be noted that such voltage detectors are not designed to respond to current flow and should be used in accordance with the manufacturer's instructions. Where any doubt about the electrical installation exists, the advice of a competent electrician should be sought.

Figure 5 **Non-contact voltage detector (single pole): Example**



8.1.4 As a minimum, the following steps shall be incorporated in any risk assessment:

a) identify any hazards;

b) confirm there is no smell of gas;

c) check for theft of gas and, if theft is suspected, inform the supplier of gas to the premises;

d) decide who might be affected by work activities;

e) evaluate the risks and decide on whether existing measures are adequate or if additional measures are required to reduce the risks;

f) confirm that there is adequate ventilation in the work area for the proposed activities;

g) confirm that there is safe access and egress;

h) review the assessment from time to time and revise as necessary; and

i) confirm that the meter and electrical equipment are suitable for the hazardous area classification of the meter installation.

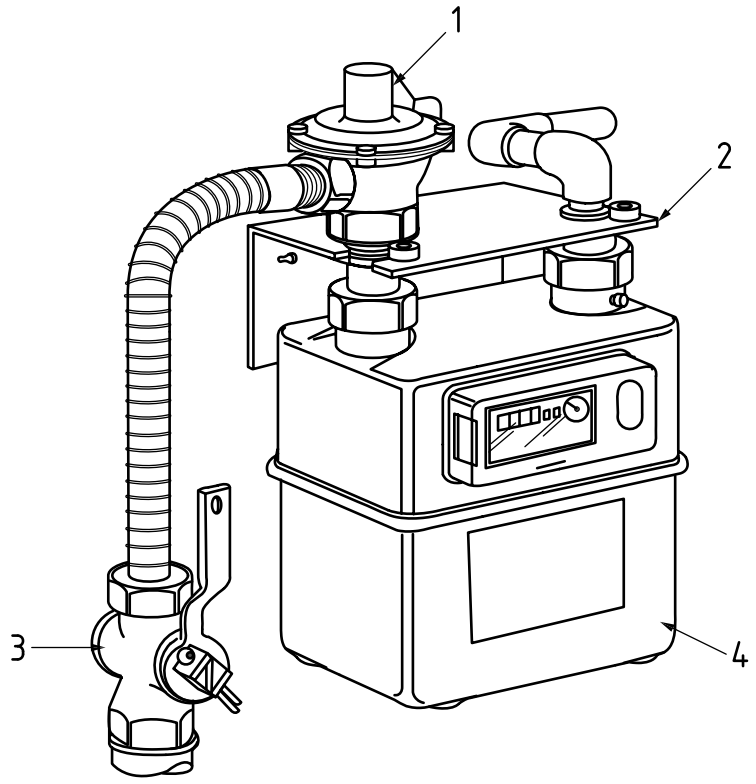
8.2 Fitting a meter installation

8.2.1 General

8.2.1.1 The primary meter installation shall be installed in accordance with a design conforming to Clause **6**.

NOTE A typical LP meter installation is shown in Figure 6.

Figure 6 **Typical meter installation**



Key

1	Regulator	3	ECV
2	Meter bracket	4	Diaphragm meter

8.2.1.2 Where a secondary meter is incorporated, it shall be installed in accordance with a design conforming to **6.4.2**.

NOTE It is not always necessary to fit a meter regulator as part of the secondary meter installation. For example, a regulator would not be required unless the nominal operating pressure at the outlet of the primary meter (i.e. the metering pressure) is greater than 21 mbar.

8.2.1.3 The regulator and the meter shall be fitted in accordance with the manufacturer's instructions.

8.2.1.4 New meter washers shall be fitted whenever a joint incorporating threads conforming to BS 746 is uncoupled.

8.2.2 Handling and care

8.2.2.1 Meters shall be handled and transported so as to prevent mechanical shock or damage. Whilst in transit, meters shall be secured so as to prevent movement, e.g. by being strapped down.

8.2.2.2 Diaphragm meters shall be kept upright at all times.

NOTE This subclause does not apply to removed meters which are intended for scrapping.

8.2.2.3 When the meter is not connected, the inlet and outlet connections shall be capped.

8.2.3 Pre-installation checks and safety precautions

8.2.3.1 General

8.2.3.1.1 The following activities shall be undertaken prior to installation.

a) Confirm that a site-specific risk assessment has been undertaken in accordance with **8.1**.

b) Open the meter housing door(s) and ensure it is held securely in the open position to allow safe access/egress in an emergency.

c) Carry out a sight, sound and smell check for any signs of tampering with the meter installation, the service pipe, the meter and the installation seals. If there are any signs of tampering or any damage to any of the seals, report it immediately to the relevant gas supplier's theft of gas team. Report any smell of gas to the National Gas Emergency Service.

NOTE 1 In Great Britain the National Gas Emergency Service number is 0800 111 999.

d) Confirm that the meter installation inlet pipework/fitting is compatible with the outlet connection of the ECV.

e) Confirm that the gas service pipe is supplied with natural gas at low pressure (i.e. 75 mbar or less) and that the regulator and its connection to the ECV are compatible for connection to a low pressure gas network.

NOTE 2 Labels that indicate the pressure in the gas service pipe might be found attached on or near the ECV.

