BS 6400-2:2006

Including
Corrigendum No. 1

BRITISH STANDARD

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)

ICS 91.149.40

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Publishing and copyright information

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Contents

List of tables

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 57 and a back cover.

Foreword

Publishing information

This British Standard was published by BSI and came into effect on 31 July 2006. 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.

The Technical Committee wishes to acknowledge the Institution of Gas Engineers and Managers for permission to use certain tables and figures from its publication IGE/TD/15 [1].

Supersession

This part of BS 6400 partially supersedes BS 6400:1997, which will be withdrawn upon publication of all three parts of BS 6400.

Relationship with other publications

This 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 6400-3, which uses terminology that is consistent with the liquefied petroleum gas industry.

This standard has been prepared as a supporting document to COP/1c [2], the Ofgas code of practice for all higher pressure and all other low pressure (LP) meter installations not covered by COP/1a [3] or COP/1b [4].

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 medium pressure 2nd family gas networks.

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 [5].

b) The Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004 [6].

c) The Gas Safety (Application) Order (Isle of Man) 1996 [7].

d) The Gas Meters (Information and Connection and Disconnection) Regulations 1996 [8].

e) The Gas Safety (Management) Regulations 1996 [9].

f) The Gas Safety (Management) Regulations (Northern Ireland) 1997 [10].

g) The Gas (Meters) Regulations 1983 (as amended) [11].

h) The Building Regulations 2000 (as amended) [12].

i) The Building (Scotland) Regulations 2004 (as amended) [13].

j) The Building Regulations (Northern Ireland) 2000 (as amended) [14].

k) The Measuring Instruments (EEC Requirements) (Gas Volume Meters) Regulations 1988 (as amended) [15].

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

Compliance with a British Standard does not of itself confer immunity from legal obligations.

1 Scope

This 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 primary meter installations:

a) supplied with 2nd family gases from medium pressure gas distribution systems with a maximum operating pressure exceeding 75 mbar but not exceeding 2 bar and with a design maximum incidental pressure of 2.7 bar;

b) only fitted downstream of the emergency control valve;

c) that utilize a pressure control and protection system contained within a regulator assembly that is 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 21 mbar.

NOTE 2 Medium pressure gas networks in Great Britain operate with maximum operating pressure in the range of 75 mbar or greater but not exceeding 2 bar with a design maximum incidental pressure of 2.7 bar.

Installation, exchange, relocation and removal of a secondary meter with a maximum capacity of 6 m^3/h is specified in BS 6400-1.

Installation pipework is specified in BS 6891.

Service pipes (including the emergency control valve) are specified in the Institution of Gas Engineers and Managers' publication on gas services, IGE/TD/4 [16].

NOTE 3 All pressures quoted in this standard are gauge pressures and all pressure absorption values are for natural gas unless otherwise specified.

NOTE 4 Additional guidance on domestic gas systems can be found in the European functional standards BS EN 1775 and BS EN 12279.

2 Normative references

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

BS 21, *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 6891:2005, *Installation of low pressure gas pipework of up to 35 mm (R1¼) in domestic premises – Specification*

BS 6400-1, *Specification for installation, exchange, relocation and removal of gas meters with a maximum capacity not exceeding 6 m^3/h – Part 1: Low pressure (2nd family gases)*

BS 7372, *Guide to choice of aperture size and wire diameter combinations for industrial wire screens and woven wire cloth*

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

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

BS EN 1359:1999, *Gas meters – Diaphragm gas meters*

BS EN 60070-10, *Electrical apparatus for explosive gas atmospheres – Part 10: Classification of hazardous areas*

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

DD ENV 14236, *Ultrasonic domestic gas meters*

DEPARTMENT OF TRADE AND INDUSTRY. *Gas Suppliers Licence: Standard Conditions*, 2001.

INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGE/UP/1, *Strength testing, tightness testing and direct purging of industrial and commercial gas installations*, 2003.

INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGE/UP/1B, *Tightness testing and purging of domestic sized Natural Gas installations*, 2006.

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.

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

INSTITUTION OF GAS ENGINEERS AND MANAGERS. PRS 28/E, *Specification for medium pressure single-stage regulators for gas flow rates not exceeding 6 m^3/h*, 2006.

INSTITUTION OF GAS ENGINEERS AND MANAGERS. PRS 29/E, *Specification for medium pressure two-stage regulators for gas flow rates not exceeding 6 m^3/h*, 2006.

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 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

NOTE In the case of a medium pressure gas network in Great Britain the DMIP is 2.7 bar.

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

NOTE 1 The DMP of a medium pressure gas network in Great Britain can be obtained from the gas transporter.

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

NOTE 3 An extreme gas supply condition is considered to be a severe winter of the type that occurs one year in twenty.

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

NOTE In the case of medium pressure gas networks in Great Britain the DP is 2 bar.

3.5 electrical insulator
gas fitting, with a high electrical resistance, to minimize the flow of any stray electrical current

3.6 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 a service

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

3.8 excess flow valve
device that automatically shuts off or restricts the flow of gas should it exceed a predetermined rate

NOTE The excess flow valve referred to in this standard is that which is incorporated in the meter regulator.

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

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

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 or fitting from the outlet of the primary 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 [5].

3.13 interconnecting pipework
pipework assembled within the meter installation

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

3.15 low pressure (LP)
gas supply with a 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 The gas transporter will be able to advise on the LOP of the gas supply.

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

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

3.18 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

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

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

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

3.19.3 positive displacement meter
meter that directly measures the volume of gas that passes through it

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

3.19.4 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

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

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

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

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

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

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

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

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

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

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

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

3.26 meter installation
installation that comprises a primary meter, valve, filter, meter regulator and associated protection devices, pliable connection, 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;

b) the outlet of the meter outlet adaptor if fitted; or

c) in the case of a semi-concealed meter with a pliable connection downstream of the meter, the outlet of the meter box outlet adaptor.

3.27 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

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

3.29 operating pressure
pressure at which a system is operating

3.30 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.

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

3.32 pressure control and protection system
meter regulator incorporating an integral pressure control and protection devices and supplied with gas at medium pressure, which maintains a controlled outlet pressure within pre-determined limits of accuracy under flow conditions and ensures that the downstream pressure is kept within acceptable limits

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

3.34 regulator assembly
factory assembled kit comprising pressure control and protection system, meter inlet valve, interconnecting pipework and/or pliable connector

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

3.36 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

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

3.38 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 transporter or gas supplier to verify that the gas service pipe is supplied at MP and 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 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 transporter or gas supplier, 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. The relevant gas transporter's authorization shall be obtained to break the seal, set and seal the meter regulator in accordance with Clause **7**.

4.2 Dissemination of information

NOTE The designer/planner should make available all information regarding the position and housing of the meter and its regulator assembly 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 fitting the meter installation should be agreed as early as possible by the interested parties and any subsequent changes be advised at the earliest opportunity.

4.4 Coordination 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 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.

NOTE The Gas Safety (Installation and Use) Regulations 1998 [5] makes requirements on consumers that intend to use gas in a way that 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.

4.6 Multiple domestic meter installations

Multiple domestic meter installations shall have a low pressure supply to the ECV and be designed and installed in accordance with BS 6400-1.

NOTE Further guidance on multiple domestic meter installations is given in IGE/G/5 [17].

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 [5].

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

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

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

5.3 Organizations who install MP meter installations shall be registered as Ofgem approved meter installers (OAMIs) for COP/1c installations [2].

5.4 All installers shall be fit and proper persons within the meaning defined in the standard conditions of the Department of Trade and Industry's Gas Suppliers Licence.

5.5 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 primary meter installation shall be arranged in accordance with Figure 1.

6.1.2 Gas fittings

6.1.2.1 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.

6.1.2.2 Any gas fittings upstream of point X in Figure 1 shall:

a) be capable of withstanding the DMIP advised by the gas transporter, i.e. in Great Britain this value is 2.7 bar for a primary MP meter installation;

b) be suitable for a MOP of 2 bar;

c) have been strength and gas tightness tested at the factory in accordance with IGE/UP/1.

6.1.2.3 Any gas fittings downstream of point X in Figure 1 to the outlet of the MIV shall:

a) be capable of withstanding a pressure resulting from the operation of the final protection device;

b) have been strength and gas tightness tested at the factory in accordance with IGE/UP/1.

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

NOTE 2 Gas pressures on MP gas distribution systems can vary significantly according to location, for this reason the designer should ensure that these variations are taken into account in the design of gas fittings in the meter installation.

6.1.3 Gas family

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

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

6.1.4 Flow rate

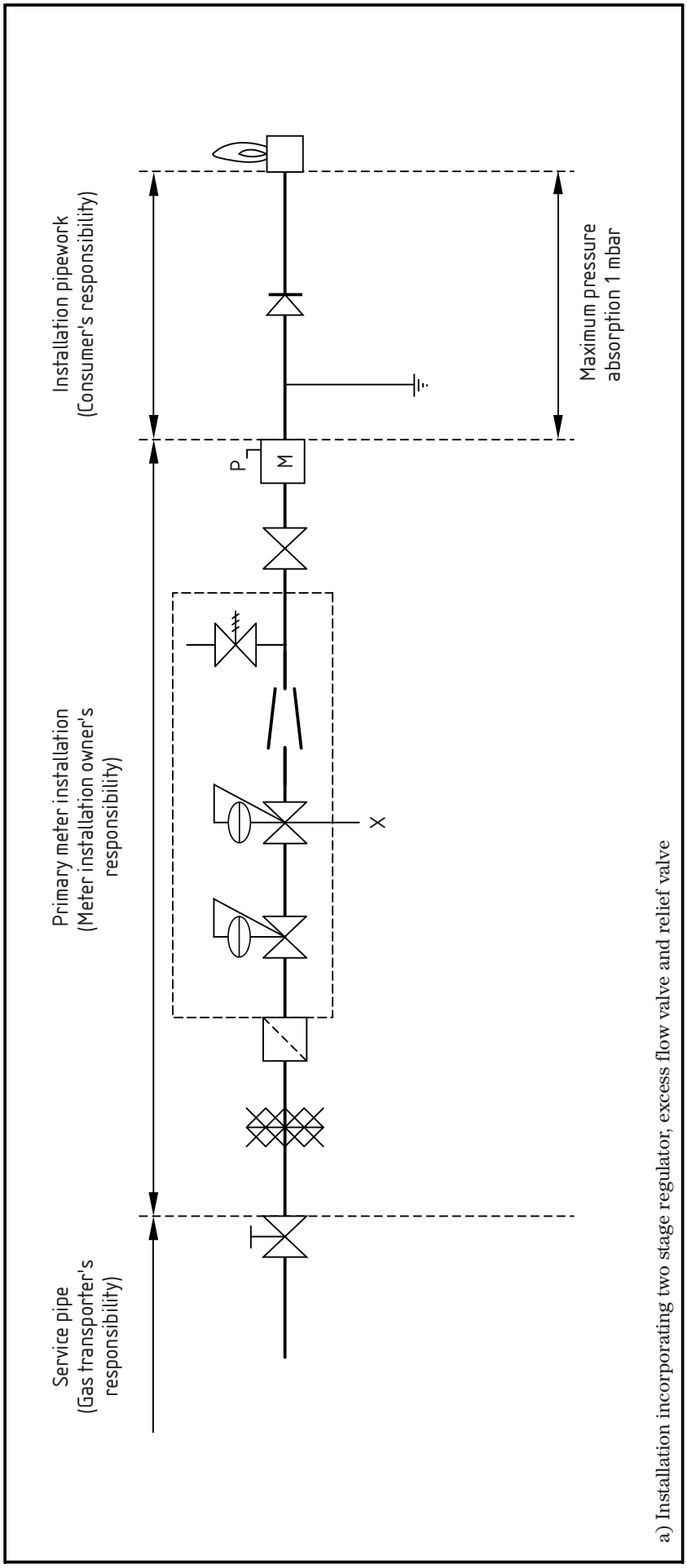
All gas fittings in the meter installation shall be designed to pass gas at a flow rate not less than the meter's maximum flow rate.

