IGEM
Institution of
Gas Engineers & Managers

Utilization Procedures
IGE/UP/1B Edition 2
Communication 1714

Tightness testing and direct purging of small Natural Gas installations

Founded 1863
Royal Charter 1929
Patron: Her Majesty the Queen

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Tightness testing and direct purging of small Natural Gas installations

Price Code: T3

Charnwood Wing
Holywell Park
Ashby Road
Loughborough, Leics, LE11 3GH
Tel: 01509 282728
Fax: 01509 283110
Email: general@igem.org.uk

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SECTION 1 : INTRODUCTION

1.1 These Procedures supersede IGE/UP/1B Edition 1, Communication 1675, which is obsolete.

1.2 These Procedures have been drafted by a Panel appointed by the Institution of Gas Engineers and Managers' (IGEM's) Gas Utilization Committee, subsequently approved by that Committee and published by the authority of the Council of the Institution.

1.3 IGE/UP/1 Edition 2 deals with all aspects of strength and tightness testing and direct purging of selected 1st, 2nd and 3rd family gases within its wide scope and at a maximum operating pressure (MOP) not exceeding 16 bar.

IGE/UP/1A Edition 2 deals with the special case of strength and tightness testing and direct purging of volumes not exceeding 1 m^3 and operating pressure (OP) not exceeding 40 mbar and using Natural Gas (NG).

IGE/UP/1B Edition 2 deals with all aspects of tightness testing and direct purging of small NG installations with a meter of capacity not exceeding U16 and supply MOP (MOP_u) not exceeding 2 bar. It has been published to take into account the extended scope of BS 6891 and the introduction of BS 6400-2.

For tightness testing of small liquefied petroleum gas (LPG) installations, BS 5482-1 or 3 or BS EN ISO 10239 apply, as appropriate. For greater volume, IGE/UP/1 Edition 2 applies.

Figure 1 will assist in selecting the appropriate standard.

Note: "MOP", "OP" and other new terms have been introduced to reflect gas pressure terminology used in European standards. Appendix 1 defines these terms and it is possible to equate them to terms used in Edition 1. These terms will arise in all relevant IGEM technical publications in future and, possibly, in other standards.

For a new system of installation pipework, the onus is on the designer to establish both the maximum incidental pressure (MIP) and MOP. For an existing system of installation pipework, the onus is on the designer/owner of the system to ensure that any increase in pressure within the system will not result in OP exceeding MOP of the system and on the gas transporter/meter asset manager (GT/MAM) to ensure that any change in their pressure regimes due to fault conditions will not jeopardise the safety of the downstream system. This involves effective communication between the GTs/MAMs and system designers/owners.

1.5 These procedures make use of the terms "should", "shall" and "must" when prescribing particular procedures. Notwithstanding Sub-Section 1.8:

a) The term "must" identifies a requirement by law in Great Britain at the time of publication.

b) The term "shall" prescribes a procedure that, it is intended, will be complied with in full and without deviation.

c) The term "should" prescribes a procedure that, it is intended, will be complied with unless, after prior consideration, deviation is considered to be acceptable.

Such terms may have different meanings when used in legislation, or HSE ACoPs or guidance, and reference needs to be made to such statutory legislation or official guidance for information on legal obligations.

1.6 The primary responsibility for compliance with legal duties rests with the employer. The fact that certain employees, for example “responsible engineers”, are allowed to exercise their professional judgement does not allow employers to abrogate their professional responsibilities. Employers must:

- have done everything to ensure, so far as is reasonably practicable, that there are no better protective measures that can be taken other than relying on exercise of professional judgement by “responsible engineers”
- have done everything to ensure, so far as is reasonably practicable, that “responsible engineers” have the skills, training, experience and personal qualities necessary for the proper exercise of professional judgement
- have systems and procedures in place to ensure that the exercise of professional judgement by “responsible engineers” is subject to appropriate monitoring and review
- not require “responsible engineers” to undertake tasks which would necessitate the exercise of professional judgement that is beyond their competence. There should be written procedures defining the extent to which “responsible engineers” can exercise their professional judgement. When “responsible engineers” are asked to undertake tasks that deviate from this, they should refer the matter for higher review.

