

**IGEM/GM/PRS/28**  
**Communication 1791**

# ***Medium pressure single-stage regulators for gas flow rates not exceeding $6 \text{ m}^3 \text{ h}^{-1}$***



*Founded 1863  
Royal Charter 1929  
Patron: Her Majesty the Queen*

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***Communication 1791***

# ***Medium pressure single-stage regulators for gas flow rates not exceeding $6 \text{ m}^3 \text{ h}^{-1}$***



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## SECTION 1 : INTRODUCTION

1.1 This Specification is part of a series of Institution of Gas Engineers and Managers (IGEM) publications, providing a specification for selecting medium pressure (MP) meter regulators.

1.2 British Gas and latterly, National Grid Metering (NGM) developed a series of specifications for key metering components based on its own suite of product requirements. These documents were made available to meter installers and purchasers under the title of Product Requirement Specification (PRS) 'e' documents. Originally, these Specifications were made available through Advantica, as they were known at the time.

NGM has transferred the ownership of these documents to IGEM to make them available to the wider industry. It is some years since the original 'e' documents were updated and these have been withdrawn.

1.3 This Specification has been drafted by an IGEM Working Group, appointed and subsequently approved by IGEM's Gas Measurement Committee, and has been approved by IGEM's Technical Coordinating Committee on behalf of the Council of IGEM.

1.4 Manufacturers supplying single stage regulators for gas flow rates not exceeding  $6 \text{ m}^3 \text{ h}^{-1}$  and inlet pressures exceeding 75 mbar but not exceeding 2 bar are to conform to the requirements of this Specification and to any other relevant documents to which reference is made herein.

1.5 Details on the installation of domestic-sized gas meters and associated components are given in BS 6400-2.

1.6 Terms such as "maximum operating pressure" (MOP), "maximum incidental pressure" (MIP) and "operating pressure" (OP) are used to reflect gas pressure terminology used in European standards. These terms will arise in all relevant IGEM Standards and, possibly, in other standards. Other terms have been introduced to assist in recognition of design information to be transferred between interested parties.

1.7 This Specification makes use of the term "must", "shall" and "should" when prescribing particular requirements.

- the term "must" identifies a requirement by law in Great Britain (GB) at the time of publication
- the term "shall" prescribes a requirement which, it is intended, will be complied with in full and without deviation
- the term "should" prescribes a requirement which, it is intended, will be complied with unless, after prior consideration, deviation is considered to be acceptable.

Such a term may have different meanings when used in legislation, or Health and Safety Executive (HSE) Approved Codes of Practice (ACoPs) or guidance, and reference needs to be made to such statutory legislation or official guidance for information on legal obligations.

1.8 New and improved products, materials or production methods may be adopted prior to this Specification being updated. Amendments to this Specification will be issued when necessary and their publication will be announced in the Journal of IGEM and elsewhere as appropriate.

- 1.9 Requests for interpretation of this Specification in relation to matters within its scope, but not precisely covered by the current text, should be addressed to Technical Services, IGEN, IGEN House, High Street, Kegworth, Derbyshire, DE74 2DA. Such requests will be submitted to the relevant Committee. Any advice given by or on behalf of IGEN does not imply acceptance of any liability, and does not relieve any party of their obligations.
- 1.10 This Specification was published in September 2016.

## SECTION 2 : SCOPE

- 2.1 This Specification defines the requirements for single stage MP meter regulators with integral slam-shut device for use with 2<sup>nd</sup> family gas (see BS EN 437) at flow rates not exceeding 6 m<sup>3</sup> h<sup>-1</sup>. Each regulator will have to be suitable for use on a pressure tier, or range of tiers, as defined in Table 1.

*Note 1: Requirements for low pressure (LP) meter regulators for gas flow rates not exceeding 6 m<sup>3</sup> h<sup>-1</sup> are given in IGEN/GM/PRS/3.*

