# Gas Industry Standard

GIS/TE/P6.3:2021

Specification for

# Equipment used in testing gas mains and gas services with operating pressures not greater than 7 bar

Cadent Your Gas Network

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# Contents

## Foreword

Gas Industry Standards (GIS) are revised, when necessary, by the issue of new editions. Users should ensure that they are in possession of the latest edition. Contractors and other users external to Gas Transporters should direct their requests for copies of a GIS to the department or group responsible for the initial issue of their contract documentation.

Comments and queries regarding the technical content of this document should be directed in the first instance to the contract department of the Gas Transporter responsible for the initial issue of their contract documentation.

This standard calls for the use of procedures that may 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.

Compliance with this engineering document does not confer immunity from prosecution for breach of statutory or other legal obligations.

## Mandatory and non-mandatory requirements

For the purposes of a GIS the following auxiliary verbs have the meanings indicated:

**can** indicates a physical possibility;

**may** indicates an option that is not mandatory;

**shall** indicates a GIS requirement;

**should** indicates best practice and is the preferred option. If an alternative method is used then a suitable and sufficient risk assessment needs to be completed to show that the alternative method delivers the same, or better, level of protection.

## Disclaimer

This engineering document is provided for use by Gas Transporters and such of their contractors as are obliged by the terms of their contracts to comply with this engineering document. Where this engineering document is used by any other party, it is the responsibility of that party to ensure that the engineering document is correctly applied.

## Brief history

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| Edited by BSI in accordance with BS 0-3:1997<br>Reviewed on behalf of the Gas Distribution Networks' Technical Standard Forum by BSI<br>Reviewed by Technical Standards Forum and clauses 6.2 & 6.5 amended | August 2006<br>September 2013<br><br>July 2021 |

## 1 Scope

This Gas Industry Standard (GIS) gives requirements for equipment used in testing buried and exposed gas mains and gas services with operating pressures not greater than 7 bar, operating at low pressure (LP), medium pressure (MP) and intermediate pressure (IP), as well as internal pipework and metering arrangements downstream of the emergency control valve.

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

BS EN 1092-1*, Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges.*

BS EN 10226-1*, Pipe threads where pressure tight joints are made on the threads — Part 1: Taper external threads and parallel internal threads — Dimensions, tolerances and designation.*

## 3 Terms and definitions

For the purposes of this GIS the following definitions apply.

**3.1**
**electronic gauge**
small electronic instrument used for gas pressure readings, normally carried in a storage case and supplied with a calibration/function checking facility

**3.2**
**IP**
intermediate pressure (2 bar to 7 bar in UK, 4 bar to 7 bar in Eire)

**3.3**
**LP**
low pressure (up to 75 mbar)

**3.4**
**manometer**
U-shaped tube partially filled with water, with a sliding graduated scale against which the tube's water level is compared to give gas pressure readings, used when carrying out testing or purging operations

NOTE 1 Used in the testing and purging of gas mains, services and internal/metering pipe-work up to the designed range maximum, e.g. a 30 mbar gauge measures maximum of 30 mbar or 12" wg pressure.

NOTE 2 Also referred to as a U-gauge.

**3.5**
**MP**
medium pressure (75 mbar to 2 bar in UK, 75mbar to 4 bar in Eire)

**3.6**
**test standpipe**
pipework assembly used for taking pressure readings on gas mains and services when carrying out testing and purging operations; colour-coded for pressure range

NOTE Details of the colour-coding are given in Clause **6**.

## 4 Manometers

**4.1** The manometer shall be one of the following, as specified by the gas transporter:

- range 0 bar to 30 mbar (12 in) enclosed in rigid case;
- range 0 bar to 60 mbar (24 in) enclosed in rigid case;
- range 0 bar to 60 mbar (24 in) manoflex type;
- range 0 bar to 120 mbar (48 in) manoflex type.

**4.2** The manometer shall be made from plastic that is resistant to normal working conditions encountered on site, including abrasion, impact and weather exposure.

**4.3** The manometer U-tube shall be made of clear plastic tube that allows the water level to be read easily. It shall not discolour with age or deteriorate in a way that will affect the viewing of the water level.

**4.4** Manometers with rigid cases shall be supplied with a cover that is easily attached or detached. This cover shall slide into the end of the case and allow the manometer to stand vertically from a flat surface when in use.