NOTE 3 If there is any doubt about whether the network is a low pressure network, this should be verified by connecting a pressure gauge at the outlet of the ECV and slowly opening the valve, noting if the pressure reading is 75 mbar or less.

f) Confirm that the site is ready to accept the completed installation.

g) Take all necessary precautions, for example not taking equipment that might be a potential ignition source into a hazardous area.

h) Confirm that the meter housing or meter compound provides adequate protection against weather, that adequate ventilation has been provided, and that the ECV and meter installation are accessible for any subsequent maintenance or adjustment.

i) Confirm that any electrical equipment installed within the meter housing is suitable for use within the hazardous area appropriate to the installation.

j) Ensure that the correct components of the meter installation, including fixings, washers and sealing materials, have been supplied for installation in accordance with the design conforming to Clause **6**.

k) Ensure that any flux to be used is of a type that only remains active during the heating process.

NOTE 4 To avoid corrosion of the pliable connector it is important that all traces of flux are removed from the pliable connector.

l) Ensure that any components within the meter installation that are made of lead are replaced.

m) Visually check that the regulator has been sealed and packaged to prevent debris entering the components prior to delivery to site. Remove the packaging and visually check that the gasways are clean.

n) Visually check that any sleeve/spigot within the vicinity of the meter is correctly installed and is sealed at one end to the pipework with a flexible fire-resistant compound.

o) Ensure that the gas fittings are undamaged and conform to the product standards specified in Clause **6**.

p) Ensure that the notices specified in Clause **11** are available for the meter installation.

8.2.3.1.2 Any person who installs, relocates or exchanges a primary gas meter shall check for the presence of any secondary meters.

8.2.3.1.3 Secondary meters shall be recorded and the supplier of gas to those premises shall be notified of the presence of secondary meters.

8.2.3.2 Emergency control valve

8.2.3.2.1 The ECV shall be checked to confirm that:

a) it is of a type suitable for a maximum operating pressure up to 75 mbar and a design maximum incidental pressure of 200 mbar;

b) it is sited so as to be readily accessible for operation by the consumer to isolate the gas supply;

c) it is sited so as to be readily accessible for servicing and exchanging;

d) it is fitted with a key or lever such that:

1) when the key or lever is moved to the fully downward position the valve is closed;

2) when the key or lever is parallel to the axis of the pipe the valve is open;

e) any detachable lever is securely held in place;

f) the "ON" and "OFF" positions and the direction of operation of the ECV are clearly and permanently marked.

8.2.3.2.2 Where the ECV does not conform to **8.2.3.2.1**, the gas transporter that conveys the gas to the ECV shall be advised.

8.2.4 Protective bonding conductor

If the installer connects a primary meter installation to any installation pipework, the installer shall check that the protective bonding conductor is evident.

NOTE Regulation 18(2) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires any person connecting installation pipework to a primary meter where a protective bonding conductor might be necessary to inform the responsible person for the premises that such bonding should be carried out by a competent person.

*COMMENTARY ON **8.2.4***

Where a primary meter is being relocated, an existing protective equipotential bond could be satisfactory as found, or it might need to be relocated.

The protective equipotential bond is located as near as practicable to the point of entry of the installation pipework into the building and before any branch pipework. Detailed requirements for the protective bonding conductor of meter installations to installation pipework are specified in BS 6891. Further information on the protective bonding conductor can be found in BS 7671 and IGEM/G/5 [N7].

8.2.5 Electrical apparatus adjacent a gas meter

Where a gas meter and its associated fittings cannot be fitted more than 150 mm from an electricity meter/electrical apparatus or more than 25 mm away from the electricity supply and distribution cables, a fire-resistant partition made of an electrically insulating material shall be placed between them.

*COMMENTARY ON **8.2.5***

*The separation distances specified in **8.2.5** are consistent with BS 6891. Every effort should be made to ensure that these separation distances are achieved instead of relying on the use of insulating material.*

8.2.6 Temporary continuity bond

During any work that necessitates connection or disconnection of any meter or associated gas fittings, a temporary continuity bond shall be fixed, whether or not the permanent protective bonding conductor has been established.

A temporary continuity bond shall not be fitted such that it bridges any insulation joint fitted upstream of the ECV.

The temporary continuity bond shall remain in position until the work is completed.

*COMMENTARY ON **8.2.6***

This procedure is to guard against the incidence of spark or shock hazard caused by contact between utility services.

Care should be taken prior to doing meter work to ensure there are no stray electrical currents present.

A recommended temporary continuity bond comprises at least 1.2 m of single core insulated flexible cable, or equivalent, of at least a 250 V rating. The cable should have a cross-sectional area of not less than 10 mm^2 and a multi-strand construction in accordance with BS 6004, BS EN 50525 or BS 6231, with a robust clip or clamp firmly attached at each end.

Regulation 10 of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that, where necessary to prevent danger, work in relation to a gas fitting is carried out using a suitable bond to maintain electrical continuity until the work is completed and permanent electrical continuity has been restored.

8.2.7 Securing the meter

8.2.7.1 General

The installation shall be prepared and the meter fitted in accordance with **8.2.7.2**, **8.2.7.3** and **8.2.7.4**.

8.2.7.2 Meter

8.2.7.2.1 The meter shall be supported so as to restrict movement and reduce the likelihood of tampering, and to conform to the following requirements.

a) The meter shall be supported in a manner that minimizes the strain being placed on any connections.

b) It shall be easy to remove and refit the meter.

c) When the meter is installed inside a building it shall be fitted to a meter bracket such that the inlet connection is on the left, with the index facing away from the meter bracket.

d) When the meter is installed in an above-ground meter housing, it shall be fitted to a meter bracket that has been fitted within the meter housing.

e) When the meter is installed in a semi-concealed meter box, it shall be restrained from movement by either the design of the box or the use of a meter bracket that has been fitted to the box.

f) When a diaphragm meter is used, it shall be installed upright and level such that it cannot be readily tilted.

g) The meter shall be secured such that it is not in direct contact with any wall and shall be protected either by design, installation or position from direct contact with any cement and/or cement composition and any floor that might be wetted.