*Note 2: Requirements for two-stage MP meter regulators for gas flow rates not exceeding 6 m<sup>3</sup> h<sup>-1</sup> are given in IGEN/GM/PRS/29.*

| PRESSURE TIER          | OPERATIONAL PRESSURES AT OUTLET OF EMERGENCY CONTROL VALVE (ECV) |                                      |                                  | DESIGN PRESSURES AT OUTLET OF ECV |                                                |
|------------------------|------------------------------------------------------------------|--------------------------------------|----------------------------------|-----------------------------------|------------------------------------------------|
|                        | DESIGN MINIMUM PRESSURE (DmP) mbar                               | LOWEST OPERATING PRESSURE (LOP) mbar | MAXIMUM OPERATING PRESSURE (MOP) | DESIGN PRESSURE (DP) mbar         | DESIGN MAXIMUM INCIDENTAL PRESSURE (DMIP) mbar |
| Medium <sup>35*</sup>  | 35                                                               | 35                                   | 185 mbar                         | 2.0                               | 2.7                                            |
| Medium <sup>65*</sup>  | 65                                                               | 75                                   | 250 mbar                         | 2.0                               | 2.7                                            |
| Medium <sup>105*</sup> | 105                                                              | 105                                  | 1.1 bar                          | 2.0                               | 2.7                                            |
| Medium <sup>180*</sup> | 180                                                              | 180                                  | 1.6 bar                          | 2.0                               | 2.7                                            |
| Medium <sup>270*</sup> | 270                                                              | 280                                  | 2.0 bar                          | 2.0                               | 2.7                                            |

\* This number refers to the DmP of the upstream network.

**TABLE 1 – STANDARD NETWORK TIERS AND CORRESPONDING PRESSURES**

- 2.2 Regulators to this Specification incorporate a single stage pressure regulating device with integral relief valve and an overpressure slam-shut device that meet the requirements of Appendix 6. They have a nominal outlet pressure of 22 mbar.
- 2.3 This Specification sets out the requirements for product type and production testing.
- 2.4 This Specification requires consideration of the life cycle of the product and its potential effect on the environment.
- 2.5 All pressures quoted in this Specification are gauge pressures unless otherwise stated.
- 2.6 Italicised text is informative and does not represent formal requirements.
- 2.7 Appendices are informative and do not represent formal requirements unless specifically referenced in the main sections via the prescriptive terms "must", "shall" or "should".

## SECTION 3 : LEGAL AND ALLIED CONSIDERATIONS

- 3.1 This Specification is set out against a background of Legislation in force in GB at the time of publication. The devolution of power to the Scottish, Welsh and Northern Ireland Assemblies means that there may be variations to the Legislation described below for each of them and consideration of their particular requirements must be made. Similar considerations are likely to apply in other countries where reference to appropriate national Legislation is necessary.
- 3.2 All relevant Legislation must be applied and relevant ACoPs, official Guidance and referenced codes, standards, etc. have to be taken into account.
- 3.3 Unless otherwise stated, the current editions of Legislation and standards apply.
- 3.4 In the absence of specific Legislation, it is essential that installations are designed, constructed, installed, operated and maintained so as to be safe.
- 3.5 The Legislation appropriate to any installation will depend largely upon its location. Advice will need to be sought from the relevant Authorities.
- 3.6 Appendix 2 lists Legislation, Guidance Notes, Standards etc. which are identified within this Specification as well as further items of Legislation that may be applicable. Where British Standards, etc. are quoted, equivalent national or international standards, etc. equally may be appropriate.

## SECTION 4 : MATERIALS

### 4.1 GENERAL REQUIREMENTS

- 4.1.1 Regulators shall be constructed of materials conforming to appropriate European, International or British Standards, as appropriate.
- 4.1.2 The quality of materials, dimensions used and method of assembling the various parts shall be such that construction and performance characteristics are safe. Moreover, performance characteristics shall not alter significantly during a reasonable life e.g. at least 10 years, maintenance free when the regulator is installed and used in accordance with the manufacturer's instructions, IGE/TD/15 (extant requirements) and BS 6400-2. Under these circumstances, all components shall withstand any reasonably foreseeable mechanical, chemical and thermal conditions to which they may be subjected during service.
- 4.1.3 Consideration shall be undertaken of the materials and process used to manufacture, use and dispose of this product and the effect they may have on the environment.

### 4.2 CASING COMPONENTS

- 4.2.1 The main body should be:
- cast in aluminium alloy EN AC-46500 to BS EN 1706 in accordance with BS EN 1559-1 and BS EN 1559-4 or
  - cast in zinc alloy ZP0400 to BS EN 12844 in accordance with BS EN 1559-1 and BS EN 1559-6 or
  - cast in iron to BS EN 1561, BS EN 1563 or BS EN 10213.
- 4.2.2 The spring housing(s) should be:
- made from one of the materials listed in clause 4.2.1 or
  - pressed or deep drawn from aluminium alloy EN AW-1050A to BS EN 485-2 with a minimum wall thickness of 1.0 mm or
  - pressed or deep drawn from steel with a minimum wall thickness (after forming) of 0.8 mm and complying with Sub Section 6.3 of BS EN 1359.