**4.5** The manometer shall be supplied with a hanging tab to allow it to be hung vertically.

**4.6** The scale shall adjust to allow zeroing of the water level.

**4.7** Velcro shall not be used to attach the cover to the case or to attach the manometer to pipes as it can give rise to static electricity sparks that could ignite the gas.

**4.8** Connections to manometers shall allow the secure leak-tight connection of ¼ in internal diameter rubber/neoprene tubing for rigid cased manometers and 5/16 in internal diameter for manoflex types.

## 5 Electronic gauges

### 5.1 Pressure range

**5.1.1** The pressure range for which the gauge is to be used shall be marked on the gauge body and specified in the manufacturer’s instructions for use.

**5.1.2** The gauge shall not fail if over pressurised by 50 % of the nominal pressure range of the gauge.

**5.1.3** The gauge shall maintain its accuracy over a temperature range of –10 ºC to 40 ºC.

**5.1.4** The gauge shall measure pressure using the units of mbar and bar.

### 5.2 Accuracy

For an instrument with a range 0.35 bar to 10.5 bar, the gauge shall have an absolute accuracy of 3 mbar.

For an instrument with a range 0 bar to 10.5 bar, the gauge shall have an absolute accuracy of 0.0285 % or greater and a resolution of 0.1 mbar.

### 5.3 Handling characteristics

**5.3.1** The gauge shall be of an appropriate size, weight and shape to be operated while being held by the user.

**5.3.2** The gauge shall have controls that can be easily used by a user wearing gloves.

**5.3.3** The gauge shall not prevent the user from wearing personal protective equipment safely.

**5.3.4** The gauge shall not have sharp edges or protrusions that could injure the user during normal usage.

**5.3.5** The gauge shall have a clear, high-resolution screen.

**5.3.6** The gauge shall have a low battery indicator.

**5.3.7** The gauge shall be supplied with a carrying case.

### 5.4 Operation and maintenance

**5.4.1** The manufacturer shall supply brief user instructions marked on the gauge or carry case and supply detailed safety, operating and maintenance instructions. The detailed instructions shall include requirements for test and calibration of the gauge no less than annually.

**5.4.2** The gauge shall be designed for maximum ease of test and calibration, preferably without the use of specialised equipment.

**5.4.3** The gauge shall be made from plastic that is resistant to normal working conditions encountered on site, including abrasion, impact and weather exposure.

**5.4.4** The gauge and all accessories shall be made from components unlikely to cause a spark either from impact with another material or static electricity.

NOTE Attention is drawn to European Directive 94/9/EC [1], also known as “ATEX 100a” and “ATEX 95”, and the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996 (as amended) (EPS) [2]. EPS implements Directive 94/9/EC with minor deviations and together they provide the technical requirements to be applied to equipment intended for use in potentially explosive atmospheres.

## 6 Test standpipes: LP, MP and IP gas mains – Design

NOTE An illustration of typical test standpipes for LP, MP and IP gas mains are given in Figures A.1 and A.2.

**6.1** Type approval and production/batch testing shall follow Annex B and C respectively.

**6.2** All joints on supplied gas mains test standpipes shall be assembled with a threadlock to withstand any torques that may be applied in the operating environment from users to help minimize possible leak paths.

**6.3** LP and MP test standpipes shall be provided with a male thread at the base of the standpipe for connection to an approved valve, as shown in Figure A.1. The air pressure relief valve and lower standpipe valve, apart from the test point valve, shall be of the diaphragm type with full flow characteristics.

**6.4** All joints on IP test standpipes shall be welded, brazed or flanged to minimize possible leak paths. The only exceptions are parts that might be removed or replaced; this includes the connections to the bourdon gauge, relief valve and air pressure relief valve. The connection to an approved valve at standpipe base shall be flanged. The air pressure relief valve and lower standpipe valve, apart from the test point valve, shall be of the diaphragm type with full flow characteristics. Flanges and gaskets shall conform to the requirements of BS EN 1092-1, PN16, as shown in Figure A.2.

**6.5** The standpipe assembly shall have a diameter of ¾" or 1" with a parallel thread that conforms to both BS 21 and BS EN 10226-1.

**6.6** IP standpipe base connection points to an approved valve shall be provided with a PN 16 flange that conforms to BS EN 1092-1.

**6.7** The standpipe shall be painted according to its test pressure range as follows:

- LP: orange;
- MP: blue;
- IP: red;
- Common lower standpipe, where fitted, for LP and MP standpipes: yellow.