6.1.5 Connections

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

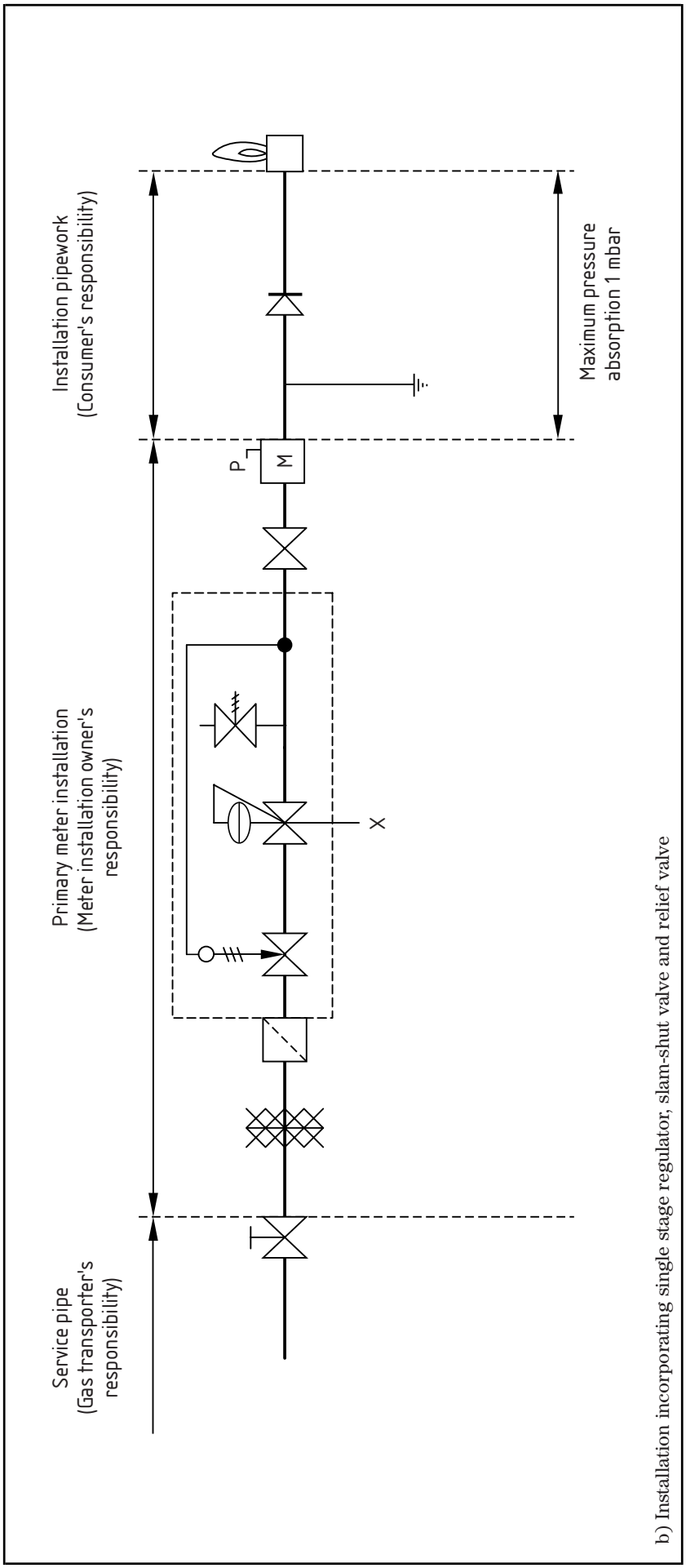
6.1.5.2 LP connections downstream of point X in Figure 1 shall have unions and adaptors that conform to BS 746 or threads that conform to BS 21.

Figure 1 **Arrangement of a MP meter installation and options for the arrangement of the pressure control and protection system (symbols to BS 1553-1)**



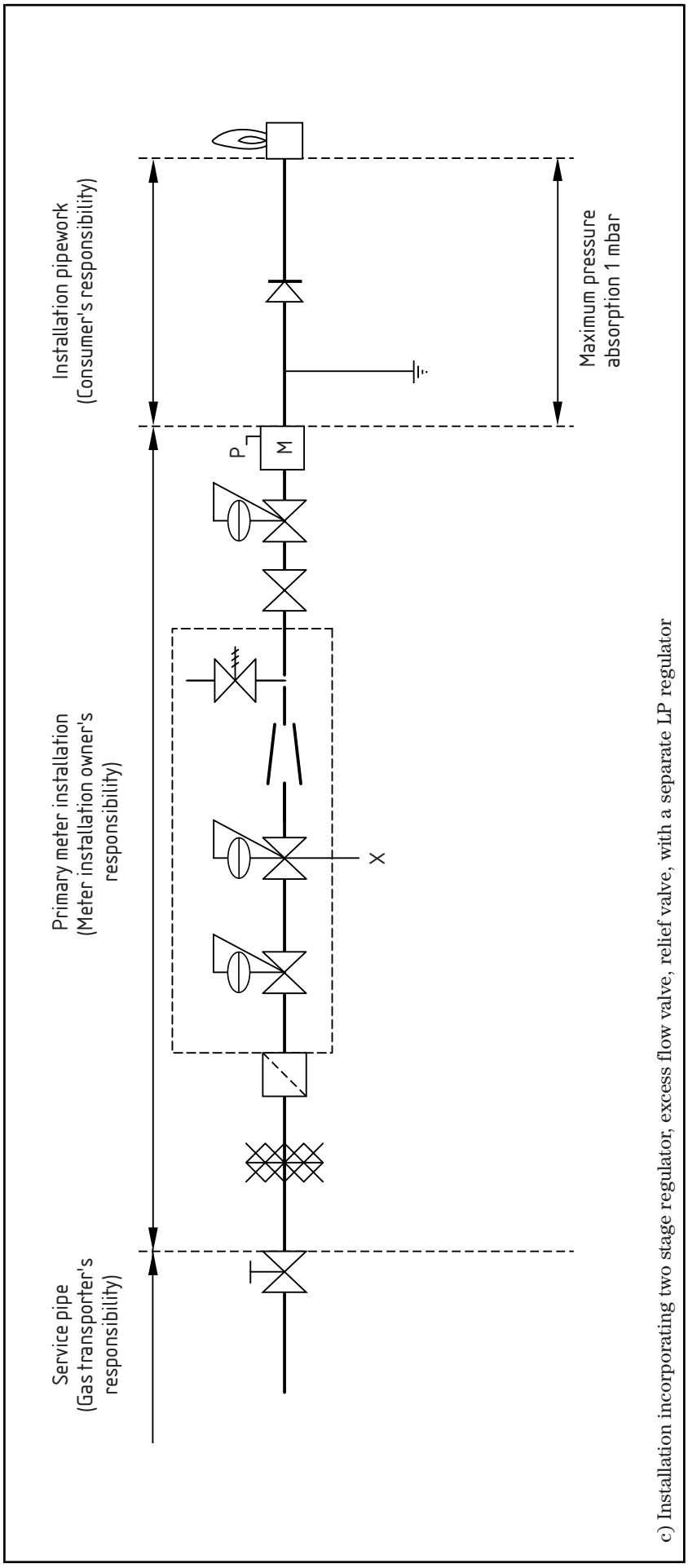
a) Installation incorporating two stage regulator, excess flow valve and relief valve

Figure 1 **Arrangement of a MP meter installation and options for the arrangement of the pressure control and protection system (symbols to BS 1553-1)** (*continued*)



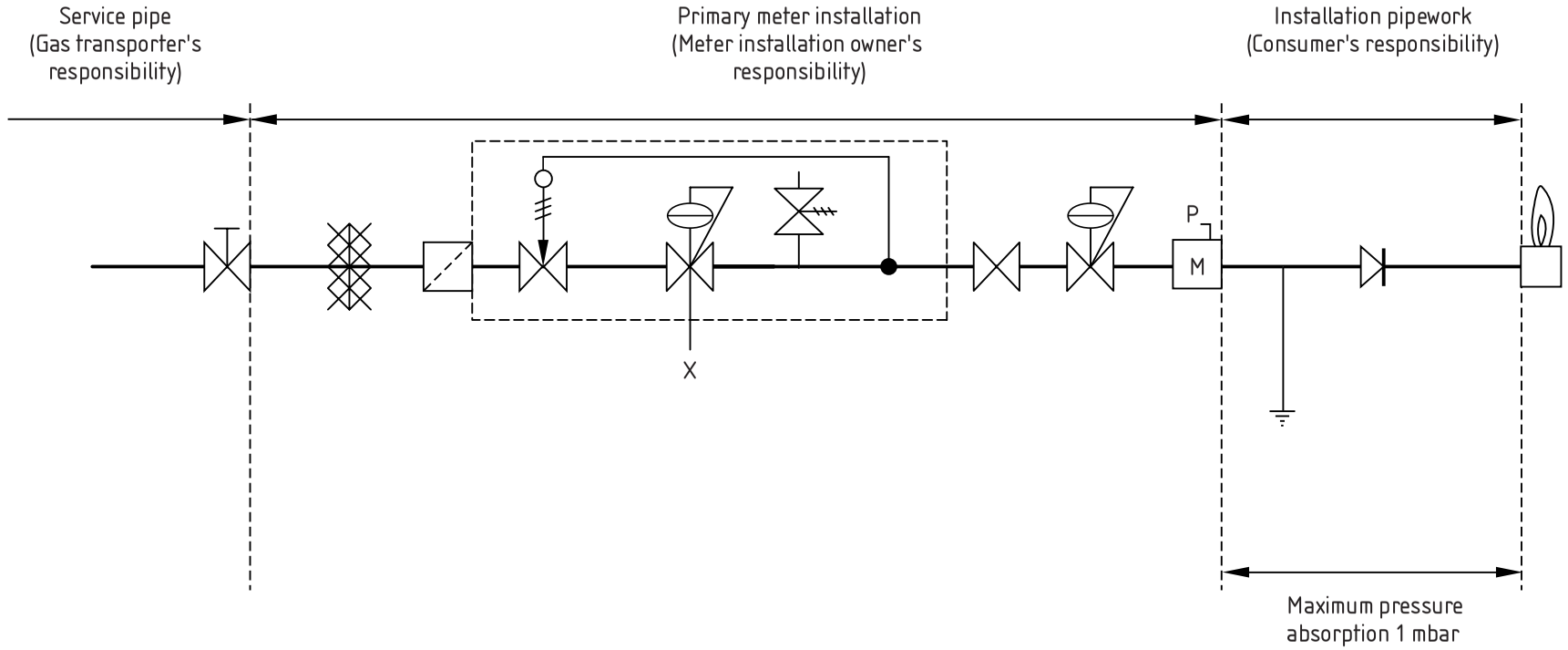
b) Installation incorporating single stage regulator, slam-shut valve and relief valve

Figure 1 **Arrangement of a MP meter installation and options for the arrangement of the pressure control and protection system (symbols to BS 1553-1)** (*continued*)



c) Installation incorporating two stage regulator, excess flow valve, relief valve, with a separate LP regulator

Figure 1 **Arrangement of a MP meter installation and options for the arrangement of the pressure control and protection system (symbols to BS 1553-1)** (*continued*)



d) Installation incorporating single stage regulator, slam-shut valve, relief valve, with a separate LP regulator

Figure 1 **Arrangement of a MP meter installation and options for the arrangement of the pressure control and protection system (symbols to BS 1553-1)** (*continued*)

Key

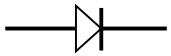

Emergency control valve


Filter (if fitted)


Excess flow valve


Meter inlet valve

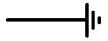
Primary meter

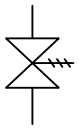

Non-return valve (if fitted)


Slam-shut valve

P

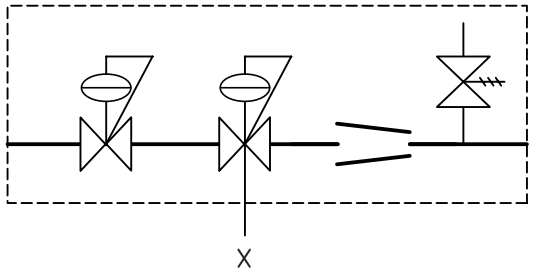
Pressure test point


Main equipotential bond

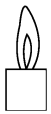

Relief valve

X

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



Pressure control and protection system


Appliance


Meter regulator


Electrical insulator (if fitted)

6.2 Pressure control

6.2.1 When the operating pressure at the inlet of the regulator is in the range of DMP to MOP, the operating pressure at the inlet of the meter shall be controlled between 19.25 mbar and 24 mbar for flows in the range of 0.5 m^3/h to the maximum capacity of the installation.

