BRITISH STANDARD

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

Part 3: Low and medium pressure (3rd family gases)

ICS 91.140.40

British Standards

Publishing and copyright information

ISBN 978 0 580 53714 1

The following BSI references relate to the work on this standard:
Committee reference GSE/30
Draft for comment 06/30086669 DC

Publication history

First published November 2007

Amendments issued since publication

Amd. no.	Date	Text affected

Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 38, an inside back cover and a back cover.

This page deliberately left blank

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 30 November 2007. 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

This part of BS 6400, along with parts 1 and 2, supersedes BS 6400:1997, which is withdrawn.

Relationship with other publications

The standard is issued 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 within this part might not necessarily be consistent with BS 6400-1 and BS 6400-2, which uses terminology that is consistent with the natural gas industry.

Information about this document

This new edition represents a full revision of BS 6400:1997, and:

- uses more up-to-date gas industry terminology;
- reflects changes in structure, practices and product availability in the gas industry;
- provides additional information on the installation, exchange, relocation and removal of gas meters with a maximum capacity not exceeding 6 m^3/h supplied from low and medium pressure 3rd family gas systems.

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

Attention is drawn to the following statutory regulations.

a) The Gas Safety (Installation and Use) Regulations 1998 [1].

b) The Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004 [2].

c) The Gas Safety (Application) Order (Isle of Man) 1996 [3].

d) The Gas Meters (Information on Connection and Disconnection) Regulations 1996 [4].

e) The Gas Safety (Management) Regulations 1996 [5].

f) The Gas Safety (Management) Regulations (Northern Ireland) 1997 [6].

g) The Gas (Meters) Regulations 1983 (as amended) [7].

h) The Building Regulations 2000 (as amended) [8].

i) The Building (Scotland) Regulations 2004 (as amended) [9].

j) The Building Regulations (Northern Ireland) 2000 (as amended) [10].

k) The Measuring Instruments (EEC Requirements) (Gas Volume Meters) Regulations 1988 (as amended) [11].

l) The Measuring Instruments (Gas Meters) Regulations 2006 [12]

m) The Dangerous Substances and Explosive Atmospheres Regulations 2002 [13].

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.

1 Scope

The standard specifies requirements for the installation, exchange, relocation and removal of credit or prepayment diaphragm and ultrasonic gas meters with a maximum capacity not exceeding 6 m^3/h.

NOTE 1 For the purposes of this 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 meter installations:

a) supplied with 3rd family gases either:

   1) from low pressure service pipework with a maximum operating pressure not exceeding 75 mbar and a design maximum incidental pressure of 350 mbar; or

   2) from medium pressure service pipework with a maximum operating pressure exceeding 75 mbar but not exceeding 2 bar and a design maximum incidental pressure of 2.7 bar;

b) only fitted downstream of the emergency control valve;

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

d) where all gas fittings subjected to medium pressure have been pre-assembled and where strength and gas tightness testing has been undertaken on the regulator assembly at the factory;

e) where the operating pressure at the outlet of the meter is nominally 37 mbar.

Installation pipework is specified in BS 5482-1 and LPGA Code of Practice 25 [14].

Service pipework (including the first emergency control valve) is specified in BS 5482-1 and the LPGA Code of Practice 22 [15] and LPGA Code of Practice 25 [14].

This standard does not cover pressure regulating installations installed in a service pipework upstream of the emergency control valve.

NOTE 2 All pressures quoted in this standard are gauge pressures and all pressure absorption values are for liquefied petroleum gas unless otherwise specified.

NOTE 3 Additional guidance on domestic gas systems can be found in the European functional standards BS EN 1775.

NOTE 4 For additional guidance on the installation of gas meters in caravan holiday homes, residential park homes and permanently moored boats, reference should be made to IGE/UP/8 [16].

2 Normative references

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

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 746:2005, *Fittings for installation of low pressure gas meters – Requirements and test methods*

BS 5482-1, *Code of Practice for domestic butane- and propane-gas-burning installations – Part 1: Installations at permanent dwellings, residential park homes and commercial premises, with installation pipework sizes not exceeding DN 25 for steel and DN 28 for corrugated stainless steel or copper*

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

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

BS EN 13785, *Regulators with a capacity of up to and including 100 kg/h, having a maximum nominal outlet pressure of up to and including 4 bar, other than those covered by EN 12864 and their associated safety devices for butane, propane or their mixtures*

BS EN 14236, *Ultrasonic domestic gas meters*

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

BS EN ISO 10806, *Pipework – Fittings for corrugated metal hoses*

INSTITUTION OF GAS ENGINEERS AND MANAGERS. PRS 6/E, *Semi-rigid and flexible meter connectors*, 2004

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

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

3.2 equipotential bond
electrical connection maintaining various conductive parts at substantially the same electrical potential

3.3 electrical insulator
gas fitting having high electrical resistance, to minimize the flow of any stray electrical current

3.4 emergency control valve (ECV)
valve for shutting off the supply of gas in an emergency, which is intended for use by a consumer of gas and is installed at the end of the service pipework

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

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

3.7 installation pipework
pipework or fitting from the outlet of the meter installation to points at which appliances are to be connected

NOTE This definition varies from that given in regulation 2 of the Gas Safety (Installation and Use) Regulations 1998[1].

3.8 interconnecting pipework
pipework assembled within the meter installation

3.9 lock-up pressure
outlet pressure of the regulator at which it shuts off completely

3.10 low pressure (LP)
gas supply with a maximum operating pressure of 75 mbar

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

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

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

NOTE The gas supplier will be able to advise on the MOP of the gas supply.

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

NOTE The gas supplier will be able to advise on the DP of the gas supply.

3.14 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 the design pressure

3.15 medium pressure (MP)
gas supply at the outlet of the emergency control valve with a design minimum pressure exceeding 75 mbar and a maximum operating pressure that does not exceed 2 bar

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

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

3.16.2 diaphragm meter
positive displacement meter in which the measuring chambers have deformable walls, e.g. a U6 or G4 gas meter

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

NOTE An example of a positive displacement meter is a diaphragm gas meter

3.16.4 prepayment meter
meter fitted with a mechanism that, on the insertion of a coin, mechanical token or smartcard, permits the passage of a predetermined volume of gas

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

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

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

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

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

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

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

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

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

3.22 meter inlet valve (MIV)
valve fitted upstream of, and adjacent to, a meter to shut off the supply of gas to it

3.23 meter installation
installation that comprises a meter, valves, filter, meter regulator and associated safety devices, pliable connector, interconnecting pipework, fittings and support.

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

- *the outlet connection of the meter;*
- *the outlet of the meter outlet adaptor if fitted; or*
- *in the case of a semi-concealed meter with a pliable connector downstream of the meter, the outlet of the meter box outlet adaptor.*

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

3.25 safety device
device which automatically operates in the event of pressure deviations outside pre determined limits

3.25.1 over pressure shut off (OPSO)
shut off device, triggered by an excess outlet pressure, which causes the complete shut off of the flow of gas for all values of inlet pressure

NOTE The restoration of the gas flow is only possible by manual intervention when the conditions which caused the shut off device to operate have cleared.

3.25.2 under pressure shut off (UPSO)
device integral to the regulator, which causes the complete shut off of the gas flow when the outlet pressure is below a pre-determined value

3.25.3 limited relief valve
device which is part of the regulator and which limits, in the event of a failure, the pressure rise above a pre-determined value without shutting off the flow of gas

3.26 meter regulator
device which controls the pressure at its outlet within predetermined parameters

3.26.1 regulator assembly
factory assembled kit comprising meter regulator, safety devices, vent pipe, meter inlet valve, interconnecting pipework and/or pliable connector

3.26.2 medium pressure (MP) meter regulator
regulator supplied at MP

3.26.3 low pressure (LP) meter regulator
regulator supplied at LP

3.27 meter support post
post for securely mounting a meter box

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

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 service pipework
pipe for supplying gas to premises from a gas storage vessel, being any pipe between the gas storage vessel and the outlet of the ECV

3.31 semi-concealed meter box
meter box intended to be installed partially below ground level

3.32 strength test
procedure intended to verify the strength of gas fittings

3.33 tightness test
procedure intended to verify that the pipework meets the requirements for gas tightness

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

3.35 vent pipe
pipe that conveys the gas from the regulator relief to the external atmosphere

4 Planning and exchange of information

4.1 Consultation

4.1.1 At the initial stages of the building design and planning of the meter installation the party e.g. architect, responsible for the design and planning shall consult with the relevant gas supplier to verify the operating pressure parameters of the gas service pipework and that the supply is of sufficient capacity to meet the needs of all the proposed appliances. An assessment shall be made of the potential gas load to determine the flow 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 from the gas supplier the LOP, MOP, DP and DMIP of the gas supply.