**6.8** The standpipe shall be fitted with a relief valve, which shall be clearly marked with the pressure range and the calibration date. The relief valve shall have the following setting appropriate to the test being undertaken:

- LP: 0.385 bar;
- MP: 3.3 bar;
- IP: 7.7 bar.

**6.9** A bourdon style glycerine-filled gauge shall be fitted for pressure indication when pressurizing the gas mains for testing, as shown in Figures A.1 and A.2. The gauge range shall be:

- LP: 0 bar to 1 bar;
- MP: 0 bar to 4 bar;
- IP: 0 bar to 10 bar.

**6.10** An air pressure relief valve shall be fitted as shown in Figures A.1 and A.2, to allow pressurization of the test standpipe and gas mains for testing. The valve shall be fitted with a Ludecke coupling for connection to a pneumatic pressure source.

**6.11** There shall be a valved connection off the upright to enable a test gauge to be fitted. This connection shall be either a single thumbcock or small wheel valve and used as a test point. It shall be fitted with snap-on connections suitable for 1/4in internal diameter pneumatic hose to connect to electronic test gauge.

**6.12** The metalwork shall be coated to reduce corrosion.

## 7 Test standpipes: LP gas services – Design

NOTE An illustration of a typical test standpipe for use on LP services is given in Figures A.3 and A.4

**7.1** Service standpipes for LP shall be type approved and production/batch tested to 350 mbar for 15 min with no leakage permitted using pneumatic test equipment.

**7.2** The LP gas service test standpipes shall be designed to be used with a manometer up to 100 mbar test for 5 min duration during field operations.

**7.3** The threaded joint at the base of the fitting shall be supplied with a female fitting that conforms to and is compatible with one of the following:

- the thread on top of electrofusion tapping tees (BS 21 and BS EN 10226-1);
- the thread on service tees (BS 21 and BS EN 10226-1);
- the thread on emergency control valves (BS 746).

**7.4** The test standpipe shall be fitted with a ¼ in thumbcock on hand pump side and nozzle attachment on gauge side. Both sides shall be fitted with a gas bag type adaptor for attaching either a ¼ in or 5/16 in internal diameter rubber/ neoprene tubing which shall remain secure and leak-tight during the test (see Figure A.3).

NOTE MP and IP services are tested as part of the mains test assembly (that is, mains and services tested together) utilizing the standpipes in Clause **6**.

## 8 Marking

**8.1** Products conforming to GIS/TE/P6-3 shall be permanently marked with the following:

a) the number and date of this standard, i.e. GIS/TE/P6-3:2013 [1)];

b) the name or trademark of the manufacturer or their appointed agent;

c) the manufacturer's contact details;

d) a serial number for recording during the required 12 monthly inspection;

e) where authorized, the product conformity mark of a third party certification body, e.g. BSI Kitemark.

NOTE Attention is drawn to the advantages of using third party certification of conformance to a standard.

**8.2** For electronic gauges, the pressure range shall be marked on the gauge body.

[1)] Marking GIS/TE/P6-3:2021 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