6.2.2 The design shall ensure a nominal operating pressure at the outlet of the meter installation (i.e. metering pressure) of 21 mbar.

6.2.3 The meter installation shall be designed such that, at gas flow rates greater than 5% of the maximum capacity of the installation, the operating pressure at the outlet of the meter installation is maintained between 15 mbar and 25 mbar when the operating pressure at the inlet of the meter installation is between the DMP and MOP.

6.2.4 The operating pressure at the outlet of the meter installation shall be maintained at or above 18 mbar when the operating pressure at the inlet of the meter installation is at or above LOP.

6.2.5 Under all circumstances (including zero flow and the failure of any one component of the protection control and protection system) with a pressure at the inlet of the meter installation up to and including DMIP, the meter installation shall protect the installation pipework, gas fittings and any appliances from being exposed to a pressure greater than the operating pressure limits given in Annex B.

*COMMENTARY ON **6.2***

Where a regulator meeting the minimum requirements of PRS 28/E or PRS 29/E is used, the pressure absorption between the regulator outlet and the meter inlet will need to be less than 0.75 mbar at the maximum capacity of the installation in order to meet these minimum requirements.

BS EN 1359 and the Gas (Meters) Regulations 1983 (as amended) [11] specify a maximum pressure absorption across a diaphragm meter with a maximum capacity of 6 m^3/h of 2 mbar when using air, which is equivalent to 1.25 mbar for typical 2nd family gas distributed in Great Britain.

6.3 Regulator assembly

6.3.1 All components between the ECV outlet connection and the outlet of the MIV shall be incorporated into the meter installation as a factory made regulator assembly.

6.3.2 The inlet connection to the regulator assembly shall have connections conforming to either BS EN ISO 10806 or BS 21. The outlet from the regulator assembly shall have connections conforming to either BS 21 or BS 746.

NOTE The connection on the outlet side of the ECV would normally be to BS EN ISO 10806.

6.3.3 The interconnecting pipework between the regulator assembly and the primary meter shall be as short as practical.

6.4 Pressure control and protection system

6.4.1 All installations shall incorporate a pressure control and protection system upstream of and in close proximity to the primary meter.

6.4.2 The pressure control and protection system shall be sited as near as practical to the outlet of the ECV.

6.4.3 The pressure control and protection system shall conform to PRS 28/E or PRS 29/E, as appropriate, and shall be selected to ensure that it is suitable for operation over the full range of operating pressures at the inlet of the meter installation that can be reasonably foreseen.

NOTE 1 The reasonably foreseen operating pressures can be obtained either from the gas transporter or gas supplier. For further information refer to ***4.1*** *and* ***6.2****.*

NOTE 2 Examples of typical regulators are given in Figure 2.

6.4.4 The meter regulator and protection devices within the pressure control and protection system shall be factory pre-set to conform to Annex B.

6.4.5 The pressure control and protection system shall be of a design and adjusted such that the failure of any one of its components will not cause the operating pressures to exceed the limits given in Annex B.

6.4.6 The maximum flow of gas through a relief valve vent shall not exceed 2.25 m^3/h under any fault conditions, such as a diaphragm failure.

NOTE Regulators to PRS 28/E have a maximum relief valve discharge capacity of 1.75 m^3/h, whereas regulators to PRS 29/E have a maximum relief valve discharge capacity of 2.25 m^3/h.

6.4.7 When the operating pressure at the inlet of the pressure control and protection system is:

a) at MOP, the regulator lock-up pressure at the outlet of the meter shall not exceed 27.5 mbar;

b) at DMIP, the regulator lock-up pressure at the outlet of the meter shall not exceed 30 mbar.

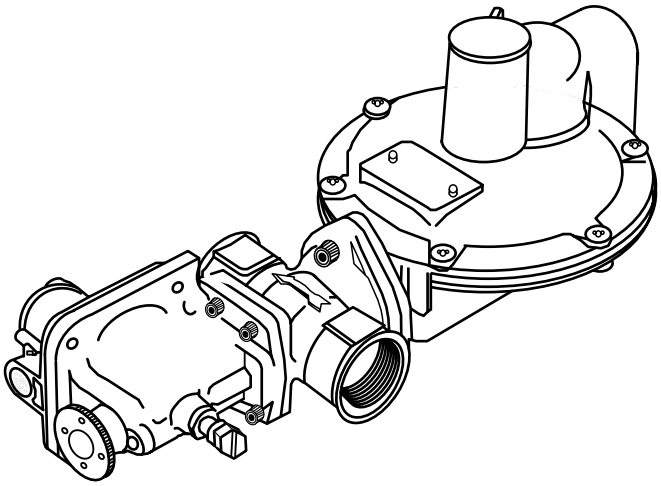
COMMENTARY ON ***6.4***

MP pressure control and protection systems are currently available in two types of design, either single stage lever type regulators with an integral slam-shut valve (PRS 28/E) or two stage regulators with an integral excess flow device limiting the downstream operating pressure to a safe limit (PRS 29/E).

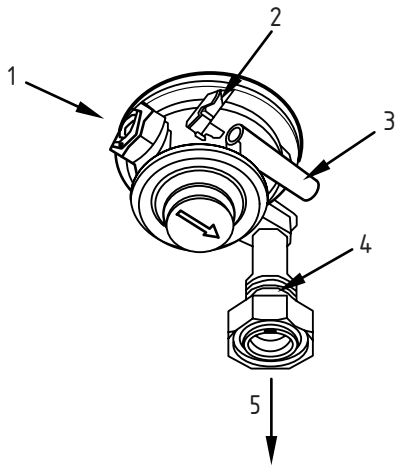
6.5 Low pressure regulator

A separate low pressure regulator incorporated into a Figure 1c) or Figure 1d) meter installation shall conform to PRS 3/E.

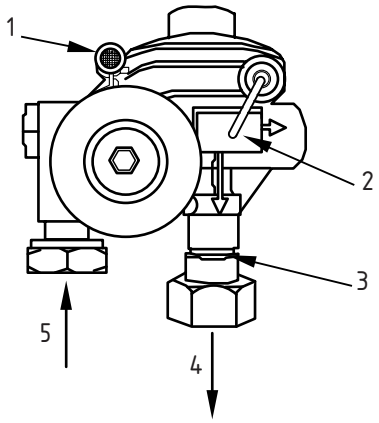
Figure 2 **MP meter regulators**



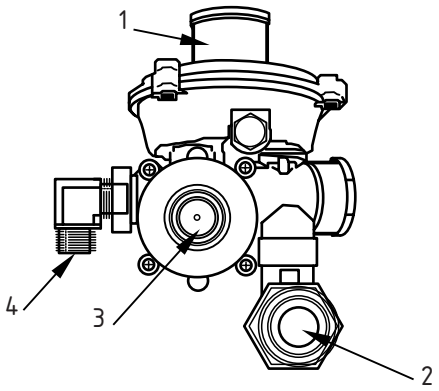
a) Typical PRS 28/E meter regulator



1)



2)



3)

b) Typical PRS 29/E regulators

Key

1 Over pressure safety relief vent	3 Reset lever	5 Union
2 Inlet	4 Reset button under plastic cap	6 Outlet

6.6 Vent pipe

6.6.1 The vent pipe shall be permanently connected to the relief outlet connection on the pressure control and protection system.

6.6.2 The termination point of a vent pipe shall be determined in accordance with the proximity distances given in Table 1.

6.6.3 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.

6.6.4 The vent pipe from the pressure control and protection system shall terminate outside the meter box, housing or enclosure and vent directly to atmosphere.

6.6.5 The tip of any vent pipe shall be fixed so it is clear of the outside of the meter box by at least 25 mm and point downwards.

6.6.6 Where the tip of the vent pipe terminates less than 200 mm from the ground level a mesh conforming to BS 7372 shall be added at the vent pipe tip.

6.6.7 The vent pipe shall be fixed to a permanent structure.

6.6.8 The part of a vent pipe and fittings that terminate more than 75 mm external to a meter box shall be made from materials specified in BS 6891:2005, Clause **6**.

6.6.9 The internal diameter of any vent pipe shall be not less than 6 mm and of sufficient size to vent at the maximum relief valve discharge capacity while achieving the operating pressure limits specified in Annex B.

*COMMENTARY ON **6.6.9***

A long vent pipe may require a larger diameter than 6 mm 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.

6.7 Meter

6.7.1 Primary meter

6.7.1.1 The primary meter shall be downstream of and as close as practical to the pressure control and protection system.

*COMMENTARY ON **6.7.1.1***

In most situations the meter will be installed adjacent to the pressure control and protection system. However, there may be circumstances where it will be necessary to install the meter elsewhere, e.g. Gas Act [18] obligation to disabled customers for access to the pre-payment mechanism.

6.7.1.2 Where the meter is to be sited or resited internal to the dwelling, e.g. for a disabled customer, a check of the pressure absorption shall be undertaken to ensure any additional gas fittings do not reduce the operating pressures lower than those in **6.2**. Where the values are lower than those in **6.2**, a Figure 1c) or Figure 1d) installation shall be fitted with the additional low pressure regulator positioned adjacent to the meter and within the dwelling.

*NOTE Further information on meter relocation is given in Clause **14**.*

6.7.1.3 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 1 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 2nd family gases installations 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 IGE/GM/8 [19] for the method of designing and installing the meter.

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

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

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

*NOTE 1 Guidance on when a meter might need to be installed inside the property is given in **6.7.1.1**.*

NOTE 2 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.

6.7.1.7 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.

6.7.1.8 New ultrasonic meters shall conform to DD ENV 14236.

NOTE The Gas (Meters) Regulations 1983 (as amended) [11] 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 diaphragm meters conforming to BS 4161-3 and BS 4161-5 and ultrasonic meters) can be used.

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

NOTE 1 Regulation 16(1) of the Gas Safety (Installation and Use) Regulations 1998 [5] requires that no person shall install a prepayment meter as a primary meter through which gas passes to a secondary meter.

NOTE 2 Typical meters are shown in Figure 3.

6.7.1.10 The meter (if electronic), 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.

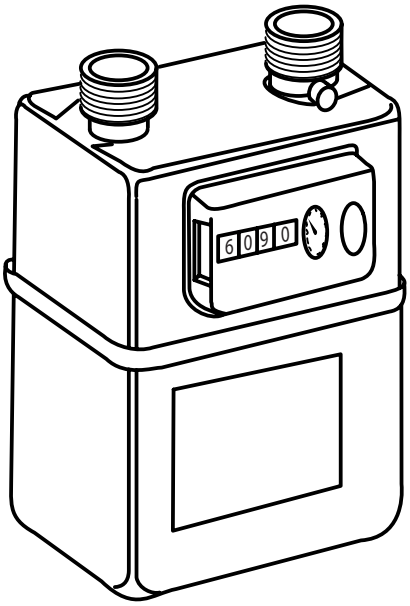
NOTE Guidance on making electrical connections to gas meters is given in the Institution of Gas Engineers and Managers' publication on gas measurement procedures, IGE/GM/7 [20].

