IGEM
Institution of
Gas Engineers & Managers

IGEM/TD/1 Edition 5
Communication 1735

Steel pipelines and associated installations for high pressure gas transmission

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SECTION 1 : INTRODUCTION

1.1 Recommendations on the installation of steel pipelines for high pressure gas transmission were first published by the Institution of Gas Engineers in 1965.

Recommendations, superseding the 1965 edition were published progressively between 1970 and 1977 and consolidated in IGE/TD/1 Edition 1.

Later in 1977, the then Section 5, Design, was further revised and issued as IGE/TD/1 Edition 2.

IGE/TD/1 Complete Edition 2 was published in 1984, extending the maximum permissible design pressure from 70 bar to 100 bar.

IGE/TD/1 Edition 3 was published in 1993, introducing guidance for risk analysis and providing more comprehensive guidance for testing, commissioning and condition monitoring.

Three Supplements to IGE/TD/1 Edition 3 were published in 1999 and 2000 on handling, transport and storage of steel pipe, bends and fittings (Supplement 1), 1219.2 mm (48 in) pipelines (Supplement 2) and uprating the design factor to 0.8 (Supplement 3).

IGE/TD/1 Edition 4 was published in 2001.

Supplements 2 and 3 to Edition 3 were included in IGE/TD/1 Edition 4 whereas Supplement 1 to Edition 3 became a supplement to Edition 4, and is now a Supplement 1 to IGEM/TD/1 Edition 5.

IGEM/TD/2 on land use planning (LUP), was published in 2008.

1.2 IGEM/TD/1 Edition 5 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 IGEM.

1.3 This Standard applies to the design, construction, inspection, testing, operation and maintenance of pipelines and associated installations, designed after the date of publication. Hence, this edition applies to all new pipelines, associated installations and diversions, as well as modifications of existing pipelines and associated installations.

Existing pipelines and associated installations that comply with IGE/TD/1 Editions 1, 2, 3 or 4 may continue to be operated in accordance with the respective Edition, although surveillance, inspection and maintenance may be undertaken in accordance with Edition 5. Operating conditions are not allowed to pass outside the limits of Edition 1, 2, 3 or 4 as appropriate, unless the new conditions are consistent with Edition 5.

Furthermore, existing associated installations that comply with IGE/TD/9 (obsolete) may be surveyed, inspected and maintained in accordance with this IGEM/TD/1 Edition 5, if appropriate.

Note: In this respect, Section 11 describes what constitute "associated installations". It is important to note that pressure regulating installations (PRIs) are not included. For existing PRIs, reference will need to be made to IGE/TD/9 (obsolete) or IGE/TD/13, as appropriate for the date when designed. In addition, "associated installations" were not addressed at all by IGE/TD/1 Editions 1, 2, 3 or 4 and reference may be needed to IGE/TD/9 (obsolete) in this respect.

IGEM/TD/1 Edition 5 can be used to provide detailed requirements to support BS EN 1594.

1.4 Significant amendments to Edition 4 have been made in this edition. These include:

- removal of the upper limit to maximum operating pressure (MOP) (formerly limited to 100 bar)
- inclusion of advice on the relevant safety evaluation when MOP exceeds 100 bar
- addition of requirements for certain associated installations (see Figure 1)
- removal of requirements for methanol swabbing, except where there is no practicable alternative (see Appendix 9)
- guidance on alternating current (AC) corrosion and application of new technology associated with corrosion protection
- inclusion of equations for proximity curves
- an alternative approach for reaffirmation of MOP, avoiding the requirement for pressure raising in all circumstances
- revision of the requirements for TD/1 audits
- the updating of numerous references to legislation and standards.

1.5 Engineering requirements are set out for the safe design, construction, inspection, testing, operation and maintenance of pipelines and associated installations, in accordance with current knowledge.

This Standard is intended to protect from possible hazards members of the public and those who work with pipelines and associated installations, as well as the environment, so far as is reasonably practicable. It is also intended to ensure that the security of gas supply is maintained.