1.7 It is widely accepted that the majority of accidents at work generally are in some measure attributable to human as well as technical factors in the sense that actions by people initiated or contributed to the accidents, or people might have acted better to avert them.

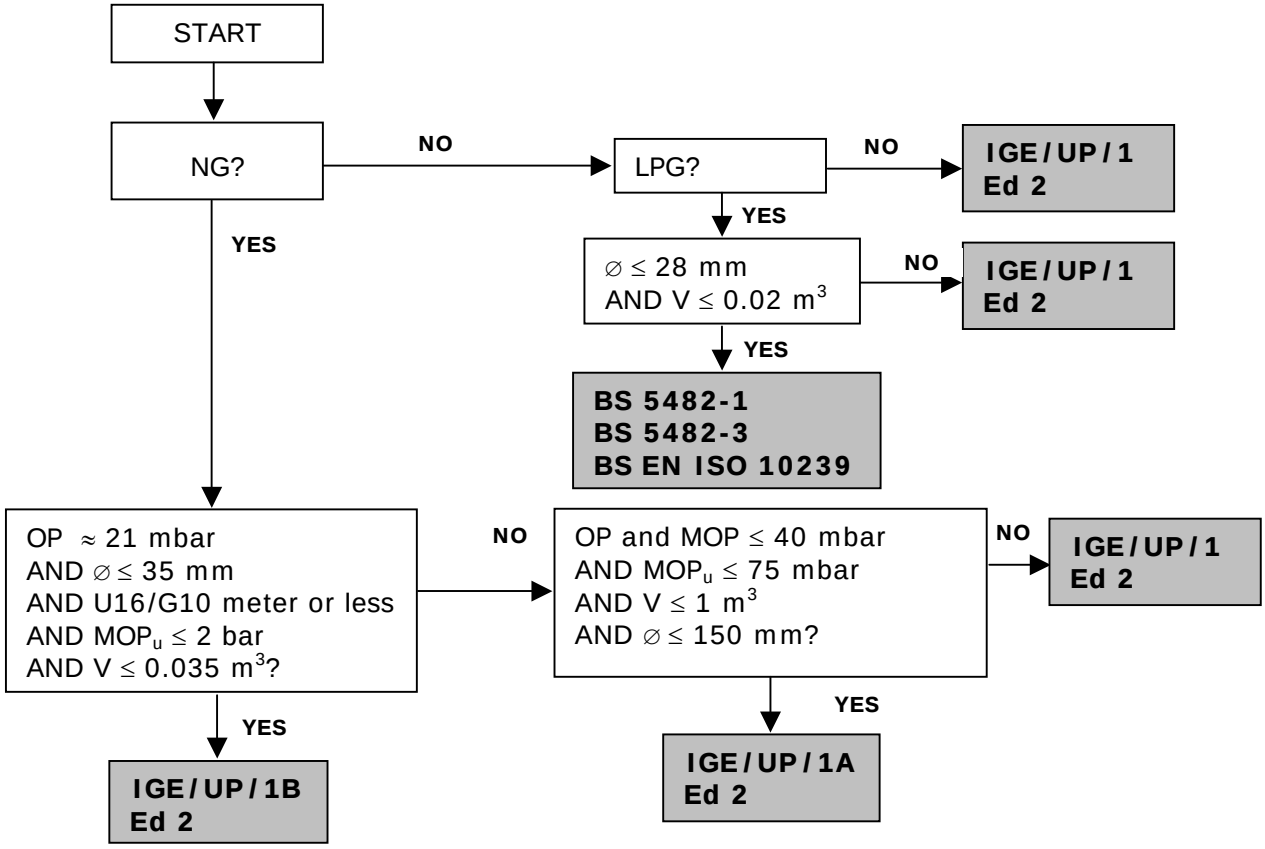
It is therefore necessary to give proper consideration to the management of these human factors and the control of risk. To assist in this, it is recommended that due cognisance be taken of HS(G)48.

1.8 Notwithstanding Sub-Section 1.5, these Procedures do not attempt to make the use of any method or specification obligatory against the judgement of the responsible engineer. Where new and better techniques are developed and proved, they should be adopted without waiting for modification to these Procedures. Amendments to these Procedures will be issued when necessary, and their publication will be announced in the Journal of the Institution and other publications as appropriate.