**Annex A (informative)**
**Typical mains and service test equipment**

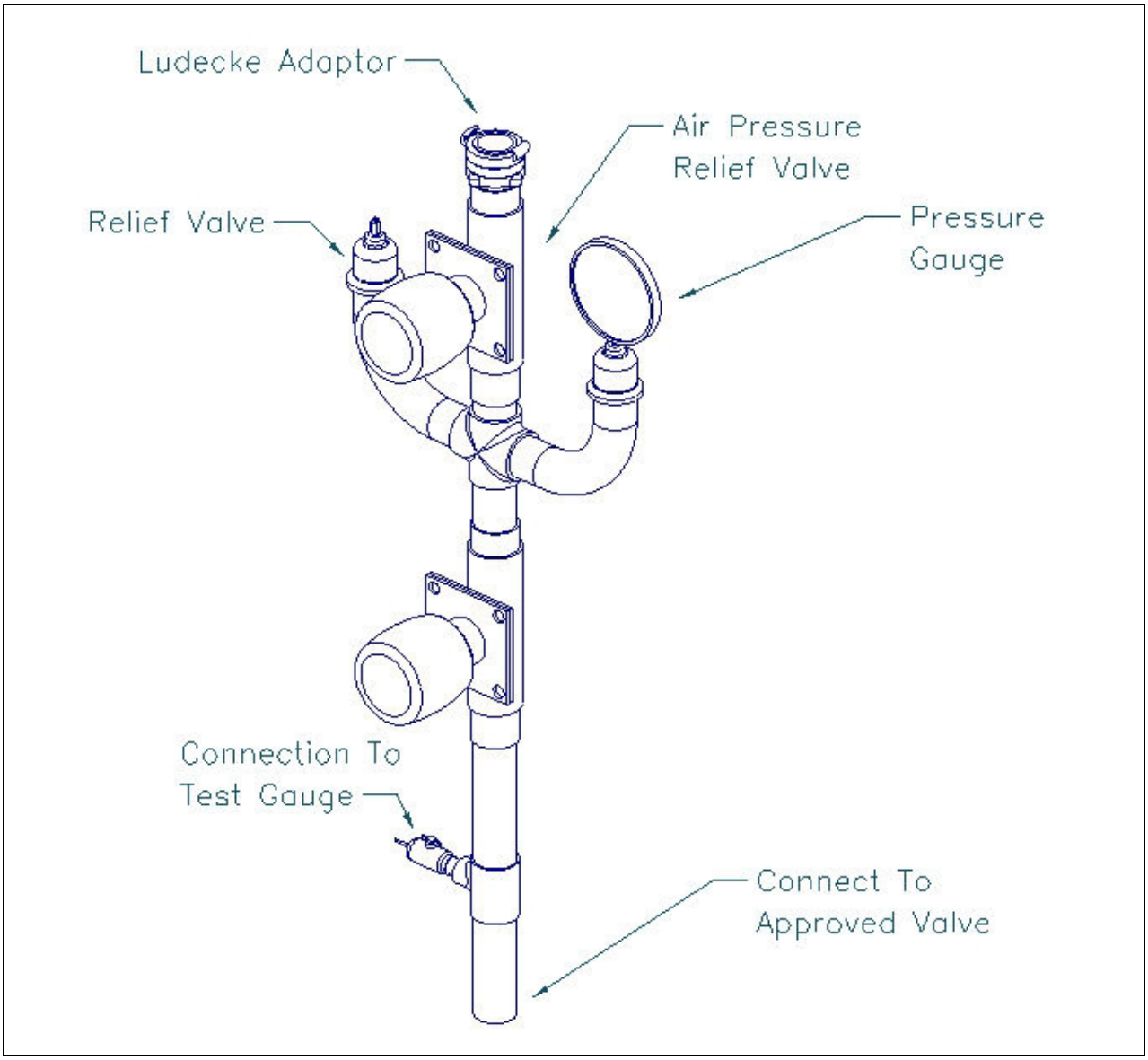



**Figure A.1 — Typical test standpipe assembly for LP and MP gas mains**

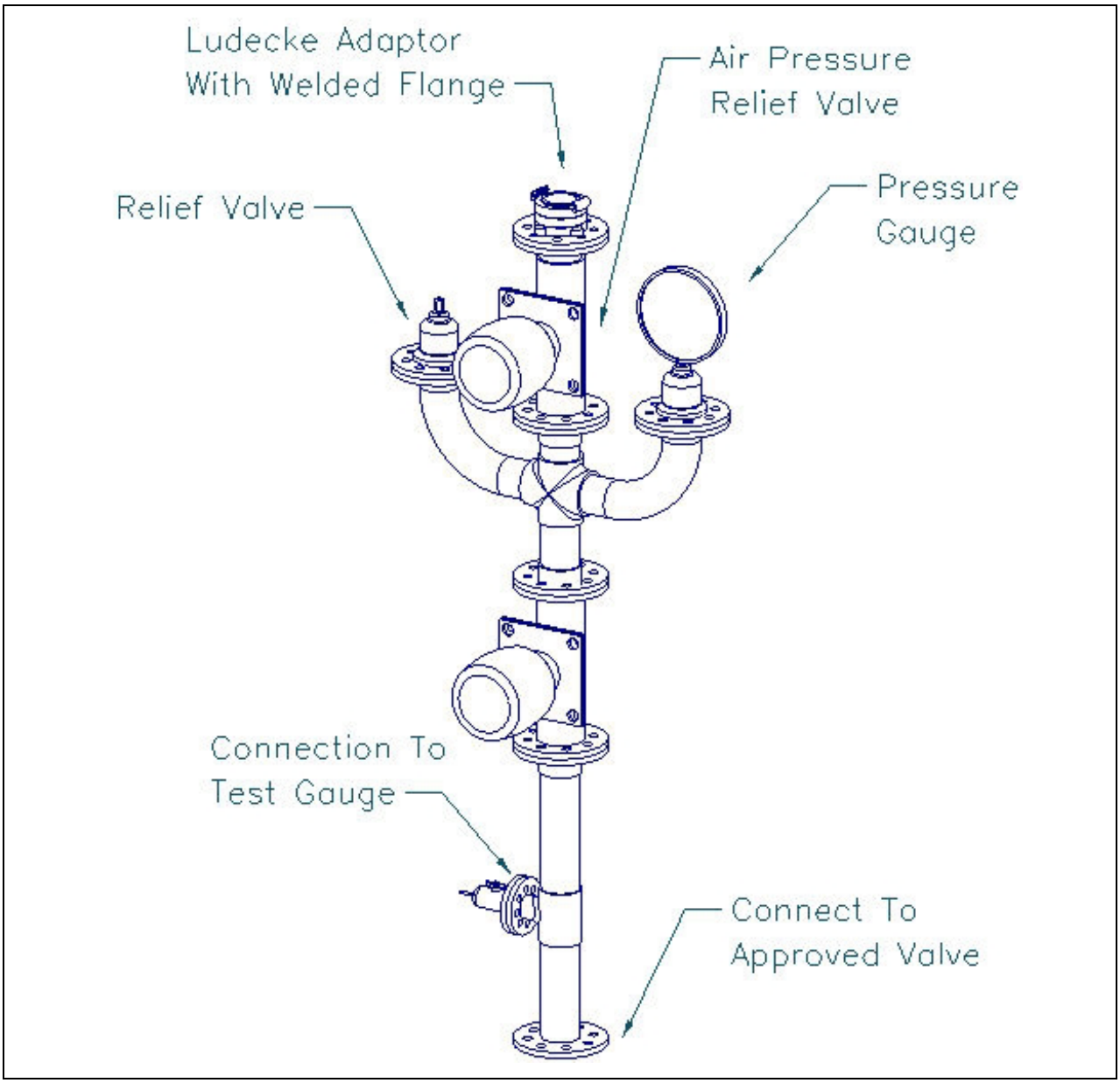
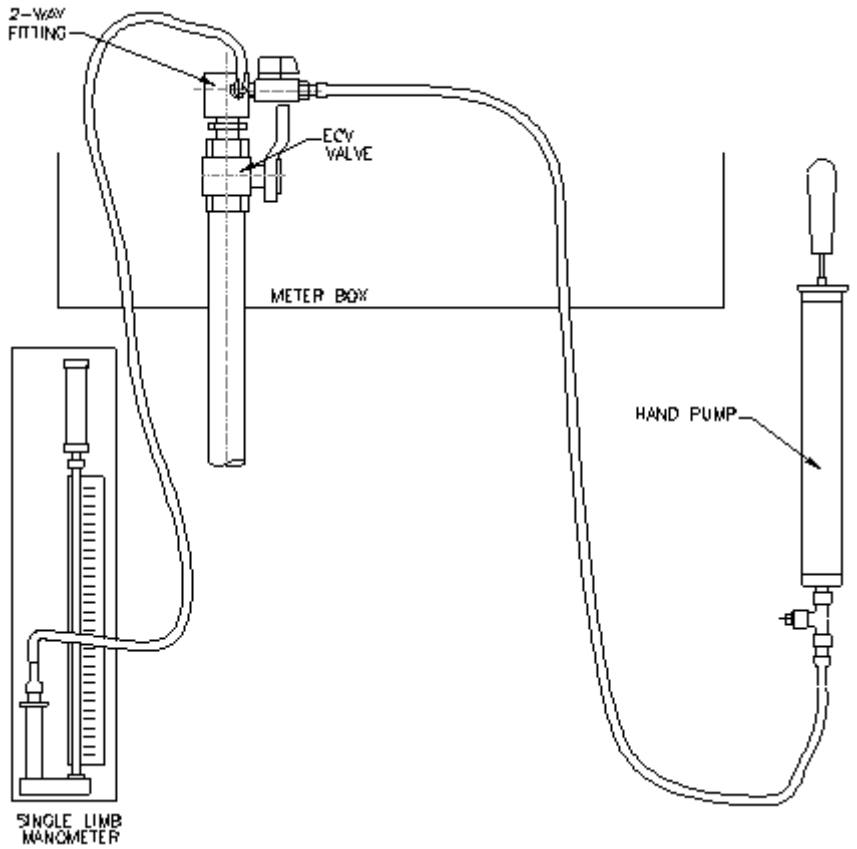



**Figure A.2 —Typical test standpipe assembly for IP gas mains**




NOTE 1 Double-limb manometers are now normally used instead of single limb manometers. Alternatively, an electronic pressure gauge of the correct pressure range can be used.