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

4.1.5 Prior to installation, the meter installer shall obtain from the gas supplier authorization to break the seal, set and seal the meter regulator.

4.2 Dissemination of information

NOTE The designer/planner should make available all information regarding the position and housing of the meter installation to the architect and builders, etc., as early as possible by means of drawings, specifications and consultations.

4.3 Scheduling

NOTE A time schedule for fixing the meter should be agreed as early as possible by the interested parties and any subsequent changes shall be advised at the earliest opportunity.

4.4 Co-ordination of work

NOTE Any work relevant to the installation that requires attendance by trades other than the gas meter installer should be clearly specified.

4.5 Non-return valve

Where an installation uses a gas compressors, 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 supplier.

5 Competency

5.1 Persons carrying out the installation shall be competent.

5.2 Installation work shall only be carried out by a business or self-employed person, who is a member of a class of persons approved for the time being by the Health and Safety Executive (HSE) as required by the Gas Safety (Installation and Use) Regulations 1998 [1].

*COMMENTARY ON **5.1** AND **5.2***

At the time of publication, the only body with HSE approval to operate and maintain a register of businesses who are a "member of a class of persons" is CORGI.

Persons deemed competent to carry out gas work are those who hold a certificate of gas safety competence acceptable to CORGI, which include (without limitation) the Accredited Certification Scheme (ACS) and the Gas Services S/NVQ that has been aligned with ACS.

5.3 Persons who design the installation shall have a knowledge and understanding of the standards and regulations that apply to ensure that the completed plans will produce a safe and satisfactory installation.

6 Design

6.1 General

6.1.1 Arrangement of the meter installation

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

6.1.2 Gas fittings

6.1.2.1 All installations

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

6.1.2.2 Medium pressure (MP) installations

6.1.2.2.1 All gas fittings upstream of point X in Figure 1a) or Figure 1b) shall:

a) be capable of withstanding the DMIP advised by the gas supplier, i.e. in Great Britain this value is 2.7 bar;

b) be suitable for a MOP of 2 bar;

c) have been strength and gas tightness tested at the factory to a minimum of 3 bar.

6.1.2.2.2 All gas fittings downstream of point X in Figure 1a) or Figure 1b) to the outlet of the meter installation shall:

a) be capable of withstanding a pressure resulting from the operation of the final safety device, i.e. the OPSO;

b) have been strength and gas tightness tested at the factory to a minimum of 1.5 times the set pressure of the final safety device, i.e. the OPSO.

NOTE Regulation 5 of the Gas Safety (Installation and Use) Regulations 1998 [1] requires that all gas fittings be of good construction and sound material, and of adequate strength and size to ensure safety.

6.1.2.3 Low pressure (LP) installations

6.1.2.3.1 All gas fitting upstream of point X in Figure 1c) shall:

a) be capable of withstanding a DMIP of 350 mbar;

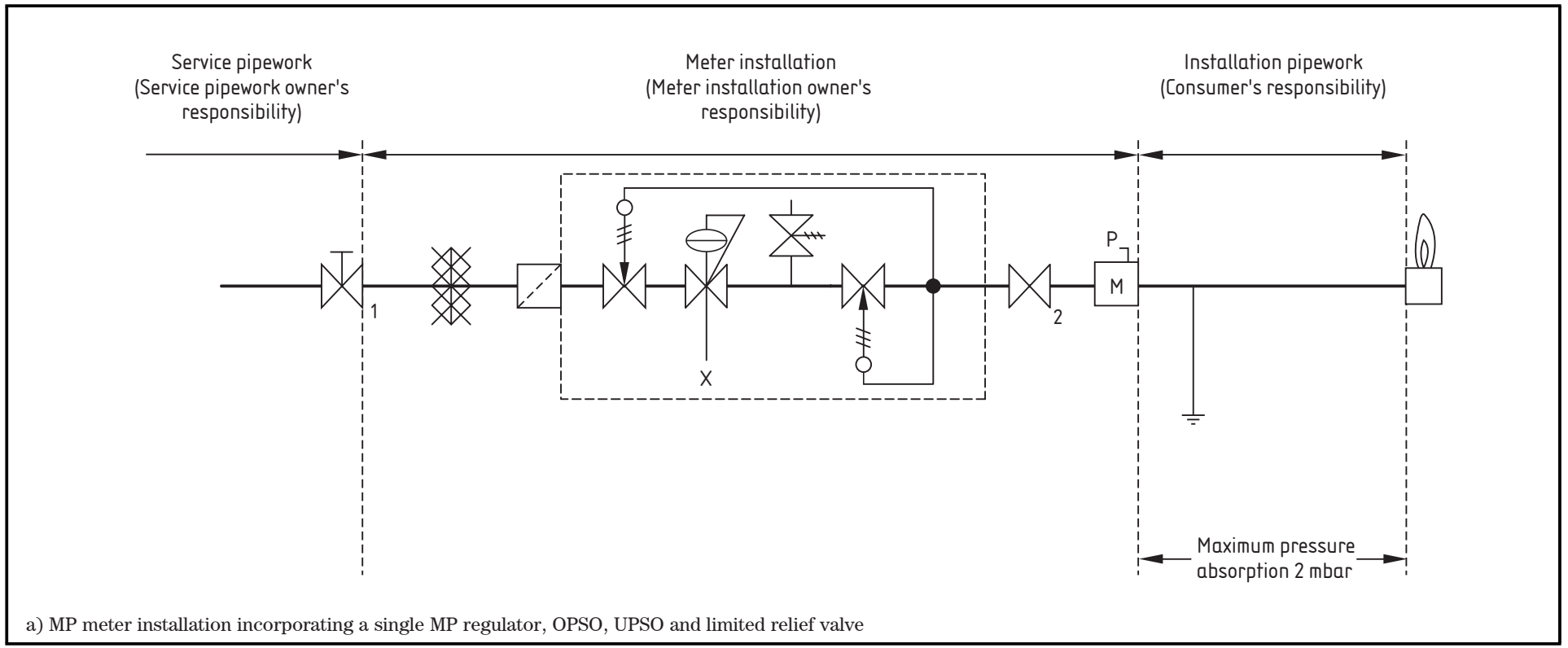
b) be suitable for a MOP of 75 mbar;

c) have been strength and gas tightness tested at the factory to a minimum of 525 mbar.

6.1.2.3.2 Any gas fittings downstream of point X in Figure 1c) to the outlet of the meter installation shall be capable of withstanding a MOP of 75 mbar:

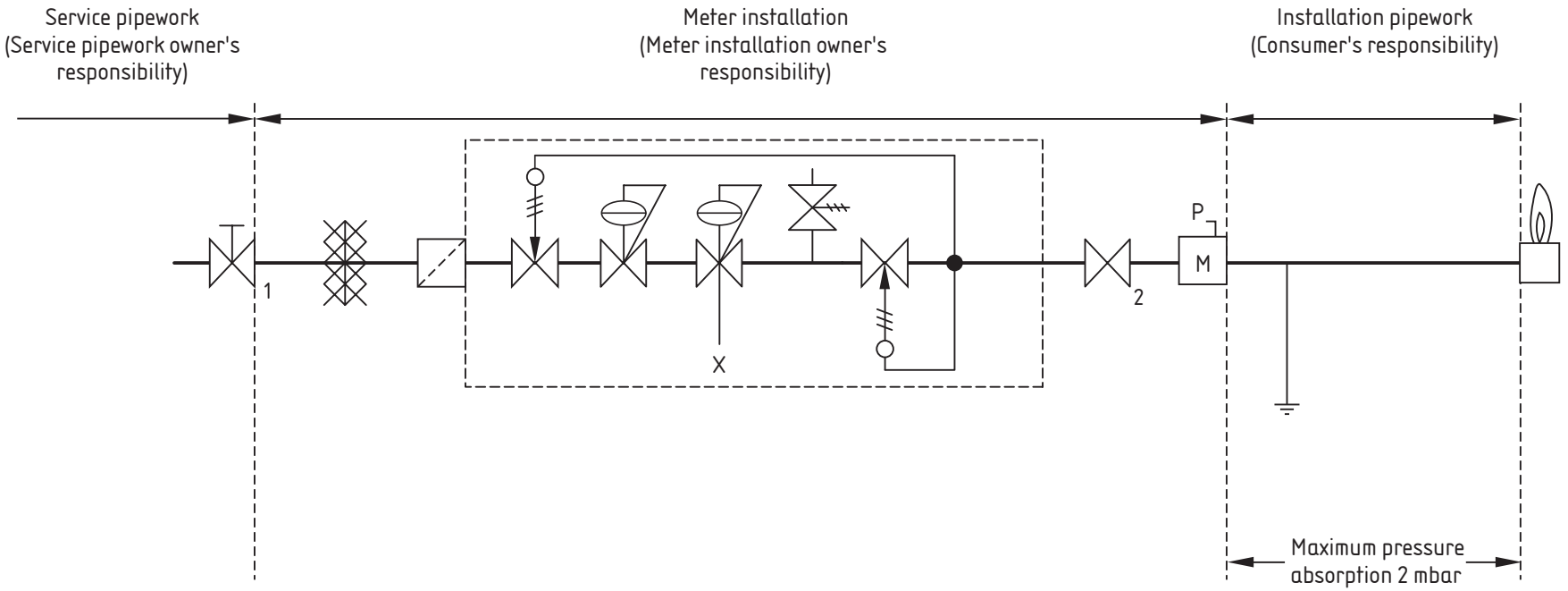
NOTE Regulation 5 of the Gas Safety (Installation and Use) Regulations 1998 [1] requires that all gas fittings be of good construction and sound material, and of adequate strength and size to ensure safety.

Figure 1 **Arrangements of a meter installation (symbols to BS 1553-1)**



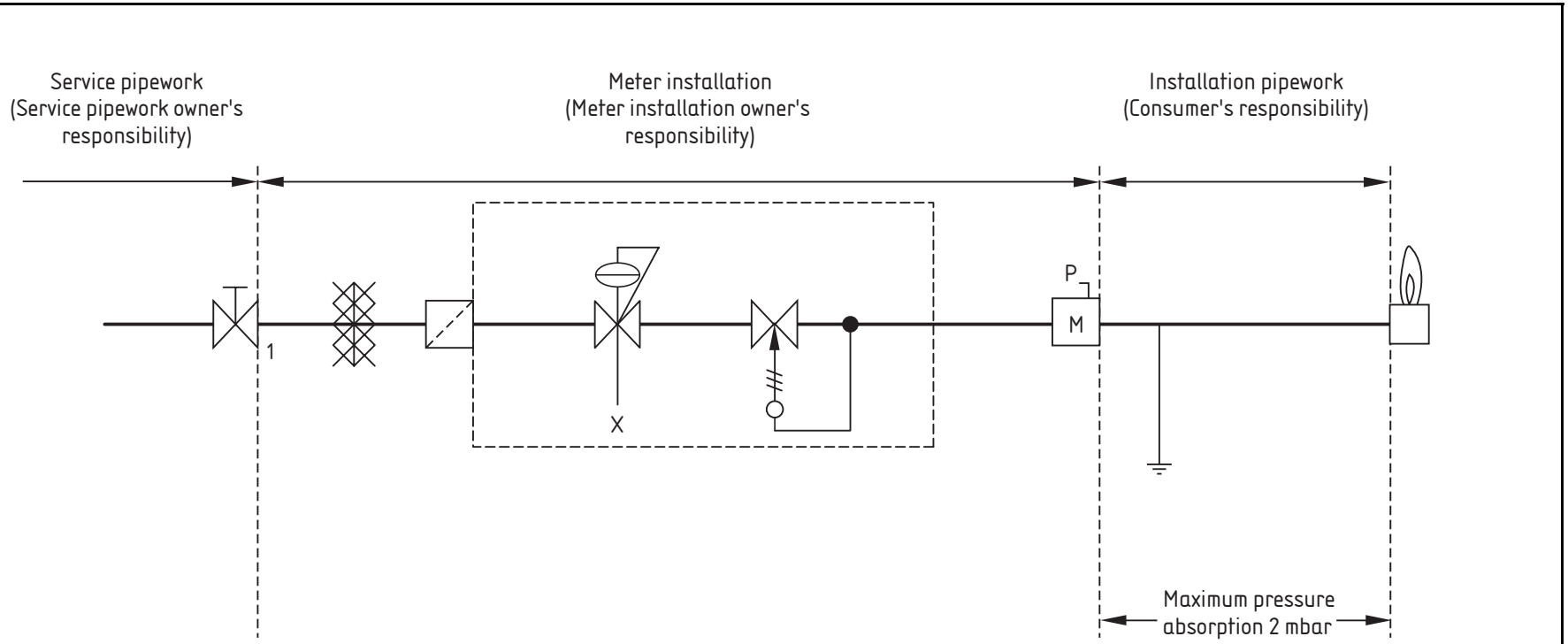
a) MP meter installation incorporating a single MP regulator, OPSO, UPSO and limited relief valve

Figure 1 **Arrangements of a meter installation (symbols to BS 1553-1)** (*continued*)



b) MP meter installation incorporating a two stage MP regulator, OPSO, UPSO and limited relief valve

Figure 1 **Arrangements of a meter installation (symbols to BS 1553-1)** (*continued*)



c) LP meter installation incorporating a single LP regulator and UPSO

Figure 1 **Arrangements of a meter installation (symbols to BS 1553-1)** (*continued*)

Key

Emergency control

Meter

Meter inlet valve

Relief valve

Filter (if fitted)

Electrical insulator (if fitted)

OPSO

P

Pressure test point

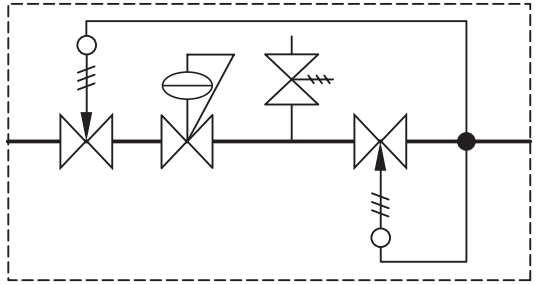
UPSO

X

The point at which the pressure changes from the inlet pressure to the outlet pressure of the regulator

Regulator

Main equipotential bond



Multifunctional pressure control and safety device. Combining two or more controls

6.1.3 Gas Family

All gas fittings shall be of a type that have been designed and manufactured for use with 3rd family gas.

NOTE 3rd family gases are defined in BS EN 437.

6.1.4 Flow rate

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

6.1.5 Connections

6.1.5.1 Any connections exposed to MP upstream of point X in Figure 1 shall have unions and adaptors that conform to BS EN ISO 10806 or threads that conform to BS 21.

6.1.5.2 LP connections downstream of point X in Figure 1 shall have unions and adaptors that conform to BS 746 or threads that conform to BS 21.

6.1.6 Pressure absorption

The pressure absorption from the outlet of the regulator to the outlet of the meter shall be such that when the operating pressure at the inlet of the regulator is in the range of LOP to MOP, the operating pressure at the outlet of the meter shall be controlled between 32 mbar and 45 mbar for flows in a range between 5% of the maximum capacity of the meter and the capacity of the meter.

6.2 Regulator and safety devices

6.2.1 General

6.2.1.1 All installations shall incorporate either a MP and/or LP regulator with safety devices upstream of the meter.

6.2.1.2 The regulator and safety devices shall be sited as near as practical to the outlet of the ECV.

6.2.1.3 The design shall ensure a nominal operating pressure at the outlet of the meter installation (i.e. metering pressure of 37 mbar).

6.2.1.4 The regulator and safety devices shall be pre-set to conform to Annex B.

6.2.2 Medium pressure (MP) regulator

A MP regulator shall incorporate:

a) an UPSO;

b) an OPSO;

c) a limited relief valve with a maximum capacity of 5% of the regulator design capacity.

NOTE 1 The regulator design capacity is the rated capacity of the regulator declared by the manufacturer.

NOTE 2 When specifying a regulator to BS EN 13785 it will be necessary to confirm that the limited relief valve has a maximum capacity of not greater than 5% of the regulator design capacity.

6.2.3 Low pressure (LP) regulator

A low pressure regulator shall incorporate an UPSO.