1.9 Requests for interpretation of these Procedures in relation to matters within their scope, but not precisely covered by the current text, should be addressed in writing to Technical Services, IGEM, Charnwood Wing, Holywell Park, Ashby Road, Loughborough, Leicestershire, LE11 3GH and will be submitted to the relevant Committee for consideration and advice, but in the context that the final responsibility is that of the engineer concerned. If any advice is given by or on behalf of IGEM, this does not relieve the responsible engineer of any of his or her obligations.

1.10 These Utilization Procedures were published on 24th March 2006.

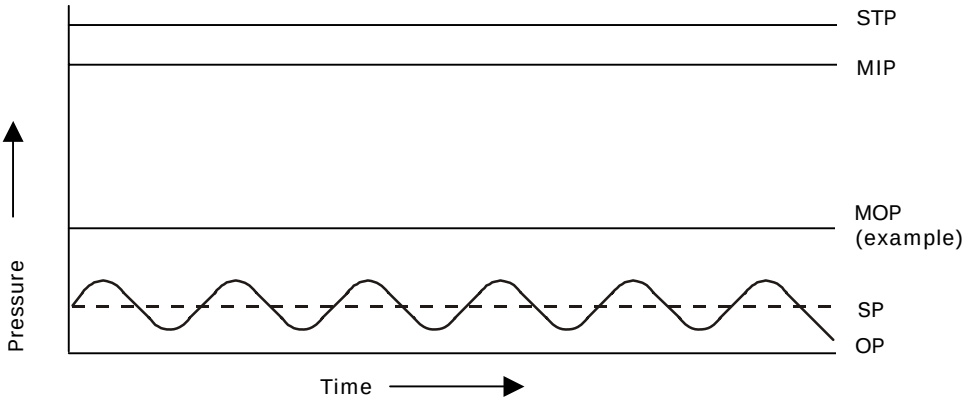
They may be used rather than the procedures given in IGE/UP/1B Edition 1 immediately but a lead-in period is allowed permitting the use of Edition 1 until 24th June 2006.



≈	normally equal to	MOP_u	supply MOP	mbar	millibar
≤	less than or equal to	NG	Natural Gas	mm	millimetres
∅	nominal diameter	OP	Operating pressure	m^3	cubic metres
V	volume	LPG	Liquefied petroleum gas		

Note: If IGE/UP/1A Edition 2 or IGE/UP/1B Edition 2 or BS 5482-1 or BS 5482-3 or BS EN ISO 10239 are not indicated, it is essential that IGE/UP/1 Edition 2 is used. If it is preferred (it is not recommended, as it is more complex to follow) IGE/UP/1 Edition 2 can be used rather than IGE/UP/1A Edition 2, IGE/UP/1B Edition 2, BS 5482-1 or 3, or BS EN ISO 10239. It is necessary to check the scope of referenced standards before proceeding.

FIGURE 1 - ALGORITHM TO SELECT TESTING AND PURGING STANDARDS



STP	=	strength test pressure
MIP	=	maximum incidental pressure
OP	=	operating pressure
MOP	=	maximum operating pressure
SP	=	set point of the regulator

Note: This is extracted from IGE/TD/13 and simplified for the purposes of IGE/UP/1B Edition 2.

FIGURE 2 - RELATIVE PRESSURE LEVELS

SECTION 2 : SCOPE

2.1 These Procedures apply to NG installations downstream of an emergency control valve (ECV) for MOP_u not exceeding 2 bar as illustrated in Figure 3. Typical installations are shown in Figure 4.

2.2 These Procedures apply to any section of pipework, including meters, having the following:

- MOP at the outlet of the ECV not exceeding 2 bar and
- OP at the outlet of the primary meter of 21 mbar (nominal) and
- a nominal bore of not greater than 35 mm (DN32, R 1¼) and
- a maximum rated capacity through the primary meter of not exceeding 16 $m^3 h^{-1}$ and
- a maximum installation volume (IV) supplying an individual dwelling or non domestic premises of 0.035 m^3 .

