

IGEM/TD/17
Communication 1769

Steel and PE pipelines for biogas distribution



Founded 1863
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Patron: Her Majesty the Queen



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© The Institution of Gas Engineers and Managers
IGEM House
High Street
Kegworth
Derbyshire, DE74 2DA
Tel: 0844 375 4436
Fax: 01509 678198
Email: general@igem.org.uk

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SECTION 1 : INTRODUCTION

- 1.1 There is an increasing demand for guidance on the installation of biogas pipelines. IGEM/TD/3 covers the majority of requirements for such installations, however account does need to be given to the different properties of biogas. This Standard provides advice on those properties and is intended to be used in conjunction with IGEM/TD/3.

Note 1: Biogas is defined as a "combustible gas created by anaerobic digestion of organic material". The composition is normally around 60% methane and 40% carbon dioxide.

Note 2: Biogas is different from biomethane, which is biogas from which the majority of carbon dioxide has been removed.

- 1.2 This Standard has been drafted by a Panel appointed by the Institution of Gas Engineers and Managers' (IGEM's) Gas Transmission and Distribution Committee, subsequently approved by that Committee and published by the authority of the Council of the Institution.

- 1.3 This Standard makes use of the terms "must", "shall" and "should" when prescribing particular requirements. Notwithstanding Sub-Section 1.4:

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

- 1.4 Notwithstanding Sub-Section 1.3, this Standard does 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 of this Standard. Amendments to this Standard will be issued when necessary and their publication will be announced in the Journal of the Institution and other publications as appropriate.

- 1.5 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 primary responsibilities. Employers must:

- (a) 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 the exercise of professional judgement by "responsible engineers".
- (b) 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.
- (c) have systems and procedures in place to ensure that the exercise of professional judgement by "responsible engineers" is subject to appropriate monitoring and review.

(d) not require “responsible engineers” to undertake tasks which would necessitate the exercise of professional judgement that is not within 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 which deviate from this, they should refer the matter for higher review.

Note: The responsible engineer is a suitably qualified, competent and experienced engineer or a suitably qualified, competent and experienced person acting under their supervision, appointed to be responsible for the application of all or part of this Standard.

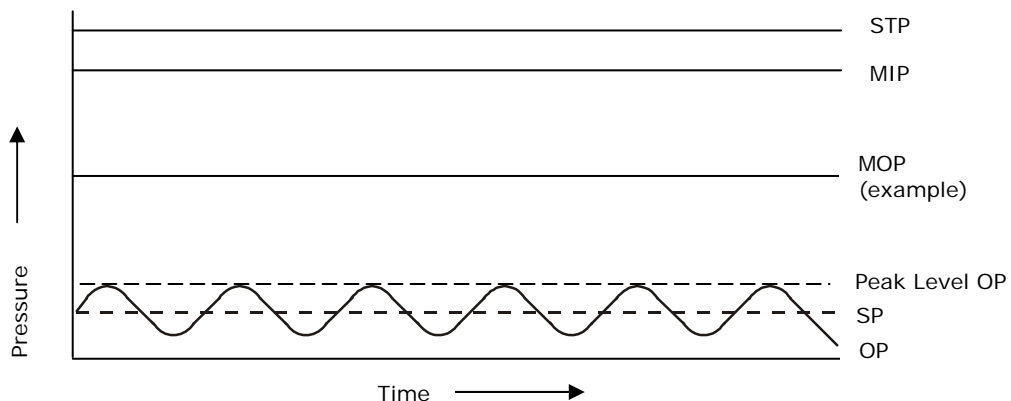
1.6 Materials and the techniques of construction and operation are constantly being improved and it is intended to keep this Standard under review.

1.7 It is now widely accepted that the majority of accidents in industry generally are in some measure attributable to human as well as technical factors. People who initiated actions that caused or contributed to accidents might have acted in a more appropriate manner to prevent them.

To assist in the control of risk and proper management of these human factors, due cognisance should be taken of HSG48.

1.8 Requests for interpretation of this Standard in relation to matters within their scope, but not precisely covered by the current text, may be addressed to Technical Services, IGEM, IGEM House, High Street, Kegworth, Derbyshire, DE74 2DA, email, technical@igem.org.uk 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 imply acceptance of any liability for the consequences and does not relieve the responsible engineer of any of his or her obligations.

1.9 IGEM has adopted the terms and definitions used in European standards for pressure such as maximum operating pressure (MOP), operating pressure (OP), maximum incidental pressure (MIP) and strength test pressure (STP). Figure 1 explains these terms. Further guidance can be found in IGEM/TD/13.



- 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 IGEM/TD/13 and simplified for the purposes of IGEM/TD/17.