6.3 Vent pipe (MP installations only)

6.3.1 A vent pipe shall be permanently connected to the limited relief valve outlet connection on the regulator.

6.3.2 The minimum distances of relief valve vent pipe tips from electrical equipment and building openings shall be in accordance with Table 1.

6.3.3 The vent pipe shall terminate away from any source of ignition and in a location and manner not subject to fouling, blockage, water ingress or interference by unauthorized persons.

6.3.4 A vent pipe shall terminate outside the meter box, housing or enclosure and vent directly to atmosphere.

6.3.5 The tip of any vent pipe shall be securely fixed so it protrudes out of the meter box by at least 25 mm and points downwards.

6.3.6 The internal diameter of any vent pipe shall not change the performance of the regulator and be of sufficient size to vent at the maximum relief valve discharge capacity of the regulator.

*COMMENTARY ON **6.3.6***

A long vent pipe may require a larger diameter in order to maintain the maximum relief valve discharge capacity and avoid undue back-pressure on the pressure control and protection system, e.g. extended vent pipes terminating more than 150 mm away and up to a maximum effective length of 1 500 mm from the meter box will require vent pipes with an internal diameter of greater than 10 mm, i.e. 12 mm or 15 mm BS EN 1057 copper tubing.

Table 1 **Minimum proximity distances for meter housings and relief valve vent pipe tips (MP installations)**

Minimum proximity distance
mm

Semi-concealed meter box to opening[A)]	**Meter housing other than semi-concealed to opening**[B)]	**Meter housing to electrical equipment**[C)]	**Vent tip to opening**[D)]	**Vent tip to electrical equipment**[E)]
1 000	180	330	570	850

NOTE 1 The limited relief valve has a capacity of not greater than 5% of the regulator design capacity.

NOTE 2 Minimum proximity distances are aligned with those in BS 6400-2 for 2nd family gases and have been confirmed by Calor Gas Limited in accordance with BS EN 60079-10.

A) This is the distance from the meter box to any un-trapped drain, gully, balanced flue terminal or low level opening into the building, such as doors or air bricks which are below 250 mm from ground level.
B) This is the distance from the meter housing to any opening into the building such as opening windows, doors, air bricks and balanced flue terminals.
C) This is the distance from any meter housing to any electrical equipment.
D) This is the distance from any relief valve vent tip to any opening into the property or un-trapped drain or gully.
E) This is the distance from the relief valve vent tip to any electrical equipment.

6.4 Meter and meter connections

6.4.1 The meter shall be downstream and as close as practical to the regulator and safety devices.

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

NOTE A meter of 6 m^3/h capacity will meet the needs of the majority of domestic gas installations. An example for calculating the size of a meter for 3rd family gas installations is given in Annex A.

6.4.3 The meter shall be suitable for 3rd family gases.

6.4.4 The meter shall be capable of withstanding a MOP of 1.5 times the set pressure of the final safety device, i.e. the OPSO.

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

NOTE Meters marked with a "T" in accordance with BS EN 1359 or refurbished meters that have no "SJ" mark conforming to BS 4161-3 or BS 4161-5 can be considered fire resistant.

6.4.6 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. Refurbished diaphragm meters with a maximum flow rate of 6 m^3/h conforming to BS 4161-3 and BS 4161-5 can also be installed.

6.4.7 Ultrasonic meters shall conform to BS EN 14236 and be designed for 3rd family gases.

NOTE Although 3rd family gas installations are not covered by the Gas Act [17], it is recommended that all meters conform to the Gas (Meters) Regulations 1983 (as amended) [7] which requires that all primary gas meters are stamped and gives requirements for how to stamp them. This means that any gas meter that has been stamped (including ultrasonic meters) can be used provided they are suitable for 3rd family gases.

6.4.8 The meter shall be either a credit or a prepayment type meter.

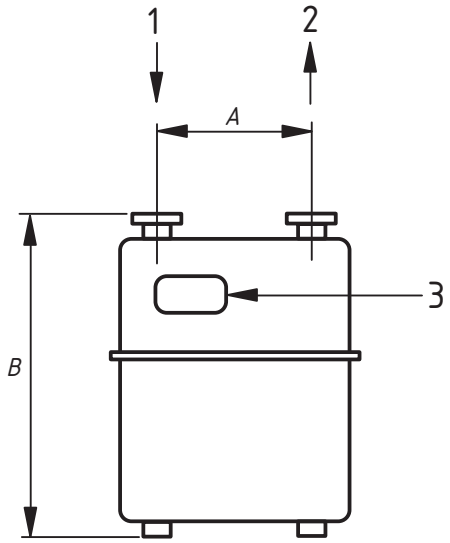
6.4.9 The meter, if electronic (e.g. electronic token meter, ultrasonic), and any other electrical equipment fitted inside the meter housing or electrically connected to the meter installation, shall be suitable for use in at least a zone 2 hazardous area as defined in BS EN 60079-10.

NOTE Guidance on making electrical connections to gas meters is given in the Institution of Gas Engineers and Managers' publication on gas measurement procedures, IGE/GM/7 [18].

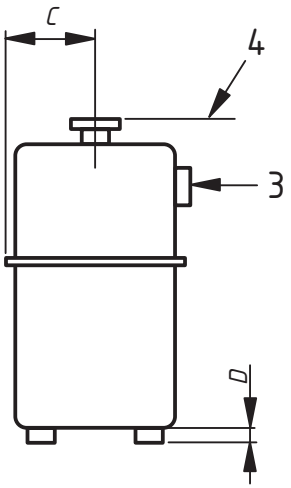
6.4.10 Connections for steel case diaphragm or ultrasonic meters (including those intended for semi-concealed installations) shall conform to BS 746 and be positioned in accordance with Figure 2.

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

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



a) Front view



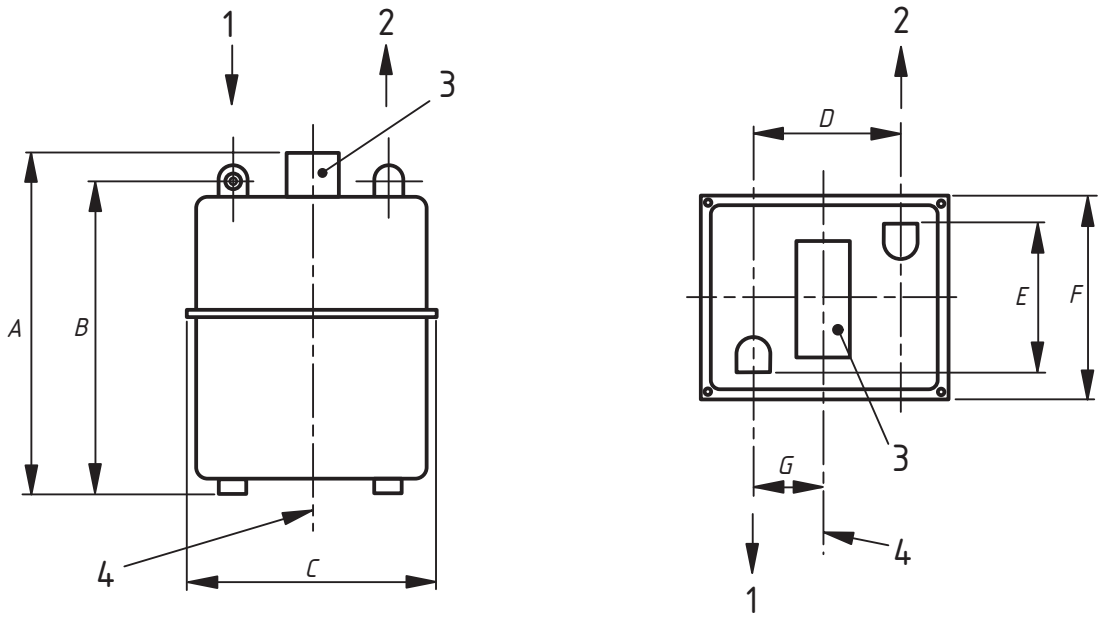
b) Side view

Key

1 Inlet
2 Outlet
3 Index
4 Top of bosses
A Distance between connection centres = (152.4 ± 0.2) mm
B Maximum overall height of meter = 282 mm
C Maximum distance between rear of meter casing to the centre line of bosses = 85 mm
D Nominal height of feet at base of meter = 5 mm

Connections shall conform to size 1 boss conforming to BS 746:2005, Table 1.