6.7.2 Secondary meter

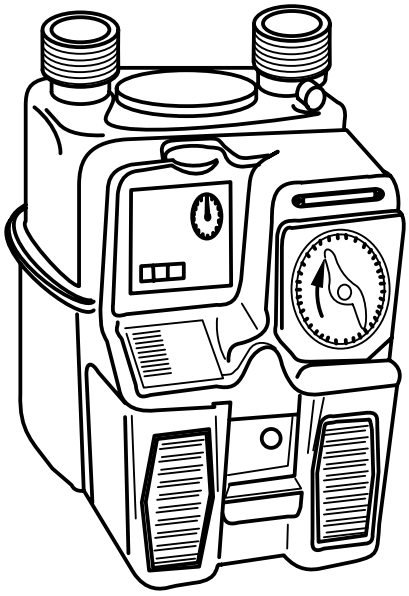
Where a secondary meter is included in the installation pipework, the secondary meter installation shall be designed and installed in accordance with BS 6400-1.

NOTE Secondary meter installations will always be supplied at low pressure.

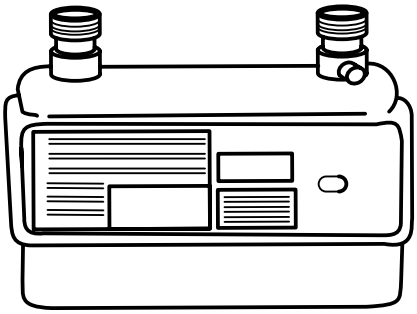
Figure 3 **Typical domestic meters**

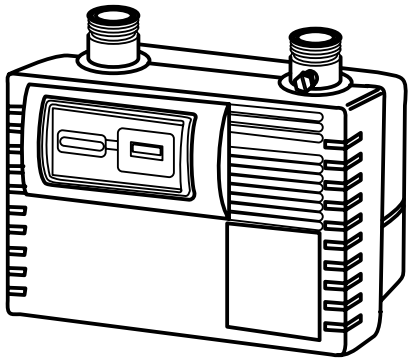


a) Diaphragm meter

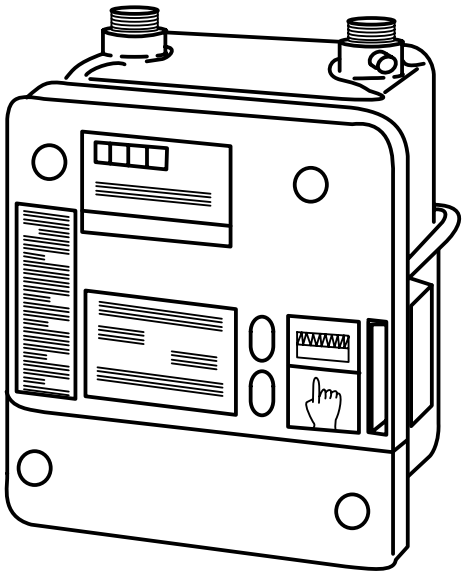


b) Coin or mechanical token meter





c) Ultrasonic meters

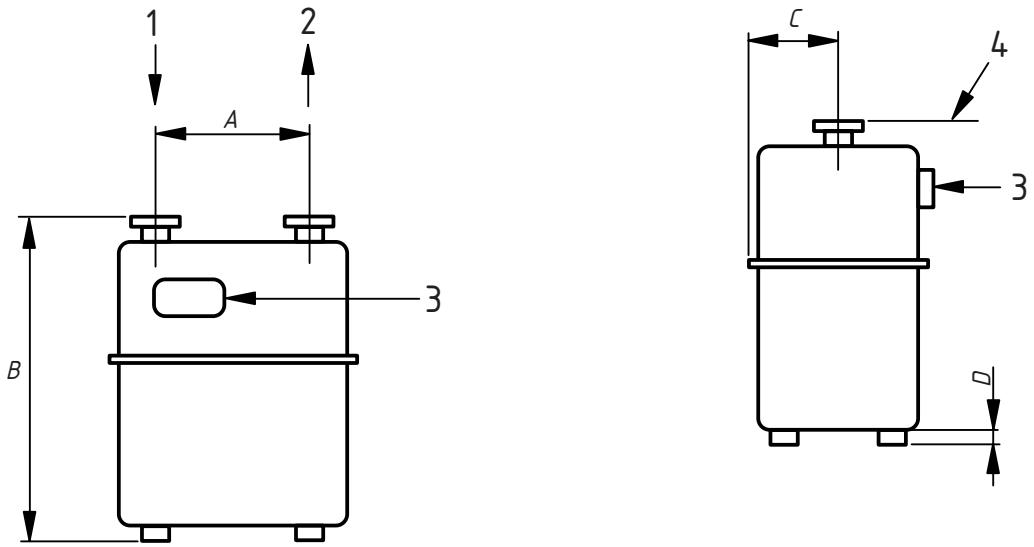


d) Electronic token meter

6.7.3 Connections

6.7.3.1 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 4.

Figure 4 **Connections on 6 m³/h metal case meter**



a) Front view

b) Side view

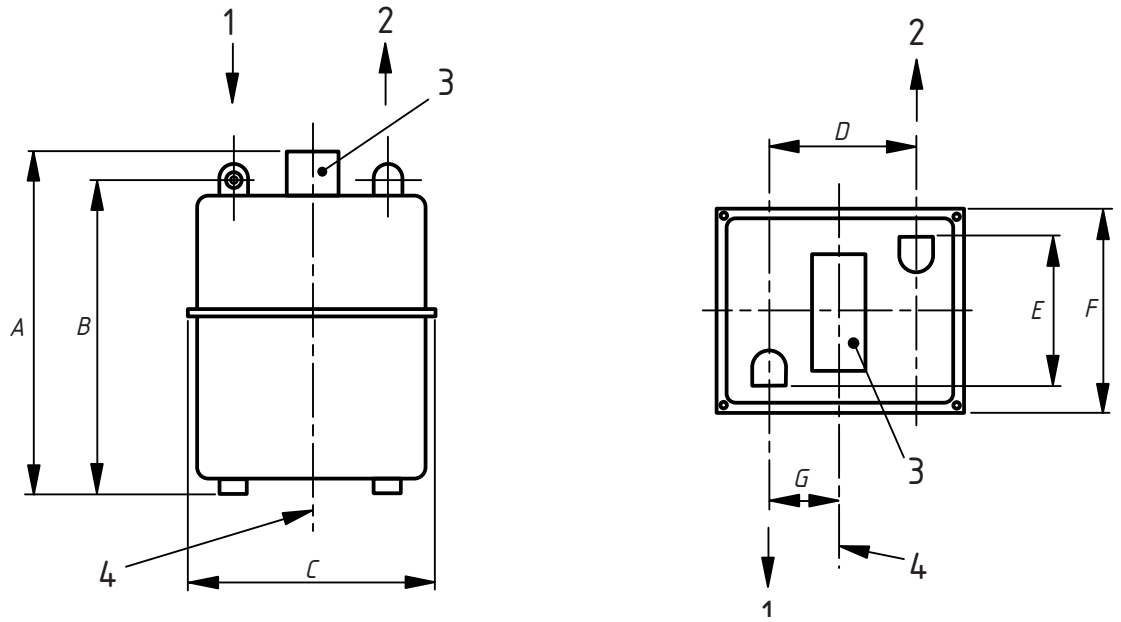
Key

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 primary 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 primary meter = 5 mm

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

6.7.3.2 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 5.

Figure 5 **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 Rp¾ parallel internal pipe conforming to BS 21.

6.8 Emergency control valve

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

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

6.8.2 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.

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

6.9 Meter inlet valve

NOTE The MIV is required to be fitted to enable correct commissioning and testing of the pressure control and protection system and to assist in gas tightness testing of the downstream system.

6.9.1 Every installation shall incorporate a MIV fitted between the pressure control and protection system and the inlet of the meter.

6.9.2 The MIV shall be selected to ensure that the pressure at the outlet of the meter conforms to **6.2.2** and **6.2.4**.

6.9.3 The MIV shall not be fitted with a handle so that it cannot be readily operated by the consumer.

6.10 Pliable connector

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

*NOTE The length of the pliable connector can significantly affect its pressure absorption. For further details on the use of pliable connectors refer to **8.9**.*

6.11 Pressure test point

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

6.12 Interconnecting pipework

Interconnecting pipework shall be made from rigid steel or copper that conforms to BS 6891:2005, Clause **6**.

6.13 Location of meter installation

6.13.1 MP gas services, fittings, regulators and relief valves for any part of the MP meter installation shall be installed external to the building (including any garage, conservatories and covered passageways) and shall only be installed in meter housings that conform to **6.14**.

6.13.2 The meter installation shall be sited so:

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

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

6.13.3 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.

6.13.4 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 in **6.15**;

g) in a covered passageway or car port;

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

6.13.5 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 [5] 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 [21].

6.14 Meter housing

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

6.14.2 Meter housings shall be:

a) semi-concealed meter boxes;

b) surface mounted meter boxes;

c) built-in meter boxes; or

d) purpose built housings designed for MP installations.

6.14.3 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) they are marked with a capital letter "G" as shown in Figure 6d);

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

f) the consumer has ready access to the ECV.

6.14.4 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 **6.14.4***

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

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

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

6.14.6 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.

6.14.7 Installation pipework or cables shall not directly enter the property from the meter housing.

NOTE This means that installation pipework or cables have to exit the meter housing before entering the premises.

6.14.8 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 **6.14.8***

*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 **6.14.8**.*

*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 **6.14.8**.*

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 [22].

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.

6.14.9 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.

6.14.10 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.

*COMMENTARY ON **6.14.10***

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.

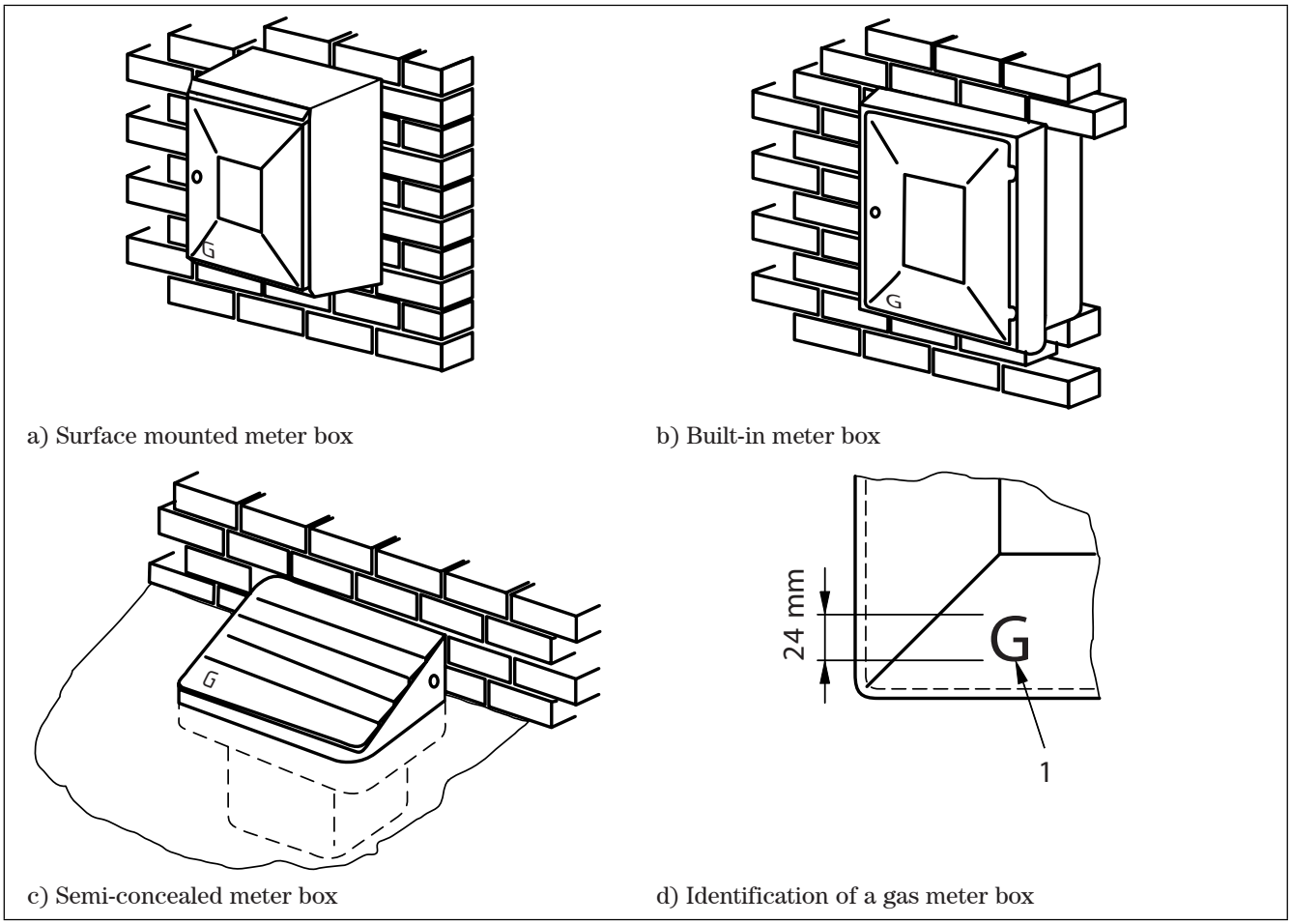
6.14.11 The consumer shall be provided with a labelled key for the housing.