NOTE This can be achieved by raising the meter above the floor using the purpose-designed meter support or using a meter manufactured with insulated feet.

8.2.7.2.2 Where a meter bracket is used, the union connections shall be fitted to the bracket such that they cannot be removed without the use of a tool or key and securely hold the meter and regulator in place.

8.2.7.3 Meter regulator

8.2.7.3.1 The inlet of the meter regulator shall be connected as near as practicable to the outlet of the ECV.

8.2.7.3.2 The outlet of the meter regulator shall be connected as near as practicable to the inlet of the meter.

8.2.7.3.3 The regulator shall be fitted in a manner that minimizes the strain being placed on any connections and such that the regulator can be easily removed and refitted.

8.2.7.3.4 The regulator shall be secured such that it is not in direct contact with any wall.

8.2.7.4 Pliable connector

8.2.7.4.1 If a pliable connector is incorporated within the meter installation, it shall not be bent so that the corrugations are close enough for condensation to bridge the gap, thereby providing a potential risk of corrosion.

8.2.7.4.2 On semi-concealed meter installations, where the meter is restrained in position by the meter box (or bracket), two pliable connectors can be used provided a meter box outlet adaptor is fitted and the pressure absorption across the installation does not exceed the limits set out in **6.2**. On all other meter installations, only one pliable connector shall be used.

*NOTE The reasons for the use of only one pliable connector are given in **8.2.7.2.1**.*

8.2.7.4.3 Upon completion of the installation, any flux and/or leak detection fluid shall be removed.

8.3 Multiple meter installations

8.3.1 Where a number of primary meters serving different parts of the building are grouped together, e.g. in large premises converted into flats or in flats over business premises, the installation shall be carried out such that:

a) the meters are situated in an area to which there is access at all times;

b) the meters are enclosed in a single lockable housing or in individual lockable meter boxes;

c) a suitably labelled key for the meter housing is provided for each occupant of the dwelling each meter serves;

d) each meter or individual meter box is clearly marked to indicate the dwelling it serves;

e) meter housings are installed, marked or labelled to indicate the dwelling to which each meter relates and that the marking or labelling is permanent and visible when the compartment is closed;

f) each individual dwelling (e.g. each house, flat or maisonette) using a supply of gas is provided with an AECV, whether or not that premises contains a gas meter, which is situated as near as is reasonably practicable to the point where the pipe supplying gas enters the premises.

NOTE Attention is drawn to the Gas Safety (Installation and Use) Regulations [2].

8.3.2 Ventilation for meter compounds shall be in accordance with IGEM/G/5 [N7].

*COMMENTARY ON **8.3***

Further guidance on multiple meter installations is given in IGEM/G/5 [N7].

9 Gas tightness testing and purging

Prior to making gas available, the installation shall be tested for gas tightness and purged in accordance with IGEM/UP/1B [N8].

10 Commissioning of the meter installation

10.1 Regulator

10.1.1 Checks

The installer shall ensure the following.

a) The regulator gives an operating pressure at the outlet of the meter of between 19 mbar and 23 mbar at corresponding flow rates between 6 m^3/h and 0.5 m^3/h. If the pressure is outside this range an Ofgem Approved Meter Installer (OAMI) who has been authorized by the gas transporter (see Clause **7**) shall follow the procedure specified in **10.1.2**.

NOTE Regulation 14(6) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that no person except the gas transporter, or a person authorized to act on the transporter's behalf, is to break the seal on a primary meter regulator. In practice, any adjustment of the primary meter regulator is only carried out by the relevant gas transporter or by an OAMI who has been granted specific authorization from the transporter to act on the transporter's behalf.

b) The regulator locks up at a pressure not exceeding 30 mbar, with no flow through the installation.

c) The regulator is sealed to prevent its setting from being interfered with, without breaking the seal.

*COMMENTARY ON **10.1.1***

In order to achieve a nominal pressure of 21 mbar at the outlet of the meter, meter regulators conforming to PRS 3/E [N5] are factory set to deliver a pressure at the outlet of $22^{0}_{-0.5}$ mbar with a pressure at the inlet of the regulator of 30 mbar at a gas flow rate of 3.5 m³/h. When checking a meter regulator on site, it is important that a sufficient gas flow rate is obtained either by operating the largest connected appliance or by using a device that allows a flow rate of at least 0.5 m³/h. Guidance on the gas flow rate at which an appliance or device should be operated in order to check the regulator is given in Table 3.

At low flow rates the operating pressure can tend towards 23 mbar and at high flows towards 19 mbar. An operating pressure at the outlet of the meter of less than 19 mbar should be investigated to determine the problem.

10.1.2 Adjustment

Sufficient appliances shall be lit to achieve a gas flow rate of at least 0.5 m³/h, but preferably nearer to 3 m³/h (see Table 3). An OAMI shall remove the seal and adjust the regulator until the pressure gauge reads 21 mbar. Following any adjustment by an OAMI, the regulator shall be sealed to prevent unauthorized adjustment with a seal marked with the OAMI's registration number.

*COMMENTARY ON **10.1.2***

If gas appliances are not installed at the time of making adjustments to the regulator, it might be appropriate to use an orifice to provide a gas flow rate of least 0.5 m³/h. If this method is used, great care should be taken to ensure that any gas is vented to atmosphere in a safe manner.