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 = (51 ± 1) mm

The inlet shall be a Rp1 parallel internal pipe conforming to BS 21.

The outlet shall be a $Rp\frac{3}{4}$ parallel internal pipe conforming to BS 21.

6.5 Emergency control valve

6.5.1 A 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.

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

6.6 Meter inlet valve

NOTE The MIV is required to be fitted in an MP installation to enable correct commissioning and testing of the regulator and safety devices and to assist in gas tightness testing of the downstream system.

6.6.1 Every MP installation shall incorporate a MIV fitted between the regulator and safety devices and the inlet of the meter.

6.6.2 The MIV shall be selected to ensure that the pressure at the outlet of the meter conforms to 6.1.4 and 6.2.

6.6.3 The MIV shall not be fitted with a handle in order that it cannot be readily operated by the consumer.

6.7 Pliable connector

Where a pliable connector is used, it shall conform to PRS 6/E.

*NOTE The length of any pliable connector can significantly affect its pressure absorption. For further details on the use of pliable connectors refer to **7.9**.*

6.8 Pressure test point

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

6.9 Interconnecting pipework

Interconnecting pipework shall be made from metallic materials that conform to BS 5482-1.

6.10 Location of meter installation

6.10.1 No components of a MP meter installation shall be installed inside a building (including any garage, conservatory or covered passageway). They shall only be installed in meter housings that conform to **6.11**.

NOTE 1 This includes service pipework, fittings, regulators and limited relief valves.

NOTE 2 A LP meter installation can be installed inside or outside a building.

6.10.2 The meter installation shall be sited so:

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

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

6.10.3 Prepayment meters shall be conveniently placed for easy operation of the coin or token mechanism or smartcard and for the withdrawal of a cash/token box, where fitted. Coin operated meters shall be inaccessible to unauthorized persons.

6.10.4 A meter installation shall not be sited:

a) in close proximity to any source of heat or where it might be subjected to extremes of temperature;

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 or corrosive atmosphere (semi-concealed meter installation excepted);

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

f) any nearer to electrical wiring, switchgear, etc. than the distances given in **6.3.2** (MP installations) and **7.10** (LP and MP installations);

g) in a covered passageway or car port (MP installations only);

h) in a basement or cellar;

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

j) for a LP meter installation in an unventilated space inside a building.

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

NOTE Regulation 12(1) of the Gas Safety (Installation and Use) Regulations 1998 [1] requires that a meter shall not be installed 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 the Health and Safety Commission (HSC) Approved Code of Practice and Guidance, Safety in the installation and use of gas systems and appliances [19].

6.10.6 The meter and its associated gas fitting 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.

6.11 Meter housing

6.11.1 Meter housing fitted external to a property shall be a:

a) semi-concealed meter box;

b) surface mounted meter box;

c) built-in (inset) meter box;

d) post mounted meter box;

e) purpose built housing.

6.11.2 Meter housings shall be designed such that:

a) the materials used 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) they are marked with a 24 mm high capital letter "G";

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

f) the consumer has ready access to the ECV.

6.11.3 The minimum distances of meter housings from electrical equipment and building openings for MP installations shall be in accordance with Table 1.

6.11.4 The size of the meter housing shall be determined by the meter to4 be fitted and by the arrangement of the pipework and associated gas fittings.

NOTE A space measuring 550 mm × 550 mm × 300 mm will accommodate a typical 6 m^3/h meter, but if it is considered necessary to reduce these dimensions then the relevant gas supplier should be consulted, as any reduction may restrict the choice of meter that could be installed.

6.11.5 Only meters that are designed and manufactured for use in semi-concealed meter boxes shall be installed in such boxes.

6.11.6 For MP installations, if a meter housing is fitted to or in a wall of a property, there shall not be any aperture or spigot constructed, or subsequently made, in the box which would allow gas to enter into any cavity or the property. In particular there shall not be any aperture constructed in the back of the housing for any purpose.

6.11.7 For MP installations, pipework or cables shall not directly enter the property from the meter housing.

NOTE This means that installation pipework has to exit the meter housing before entering the premises.

6.11.8 The meter housing shall be ventilated by the inclusion of purpose-designed, non-closable ventilation, sized and located to promote air movement sufficient to achieve a BS EN 60079-10 hazardous area classification of zone 2 (or safer) within the meter housing.

*COMMENTARY ON **6.11.8***

*A purpose-designed, above ground housing incorporating 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-adjustable type, will ensure that the installation conforms to **6.11.8**.*

*A purpose-designed partly below ground housing (e.g. in a semi-concealed meter box) incorporating ventilation that is a minimum of 6% of the plan area, evenly disposed around the housing at high level will ensure that the installation conforms to **6.11.8**.*

Other methods may be acceptable providing a risk assessment has been undertaken to demonstrate that the housing is classified as a BS EN 60079-10 zone 2 (or safer) hazardous area. Some guidance on hazardous area assessments may be obtained from IGE/SR/25 [20].

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.

6.11.9 Built-in meter boxes for MP installation shall not be secured by a method that involves breaching the box, e.g. securing with hammer fix screws is not allowed.

6.11.10 The meter shall not be installed in a built-in meter box with its main body damaged such that there is a risk that gas may enter the cavity or fabric of the building.

6.11.11 Where the main equipotential bonding connection is made inside a built-in meter box:

a) for a MP installation, the cable shall enter/leave the box via the bottom exit and not by drilling or piercing the box;

b) for a LP installation the cable shall enter/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.

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

7 Installation

7.1 General

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

7.1.2 The regulator assembly and the meter shall be installed in accordance with the manufacturer's instructions.

7.2 Handling and care

7.2.1 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.

7.2.2 Diaphragm meters shall be kept upright at all times.

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

7.3 Pre-installation checks and safety precautions

*COMMENTARY ON **7.3***

If there is any doubt about whether the network is a LP or MP 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 in the range obtained via the gas supplier.

The following pre-installation checks shall be undertaken prior to installation.

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

b) Confirm whether the pressure in the service pipework is either LP or MP. Confirm that the regulator and safety devices and their connection to the ECV are compatible with the pressure in the gas service pipework.

NOTE Care should be taken to ensure that the regulator assembly is suitable for the full range of pressures, paying particular attention to ensure that it will operate satisfactorily at LOP.

c) Confirm the site is ready to accept the completed installation, for example any housing and foundations have been completed.

d) Confirm that the location and design of the meter housing conforms to **6.11** and that the ECV is accessible in accordance with **6.5**. Ensure that the location of the vent pipe conforms to **6.3**.

e) Confirm that any electrical equipment installed within the meter housing is suitable for use within a BS EN 60079-10 zone 2 hazardous area.

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

g) Confirm that all gas fittings have been strength and tightness tested at the factory in accordance with **6.1.2.**

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

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

j) The meter shall not be installed in a built-in meter box with its main body damaged such that there is a risk that gas may enter the cavity or fabric of the building.

NOTE Where the main body of a built-in meter box is damaged and has a small hole (10 mm^2 approximately), the meter should not be installed unless the box is permanently repaired, e.g. glass fibre re-enforce plastic (GRP), to achieve a gas tight seal. If the main body has a hole greater than 10 mm^2 or is cracked then the body should be replaced.

k) Ensure that the notices in Clause **10** are available for the meter installation.

7.4 Temporary continuity bond

*COMMENTARY ON **7.4***

This procedure safeguards 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 of 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 multi-strand flexible construction generally in accordance with BS 6004, BS 6007 or BS 6231, with a robust clip or clamp firmly attached at each end.

During any work that necessitates connection or disconnection of any meter or associated gas fittings, a temporary continuity bond shall be fixed where it is necessary to avoid electrical danger whether or not a permanent equipotential bonding has been established. The temporary continuity bond shall remain in position until the work is completed.

7.5 Main equipotential bonding

*COMMENTARY ON **7.5***

For internal meters, for verification purposes the bonding connection should be within 600 mm of the meter outlet. For meters in outside meter boxes/compartments the bonding connection should be preferably inside the building and as near as practicable to the point of entry of the installation pipework into the building. Detailed requirements for the main equipotential bonding of meter installations to installation pipework are given in BS 5482-1. Further information on equipotential bonding can be found in BS 7671.

Except where the service pipework is of polyethylene to a point above ground level, it might be necessary to fit an electrical insulator in the service pipework to the meter to prevent the passage of stray electrical currents between the service pipework and installation pipework. If there is any doubt as to whether an electrical insulator is needed, the matter should be referred to the gas supplier.