Note 1: There are some existing installations, where MOP_u exceeds 75 mbar, that have been installed without the facility of a meter inlet valve (MIV). These installations are not within the scope of IGE/UP/1B but advice on testing and purging is given in Appendix 3.

Note 2: Installations of larger volume are very rare in domestic premises. However, if there is any doubt, it is advisable to calculate IV in accordance with Appendix 5 before using these Procedures.

Note 3: For installations where the nominal bore exceeds 35 mm or where the gas meter has a maximum capacity greater than 16 $m^3 h^{-1}$, or where IV is greater than 0.035 m^3, IGE/UP/1 or IGE/UP/1A apply as appropriate.

2.3 These Procedures cover tightness testing and direct purging of pipework containing NG.

Note 1: For other gases, BS 5482-1 or 3, or BS EN ISO 10239 or IGE/UP/1 apply, as appropriate (see Figure 1).

Note 2: Historically, BS 6891 (which preceded IGE/UP/1B Edition 1 for "soundness testing") and IGE/UP/1B Edition 1 have not required strength testing. This philosophy continues for IGE/UP/1B Edition 2 (for components of MOP ≤ 75 mbar) as there is no significant case evidence for introducing strength testing, the risk associated with failure of integrity is comparatively low (due to low energy contained) and the available materials and methods of construction are such as to give confidence that integrity will be assured. Steps are given in the tightness test section to check that jointing has been correctly carried out.

2.4 These Procedures apply to tightness testing in the following circumstances:

- **new** installations
- alteration to, replacement of, or re-use of, **existing** installations
- **new** extensions to **existing** pipework
- prior to any work on **existing** installations
- where there is a known or suspected gas leak
- where there has been a complete loss of supply pressure i.e upstream of the ECV, or of installation pressure, for any reason
- routine testing of **existing** installations
- immediately before purging of installations (except when taking components permanently out of service).

Note: These Procedures may not need to be applied when carrying out routine maintenance, such as servicing.

2.5 These Procedures apply to direct purging in the following circumstances:

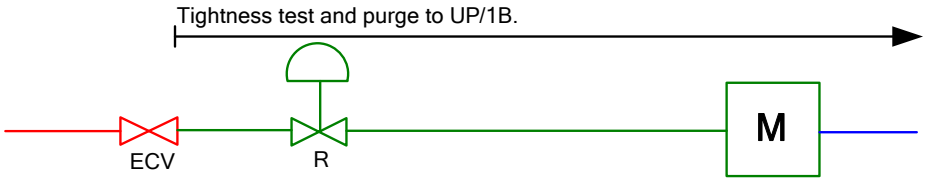
- **new** installations
- alteration to, replacement of, or re-use of, **existing** installations
- **new** extensions to **existing** installations
- where there has been a complete loss of installation pressure for any reason
- where there is the possibility of air being present in an installation

Note: These Procedures may not need to be applied when carrying out routine maintenance, such as servicing.

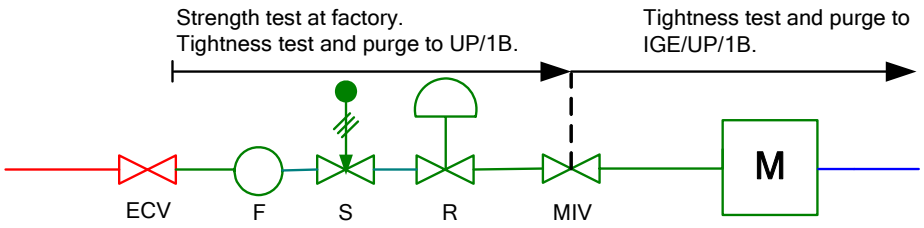
2.6 All pressures quoted are gauge pressures unless otherwise stated.

2.7 Italicised text is informative and does not represent formal Procedures.

2.8 Appendices are informative and do not represent formal Procedures unless specifically referenced in the main sections via the prescriptive terms “should”, “shall” or “must”.