If the regulator can only be adjusted to give pressures below the required outlet pressure, the inlet pressure to the meter installation should be investigated further, prior to replacement of the regulator.

Table 3 **Appliance gas flow rates for checking meter regulator performance**

Appliance	Gas flow rate
Gas fire	Full rate
Flueless heater	Full rate
Central heating boiler	Full rate
Warm air unit	Full rate
Circulator	Full rate
Gas cooker	Three burners full rate
Instantaneous water heater/combination boiler (in hot water mode)	Full rate
Storage water heater	Full rate
Hotplate boiling rings	Full rate
Room sealed convector heater	Full rate

10.2 Meter

The installer shall ensure that:

a) any prepayment mechanism is functioning correctly;

b) the index is functioning correctly;

c) where the meter displays a diagnostic flag, the appropriate action is taken before leaving the premises;

d) the meter index is read and recorded in accordance with Clause **15**; and

e) any flux and/or leak detection fluid is removed.

NOTE If flux and/or leak detection fluid is left on the pliable connector it can deteriorate the stainless steel to the point of leakage.

11 Notices

11.1 General

NOTE 1 Regulation 16(3) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that, where a meter is removed, any live gas pipe in the premises in which the meter was installed is marked to the effect that the pipe contains gas.

Warning notices shall be prominently displayed and of durable form, protected against damage as necessary, e.g. weather-resistant.

NOTE 2 Labels conforming to BS 4781 are of a suitable durability.

11.2 Emergency notices

11.2.1 Primary meter adjacent to the emergency control valve

The installer shall ensure that an emergency notice in permanent form is affixed on or near the meter to inform the consumer:

a) to shut off the supply of gas if there is a gas escape at the premises;

b) to immediately notify the National Gas Emergency Service if gas continues to escape;

c) not to reinstate the supply until remedial action has been taken by a competent person to prevent gas escaping again;

d) of details of the emergency service contact, including the emergency telephone number;

NOTE 1 In Great Britain the National Gas Emergency Service number is 0800 111 999.

e) of the date the notice was first displayed.

NOTE 2 Regulation 15(1) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that a suitably worded notice in permanent form is prominently displayed on or near the meter indicating the procedure to be followed in the event of an escape of gas. The HSE Approved Code of Practice L56 [27] provides futher guidance.

NOTE 3 Regulation 9(2) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires either that the means of operating the key or lever of the emergency control is clearly or permanently marked or a notice in permanent form is prominently displayed near such means so as to indicate when the emergency control is open and when it is shut. One method of achieving the latter is to wrap "ON/OFF" adhesive tape around the first section of pipework after the valve.

NOTE 4 Regulation 16(2) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that, where the service pipe supplies more than one primary meter, a notice in permanent form is to be prominently displayed on or near each primary meter indicating that more than one primary meter is provided with gas through that service pipe. The gas transporter would normally fit these notices. The HSE Approved Code of Practice L56 [27] provides futher guidance.

11.2.2 Primary meter not adjacent to the emergency control valve

11.2.2.1 Emergency notice at the emergency control valve

The installer shall ensure that an emergency notice in permanent form (bearing the words "GAS EMERGENCY CONTROL") is affixed on or near to the ECV to inform the consumer:

a) to shut off the supply of gas if there is a gas escape at the premises;

b) to immediately notify the National Gas Emergency Service if gas continues to escape;

c) not to reinstate the supply until remedial action has been taken by a competent person to prevent gas escaping again;

d) of details of the emergency service contact, including the emergency telephone number;

NOTE 1 In Great Britain the National Gas Emergency Service number is 0800 111 999.

e) of the date the notice was first displayed.

NOTE 2 Regulation 9(3) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that, where a person installs an emergency control which is not adjacent to a primary meter, a suitably worded notice in permanent form is to be prominently displayed on or near the means of operating the control indicating the procedure to be followed in the event of an escape of gas.

NOTE 3 Regulation 9(4) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that, where any person first supplies gas to premises where an emergency control is installed, the person needs to ensure that the notice required by regulation 9(3) remains suitably worded.

NOTE 4 The HSE Approved Code of Practice L56 [27] provides futher guidance.

11.2.2.2 Emergency notice at the meter

The installer shall ensure that an emergency notice conforming to **11.2.1** is affixed at or on the meter.

NOTE Regulation 15(2) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that, where a meter is installed or relocated at a distance of more than 2 m from, or out of sight of, the nearest upstream emergency control, a suitably worded notice in permanent form is prominently displayed on or near the meter indicating the position of that control.

11.3 Notices for installations incorporating a secondary meter

Every secondary meter shall be labelled "SECONDARY METER".

NOTE 1 Regulation 17(1) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that a line diagram in permanent form is prominently displayed on or near the primary meter or gas storage vessel and on or near all emergency controls connected to the primary meter, showing the configuration of all meters, installation pipework and emergency controls.

NOTE 2 Regulation 17(2) of the Gas Safety (Installation and Use) Regulations 1998 [2] requires that any person who changes the configuration of any meter, installation pipework or emergency control so that the accuracy of the line diagram is affected is to ensure that the line diagram is amended to show the altered configuration.

11.4 Meter housing notice

The installer shall ensure that any meter housing is labelled to indicate:

a) the meter housing manufacturer's details and details of the housing;

NOTE 1 The details should include the manufacturer's name, address and telephone number, and the model number of the box (if the meter housing is a box), ventilation details and the classification of the hazardous zone deemed to exist within the housing.

b) the gas family and MOP for which the housing is intended.