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

If the installer connects a meter installation to any installation pipework, the installer shall check that main equipotential bonding is evident. Where it is not evident the installer shall inform the person responsible for the premises.

NOTE Regulation 18(2) of the Gas Safety (Installation and Use) Regulations 1998 [1] requires that any person who connects any installation pipework to a meter shall, in any case where equipotential bonding may be necessary, inform the responsible person for the premises that such bonding should be carried out by a competent person.

7.6 Securing the meter

7.6.1 The installation shall be prepared such that:

a) the meter, regulator and safety devices can be supported and installed in a manner that minimizes strain being placed on any connections and allows easy removal and refitting of the meter, regulator and safety devices;

b) the meter can be fitted and supported so as to restrict movement and reduce the likelihood of tampering;

c) a meter that is to be installed inside a building can be fitted to a meter bracket;

d) a meter that is to be installed in an above ground meter housing can be fitted to a meter bracket that has been fitted within the meter housing.

e) a meter that is to be installed in a semi-concealed meter box can 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) where a diaphragm meter is used it can only be installed upright and level such that it cannot be readily tilted;

g) the meter and its regulator and safety devices can be secured such that they are 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 feet.

7.6.2 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 special tool or key.

7.7 Emergency control valve

*COMMENTARY ON **7.7***

*Where the ECV has been checked and found not to have been installed in accordance with **7.7**, the gas supplier that conveys the gas to the ECV should be advised.*

The ECV shall be checked to ensure that:

a) it is of a type suitable for operating pressures within the range of LOP and DMIP;

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

c) it is sited so as to permit easy access for operating, servicing and exchanging;

d) it is fitted with a key or lever such that the key or lever cannot be moved in a downward direction to open it and any detachable lever is securely held in place;

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

7.8 Meter regulator and safety devices

7.8.1 The inlet of the meter regulator and its safety devices shall be connected as near as practical to the outlet of the ECV.

7.8.2 The outlet of the meter regulator and its safety devices shall be connected as near as practical to the inlet of the meter.

7.9 Pliable connector

7.9.1 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.

7.9.2 Only one pliable connector shall be used within the meter installation.

*NOTE The reasons for the use of only one pliable connector are given in **7.6.1**b).*

7.10 Electrical apparatus adjacent a gas meter

7.10.1 Low pressure (LP) installation

*COMMENTARY ON **7.10.1***

*The separation distances given in **7.10.1** are consistent with BS 5482-1. Every effort should be made to ensure that these separation distances are achieved instead of relying on the use of insulating material.*

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 non-combustible partition made of an electrically insulating material shall be placed between them.

7.10.2 Medium pressure (MP) installation

The minimum distances of meter housings and relief valve vent tips from electrical equipment and building openings shall be in accordance with Table 1.

7.11 Multiple meter installations

*COMMENTARY ON **7.11***

General guidance on multiple domestic meter installations is given in IGE/G/5 [21].

7.11.1 Multiple domestic meter installations shall have a LP supply to the ECV and meet the following requirement:

a) be installed in accordance with Figure 1c)

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

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

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

e) each meter or individual meter box is clearly marked to indicate the premises it serves;

f) each individual premises has an appropriately sited AECV as close as practicable to where the installation pipework enters the premises;

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

h) each individual premises (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.

7.11.2 Multiple domestic meter installations shall not be connected to an ECV supplied at MP.

8 Gas tightness testing and purging

Prior to making gas available, the installation shall be tested for gas tightness and purged in accordance with BS 5482-1.

9 Commissioning of the meter installation

9.1 Meter regulator and safety devices

*COMMENTARY ON **9.1***

In order to achieve a nominal pressure of 37 mbar at the outlet of the meter, meter regulators are factory set to deliver a pressure at their outlet of between 32 mbar and 45 mbar for regulators set to meet the requirements of Table B.3.1 and set to deliver a pressure at their outlet of between 32 mbar and 42 mbar for regulators set to meet the requirements of Table B.3.2. 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 m^3/h.

The installer shall ensure the following:

a) the regulator gives an operating pressure at the outlet of the meter of between:

   1) 32 mbar and 45 mbar at corresponding flow rates between 6 m^3/h and 0.5 m^3/h for regulators set to meet the requirements of Table B.3.1;

   2) 32 mbar and 42 mbar at corresponding flow rates between 6 m^3/h and 0.5 m^3/h for regulators set to meet the requirements of Table B.3.2.

b) If the pressure is outside this range the regulator shall be adjusted by a person authorized by the gas supplier;

   NOTE Regulation 14(6)(b) of the Gas Safety (Installation and Use) Regulations 1998 [1] requires that no person except the gas supplier, or a person authorized to act on the supplier's behalf, shall break a seal on a primary meter regulator.

c) the regulator lock up is at a pressure not exceeding the values given in Table B.3.1 and Table B.3.2 as appropriate, with no flow through the installation;

d) the UPSO and OPSO are set in accordance with the manufacturer's instructions to meet the design criteria given in **6.1.2** using the values given in Table B.3.1 and Table B.3.2 as appropriate;

e) the regulator and safety device(s) are sealed to prevent their settings from being interfered with, without breaking the seal.

9.2 Meter

The installer shall ensure that:

a) any prepayment coin or token mechanism is operating correctly;

b) the index is incrementing correctly;

c) for an ultrasonic meter that is not new or does not have an index reading of between 99 997.000 and 99 999.999 the diagnostic functions are reset after installation;

d) the meter index is read and recorded in accordance with Clause **14**.

10 Notices

10.1 General

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

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

10.2 Emergency notices

10.2.1 Meter adjacent to the emergency control valve

An emergency notice in permanent form shall be fitted by the installer 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 gas supplier if gas continues to escape;

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

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

e) of the date the notice was first displayed.

NOTE Regulation 15(1) of the Gas Safety (Installation and Use) Regulations 1998 [1] 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.

10.2.2 Meter not adjacent to the emergency control valve

10.2.2.1 Emergency notice at the emergency control valve

An emergency notice in permanent form (bearing the words "GAS EMERGENCY CONTROL") on or near to the ECV shall be checked by the installer that it informs the consumer:

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

b) to immediately notify the gas supplier 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;

e) of the date the notice was first displayed.

NOTE 1 Regulation 9(3) of the Gas Safety (Installation and Use) Regulations 1998 [1] requires that where a person installs an emergency control which is not adjacent to a primary meter, a suitably worded notice in permanent form shall 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 2 Regulation 9(4) of the Gas Safety (Installation and Use) Regulations 1998 [1] requires that where any person first supplies gas to premises where an emergency control is installed, the person shall ensure that the notice required by regulation 9(3) remains suitably worded.

10.2.2.2 Emergency notice at the meter

An emergency notice conforming to **10.2.1** shall be fitted by the installer at or on the meter. In addition, it shall indicate where the ECV is situated.

NOTE Regulation 15(2) of the Gas Safety (Installation and Use) Regulations 1998 [1] 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.

10.3 Emergency control valve

10.3.1 The installer shall check that a notice in permanent form is prominently displayed near any ECV so as to indicate when the valve is open and when it is closed.

NOTE Regulation 9(2) of the Gas Safety (Installation and Use) Regulations 1998 [1] 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.

10.3.2 The installer shall check that a notice in permanent form is prominently displayed near the ECV to indicate the maximum operating pressure of the service pipework.

10.4 Live gas

After removal of the meter, any live gas pipe shall be clearly and permanently marked with a notice that the pipe contains gas.

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

*NOTE 2 Further requirements for the removal of a meter are given in Clause **13**.*

10.5 Meter installation

A notice in permanent form shall be fitted by the installer on or near the meter to inform of:

a) the name and contact details of the gas supplier;

b) the setting of the operating pressure at the outlet of the meter (i.e. metering pressure);

c) the UPSO set pressure;

d) the relief valve set pressure (for MP installations only);

e) the OPSO set pressure (for MP installations only);

f) regulator lock up pressure; and

g) if applicable, the method of resetting the UPSO in the event of no gas at the appliance(s).

NOTE Typical meter installation notices are given in Figure 4.