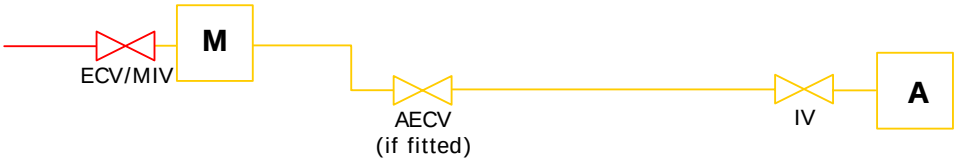
(a) **- Meter installation. $MOP_u \leq$ 75 mbar**



ECV	emergency control valve		Network
F	filter		meter installation
R	regulator		installation pipework
MIV	meter inlet valve	<	less than
M	meter.	≤	less than or equal to
MOP_u	supply MOP		
S	safety device.		

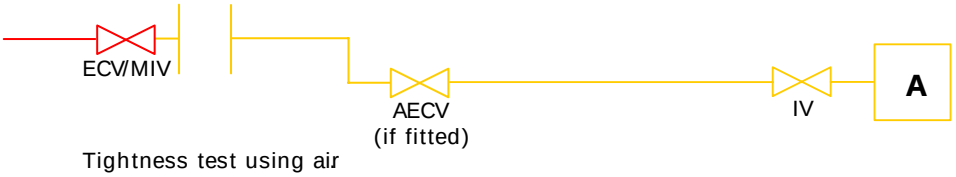
(b) **- Meter installation. 75 mbar < $MOP_u \leq$ 2 bar**

FIGURE 3 - TYPICAL PRIMARY METER INSTALLATIONS



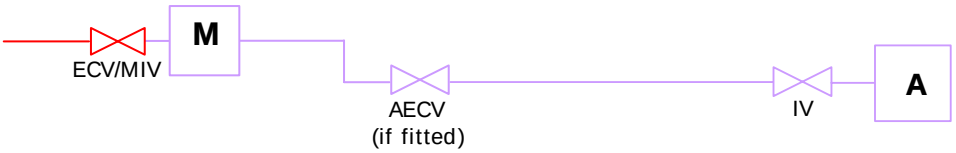
Tightness test using NG

(a) - New installation pipework with new meter



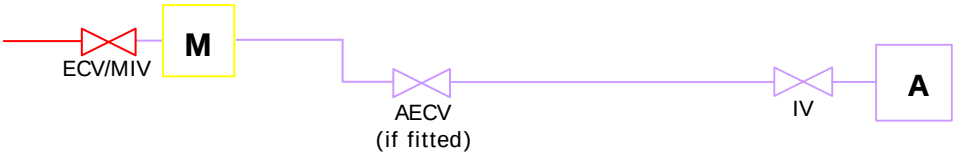
Tightness test using air

(b) - New installation pipework – no meter fitted



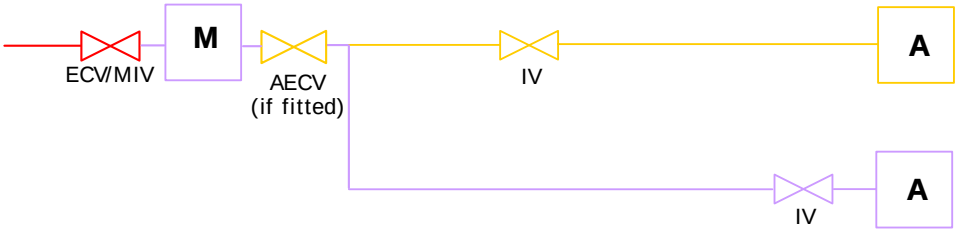
Tightness test using NG

(c) - Existing installation pipework and existing meter



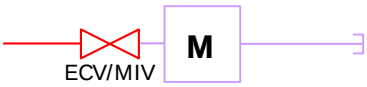
Tightness test using NG

(d) - Existing installation pipework and new meter



Tightness test using NG

(e) - Existing installation pipework and meter. New extension



Tightness test using NG

(f) - New or existing installation with a gas meter but no outlet pipework connected

A	gas appliance
AECV	additional emergency control valve
ECV	emergency control valve
IV	isolation valve
MIV	meter inlet valve
M	meter
NG	Natural Gas

new items
existing items
no test requirements

Note: Appliances may or may not be fitted.

FIGURE 4 - TYPICAL APPLICATIONS ($MOP_u \leq 75$ mbar)