6.15 Proximity distances for meter boxes and vent-discharges

6.15.1 The capacity of the relief valve shall be determined before the meter box and any equipment is installed.

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

Figure 6 **Typical meter boxes**



a) Surface mounted meter box

b) Built-in meter box

c) Semi-concealed meter box

d) Identification of a gas meter box

Table 1 **Minimum proximity distances for meter boxes and relief valve vent pipe tips**

Relief valve discharge capacity m^3/h	**Minimum proximity distance** mm			
	Meter box to building opening[A)]	**Meter box to electrical equipment**[B)]	**Vent pipe tip to building opening**[C)]	**Vent pipe tip to electrical equipment**[D)]
0 ≤ 1	180	330	570	850
1 ≤ 2	180	330	800	1 300
2 ≤ 2.25	180	330	1 000	1 550

NOTE 1 Regulators to PRS 28/E have a maximum relief valve discharge capacity of 1.75 m^3/h, whereas regulators to PRS 29/E have a maximum relief valve discharge capacity of 2.25 m^3/h.

NOTE 2 Minimum proximity distances have been determined using the principles of IGE/SR/25 [22].

NOTE 3 This table is adapted from the Institution of Gas Engineers and Managers' publication, IGE/TD/15 [1].

A) This is the distance of a meter box from any opening (such as an openable window, door, air brick, balanced flue terminal or other breaches) into property at which a 5% gas-in-air mixture may occur from a release of gas within the meter box.

B) This is the distance above or at the side of a meter box to any electrical equipment at which a 2.5% gas-in-air mixture might occur from a release of gas within the meter box.

C) This is the distance from any relief valve vent pipe tip to any opening into property at which a 5% gas-in-air mixture may occur from the relief valve vent pipe.

D) This is the distance from any relief valve vent pipe tip to any electrical equipment at which a 2.5% gas-in-air mixture might occur from a release of gas from the relief valve vent pipe.

7 Gas transporter's appraisal of a primary meter installation

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;

NOTE 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 service installer, the location of the installation and the 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 seal the primary meter regulator and any associated pressure control and protection devices to give the correct operating pressure at the outlet of the meter.

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

8 Fitting a meter installation

8.1 General

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

NOTE Typical MP meter installations are shown in Figure 7.

8.1.2 The regulator assembly and the meter shall be fitted in accordance with the manufacturers' instructions.

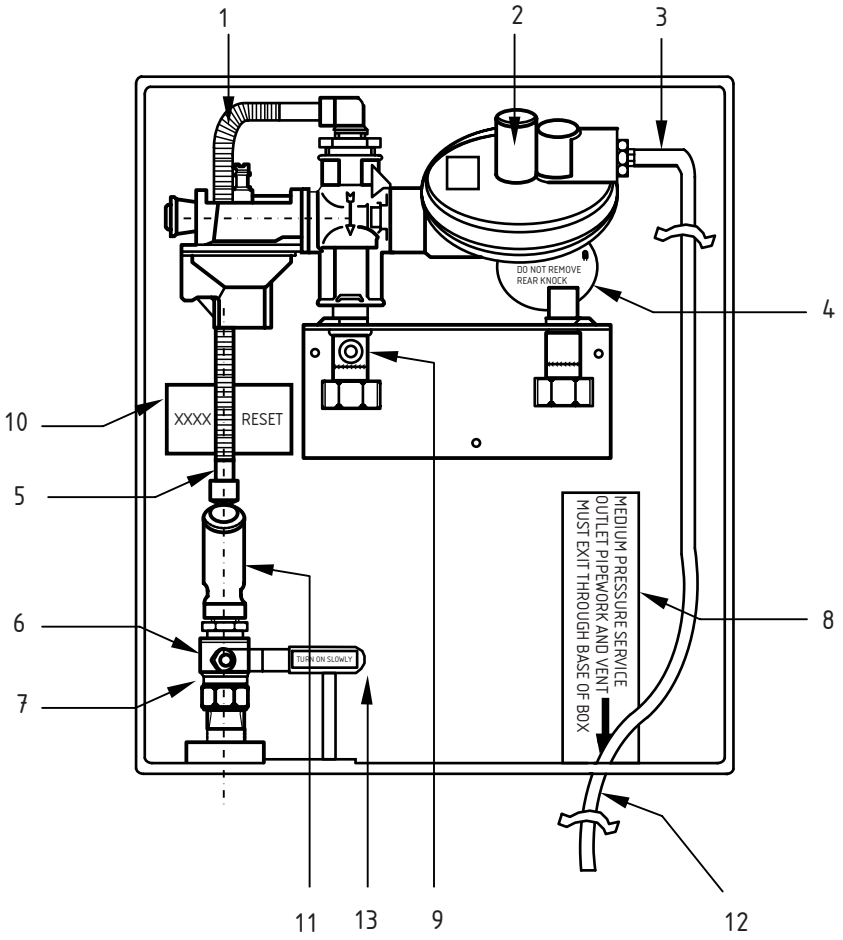
8.2 Handling and care

8.2.1 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 Diaphragm meters shall be kept upright at all times.

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

Figure 7 **Typical MP meter installations**

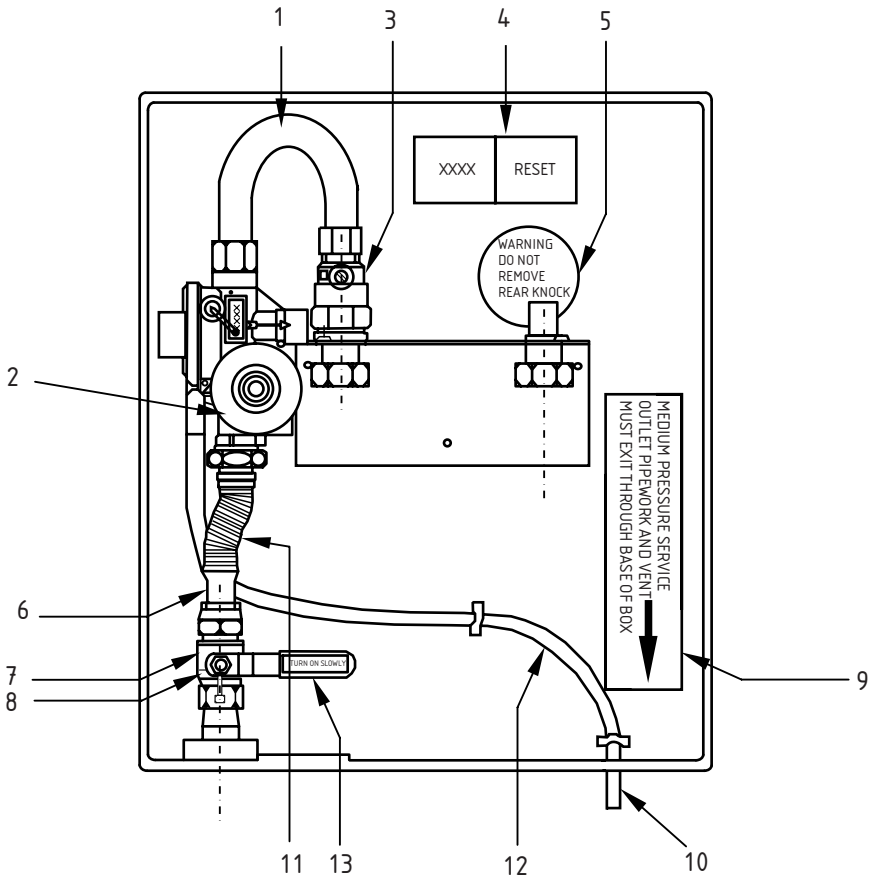


a) Typical MP meter installation incorporating a PRS 28/E regulator

Key

1	Pliable connector	6	ECV	11	Filer
2	Regulator	7	MP warning label positioned here	12	Vent pipe outlet
3	Vent pipe	8	Vent outlet label	13	Label
4	Knock-out label	9	MIV		
5	Self adhesive on/off tape	10	Reset label		

Figure 7 **Typical MP meter installations** (*continued*)

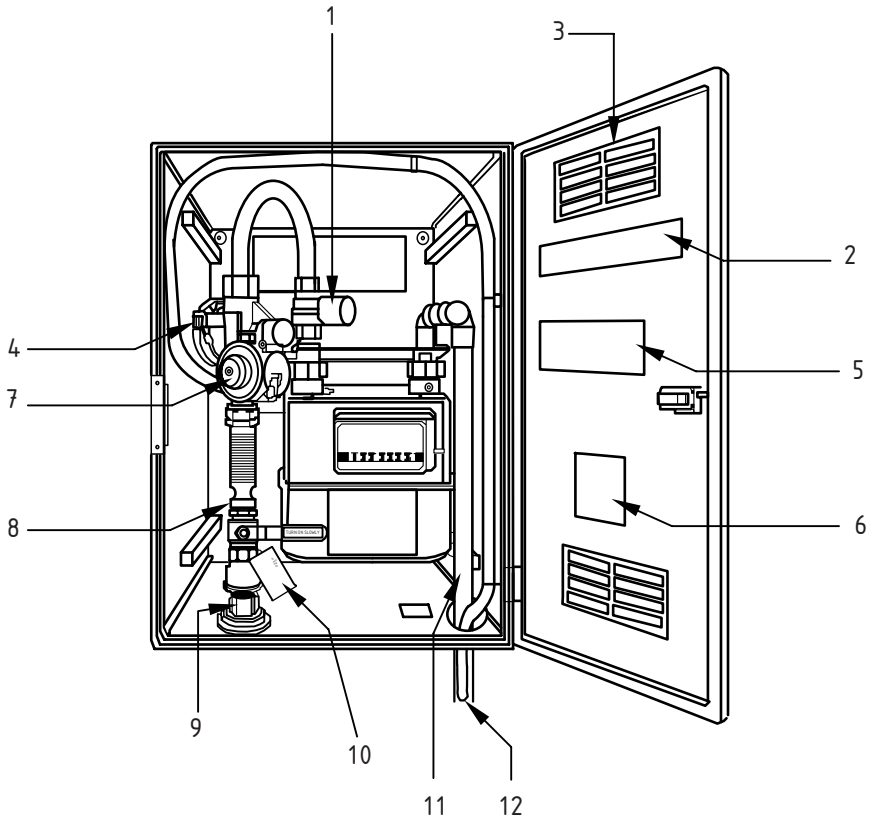


b) Typical MP meter installation incorporating a PRS 29/E regulator

Key

1	Rigid bend	6	Self adhesive on/off tape	11	Pliable connector
2	Regulator	7	ECV	12	Vent pipe
3	MIV	8	MP warning label positioned here	13	Label
4	Reset label	9	Vent outlet label		
5	Knock-out label	10	Vent pipe outlet		

Figure 7 **Typical MP meter installations** (*continued*)



c) Typical MP meter installation within a meter box

Key

1	MIV	5	Public gas transporter label	9	ECV
2	Operating instructions for MP regulator	6	Gas escape label	10	MP warning label
3	Vented door	7	Regulator	11	Installation pipe outlet
4	Reset lever	8	Self adhesive on/off tape	12	Vent pipe outlet

8.3 Pre-installation checks and safety precautions

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 that the pressure in the gas service pipe is at MP and that the regulator assembly and its connection to the ECV is compatible for connection to a MP gas network.