NOTE 2 For a meter installed in non-domestic premises, attention is drawn to DSEAR [14] which require an "Ex" sign to be displayed where necessary at the entry to a hazardous area. This requirement of DSEAR does not apply to gas fittings as defined in the Gas Safety (Installation and Use) Regulations 1998 [2] at domestic premises.

12 Meter exchange and/or replacement of other gas fittings

12.1 General

Before exchanging the meter and/or replacing any other gas fittings, the installation shall be checked to ensure that any replacements conform to Clause **6**, in particular that pressure absorption conforms to **6.2**.

NOTE Where a meter is to be exchanged and the installation does not conform to this standard, consideration should be given to updating the whole installation.

12.2 Temporary continuity bond

12.2.1 In any case where a meter is exchanged or any other gas fittings are replaced, no work shall be carried out without using a temporary continuity bond to maintain electrical continuity in accordance with **8.2.6**.

12.2.2 The bond shall remain in place until the work is completed and permanent electrical continuity has been restored.

12.3 Carrying out the work

12.3.1 Prior to undertaking any work, a preliminary tightness test shall be carried out in accordance with IGEM/UP/1B [N8].

12.3.2 Any existing components that are defective, that are not in good working order or that do not conform to Clause **6** shall be replaced.

NOTE The level of corrosion might indicate that a component could become defective.

12.3.3 Any components within the meter installation that are made of lead shall be replaced.

12.3.4 A meter or any other gas fittings that are being exchanged and/or replaced shall be fitted, gas tightness tested, purged and commissioned in accordance with Clause **8**, Clause **9** and Clause **10**.

12.3.5 Notices shall conform to Clause **11**.

12.3.6 Records shall be completed in accordance with Clause **15**.

13 Meter relocation

13.1 General

13.1.1 The meter or meter installation shall be relocated by:

a) altering the position of the gas service pipe; or

b) relocating the meter only, in accordance with Figure 7a); or

c) relocating the regulator and meter in accordance with Figure 7b).

NOTE The relocation of the meter/meter installation can be instigated by:

- *the owner of the premises;*
- *the owner of the meter/meter installation;*
- *the relevant gas transporter; or*
- *the relevant gas supplier.*

13.1.2 Where an electrical insulation joint (see **3.13**) is fitted downstream of the ECV (in a legacy installation), this shall only be removed with the consent of the Network Operator and where a safe method of working has been established.

NOTE A generic consent for the removal of the insulation joint might be in place.

13.1.3 Before relocation of the meter or meter installation, permission shall be obtained from the relevant parties, such as the owner of the meter/meter installation, the owner of the premises and the gas supplier.

NOTE The parties that need to be involved in deciding on relocation of the meter/meter installation will be dependent upon the particular circumstances and the person who has instigated the relocation.

13.2 Inspection of existing installation

13.2.1 Prior to determining the most appropriate method of relocating the meter/meter installation, a survey of the complete gas installation shall be carried out. This survey shall determine:

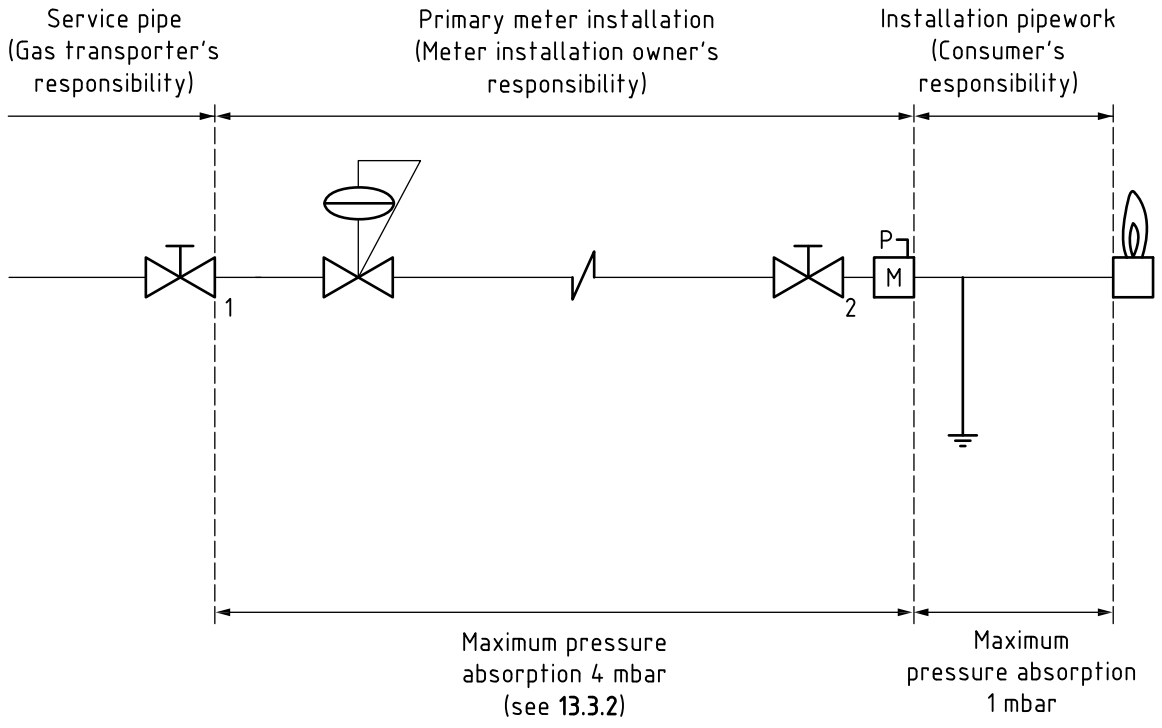
a) the condition of the gas fittings;

b) the suitability of the proposed location;