Figure 4 **Typical meter installation notices**

MP METER INSTALLATION		IF YOU THINK YOU CAN SMELL GAS, CONTACT THE GAS EMERGENCY SERVICE ON
Installation date:		*insert phone no.*
Metering pressure:	37 mbar	IF THERE IS NO GAS AT APPLIANCES:
UPSO set pressure:	30 mbar	a) Turn off all appliances;
Relief valve set pressure:	75 mbar	b) Check that the emergency control valve is open;
OPSO set pressure:	100 mbar	c) [insert UPSO reset method];
Regulator lock up pressure:	50 mbar	d) Check whether gas is available at an appliance;
Installed by:		e) If no gas, repeat c) and d);
Gas supplier:		f) If there is still no gas, ring
Telephone:		*insert phone no.*

a) MP meter installation

LP METER INSTALLATION		IF YOU THINK YOU CAN SMELL GAS, CONTACT THE GAS EMERGENCY SERVICE ON
Installation date:		*insert phone no.*
Metering pressure:	37 mbar	IF THERE IS NO GAS AT APPLIANCES:
UPSO set pressure:	30 mbar	a) Turn off all appliances;
Regulator lock up pressure:	50 mbar	b) Check that the emergency control valve is open;
Installed by:		c) Check whether gas is available at an appliance;
Gas supplier:		d) If no gas, repeat c) and d);
Telephone:		e) If there is still no gas, ring
		insert phone no.

b) LP meter installation

10.6 Meter housing notice

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

a) where the service pipework at the ECV is at MP, the outlet pipe and vent pipe shall not exit via the rear of the box;

b) the housing manufacturer's details;

NOTE The manufacturer's details should include the name, address and telephone number, model number of the box, ventilation details and the hazardous zone deemed to exist within the box.

c) the gas family and MOP for which the housing is intended, e.g. "3rd family gas with a maximum operating pressure not exceeding 2 bar".

10.6.2 For a meter installed in non-domestic premises, an EX sign shall be fitted to the outside of the meter housing.

NOTE Attention is drawn to the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) [13] that require an EX sign to be displayed where necessary at the entry to a hazardous area. This regulation of DSEAR does not apply to gas fittings as defined in the Gas Safety (Installation and Use) Regulations 1998 [1] at domestic premises.

11 Meter exchange and/or replacement of other gas fitting

11.1 Inspection

*COMMENTARY ON **11.1***

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.

Before replacing the meter or any other gas fittings, the installation shall be checked to ensure that the replacements conform to Clause **6**, in particular that pressure absorption conforms to **6.1.6**.

11.2 Temporary continuity bonding

In any case where a meter and other gas fittings are exchanged or removed, no work shall be carried out without using a temporary continuity bond to maintain electrical continuity in accordance with **7.4**. The bond shall remain in place until the work is completed and permanent electrical continuity has been restored.

11.3 Carrying out the work

11.3.1 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 **7**, Clause **8** and Clause **9**.

11.3.2 Any defective gas fitting shall be replaced.

11.3.3 Notices shall conform to Clause **10**.

11.3.4 Records shall be completed in accordance with Clause **14**.

12 Meter relocation

12.1 General

12.1.1 The meter or meter installation shall be relocated by:

a) altering the position of the service pipework;

b) relocating the meter only;

c) relocating the regulator and meter.

NOTE 1 In some circumstances a MP installation can be replaced with a LP installation and in other circumstances, a LP installation can be replaced with a MP installation.

*NOTE 2 A MP installation cannot be sited within the property (see **6.10** and **6.11**).*

NOTE 3 The need to relocate the meter/meter installation can be instigated by:

a) the owner of the premises;

b) the owner of the meter/meter installation;

c) the relevant gas supplier.

12.1.2 Before agreeing the relocation, 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 relocating the meter/meter installation will be dependant upon the particular circumstances and the person who has instigated the relocation.

12.2 Inspection of existing installation

12.2.1 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 **12.1.1** is the most practical.

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

12.3 Design

12.3.1 Following the completion of the survey described in **12.2**, the type of relocation shall be agreed out of those listed in **12.1.1**. If the survey indicates that it is more appropriate to alter the position of the service pipework, the gas supplier shall be consulted.

12.3.2 The feasibility of the proposed location for a relocated meter or meter installation shall be confirmed by ensuring that the nominal operating pressure at the outlet of the meter installation (i.e. metering pressure) will be 37 mbar.

*NOTE 1 Information on pressure absorption is given in **6.1.6**.*

NOTE 2 The pressure absorption of installation pipework conforming to BS 5482-1 will not exceed 2 mbar. Meter installations conforming to this standard connected to installation pipework installed in accordance with BS 5482-1 will ensure that sufficient pressure is available at the appliance.

12.4 Carrying out the work

12.4.1 Gas tightness of existing installation

Prior to undertaking work, the installation shall be tested for gas tightness in accordance with BS 5482-1.

12.4.2 Temporary continuity bond

A temporary continuity bond shall be used in accordance with **7.4** in order to maintain electrical continuity.

NOTE Regulation 10 of the Gas Safety (Installation and Use) Regulations 1998 [1] requires that in any case where it is necessary to prevent danger, no person shall carry out work in relation to a gas fitting without using a suitable bond to maintain electrical continuity until the work is completed and permanent electrical continuity has been restored.

12.4.3 Relocation work

12.4.3.1 The existing meter shall be disconnected and handled with care in accordance with **7.2**.

12.4.3.2 The installation shall be arranged in accordance with Figure 1a), b) or c), as appropriate.

12.4.3.3 The relocated meter and associated gas fittings shall be installed in accordance with Clause **7**.

12.5 Gas tightness testing and purging

Prior to making gas available, the installation shall be re-tested for gas tightness and purged in accordance with BS 5482-1.

12.6 Commissioning, notices and records

The installer shall:

a) commission the meter installation in accordance with Clause **9**;

b) fit notices in accordance with Clause **10**; and

c) complete records in accordance with Clause **14**.

13 Meter removal

13.1 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.

13.2 If a meter is permanently removed, the whole meter installation shall be removed sealing the ECV and the installation pipe with a plug, cap or otherwise permanently sealed with appropriate gas fittings.

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

13.3 Where a meter is to be removed and not subsequently re-installed or replaced by another meter, before it is removed the person who removes it shall clearly mark any live gas pipe in the premises in which the meter was installed.

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

13.4 During and after removal, meters shall be handled with care in accordance with **7.2**.

13.5 Where a section of pipework, or meter, is permanently removed and the remaining pipe ends could be simultaneously touched, i.e. they are less than 2 m apart, a permanent equipotential bond shall be fixed using earthing cable conforming to BS 7671.

*NOTE 1 The commentary to **7.4** contains guidance on temporary continuity bonds. This same guidance is suitable for 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 disconnection is short and not earthed, e.g. a polyethylene (PE) service pipework with only an ECV and/or short length of installation pipe.

14 Records

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

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

15 Post installation checks

After installing any part of a meter installation it shall be checked that:

a) all un-used 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 [1].

b) any MIV handle has been removed except when it has been relocated in accordance with Clause **12** because it is acting as an AECV;

c) the regulator and safety devices have been sealed to prevent their settings from being interfered with, without breaking any seal;

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

e) notices are fitted in accordance with Clause **10**.

f) the meter details have been recorded in accordance with Clause **14**.

Annex A (normative) Sizing of meters

A.1 Diversity factor

A diversity factor is given to each type of appliance according to the normal degree of intermittence of use. Where there are only one or two appliances (e.g. combination boiler and cooker) the diversity factor shall have a value of one. 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 sizing**

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

A.2 Meter size calculation

To calculate the size of meter required, multiply the maximum heat input of each appliance by its diversity factor, add these figures, convert to megajoules and divide the total by the calorific value of the gas (typically 95 MJ/m^3 for propane). The following is an example of such a calculation.

Type of appliance	Heat input (kW)	Diversity factor	Gas load (kW)
Central heating boiler	35.0	× 1.0	= 35.0
Room heater	6.0	× 0.6	= 3.6
Tumble dryer	3.0	× 0.6	= 1.8
Cooker	33.5	× 0.4	= 13.4
Total gas load rating			= 53.8 kW
Convert to MJ/h (1 kW = 3.6 MJ)			= 193.68 MJ/h
Equivalent gas flow rate (propane)			= 2.04 m^3/h

NOTE The maximum capacity of the meter when operating on LPG is reduced due to the increased density of LPG when compared with air. All meters are given their maximum capacity at a specific pressure absorption using air. As the density of LPG is typically 1.5 times that of air, the meter's maximum capacity is effectively reduced by a third.