NOTE 1 Labels that indicate the pressure in the gas service pipe can be found attached on or near the ECV.

NOTE 2 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 DMP.

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

d) Confirm that the meter housing conforms to **6.14** and the ECV is accessible in accordance with **6.8.2**. Ensure that the planned location of the housing conforms to the minimum distances in **6.15**.

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 gas tightness tested at the factory in accordance **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 site. Remove the packaging and visually check that to ensure that the gasways are clean.

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

j) Ensure that the notices in Clause **12** are available for the meter installation.

*COMMENTARY ON **8.3***

If there is any doubt about whether the network is a 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 or gas transporter.

8.4 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 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.

COMMENTARY ON ***8.4***

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.

8.5 Main equipotential bonding

If the installer connects a primary 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 [5] requires that any person who connects any installation pipework to a primary 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.

COMMENTARY ON ***8.5***

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

The main equipotential bonding is found 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 is given in BS 6891. Further information on equipotential bonding can be found in BS 7671.

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

8.6 Securing the meter installation

8.6.1 The installation shall be prepared such that:

a) the meter and regulator assembly 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 and regulator assembly;

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 in an above ground meter housing can be fitted to a meter bracket that has been fitted within the meter housing;

d) 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;

e) where a diaphragm meter is used it can only be installed upright and level such that it cannot be readily tilted;

f) the meter and its regulator assembly 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.

8.6.2 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.

8.7 Emergency control valve

The ECV shall be checked to ensure that:

a) it is of a type suitable for operating pressures within the range of DMP and DIMP;

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.

*COMMENTARY ON **8.7***

*Where the ECV has been checked and found not to have been installed in accordance with **8.7**, the gas transporter that conveys the gas to the ECV should be advised.*

8.8 Regulator assembly

8.8.1 The inlet of the regulator assembly shall be connected directly to the outlet of the ECV.

8.8.2 The outlet of the regulator assembly shall either be:

a) connected to the inlet side of the meter bracket; or,

b) in the case of a semi-concealed meter box without a bracket or other means of constraint, left unconnected for subsequent connection to the meter.

8.8.3 Where the manufacturer has supplied the regulator assembly with the union connections disconnected from the regulator assembly, this connection shall be remade as part of the installation of the regulator assembly.

8.8.4 On completion of the installation of the regulator assembly the MIV shall be left in the open position.

8.9 Pliable connector

8.9.1 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.

8.9.2 Only one pliable connection shall be used within the meter installation.

*NOTE The reasons for the use of only one pliable connector are given in **8.6.1**b).*

9 Testing, purging and commissioning of the regulator assembly

Testing, purging and commissioning of the regulator assembly shall be performed in accordance with Annex C prior to fitting the meter.

10 Fitting, testing and purging the meter

10.1 General

Fitting, testing and purging the meter shall be undertaken following completion of commissioning, testing and purging of the regulator assembly in accordance with Clause **9**.

Fitting, testing and purging of the meter shall conform to **10.2** or **10.3**.

10.2 Installations conforming to Figure 1a) and Figure 1b)

Fitting, testing and purging the meter in installations conforming to Figure 1a) and Figure 1b) shall be undertaken using the following procedure.

a) Fit the meter outlet adaptor and secure the meter to the meter bracket if there is one.

b) Ensure that the meter is secure in accordance with **8.6**.

c) Connect the outlet of the regulator assembly to the meter inlet and seal the meter outlet adaptor with an appropriate fitting or connect to the installation pipework. Ensure that the regulator assembly is sited so as to permit easy access for operating, servicing and exchanging the MIV.

NOTE An appropriate fitting is as defined in the Gas Safety (Installation and use) Regulations 1998 [5].

d) Undertake a gas tightness test in accordance with IGE/UP/1B and purge the installation from the MIV to the outlet of the meter installation and any connected pipework in accordance with IGE/UP/1B.

NOTE The Gas Safety (Installation and use) Regulations 1998 require that installation pipework not be left connected to the outlet of the meter installation unless it has been gas tightness tested, purged and labelled, and connected appliances commissioned.

e) Following gas tightness testing and purging:

1) commission the meter installation in accordance with Clause **11**;

2) fit notices in accordance with Clause **12;** and

3) undertake post installation checks in accordance with Clause **17**.

10.3 Installations conforming to Figure 1c) and Figure 1d)

Fitting, testing and purging the meter in installations conforming to Figure 1c) and Figure 1d) shall be undertaken using the following procedure.

a) Fit the meter outlet adaptor and secure the meter to the meter bracket if there is one.

b) Ensure that the meter is secure in accordance with **8.6**.

c) Connect the outlet of the regulator assembly to the inlet of the LP regulator. Connect the LP regulator to the meter inlet and seal the meter outlet adaptor with an appropriate fitting or connect to the installation pipework. Ensure that the regulator assembly is sited so as to permit easy access for operating, servicing and exchanging the MIV.

NOTE An appropriate fitting is as defined in the Gas Safety (Installation and use) Regulations 1998 [5]

d) Undertake the gas tightness test in accordance with IGE/UP/1 and purging of the installation from the MIV to the outlet of the meter installation and any connected pipework in accordance with IGE/UP/1B.

NOTE The Gas Safety (Installation and use) Regulations 1998 require that installation pipework not be left connected to the outlet of the meter installation unless it has been gas tightness tested, purged and labelled, and appliances commissioned.

e) Following gas tightness testing and purging:

1) commission the meter in accordance with Clause **11**;

2) fit notices in accordance with Clause **12;** and

3) undertake post installation checks in accordance with Clause **17**.

11 Commissioning of the meter installation

11.1 Regulator

11.1.1 Either whilst purging the regulator assembly in accordance with Clause **9** or following purging of the whole meter installation in accordance with Clause **10**, the installer shall ensure that the regulator gives an operating pressure at the outlet of the meter of between 19 mbar and 23 mbar at a flow rate exceeding 0.5 m^3/h. If the pressure is outside this range and the pressure control and protection system:

a) is of a type that can be adjusted, it shall be adjusted by an Ofgem approved meter installer (OAMI) in accordance with the manufacturer's instructions; or

b) is of a type that cannot be adjusted, the complete regulator assembly shall be replaced.

NOTE Regulation 14(6) of the Gas Safety (Installation and Use) Regulations 1998 [5] requires that no person except the gas transporter, or a person authorized to act on the transporter's behalf, may 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.

*COMMENTARY ON **11.1.1***

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. 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 2.

At low gas 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.

11.1.2 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.

Table 2 **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	Full rate
Storage water heater	Full rate
Hotplate boiling rings	Full rate
Room sealed convector heater	Full rate

11.2 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 **16**.

12 Notices

12.1 General

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

NOTE 1 Labels conforming to BS 4781 are of a suitable durability.

NOTE 2 Typical meter installation notices are given in Figure 8.

12.2 Emergency notices

12.2.1 Primary 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 Emergency Service on 0800 111 999, 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 Regulation 15(1) of the Gas Safety (Installation and Use) Regulations 1998 [5] 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.

12.2.2 Primary meter not adjacent to the emergency control valve

12.2.2.1 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 Emergency Service on 0800 111 999, 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 [5] 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 [5] 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.

12.2.2.2 Emergency notice at the meter

An emergency notice conforming to **12.2.1** 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 [5] 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.

12.3 Emergency control valve

12.3.1 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 [5] 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.

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

12.4 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 a person approved by Ofgem as registered as a meter asset manager under the *Code of Practice for Meter Asset Managers* [23];

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

c) the relief valve setting;

d) the final protection device setting;

e) the final protection device limiting pressure; and

f) if applicable, the method of resetting the pressure control and protection system in the event of no gas at the appliance.

NOTE Typical meter installation notices are given in Figure 8.

12.5 Live gas

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

NOTE 1 Regulation 16(3) of the Gas Safety (Installation and Use) Regulations 1998 [5] 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 **15**.*

Figure 8 **Typical meter installation notices**

MP METER INSTALLATION Single stage regulator assembly Installation date: Metering date; 21 mbar Relief valve setting: 35 mbar Slam-shut setting: 47.5 mbar Slam-shut limiting pressure: 50 mbar Installed by: Operated by: Telephone:	IF YOU THINK YOU CAN SMELL GAS, CONTACT THE GAS EMERGENCY SERVICE ON 0800 111 999 IF THERE IS NO GAS AT APPLIANCES, CONTACT THE OPERATOR (SEE OPPOSITE) TO ARRANGE FOR THE REGULATOR TO BE RESET

a) Meter installation with single stage regulator conforming to PRS 28/E

MP METER INSTALLATION Two stage regulator assembly Installation date: Metering date; 21 mbar Relief valve setting: 35 mbar Relief valve maximum accumulation pressure: 40 mbar Installed by: Operated by: Telephone:	IF YOU THINK YOU CAN SMELL GAS, CONTACT THE GAS EMERGENCY SERVICE ON 0800 111 999 IF THERE IS NO GAS AT APPLIANCES: a) turn off all appliances; b) check that the emergency control valve is open; c) push the green lever on the regulator against the spring pressure and hold for at least 5 seconds then release; d) check whether gas is available at an appliance; e) if no gas, repeat c) and d); f) if there is still no gas, ring 0800 111 999.

b) Meter installation with two stage regulator conforming to PRS 29/E

12.6 Installations incorporating a secondary meter

12.6.1 Primary meter

A label shall be fitted by the installer to the primary meter indicating the number and location of any secondary meters supplied through it.

NOTE 1 Regulation 17(1) of the Gas Safety (Installation and Use) Regulations 1998 [5] 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 [5] 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 shall ensure that the line diagram is amended so as to show the altered configuration.

12.6.2 Secondary meters

Every secondary meter shall be labelled "SECONDARY METER".

12.7 Meter housing notice

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

a) that 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. "2nd family gas with a maximum operating pressure not exceeding 2 bar".

12.7.2 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) [24] 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 [5] at domestic premises.

13 Meter exchange and/or replacement of other gas fittings

13.1 Inspection

Before replacing the meter or any other gas fitting, the installation shall be checked to ensure that any replacements conform to Clause **6**.

*COMMENTARY ON **13.1***

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

13.2 Temporary continuity bond

In any cases 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 **8.4** until the work is completed and permanent electrical continuity has been restored.

13.3 Carrying out the work

13.3.1 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 **8**, Clause **9**, Clause **10** and Clause **11**.