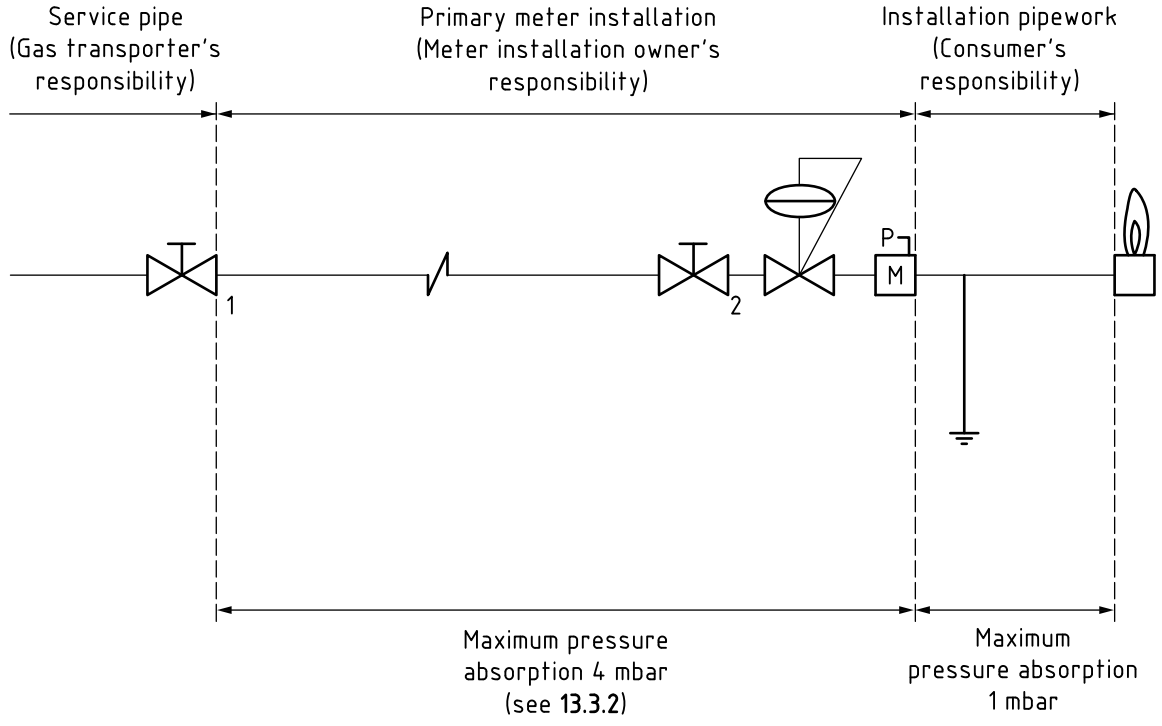
c) which type of relocation listed in **13.1.1** is the most practicable.

13.2.2 Where a meter installation is to be relocated and does not conform to this British Standard, the whole meter installation shall be updated to conform to this standard.

Figure 7 **Arrangement of relocated meter and associated gas fittings** *(1 of 2)*



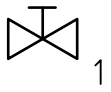
a) Relocation of meter only



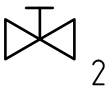
b) Relocation of meter and regulator

Figure 7 **Arrangement of relocated meter and associated gas fittings** *(2 of 2)*

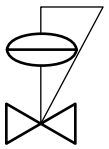
Key



Emergency control valve



Additional emergency control valve



Meter regulator

Primary meter

P

Pressure test point

Protective equipotential bond

Extended interconnecting pipework

Appliance

NOTE The following can be fitted, if required, in the meter installation prior to the meter regulator, subject to the agreement of the meter asset manager:

a) *excess flow valve;*

b) *thermal cut-off device;*

c) *filter.*

13.3 Design

13.3.1 Following the completion of the survey specified in **13.2.1,** the type of relocation, out of those listed in **13.1.1**, and the new position shall be agreed with the relevant parties, such as the owner of the meter/meter installation, the owner of the premises and the gas supplier. If the survey indicates that it is most appropriate to alter the position of the service pipe, the relevant gas supplier/ transporter shall be consulted.

13.3.2 The feasibility of the proposed location for a relocated meter or meter installation shall be confirmed by ensuring that:

a) the pressure absorption of a primary meter installation will not exceed 4 mbar when the meter is operating at its maximum rated capacity and the pressure at the outlet of the ECV is 19 mbar (this will include any increased pressure absorption imposed by additional gas fittings);

NOTE The pressure absorption of installation pipework conforming to BS 6891 does not exceed 1 mbar. Meter installations conforming to this part of BS 6400 connected to installation pipework installed in accordance with BS 6891 can be expected to ensure that sufficient pressure is available at the appliance.

b) its location conforms to **6.9**;

c) if a primary meter is being moved, an appraisal has been undertaken by the gas transporter in accordance with Clause **7**; and

d) within the building the length of interconnecting pipework subjected to gas at distribution pressure is kept to a minimum and does not exceed 2 m.

13.3.3 The meter and its associated gas fittings shall conform to Clause **6**.

13.4 Interconnecting pipework

Interconnecting pipework shall conform to **6.8** and BS 6891.

13.5 Carrying out the work

13.5.1 Gas tightness of existing installation

Prior to undertaking work, the installation shall be tested for gas tightness in accordance with IGEM/UP/1B [N8].

13.5.2 Temporary continuity bond

A temporary continuity bond shall be used in accordance with **8.2.6** in order to maintain electrical continuity.