1.6 This Standard is applicable to conditions normally encountered in the transmission of gas. Additional design considerations may be necessary where unusual conditions are encountered. These may include unstable ground (including the possibility of mining subsidence), mechanical or sonic vibrations, long self-supported spans, massive special attachments or thermal forces other than seasonal.

Note: Some guidance on dealing with subsidence is provided in Section 6.

1.7 This Standard makes use of the terms "should", "shall" and "must" when describing particular requirements. Notwithstanding Sub-Section 1.9:

- 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 Codes of Practice (ACoPs) or guidance, and reference needs to be made to such statutory legislation, ACoPs or official guidance for information on legal obligations.

1.8 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 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.

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:

- 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"
- 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 judgement. When "responsible engineers" are asked to undertake tasks that deviate from this, they should refer the matter for higher review.

Note: The responsible engineer is a suitably qualified, competent and experienced engineer appointed to be responsible for the execution and for approval of activities associated with the design, construction, operation and maintenance of pipelines and associated installations.

1.9 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 to this Standard. Amendments to this Standard will be issued when necessary and their publication will be announced in the Journal of IGEM and other publications as appropriate.

1.10 Requests for interpretation of this Standard in relation to matters within its scope, but not precisely covered by the current text, should be addressed 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.

1.11 This Standard was published on 1st December 2008.

SECTION 2 : SCOPE

2.1 This Standard covers the design, construction, inspection, testing, operation and maintenance of steel pipelines and certain associated installations (see Figure 1), for the transmission of dry Natural Gas (predominantly methane), with or without odorisation, at MOP exceeding 16 bar and not exceeding 100 bar. The scope may be extended beyond MOP of 100 bar but specific areas will require further justification and documentation which embraces a safety evaluation.

While the Standard may be appropriate for use with other gases, the characteristics of the gas and the consequential effect upon design, material, operations and maintenance of the pipeline have to be taken into account. In this context, other gases are those described by 1st family, other 2nd family and 3rd family gases as defined in BS EN 437.

Note 1: Requirements for steel pipelines of MOP not exceeding 16 bar are contained in IGE/TD/3, and on steel services in IGE/TD/4. Those Standards do not address associated installations so reference may also need to be made to IGE/TD/13 whose principles may be applied. Equally, it may be deemed appropriate to use the principles of this Standard for such installations.

Note 2: A safety evaluation involves a systematic study of the major hazard potential of a pipeline and its associated installation (see Sub-Section 6.8).

2.2 This Standard covers operating temperatures between – 25°C and + 120°C inclusive.

2.3 This Standard applies to pipelines laid between points on land, including water crossings. For pipelines of which any part is offshore, additional or alternative guidance may be required for the offshore section. However, many of these requirements will remain valid.

Note: Offshore pipelines are those that are on the seaward side of the low water mark or special boundaries drawn at bays and estuaries.

The Standard equally applies to pipework design for certain associated installations, including above-ground valves, pig trap installations, manifolds, multi-junction stations, the main pipework at compressor stations, metering installations, connections and other off takes but does not apply for PRIs (when IGE/TD/13 applies).

Note: This Standard is not intended to cover detailed planning and siting requirements for these associated installations.