FIGURE 1 - PRESSURE TERMINOLOGY

SECTION 2 : SCOPE

- 2.1 This Standard covers the additional requirements for design, construction, inspection, testing, operation and maintenance of stainless steel and polyethylene (PE) pipelines for the conveyance of biogas.
- Note 1: Reference has to be made to IGEM/TD/3 and IGEM/UP/2. This standard primarily deals with safety concerns relating to the composition of the biogas being distributed.*
- Note 2: It is likely many of the requirements will be appropriate for carbon steel but a suitable risk assessment will need to be undertaken to take account of the different constituents and consequent effects on material and operations.*
- 2.2 This Standard covers pipelines distributing biogas of MOP not exceeding 2 bar and at a temperature from 0°C to 40°C (see Note 2) inclusive for PE and -40°C to 100°C inclusive for stainless steel.
- Note 1: The scope may be extended beyond MOP of 2 bar but specific areas will require further justification and documentation which embraces a safety evaluation.*
- Note 2: For PE pipelines operating above 20°C, the effect of fatigue impact will need to be accounted for in the design. Guidance is given in IGEM/TD/3.*
- 2.3 This Standard covers the predominantly underground network of pipes that convey biogas from biogas production plants to a suitable point where it can be used in the industrial/commercial sector or upgraded (via a biogas upgrading plant (BUP)) to biomethane, either for use as a vehicle fuel or for injection into the Natural Gas network following enrichment and odourisation if appropriate (see Figure 2).
- Note 1: IGEM/G/1 provides extensive definitions with respect to the end of a gas supply network.*
- Note 2: Pressure regulating installations (PRIs) are covered in IGEM/TD/13, IGEM/GM/6 and IGEM/GM/8 respectively.*
- Note 3: Above ground biogas pipework is covered by IGEM/UP/2.*
- Biomethane Network Entry Facilities (BNEF's) are covered by IGEM/TD/16.*
- Below ground biomethane pipelines are covered by IGEM/TD/3.*
- 2.4 All references to gas pressure are gauge pressure, unless otherwise stated.
- 2.5 Italicised text is informative and does not represent formal requirements.
- 2.6 Appendices are informative and do not represent formal requirements unless specifically referenced in the main sections via the prescriptive terms "must", "shall" or "should".

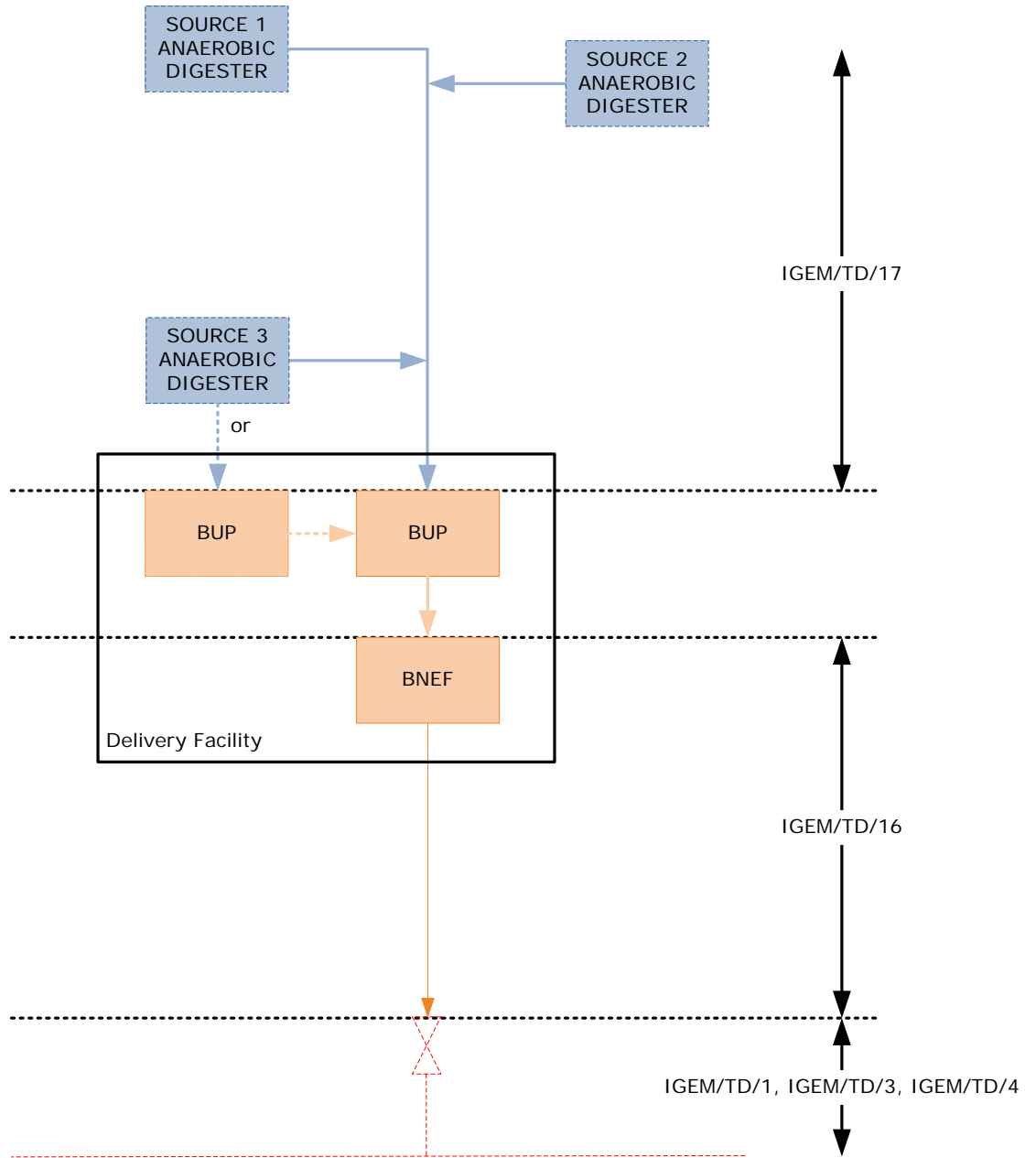


FIGURE 2 - SCOPE OF IGEM/TD/17