13.5.3 Relocation work

13.5.3.1 The existing meter shall be disconnected, capped and handled in accordance with **8.2.2**.

13.5.3.2 On disconnection of the meter the ECV shall be sealed to prevent unauthorized reinstatement of the gas supply.

13.5.3.3 The installation shall be relocated in accordance with Figure 7a) or Figure 7b).

13.5.3.4 Where the meter is relocated in accordance with Figure 7a) or Figure 7b), an AECV shall be fitted when:

a) the meter is more than 2 m from the existing ECV; or

b) the distance between the primary meter and the existing ECV is less than 2 m but the meter is in another room/housing, i.e. not within line of sight or action.

13.5.3.5 Where only the meter is relocated [i.e. in accordance with Figure 7a)], the regulator shall remain in its original location, i.e. close to the end of the service pipe and downstream of the ECV.

13.5.3.6 The relocated meter and associated gas fittings shall be installed in accordance with Clause **8**.

13.6 Gas tightness testing and purging

13.6.1 Prior to making gas available, the installation shall be retested for gas tightness and purged in accordance with IGEM/UP/1B [N8].

13.6.2 When undertaking work in the vicinity of the meter installation, no flux shall be allowed to touch the pliable connector, but if it does it shall be immediately removed.

NOTE This action is intended to avoid accelerated corrosion of the pliable connector.

13.7 Commissioning, notices and records

13.7.1 Upon completion of the installation, any leak detection fluid shall be removed.

13.7.2 The installer shall:

a) commission the meter installation in accordance with Clause **10**;

b) check that a permanent protective bonding conductor is present and correctly located in accordance with **8.2.4** or, if is not, advise the appropriate responsible person, e.g. the owner of the premises;

c) fit notices in accordance with Clause **11**; and

d) complete records in accordance with Clause **15**.

14 Meter removal

14.1 Meters shall be decommissioned in accordance with the meter manufacturer's instructions.

14.2 A meter shall not be permanently removed without the authority of the meter owner (details of which are included in the meter installation notices), the gas supplier or the owner of the premises.

14.3 If a primary meter is permanently removed, the whole meter installation shall be removed, except for any meter bracket that is part of a meter box. The ECV and the installation pipe shall be plugged, capped or permanently sealed with appropriate gas fittings. If a secondary meter is removed, the AECV and the installation pipe at the meter shall be plugged, capped or otherwise permanently sealed with appropriate gas fittings.

NOTE 1 An appropriate fitting is defined in the Gas Safety (Installation and use) Regulations 1998 [2].

NOTE 2 Attention is drawn to Regulation 16(3) of the Gas Safety (Installation and Use) Regulations 1998 [2] which requires that, where a meter is removed, any live gas pipe in the premises in which the meter was installed is to be marked to the effect that the pipe contains gas.

14.4 During and after removal, meters shall be handled with care in accordance with **8.2.2**.

14.5 Where a section of pipework, or a meter, is permanently removed and the remaining pipe ends could be simultaneously touched, i.e. they are less than 2 m apart, a permanent protective bonding conductor shall be fixed in accordance with BS 7671. A permanent continuity bond shall not be fitted such that it bridges any insulation joint fitted upstream of the ECV.

*NOTE 1 The commentary to **8.2.6** contains guidance on temporary continuity bonds. This guidance is also applicable to a permanent continuity bond.*

NOTE 2 This practice is not necessary where a meter is removed and the inlet and outlet connections are still attached to a meter bracket, or if one side of the disconnected pipework is short and not earthed, e.g. a polyethylene (PE) service pipe with only an ECV and/or short length of installation pipe.

NOTE 3 Attention is drawn to requirements given for meter removal in the Gas Meters (Information on Connection and Disconnection) Regulations 1996 [5]. Attention is also drawn to Regulation 16(3)(b) of the Gas Safety (Installation and Use) Regulations 1998 [2] which requires that, if a primary meter is permanently removed, the gas supply has to be disconnected or isolated within 12 months.

15 Records

Following the installation, exchange or removal of a secondary meter its details shall be recorded in accordance with the meter owner's requirements.

NOTE 1 Details of the meter owner are likely to be included on the meter installation notices.

NOTE 2 Attention is drawn to the Gas Meters (Information on Connection and Disconnection) Regulations 1996 [5], which require that the details of a primary meter are recorded and forwarded following its installation, exchange or removal.

16 Post installation checks and actions

16.1 After installing any part of a meter installation, checks shall be carried out to ensure that:

a) all unused tappings and purge points are capped or plugged with appropriate fittings;

NOTE An appropriate fitting is as defined in the Gas Safety (Installation and use) Regulations 1998 [2].

b) the meter regulator has been sealed (with the regulator manufacturer's mark or an OAMI registration number) to prevent its setting from being interfered with without breaking the seal;

c) the installation pipework has not been connected to the outlet of the meter installation unless it has been gas tightness tested, purged and labelled, and all appliances commissioned or disconnected from the gas supply;

d) the joints, pliable connector and other components within the installation have been thoroughly cleaned to remove any flux residues;

e) where appropriate, the annulus between the meter box spigot and the installation pipework is sealed with a flexible fire-resistant compound;

f) notices are affixed in accordance with Clause **11**;

g) the meter details have been recorded in accordance with Clause **15**;

h) the ECV is accessible to and operable by the consumer;

i) where appropriate, the consumer has a key to the meter box or housing;

j) any special instructions regarding use of the meter have been passed to the consumer.

16.2 When the checks are complete, the lid or door of any meter box or housing shall be fastened closed.

17 Maintenance

17.1 Risk assessment

Prior to undertaking any maintenance work a risk assessment shall be carried out in accordance with **8.1**.