13.3.2 Any defective gas fitting shall be replaced.

13.3.3 Notices shall conform to Clause **12**.

13.3.4 Records shall be completed in accordance with Clause **16**.

14 Meter relocation

14.1 General

14.1.1 The meter or meter installation shall be relocated by:

a) altering the position of the gas service pipe to an alternative position external to the building;

b) leaving the MP regulator assembly (including the MIV) in its existing position, relocating the LP regulator and meter of a Figure 1c) or Figure 1d) installation, and fitting an AECV upstream of the repositioned LP regulator and meter; or

c) replacing a Figure 1a) or Figure 1b) installation with a Figure 1c) or Figure 1d) installation, fitting the new MP regulator assembly (including the MIV) in the position of the original assembly, and fitting an AECV upstream of the new LP regulator and repositioned meter.

NOTE 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 transporter.

14.1.2 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.

14.2 Inspection of existing installation

14.2.1 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 **14.1.1** is the most practical.

14.2.2 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.

14.3 Design

14.3.1 Following the completion of the survey described in **14.2** the type of relocation, out of those listed in **14.1.1**, shall be agreed. If the survey indicates that it is more appropriate to alter the position of the service pipe, the relevant gas supplier/transporter shall be consulted.

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

a) the nominal operating pressure at the outlet of the meter installation (i.e. metering pressure) will be 21 mbar;

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

b) the new location of the meter, LP regulator and MIV conforms to BS 6400-1:2006, **6.9**;

c) an appraisal has been undertaken by the gas transporter in accordance with Clause **7**;

14.4 Carrying out the work

14.4.1 Gas tightness of existing installation

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

14.4.2 Temporary continuity bond

A temporary continuity bond shall be used in accordance with **8.4** in order to maintain electrical continuity.

NOTE Regulation 10 of the Gas Safety (Installation and Use) Regulations 1998 [5] 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.

14.4.3 Relocation work

14.4.3.1 The existing meter shall be disconnected and handled with care in accordance with **8.2**.

14.4.3.2 The installation shall be arranged in accordance with **14.1.1**b) or **14.1.1**c) with an additional pressure test point positioned immediately downstream of the MIV.

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

14.5 Gas tightness testing and purging

Prior to making gas available, the installation shall be re-tested for gas tightness and purged in accordance with IGE/UP/1B.

14.6 Commissioning, notices and records

The installer shall:

a) commission the meter installation in accordance with Clause **11**;

b) fit notices in accordance with Clause **12**; and

c) complete records in accordance with Clause **16**.

15 Meter removal

15.1 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.

15.2 If a primary 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 [5].

15.3 Where a primary 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 (in accordance with **12.5**) any live gas pipe in the premises in which the meter was installed.

15.4 During and after removal, meters shall be handled with care in accordance with **8.2**.

15.5 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 continuity bond shall be fixed using earthing cable conforming to BS 7671.

*NOTE 1 The commentary to **8.4** 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 pipe with only an ECV and/or short length of installation pipe.

*COMMENTARY ON CLAUSE **15***

Attention is drawn to the requirements given for meter removal in the Gas Meters (Information on Connection and Disconnection) Regulations 1996 [8].

16 Records

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

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

NOTE 2 Attention is drawn to the Gas Meters (Information on Connection and Disconnection) Regulations 1996 [8] which requires that the details of a primary meter are recorded and forwarded following its installation, exchange or removal.

17 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 [5].

b) any MIV handle has been removed except when it has been relocated in accordance with Clause **14** because it is acting as an AECV;

c) the pressure control and protection system has been sealed (with a seal marked with OAMI registration number or the regulator manufacturer's mark) to prevent its setting 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 gas tightness tested, purged and labelled and all appliances commissioned or disconnected from the gas supply;

e) notices are fitted in accordance with Clause **12**;

f) the meter details have been recorded in accordance with Clause **16**.

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 is 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
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 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 39 MJ/m^3 for 2nd family gas). The following is an example of such a calculation.

Type of appliance	Heat input (kW)	Diversity factor	Gas load (kW)
Central heating boiler	30.0	× 1.0	= 30
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)			= 161.3 MJ/h
Equivalent gas flow rate			= 4.2 m^3/h

Conclusion

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

Annex B (normative) Operating pressure limits

The operating pressure limits in Table B.1 shall be used when designing a MP metering installation.

Table B.1 **Operating pressure limits for meter installation pressure control and protection systems**

System design	**Operating pressure limits at the inlet to the pressure control and protection system** bar	**Operating pressures at the inlet to the LP regulator** mbar			**Operating pressures at the outlet of the meter**[A] mbar			
		Function		**Setting**	**Tolerance**	**Function**		**Setting**	**Tolerance**
Figure 1a) or Figure 1b)	$DMIP_{Upstream}$ $MOP_{Upstream}$ $LOP_{Upstream}$	Not applicable				Slam-shut operation [Figure 1b) only]		47.5	±2.5
						Relief valve maximum accumulation pressure [Figure 1a) only]		40	–
						Relief valve opening		35	±3.5
						Regulator lock-up pressure (up to MOP)		27.5	–
						Regulator lock-up pressure (up to DMIP)		30	–
						Metering pressure	$0.05Q_{i\,max}$	21	+2
							$Q_{i\,max}$	21	–2
Figure 1c) or Figure 1d)	$DMIP_{Upstream}$ $MOP_{Upstream}$ $LOP_{Upstream}$	Slam-shut operation [Figure 1d) only]		70	±5	Not applicable			
		Relief valve maximum accumulation pressure [Figure 1c) only]		75	–				
		Relief valve opening		45	±3.5				
		Regulator lock-up pressure		37	–	Regulator lock-up pressure (up to MOP)		27.5	–
		Regulator lock-up pressure (up to DMIP)		40	–	Regulator lock-up pressure (up to DMIP)		30	–
		Regulator control	$0.05Q_{i\,max}$	30	+2	Metering pressure	$0.05Q_{i\,max}$	21	+2
			$Q_{i\,max}$	30	–2		$Q_{i\,max}$	21	–2

NOTE 1 This table is reproduced by permission of the Institution of Gas Engineers and Managers from the publication IGE/TD/15 [1].

NOTE 2 The values in this table are taken at ambient conditions of 20 °C.

NOTE 3 Pressure conditions at the outlet of the ECV are dependant upon the design capacity (nominated energy value) of the service (kW).

NOTE 4 The stated pressures for lock-up pressure, relief valve opening, maximum accumulation pressure and slam-shut valve operation have been determined from industry construction and use standards, practice and consultation with appliance and pressure control equipment manufacturers.

Any temporary or incidental pressure condition, involving venting through a relief valve, is considered detectable by a "smell gas" event.

The differential pressure setting regimes between the regulator control pressure, regulator lock-up pressure and the relief valve opening pressure need to avoid interference between the discrete functions of the pressure control and protection system and provide an "as far as reasonably practicable" approach to the issue of efficiency of combustion of fuel gas.

NOTE 5 The gas appliance operation pressure limits are derived from an analysis of the testing requirements specified in BS and BS EN gas appliance standards and are taken to be tightness (soundness) pressure of 50 mbar, maximum pressure of 25 mbar, operating pressure of 20 mbar and minimum pressure of 17 mbar. Gas appliance operating conditions are achieved by the design and setting of the pressure control functions of the metering installation.

The pressure limits for the control and safety functions of a metering installation are intended to limit any temporary operating pressure that may occur at the gas appliance.

The pressure limits for the safety functions of the metering installation are intended to limit any incidental (fault) pressure that may occur at the appliance to the tightness test pressure specified in the relevant appliance standard.

[A] $Q_{i\,max}$ is the maximum capacity of the installation.

Annex C (normative) Testing, purging and commissioning of the regulator assembly

*NOTE 1 The tests described in **C.1**, **C.2**, **C.3** and **C.4** should be performed using the test and purge apparatus in Figure C.1. The tests cover the operation of the regulator, gas tightness tests on valves and pipe work, the lock-up pressure of the active regulator, a let-by test of the MIV, the operation of the relief valve and the operation of the excess flow valve/slam shut valve.*

NOTE 2 When using a fluid gauge, "no perceptible movement" means that the gauge reading is not seen to alter. When using an electronic gauge, "no perceptible movement" means that the gauge shall not register a rise or fall of more than 0.25 mbar. Gauges reading to only one place of decimal shall have this change rounded down to 0.2 mbar.

C.1 Purging and testing a pressure control and protection system utilizing a PRS 29/E regulator [Figure 1a)]

The following procedure shall be undertaken.

a) Connect the test apparatus to the connection designated for the meter inlet, with the valve to the purge hose in the closed position, and ensure the MIV is in the open position.

b) Position the flame trap on the purge hose in a suitable safe location.

c) Undertake a 1 min let-by test of the ECV.

NOTE One of the ways to undertake this test is to open slowly the ECV and close again to admit pressure to the regulator assembly, then hold the re-set lever against the spring pressure whilst opening slowly the purge valve to reduce the pressure to 10 mbar, then close the purge valve. Continue to hold the reset lever against the spring pressure and time for 1 min, checking the pressure reading and determine that there is no perceptible movement of the gauge.

d) Open slowly the ECV and arm the regulator by moving the re-set lever against spring pressure for a period of not less than 5 s to pressurize the test apparatus, then release.

e) Purge the installation by opening slowly the purge valve so as not to activate the excess flow valve, which is part of a regulator conforming to PRS 29/E.

f) During the purge, check that the operating pressure at the outlet of the regulator is in the range (22 ± 2) mbar.

g) When the purge is complete, slowly close the purge valve and apply leak detection fluid (LDF) to all exposed joints not included in the original test of the service (including the spindles of the ECV and MIV). Rectify any leaks and wipe off any remaining LDF from the pipework and fittings. Check that the lock-up pressure on the regulator does not exceed 27.5 mbar.

NOTE 1 Any gas escapes from the ECV shall be immediately referred to the Gas Emergency Service on 0800 111 999.

NOTE 2 Guidance on the use and composition of LDF is given in IGE/UP/1B.

h) Close the MIV and release the pressure on its outlet by opening the purge valve until the pressure reading drops to approximately 10 mbar. Close the purge valve.

i) Apply a 1 min let-by test to the MIV and determine that there is no perceptible movement of the gauge. If the MIV is passing gas, i.e. there is perceptible movement of the gauge, close the ECV, depressurize the installation, replace the complete regulator assembly and re-test.

j) To test the relief valve, open the MIV and, with the regulator in its locked-up position, insert the tip of the relief valve vent pipe into water to confirm the relief is not passing gas. Test the operation of the relief valve by using the pump on the test apparatus to increase the pressure on the outlet of the regulator until the relief valve operates. The relief valve should operate at a pressure of (35 ± 3.5) mbar. If the relief valve operates outside of this range, replace the complete regulator assembly and re-test the installation.

k) To test the operation of the excess flow valve, open fully the purge valve. This should trip the excess flow valve and gas flow will cease. Close the purge valve and then re-arm the 2nd stage on the regulator by moving the re-set lever against spring pressure for at least 5 s and release to pressurize the test apparatus. The regulator should now move to lock-up and the gauge should indicate a pressure, which shall not exceed 27.5 mbar. If the excess flow valve fails to operate, or the lock-up pressure is exceeded, replace the complete regulator assembly and re-test the installation.

l) Close the MIV, depressurize and remove the test apparatus.

C.2 Purging and testing a pressure control and protection system utilizing a PRS 28/E regulator [slam-shut, Figure 1b)]

The following procedure shall be undertaken.

a) Connect the test apparatus to the connection designated for the meter inlet, with the valve to the purge hose in the closed position, and ensure the MIV is in the open position.

b) Position the flame trap on the purge hose in a suitable safe location.

c) Undertake a 1 min let-by test of the ECV.

