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Institution of
Gas Engineers & Managers

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Communication XXXX

Founded 1863
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Her Majesty the Queen

Gas in Multi-occupancy Buildings

6TH WORKING DRAFT AFTER COMMENT

1 This draft Standard IGEM/G/5 Edition 3 has been prepared by a Panel under the chairmanship of Rodney Hancox.

2 This 6th Working Draft after Comment is presented to the G5 Panel for its consideration.

3 This is a draft document and should not be regarded or used as a fully approved and published Standard. It is anticipated that amendments will be made prior to publication.

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SECTION 1 : INTRODUCTION

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

1.2 This Standard summarises best practice for the design, installation, operation, inspection and maintenance of gas installations for multi-occupancy buildings (see Sub-Section 2.1). It combines well established practices with new advice on aspects of design and construction of such installations. The Standard consolidates best practice and guidance from Legislation, and existing gas industry standards and procedures, with the aim of helping to achieve safe designs, installations and continuing operation for gas in the buildings concerned throughout the lifetime of the asset.

1.3 This standard is primarily for an informed and experienced audience such as Gas Engineering professionals, Architects, M&E Consultants and Building Facilities and Maintenance Managers and Responsible Person for the building. It is assumed that readers of this standard are familiar with and understand the roles specified in the Construction (Design and Management) Regulations (CDM).

1.4 Compliance with this Standard cannot confer immunity from statutory legal obligations.

1.5 Significant amendments have been made compared to the second edition. These include:

- reviewed risk hierarchy for timber and traditionally constructed buildings
- revision of figures and the addition of new figures
- reviewed responsibilities associated with new work, replacement work and ongoing operation inspection and maintenance
- updated requirements for inspection of network pipelines
- updated references to materials standards
- reviewed competence requirements
- reviewed record keeping and information to be presented to the Responsible Person for the Building
- decommissioning.

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1.6 This Standard makes use of the terms "must", "shall" and "should", when prescribing particular procedures. Notwithstanding Sub-Section 1.7:

- the term "must" identifies a requirement by law in the United Kingdom (UK) 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.

Note: *The phrase "prior consideration" means that a suitable and sufficient risk assessment will be completed and documented to show that the alternative method delivers the same, or better level of protection.*

1.7 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.

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 the HSG48 and HSG65.

1.9 Notwithstanding Sub-Section 1.6, 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 IGEM's Journal 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, IGEM House, High Street, Kegworth, Derbyshire, DE74 2DA, 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 in xxxxx 2019.

SECTION 2 : SCOPE

2.1 This Standard covers gas infrastructure to and within multi-occupancy buildings and the individual dwellings and commercial units within such buildings. The principles underpinning this standard apply to all building situations whether typical or more complex ones.

Note 1: The term "multi-occupancy building" means a building that contains multiple domestic dwellings or a building that contains both multiple domestic dwellings and commercial units.

~~*Note 2: The term "dwelling(s)" means both "domestic dwelling(s)" and "commercial unit(s)" within a multi-occupancy building, unless otherwise stated.*~~

Note 2: In England and Wales, buildings with 3 or more storeys and where the distance between ground level and the floor of the top most storey is less than 18 metres ~~are categorised~~have been regarded as medium rise. Buildings where the distance between ground level and the floor of the top most storey is 18 metres or more ~~are categorised~~have been regarded as high rise.

The Building Safety Bill has introduced the designation of High Risk Building. It is intended that descriptions of buildings to be designated as "High Risk" will be prescribed in Regulations. Initially, it is intended that High Risk Buildings will be high rise multi occupancy buildings where

a) The floor surface of the building ' s top storey is 18 metres or more above ground level, or

b) the building contains more than 6 storeys.

However, in Scotland, a building where the distance between ground level and the floor of the top most storey is 11 metres or more is categorised as high rise (so will apply where there are five or more storeys). This aligns with the height of a pitched fire and rescue service ladder, and with advice from the Scottish Fire and Rescue Service of the height that might be reached by a jet from a fire-fighter's hose, discharged at ground level.

Measurement diagrams can be found in Approved Document B.

Note 3: Properties deemed separate buildings, each comprising an individual single dwelling, such as detached, semi-detached or terraced houses/bungalows, are not covered.

Note 4: The principles of this Standard may be applied to other high risk buildings such as student accommodation, schools, residential care homes, hotels and shopping malls etc.

2.2 This Standard covers new, replacement and like for like component replacement of gas network pipelines, meter installations, installation pipework (including secondary meters), appliances and chimneys.

This Standard also covers inspection, maintenance, repair, alteration and decommissioning processes.

Note 1: In this context, "new and replacement" embraces:

- *any first time gas supply or replacement of any of the above mentioned sections of the gas supply system*
- *any new extension to an existing section of the gas supply system*
- *significant partial replacement of/alteration to any of the sections of the gas supply system. For example, the replacement of a riser system having one or more laterals connected would likely be deemed 'significant partial replacement'.*

Regarding replacement/alteration, it is important to comply with legal obligations, for example, the checks required by Gas Safety (Installation & Use) Regulations (GS(I&U)R) following work on any part of a gas supply system.