### 4.3 RESISTANCE TO CORROSION

- 4.3.1 Any parts, including springs, in contact with gas or the surrounding atmosphere, shall be manufactured from corrosion-resistant materials or shall be suitably protected. Movement shall not impair the corrosion protection for springs and other moving parts.

### 4.4 POLYMERIC COMPONENTS

- 4.4.1 Components made from polymers e.g. seals, diaphragms, valve pads, valve seats, valve spindles shall be homogeneous and free from inclusions, grit, blisters and surface imperfections visible to the naked eye. Such components shall not contain a level of porosity that would significantly affect the strength of the component or the performance of the regulator.
- 4.4.2 Components made from elastomers e.g. seals, diaphragms, valve pads and valve seats shall be class A2, ozone resistant, to BS EN 549.
- 4.4.3 The regulator shall be designed such that:
- manufacturing and operating stresses do not result in excess stresses that may cause premature failure of any component

*Note: Particular attention is to be paid to the design of plastic components.*

- as a result of any component failure, any diaphragm material split is avoided or arrested.

4.4.4 Assembly methods shall be such as to minimise stress levels, particularly residual stresses following assembly.

## SECTION 5 : FINISH

- 5.1 All parts, including those with protected surfaces e.g. plated or coated with paint, shall withstand the humidity test in Appendix 3 without signs of corrosion, lifting or blistering that are visible to the naked eye.

## SECTION 6 : TORSION AND BENDING

### 6.1 GENERAL

- 6.1.1 Regulators shall be constructed such that they have adequate strength to withstand any likely mechanical stresses to which they may be subjected during installation and service.

### 6.2 TORSION

- 6.2.1 Regulators shall be subjected to a torque of 85 Nm in accordance with A4.1. After testing, there shall be no permanent deformation and any leakage shall not exceed that specified in clause 8.2.2.

### 6.3 BENDING MOMENT

- 6.3.1 Regulators shall be subjected to a bending moment of 225 Nm in accordance with A4.2. After testing, there shall be no permanent deformation, and any leakage shall not exceed that specified in clause 8.2.2.

## SECTION 7 : DESIGN AND DIMENSIONS

### 7.1 GENERAL REQUIREMENTS

- 7.1.1 Each regulator shall be suitable for operation over a pressure tier, or range of pressure tiers, as defined in Table 1. Manufacturers shall declare the tier(s) and corresponding range of inlet pressures for each design of regulator.
- 7.1.2 Regulators shall be suitable for installation in environments with ambient temperatures in the range -20°C to +60°C.
- 7.1.3 Regulator configuration should be one of the following types, as illustrated by Figure 1 in Appendix 4:
- right-angle or
  - in-line or
  - 'U' - shaped.
- 7.1.4 Regulators and any necessary fittings shall be capable of being readily installed in a domestic meter box.
- Note: Size envelopes are given in Appendix 5 for guidance on suitable dimensions.*
- 7.1.5 Regulators should incorporate an inlet strainer with a cut-off which shall not be greater than 100 µm.
- 7.1.6 Screws provided in regulators for servicing purposes shall conform to European, International or British Standards, as appropriate.
- 7.1.7 Screws provided in regulators for servicing purposes shall not be of the thread cutting type.
- 7.1.8 Holes for screws, pins etc., which are used for the assembly of parts, shall not penetrate gas ways. The wall thickness between gas ways and holes for screws, pins, etc. shall be at least 1.0 mm.
- Note: This limits the minimum thickness of the remaining material at the base of blind (fixing) holes in castings, forgings, etc.*
- 7.1.9 Regulators shall have their outlet pressure, relief valve and slam-shut device factory-set at their required settings, (see Sub-section 9 and Section 10) and should not have an adjustment facility.
- 7.1.10 Regulators shall be designed to ensure that any settings cannot be disturbed by vibration.

### 7.2 NON-ADJUSTABLE REGULATORS

The housing of non-adjustable regulators shall be sealed permanently with the manufacturer's specific mark, so as to deter interference with the settings and make any interference evident.

### 7.3 ADJUSTABLE REGULATORS

- 7.3.1 For adjustable regulators (including the protective device(s)) the adjustment facilities shall:
- be sealed to prevent unauthorised interference
  - be accessible only by the use of tools
  - incorporate holes for sealing-tie seals with a minimum diameter of 2.5 mm