NOTE One of the ways to undertake this test is to open slowly the ECV and close again to admit pressure to the regulator assembly, slowly open the purge valve to reduce the pressure to 10 mbar, then close the purge valve. Time for 1 min, checking the pressure reading and determine that there is no perceptible movement of the gauge.

d) Open slowly the ECV and verify that the regulator is in the open position, this will be indicated by a rise in the gauge reading.

e) Purge the installation by opening slowly the purge valve.

f) During the purge, check that the operating pressure at the outlet of the regulator is in the range (22 ± 2) mbar.

g) When the purge is complete, slowly close the purge valve and apply LDF to all exposed joints not included in the original test of the service (including the spindles of the ECV and MIV). Rectify any leaks and wipe off any remaining LDF from pipework and fittings. Check that the lock-up pressure on the regulator does not exceed 27.5 mbar.

NOTE 1 Any gas escapes from the ECV shall be immediately referred to the Gas Emergency Service on 0800 111 999.

NOTE 2 Guidance on the use and composition of LDF is given in IGE/UP/1B.

h) Close the MIV and release the pressure on its outlet by opening the purge valve until the pressure reading drops to approximately 10 mbar. Close the purge valve.

i) Apply a 1 min let-by test to the MIV and determine that there is no perceptible movement of the gauge. If the MIV is passing gas, i.e. there is perceptible movement of the gauge, close the ECV, depressurize the installation, replace the complete regulator assembly and re-test.

j) To test the relief valve, open the MIV and, with the regulator in its locked-up position, insert the tip of the relief valve vent pipe into water to confirm the relief is not passing gas. Test the operation of the relief valve by using the pump on the test apparatus to increase the pressure on the outlet of the regulator until the relief valve operates. The relief valve should operate at a pressure of (35 ± 3.5) mbar. If the relief valve operates outside this range, replace the complete regulator assembly and re-test the installation.

k) Blank off any vent outlet with a suitable plug. Using the hand pump on the test apparatus, increase slowly the pressure on the outlet of the regulator until the slam-shut valve operates. The slam-shut valve should operate at a pressure of (47.5 ± 2.5) mbar.

l) Depressurize the installation and re-set the slam-shut valve. Repeat the operation a further two times and record the operating pressure of the slam-shut valve. If the slam-shut valve operates outside the range (45 – 50) mbar, replace the complete regulator assembly and re-test the installation.

m) Re-set the slam-shut valve and remove the plug from any relief valve vent.

n) Reconnect the vent pipe.

o) Close the MIV, depressurize and remove the test apparatus.

C.3 Purging and testing a pressure control and protection system utilizing a PRS 29/E regulator and an additional PRS 3/E LP regulator [Figure 1c)]

NOTE The following assumes a regulator is installed upstream of a LP regulator which controls pressure from above 75 mbar to below 75 mbar. This regulator is referred to as the MP regulator in the following text.

The following procedure shall be undertaken.

a) Connect the test apparatus to the outlet of the MIV with the valve to the purge hose in the closed position, and ensure the MIV is in the open position.

b) Position the flame trap on the purge hose in a suitable safe location.

c) Undertake a 1 min let-by test of the ECV.

NOTE One of the ways to undertake this test is to open slowly the ECV and close again to admit pressure to the regulator assembly, then hold the re-set lever against the spring pressure whilst opening slowly the purge valve to reduce the pressure to 10 mbar, then close the purge valve. Continue to hold the reset lever against the spring pressure and time for 1 min, checking the pressure reading and determine that there is no perceptible movement of the gauge.

d) Open slowly the ECV and arm the MP regulator by moving the re-set lever against spring pressure for period of not less than 5 s to pressurize the test apparatus, then release.

e) Purge the installation by opening slowly the purge valve so as not to activate the excess flow valve, which is part of a regulator conforming to PRS 29/E.

f) During the purge, check that the operating pressure at the outlet of the MP regulator is in the range (30 ± 2) mbar.

g) When the purge is complete, slowly close the purge valve and apply LDF to all exposed joints not included in the original test of the service (including the spindles of the ECV and the MIV). Rectify any leaks and wipe off any remaining LDF from pipework and fittings. Check that the lock-up pressure on the MP regulator does not exceed 37 mbar.

NOTE 1 Any gas escapes from the ECV shall be immediately referred to the Gas Emergency Service on 0800 111 999.

NOTE 2 Guidance on the use and composition of LDF is given in IGE/UP/1B.

h) Close the MIV and release the pressure on its outlet by opening the purge valve until the pressure reading drops to approximately 10 mbar. Close the purge valve.

i) Apply a 1 min let-by test to the MIV and determine that there is no perceptible movement of the gauge. If the MIV is passing gas, i.e. there is perceptible movement of the gauge, close the ECV, depressurize the installation, replace the complete regulator assembly and re-test.

j) To test the relief valve, open the MIV and, with the MP regulator in its locked-up position, insert the tip of the relief valve vent pipe into water to confirm the relief is not passing gas. Test the operation of the relief valve by using the pump on the test apparatus to increase the pressure on the outlet of the MP regulator until the relief valve operates. The relief valve will operate at a pressure of (45 ± 3.5) mbar. If the relief valve operates outside of this range, replace the complete regulator assembly and re-test the installation.

k) To test the operation of the excess flow valve, open fully the purge valve. This should trip the excess flow valve and gas flow will cease. Close the purge valve and then rearm the 2nd stage on the MP regulator by moving the re-set lever against spring pressure for at least 5 s and release to pressurize the test apparatus. The MP regulator should now move to lock-up and the gauge should indicate a pressure which shall not exceed 37 mbar. If the excess flow valve fails to operate, replace the complete regulator assembly and re-test the installation.

l) Close the MIV, depressurize and remove the test apparatus.

C.4 Purging and testing a pressure control and protection system utilizing a PRS 28/E regulator and an additional PRS 3/E LP regulator [Figure 1d)]

NOTE The following assumes a regulator is installed upstream of the LP regulator which controls pressure from above 75 mbar to below 75 mbar. This regulator is referred to as the MP regulator in the following text.

The following procedure shall be undertaken.

a) Connect the test apparatus to the outlet of the MIV with the valve to the purge hose in the closed position, and ensure the MIV is in the open position.

b) Position the flame trap on the purge hose in a suitable safe location.

c) Undertake a 1 min let-by test of the ECV.

NOTE One of the ways to undertake this test is to open slowly the ECV and close again to admit pressure to the regulator assembly, slowly open the purge valve to reduce the pressure to 10 mbar, then close the purge valve. Time for 1 min, checking the pressure reading and determine that there is no perceptible movement of the gauge.

d) Open slowly the ECV and verify that the regulator is in the open position, this will be indicated by a rise in the gauge reading.

e) Purge the installation by opening slowly the purge valve.

f) During the purge, check that the operating pressure at the outlet of the MP regulator is in the range (30 ± 2) mbar.

g) When the purge is complete, slowly close the purge valve and apply LDF to all exposed joints not included in the original test of the service (including the spindles of the ECV and MIV). Rectify any leaks and wipe off any remaining LDF from the pipework and fittings. Check that the lock-up pressure on the MP regulator does not exceed 37 mbar.

NOTE 1 Any gas escapes from the ECV shall be immediately referred to the Gas Emergency Service on 0800 111 999.

NOTE 2 Guidance on the use and composition of LDF is given in IGE/UP/1B.

h) Close the MIV and release the pressure on its outlet by opening the purge valve until the pressure reading drops to approximately 10 mbar. Close the purge valve.

i) Apply a 1 min let-by test to the MIV and determine that there is no perceptible movement of the gauge. If the MIV is passing gas, i.e. there is perceptible movement of the gauge, close the ECV, depressurize the installation, replace the complete regulator assembly and re-test.

j) To test the creep relief valve, open the MIV and, with the MP regulator in its locked-up position, insert the tip of the relief valve vent pipe into water to confirm the relief is not passing gas. Test the operation of the relief valve by using the pump on the test apparatus to increase the pressure on the outlet of the MP regulator until the relief valve operates. The relief valve should start to operate at a pressure of (45 ± 3.5) mbar. If the relief valve operates outside this range, replace the complete regulator assembly and re-test the installation.

k) Blank off any vent outlet with a suitable plug. Using the hand pump on the test apparatus, increase slowly the pressure on the outlet of the MP regulator until the slam-shut valve operates. The slam-shut valve should operate at a pressure of (70 ± 5) mbar;

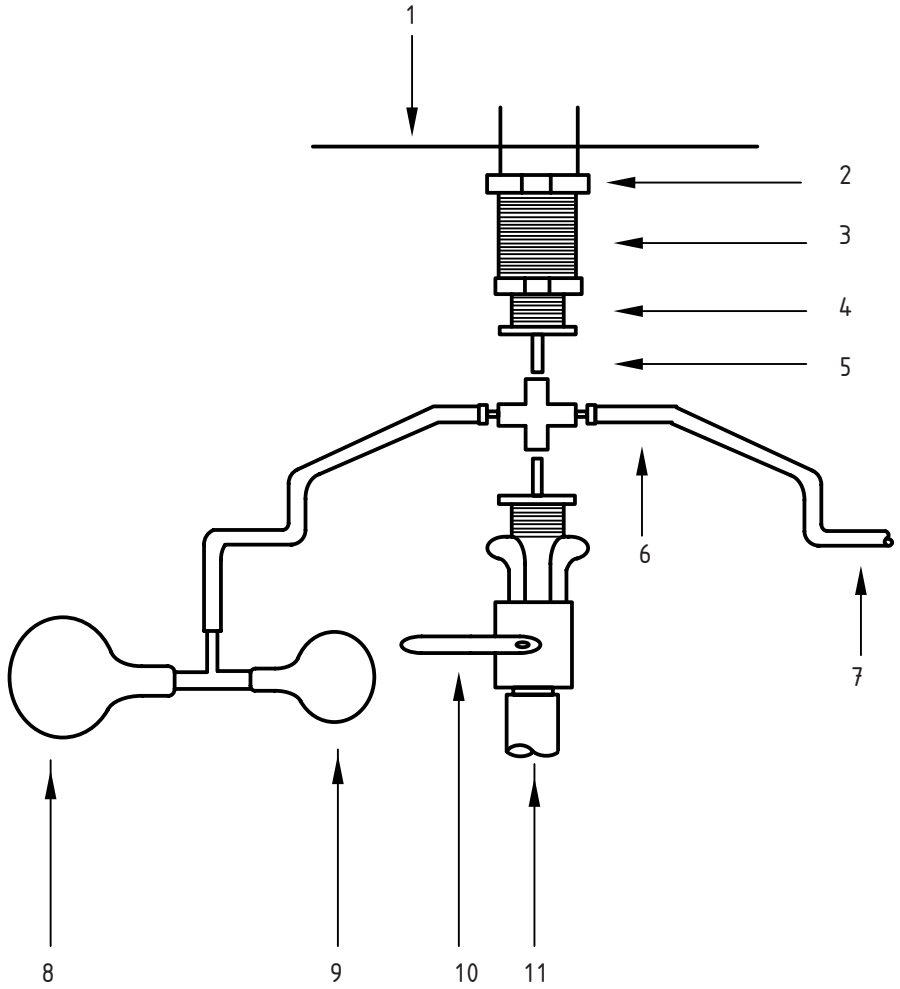
l) Depressurize the installation and re-set the slam-shut valve. Repeat the operation a further two times and record the operating pressure of the slam-shut valve. If the slam-shut valve operates outside the range (65–75) mbar, replace the complete regulator assembly and re-test the installation.

m) Re-set the slam-shut valve and remove the plug from any relief valve vent.

n) Reconnect the vent pipe.

o) Close the MIV, depressurize and remove the test apparatus.

Figure C.1 **Typical arrangement of test and purge apparatus**



Key

1 Meter bar
2 Union washer
3 Meter box outlet adaptor
4 Bush
5 Nipple
6 Test nipple
7 Pressure gauge (at least to 100 mbar)
8 Pump
9 Inflatable bag
10 Purge valve
11 Purge hose with flame trap

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