NOTE 2 The standpipe for electrofusion PE tapping and metallic service tees is similar apart from the threaded connection to ECV.

**Figure A.3 — Typical test assembly for steel or polyethylene services from the house end using an emergency control valve**

## Annex B (normative)
## Type approval test

### B.1 Principle

Pneumatic tests to prove test standpipe can withstand the anticipated working pressure and the relief valve provides effective protection.

### B.2 Apparatus

**B.2.1** *Pneumatic pressure*, raising equipment to at least 16 bar.

**B.2.2** *Test assembly,* to withstand at least 16 bar.

**B.2.3** *Pneumatic test gauges,* to test to 16 bar of the electronic or dead weight testing type.

### B.3 Procedure

**B.3.1** If the standpipe is made up of 2 parts, common lower and separate upper standpipe, then they shall be tested separately.

**B.3.2** After welding or brazing completed on the test standpipe assembly and before coating, pneumatically test the standpipe to 12 bar for 15 min and record the results. This applies to all LP, MP and IP standpipes.

**B.3.3** If test is satisfactory, release pressure to atmospheric then apply finished coating, final assemble, blank off the relief valve and apply a further pneumatic test for 15 min on the assembled standpipe at least 1.5 times the maximum working pressure indicated which is at least for LP (0.525 bar), MP (3 bar) and IP (10.5 bar). Record the results.

**B.3.4** If test is satisfactory, release pressure to atmospheric then fit the relief valve to standpipe test assembly and raise the pneumatic pressure until the relief valve blows off. Record the results.

### B.4 Test results

**B.4.1** No leakage is permitted on any part of the test standpipe at 12 bar test in **A.3.2**.

**B.4.2** No leakage is permitted on any part of the standpipe when tested as **A.3.3**.

**B.4.3** The relief valve shall blow at the following pressures, LP (0.385 bar), MP (3.3 bar) and IP (7.7 bar).

**Annex C (normative)**
**Production/batch testing**

### C.1 Principle

Pneumatic tests to prove test standpipe can withstand the anticipated working pressure and (on 1 in 5 sample) the relief valve provides effective protection.

### C.2 Apparatus

**C.2.1** *Pneumatic pressure raising equipment,* to at least 16 bar.

**C.2.2** *Test assembly,* to withstand at least 16 bar.

**C.2.3** *Pneumatic test gauges,* to test to 16 bar of the electronic or dead weight testing type.

### C.3 Procedure

**C.3.1** If the standpipe is made up of 2 parts, common lower and separate upper standpipe, then they shall be tested separately.

**C.3.2** After welding or brazing completed on the test standpipe assembly and before coating, pneumatically test the standpipe to 12 bar for 15 min and record the results. This applies to all LP, MP and IP standpipes.

**C.3.3** If test is satisfactory, release pressure to atmospheric then apply finished coating, final assemble, blank off relief valve apply a further pneumatic test for 15 min on the assembled standpipe at least 1.5 times the maximum working pressure indicated which is at least for LP (0.525 bar), MP (3 bar) and IP (10.5 bar). Record the results.

**C.3.4** If test is satisfactory, release pressure to atmospheric then fit the relief valve to standpipe test assembly and on a 1 in 5 batch only, raise the pneumatic pressure until the relief valve blows off . Record the results.

### C.4 Test results

**C.4.1** No leakage is permitted on any part of the test standpipe at 12 bar test in **A.3.2**.

**C.4.2** No leakage is permitted on any part of the standpipe when tested as **A.3.3**.

**C.4.3** The relief valve shall blow at the following pressures on a 1 in 5 batch, LP (0.385 bar), MP (3.3 bar) and IP (7.7 bar).

## Bibliography

[1] EUROPEAN COMMUNITIES. *Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.* Luxembourg: Office for Official Publications of the European Communities.

[2] GREAT BRITAIN. *The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996 (as amended).* London: The Stationery Office. SI 1996 No. 192.