Conclusion

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

Annex B (normative) Operational pressure limits

The operational pressure limits in Table B.1, Table B.2, Table B.3.1 and Table B.3.2 shall be used when designing a meter installation.

Table B.1 **Operational pressure limits for a regulator conforming to BS EN 13785 which supplies MP (sometimes referred to as first stage)**

Nominal regulated pressure P_d	**Regulator lock up pressure P_0**	**Minimum regulated pressure P_{min}**		**Gas tightness test pressure**	**DMIP**	**MOP**	**LOP[B] $P_{min} \times 0.85$**	
bar	bar	bar		bar	bar	bar	bar	
		Active[A]	**Monitor[A]**				**Active[A]**	**Monitor[A]**
1.5	1.95	1.05	0.98	3	2.7	2	0.89	0.83
1	1.3	0.7	0.63				0.6	0.53
0.8	1.04	0.56	0.49				0.48	0.42

[A] Where two regulators are installed in parallel to guarantee supply, one regulator is called the active regulator and acts as the main pressure control device. The other regulator is called the monitor regulator and takes over when the active regulator fails. The monitor regulator is set 0.1 bar lower than the nominal regulated pressure of the active regulator.

[B] The LOP pressures include a 15% pressure absorption at the maximum capacity of the installation.

Table B.2 **Operational pressure limits for MP regulator conforming to BS EN 13785 which supplies LP (sometimes referred to as the second stage regulator when used in a three stage system)**

Nominal regulated pressure P_d	**Regulator lock up pressure P_0**	**Minimum regulated pressure P_{min}**		**Gas tightness test pressure**	**DMIP**	**MOP**	**LOP[B] $P_{min} \times 0.85$**	
mbar	mbar	mbar		bar	mbar	mbar	mbar	
		Active[A]	**Monitor[A]**				**Active[A]**	**Monitor[A]**
75	97.5	52.5	45.5	3	350	100	44.6	38.7

[A] Where two regulators are installed in parallel, one regulator is called the active regulator and acts as the main pressure control device. The other regulator is called the monitor regulator and takes over when the active regulator fails. The monitor regulator is set 0.1 bar lower than the nominal regulated pressure of the active regulator.

[B] The LOP pressures include a 15% pressure absorption at the maximum capacity of the installation.

Table B.3.1 **Operational pressure limits for a MP or LP regulator conforming to BS EN 13785 which supplies the gas appliance where the downstream equipment has a MOP of 150 mbar**

Nominal regulated pressure P_d	**Regulator lock up pressure P_0**	**Maximum regulated pressure P_{mg}**	**Minimum regulated pressure P_{mp}**	**OPSO set pressure (max)**	**Limited relief valve set pressure (max)**	**UPSO set pressure**
mbar	mbar	mbar	mbar	mbar	mbar	mbar
37	50	45	>32	110	80	27 ⩽ 32

NOTE *P_0, P_{mg} and P_{mp} are definitions from BS EN 13785.*

- *Lock up pressure P_0: the maximum pressure obtainable at no flow for all values of the supply pressure.*
- *Minimum admitted pressure P_{mg}: minimum value of the regulated pressure supplied by the regulator for all values of the supply pressure and all values of the flow rate.*
- *Maximum admitted pressure P_{mp}: maximum value of the regulated pressure supplied by the regulator for all values of the supply pressure and all values of the flow rate between the closing area and the guaranteed rate.*

Table B.3.2 **Operational pressure limits for a MP or LP regulator which supplies the gas appliance where the downstream equipment has a MOP of 75 mbar**

Nominal regulated pressure	**Regulator lock up pressure**	**Maximum regulated pressure**	**Minimum regulated pressure**	**OPSO set pressure**	**Limited relief valve set pressure**	**UPSO set pressure**
mbar	mbar	mbar	mbar	mbar	mbar	mbar
37	45	42	>32	75 ±5	$55\ ^{+7}_{-5}$	25 ⩽ 32

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 4161-3:1989, *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*

BS 4161-5:1990, *Gas meters – Part 5: Specification for diaphragm meters for working pressures up to 7 bar*

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

BS 6004, *Electric cables – PVC insulated, non-armoured cables for voltages up to and including 450/750 V, for electric power, lighting and internal wiring*

BS 6007, *Electric cables – Single core unsheathed heat resisting cables for voltages up to and including 450/750 V, for internal wiring*

BS 6400-2, *Specification for installation, exchange, relocation and removal of gas meters with a maximum capacity not exceeding 6 m^3/h – Part 2: Medium pressure (2nd family gases)*

BS 6231, *Electric cables – Single core PVC insulated flexible cables of rated voltage 600/1000 V for switchgear and controlgear wiring*

BS EN 437, *Specification for test gases – Test pressures – Appliance categories*

BS EN 1057, *Copper and copper alloys – Seamless, round copper tubes for water and gas in sanitary and heating applications*

BS EN 1775, *Gas supply – Gas pipework in buildings – Maximum operating pressure less than or equal to 5 bar – Functional recommendations*

Other publications

[1] GREAT BRITAIN. The Gas Safety (Installation and Use) Regulations 1998, No. 2451, London: HMSO.

[2] NORTHERN IRELAND. The Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004, No. 63, London: HMSO.

[3] ISLE OF MAN. The Gas Safety (Application) Order (Isle of Man) 1996, No. 326/96. Hard copies are available from the Health and Safety at Work Inspectorate of the Isle of Man.

[4] GREAT BRITAIN. The Gas Meters (Information on Connection and Disconnection) Regulations 1996, No. 450, London: HMSO.

[5] GREAT BRITAIN. The Gas Safety (Management) Regulations 1996, No. 551, London: HMSO.

[6] NORTHERN IRELAND. The Gas Safety (Management) Regulations (Northern Ireland) 1997, No. 195, London: HMSO.

[7] GREAT BRITAIN. The Gas (Meters) Regulations 1983 (as amended), No. 684, London: HMSO.

[8] GREAT BRITAIN. The Building Regulations 2000 (as amended), No. 2531, London: HMSO.

[9] GREAT BRITAIN. The Building (Scotland) Regulations 2004 (as amended), No. 406, London: HMSO.

[10] NORTHERN IRELAND. The Building Regulations (Northern Ireland) 2000 (as amended), No. 389, London: HMSO.

[11] GREAT BRITAIN. The Measuring Instruments (EEC Requirements) (Gas Volume Meters) Regulations 1988 (as amended), No. 296, London: HMSO.

[12] GREAT BRITAIN. The Measuring Instruments (Gas Meters) Regulations 2006, No. 2647, London: HMSO.

[13] GREAT BRITAIN. The Dangerous Substances and Explosive Atmosphere Regulations 2002, No. 2776, London: HMSO.

[14] LPGA. Liquefied Petroleum Gas Association Code of Practice 25 *LPG Central Storage and Distribution Systems for Multiple Consumers*, 1999. Ringwood, Hampshire: The LP Gas Association, 1999.

[15] LPGA. Liquefied Petroleum Gas Association Code of Practice 22 *LPG Piping System Design and Installation*, 2002. Ringwood, Hampshire: The LP Gas Association, 2002.

[16] INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGE/UP/8, *Gas in caravans, holiday homes and boats*, 2000. Loughborough: IGEM

[17] GREAT BRITAIN. Gas Act 1986 (as amended by the Gas Act 1995 and incorporating standalone provisions of the Utilities Act 2000). London: HMSO.

[18] INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGE/GM/7, *Gas measurement procedures – Electrical connections and hazardous area classification for gas metering equipment* (as amended), 2004, Loughborough: IGEM.

[19] HEALTH AND SAFETY COMMISSION (HSC). *L56, Safety in the installation and use of gas systems and appliances. The Gas Safety (Installation and Use) Regulations 1998: Approved Code of Practice and Guidance*, 1998, Sudbury: HSE Books, www.hsebooks.co.uk.

[20] INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGE/SR/25, *Hazardous area classification of natural gas installations*, 2000, Loughborough: IGEM.

[21] INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGE/G/5, *Gas installations in multi-occupancy, multi-dwelling buildings*, 2006, Loughborough: IGEM.

This page deliberately left blank

BSI – British Standards Institution

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

Revisions

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

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

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

Buying standards

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

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

Information on standards

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

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

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

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

Copyright

389 Chiswick High Road
London
W4 4AL