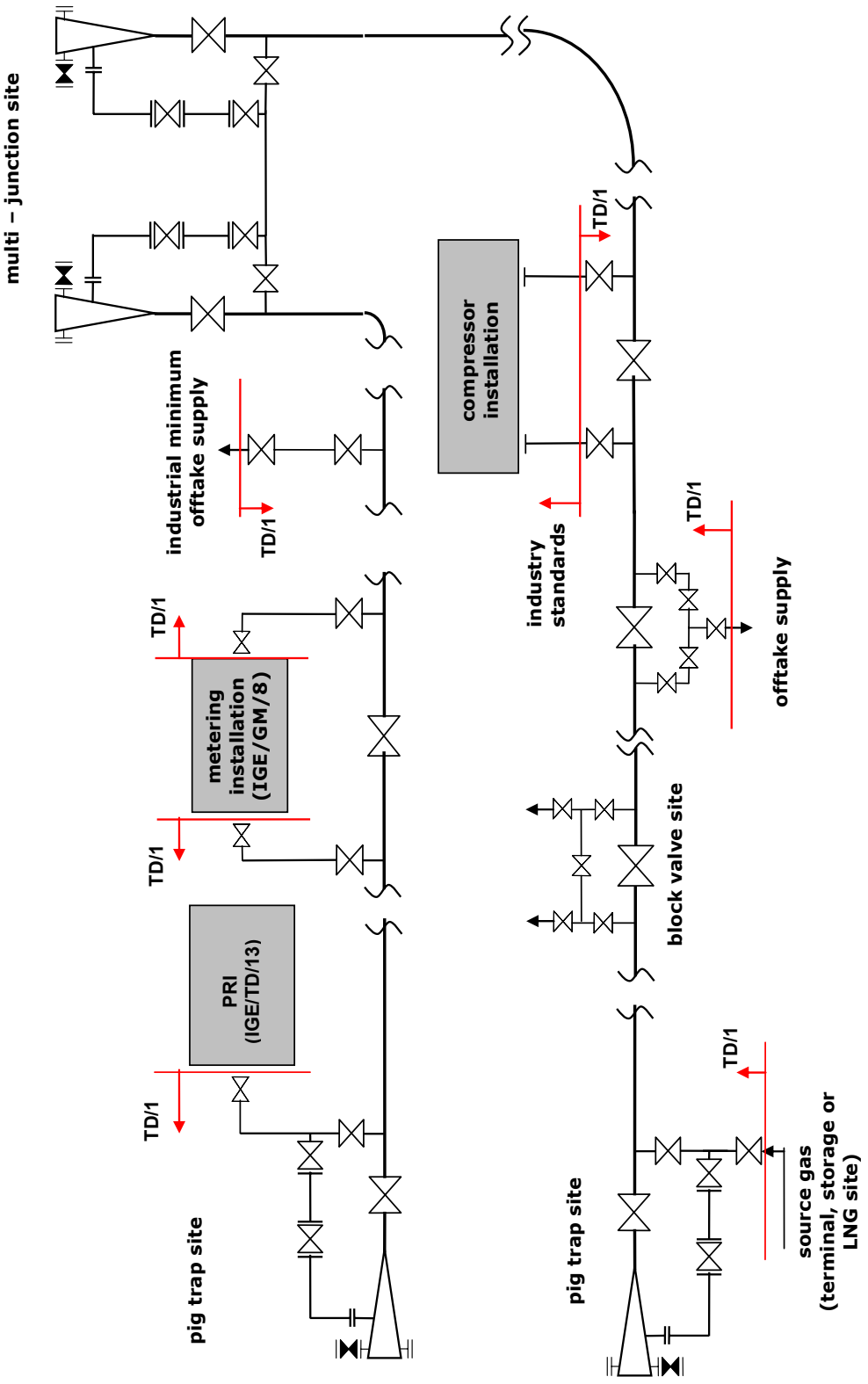
2.4 All references to gas pressure are gauge pressure, unless otherwise stated.

2.5 Details of all legislation, standards and other publications referenced are provided in Appendix 2.

Where standards are quoted, equivalent national and international standards, etc. equally may be appropriate.

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 "should", "shall" or "must".



Note 1: The diagram is for illustrative purposes only – it does not purport to demonstrate typical pipeline arrangements.

Note 2: Pig traps may be installed at a factory, onshore terminal, refinery, compressor station and otherwise as a component of the pipeline, when the limits of the pipeline end at the outlet of vent valves.

FIGURE 1 - SCOPE OF IGEM/TD/1 EDITION 5