17.2 Job instructions

17.2.1 Job instructions shall be used to control all maintenance activities.

17.2.2 The job instructions shall:

a) clearly define the task to be undertaken;

b) make reference to relevant maintenance procedures and instructions;

c) have provision for reporting the results of findings of work activities and for reporting the completion of a task.

17.2.3 During any work that necessitates connection or disconnection of any meter or associated gas fittings, a temporary continuity bond shall be fitted to avoid electrical danger, whether or not the permanent protective bonding conductor has been established. The temporary continuity bond shall remain in position until the work is completed (see **8.2.6**).

17.3 Maintenance activities

17.3.1 Metering equipment shall be maintained in accordance with the manufacturers' instructions.

17.3.2 The following steps shall be taken, as applicable.

a) Carry out a sight, sound and smell check for any signs of tampering with the meter installation, the service pipe, the meter and the installation seals. If there are any signs of tampering or any damage to any of the seals, report it immediately to the relevant gas supplier's theft of gas team. Report any smell of gas to the National Gas Emergency Service.

   NOTE In Great Britain the National Gas Emergency Service number is 0800 111 999.

b) Take all necessary precautions, for example not taking equipment that might be a potential ignition source into a hazardous area.

c) Open the meter housing door(s) and ensure it is held securely in the open position to allow safe access/egress in an emergency.

17.3.3 Maintenance shall be carried out such that when the maintenance engineer leaves the site (the following list is non-exhaustive):

a) the meter installation:
   1) is installed correctly;
   2) is in sound mechanical condition;
   3) operates at the intended set points;
   4) operates in a safe manner;
   5) has appropriate notices affixed;
   6) has, where fitted, a functional data transmission system;

b) any official metrological meter seal is intact;

c) the regulator seal is intact and has been sealed by the manufacturer or by an OAMI;

d) the general condition and security of the installation is satisfactory;

e) the meter housing/box is not damaged and its integrity is such as not to allow gas to enter any adjacent cavity or property;

f) the ECV operable and is accessible to the consumer;

g) the flow rates and operating pressures for the installation are within the design constraints;

h) the meter is not noisy;

i) the index movement has smooth operation and is not jerky;

j) the metering pressure is as intended, reset if necessary (see Clause **7** and **10.1**) and, if the meter regulator seal has to be broken, resealed by an OAMI;

k) the meter installation has the appropriate ventilation (see **6.9.2.5**);

l) any meter or electrical apparatus is suitable for use in any hazardous area associated with the meter installation (see **6.1.1**);

m) the electrical separation is in accordance with **8.2.5**;

n) the protective bonding conductor is present (see **8.2.4**);

o) there are no diagnostic indicators displayed;

p) any electronic display is operable;

q) the installation has the appropriate notices affixed or any defects or non-conformities found have been rectified or made safe and reported to the appropriate body.

17.4 Battery replacement

Any replacement batteries shall meet the meter manufacturer's specification. Batteries shall be replaced in accordance with the meter manufacturer's instructions.

17.5 Meter service tool

Where a specific meter service tool is required, it shall be used to carry out maintenance activities.

Annex A (normative) Determination of required maximum capacity of a meter or meter installation

A.1 Diversity factor

To determine the required maximum capacity of a meter or meter installation the diversity factor shall be used.

NOTE A diversity factor is given to each type of appliance according to the expected frequency of normal use.

Where there are only one or two appliances (e.g. a combination boiler and a cooker) a diversity factor of 1 shall be used. Where there are more than two appliances the diversity factors listed in Table A.1 shall be used.

Table A.1 **Diversity factors of appliances for meter installation maximum capacity calculations**

Appliance	Diversity factor
Central heating appliances (other than combination boilers)	1
Unit heaters	1
Circulators	1
Combination boilers	0.8
Instantaneous water heaters	0.8
Sink water heaters	0.6
Room heaters	0.6
Tumble dryers	0.6
Hotplates	0.6
Ovens	0.6
Cookers	0.4
Refrigerators	0

A.2 Meter capacity calculation

To calculate the required capacity, multiply the maximum heat input of each appliance, in kilowatts, by its diversity factor, add up these values, convert the total to megajoules per hour, and divide the total by the calorific value of the gas (typically 39 MJ/m^3 for a 2nd family gas) to give the equivalent gas flow rate in cubic metres per hour. This is the required capacity of the meter.

WORKED EXAMPLE

Type of appliance	**Heat input** kW	**Diversity factor**	**Gas load** (heat input × diversity factor)
Central heating boiler	30.0	× 1.0	= 30.0
Room heater	6.0	× 0.6	= 3.6
Tumble dryer	3.0	× 0.6	= 1.8
Cooker	23.5	× 0.4	= 9.4
Total gas load			= 44.8 kW
Convert to MJ/h (1 kW = 3.6 MJ/h)			= 161.3 MJ/h
Equivalent gas flow rate			= 4.2 m^3/h

Conclusion

Select a meter with a capacity of 6 m^3/h.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 4161-3, *Gas meters – Part 3: Specification for diaphragm meters of 6 cubic metres (or 212 cubic feet) per hour rating for working pressures up to 50 mbar* [3)]

BS 4161-5, *Gas meters – Part 5: Specification for diaphragm meters for working pressures up to 7 bar*[3)]

BS 4781, *Specification for pressure-sensitive adhesive plastics labels for permanent use*

BS 6004, *Electric cables – PVC insulated and PVC sheathed cables for voltages up to and including 300/500 V for electric power and lighting*

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