Note 2: A network pipeline supplying a primary meter installation will be a "service" or a "distribution main". The difference, for the purposes of this Standard, is insignificant except when cross referring to other Standards, for example IGEM/TD/3 and IGEM/TD/4. This Standard uses either or both of the terms "network" or "pipeline" throughout.

Note 3: IGEM/TD/3 does not address pipes in buildings. IGEM/TD/4 references IGEM/G/5 with respect to gas in multi-occupancy buildings.

2.3 This Standard defines requirements covering the core areas of safety for gas in multi-occupancy buildings, such as:

- planning, risk assessment and minimising risk
- meter installations and location of gas meters with respect to escape routes and the GS(I&U)R and Building Regulations

  Note: This affects many other aspects of the installation significantly, for example ventilation, consumer access for meter reading and isolation, and escape routes.
- network pipelines, types of building entry, risers, laterals and isolation valves
- ventilation of network pipelines, meter installations and installation pipework
- access for inspection and maintenance to network pipelines, meters, installation pipework and appliance chimneys
- modifications, repairs, testing, re-commissioning and decommissioning of existing network pipelines
- energy centres and their associated risks
- installation pipework, gas appliances and chimneys
- materials
- location of valves
- inspection, maintenance and decommissioning
- electrical safety and equipotential bonding.

  Note: The text on this subject has been drawn up with the assistance of the Institution of Engineering Technology (IET) and the Energy Networks Association (ENA).
- roles, responsibilities and competence.

Note: This Standard includes requirements that are either additional to or vary existing requirements contained in other standards where the requirements of those other standards may not be sufficient for gas installations in multi-occupancy buildings. However, those existing Standards are referenced and the majority of their requirements will still apply where relevant. These standards include:

- *IGEM/TD/3 and IGEM/TD/4 for network pipelines;*
- *IGEM/TD/13 for pressure regulating installations (PRIs);*
- *BS 6400 for domestic-sized meter installations;*
- *IGEM/GM/6 and IGEM/GM/8 for larger meter installations;*
- *IGEM/GM/7A and IGEM/GM/7B for electrical connections to, and hazardous area classification of, meter installations;*
- *BS 6891 for domestic-sized installation pipework;*
- *IGEM/UP/2 for larger installation pipework;*
- *IGE/UP/7 for timber and light steel framed buildings;*
- *BS 5440-1 and 2 for the supply of chimneys and ventilation;*
- *IGEM/UP/17 for dealing with shared chimney and flue systems*
- *BS 8313 Building Services in Ducts.*

2.4 This Standard addresses requirements for the risk assessment of gas installations within any multi-occupancy building and the individual dwelling(s)/unit(s) within such a building.

2.5 This Standard generally addresses appliances within domestic dwellings or commercial units which have been CE marked or designed to a relevant Standard.

This Standard covers all types of open flue chimney or room sealed chimney systems (that comply with appropriate construction standards) for gas appliances, whether they are separate from, or integral with, the appliances.

2.6 This Standard addresses gas installations intended to contain odorised Natural Gas at a network maximum operating pressure (MOP) not exceeding 75 mbar within an occupied building.

Note 1: Where the network MOP exceeds 75 mbar, a PRI has to be installed in the network pipeline in accordance with IGEM/TD/13. Any such PRI has to be located outside the building or in a separate compound/enclosure remote from the building and accessible only from the outside.

Note 2: This Standard assumes a gas supply layout as given in IGEM/G/1 for "Standard gas supply arrangements". Where a "bulk meter" serves secondary meters, via installation pipework, the principles of IGEM/UP/2 also may be applicable.

Note 3: For energy centre installations, see Section 11.

2.7 The term "meter" means "gas meter installation" unless otherwise stated.

2.8 The term Gas Transporter (GT) is deemed to include a "Gas Conveyor" conveying gas in a network pipeline.

Note 1: The definition of "Gas Conveyor" is given in IGEM/G/1 and IGEM/G/4.

Note 2: An alternative description taken from The Gas (Exemptions) Order 2011 is "Licence Exempt Gas Transporter".

2.9 All pressures quoted are gauge pressures, unless otherwise stated.

2.10 Italicised text is informative and does not represent formal requirements.

2.11 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 : LEGISLATION

3.1 **GENERAL**

3.1.1 This Standard is set out against a background of Legislation in force in the UK at the time of publication. Similar considerations are likely to apply in other countries and reference to appropriate national legislation will be necessary.

Appendix 2 lists Legislation, guidance notes and standards etc. which are identified within this Standard as well as further items of legislation that may be applicable.

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

Unless otherwise stated, the latest version of the referenced document should be used.

3.1.2 Health and safety legislation must be observed, including those requirements concerned with the duties of employers towards both their employees and other persons, including members of the public whose safety may be affected.

In the absence of specific Legislation, it is essential that installations are designed, constructed, installed, operated, maintained and decommissioned so as to be safe.

3.2 **LEGISLATION**

3.2.1 **Health and Safety at Work etc. Act (HSWA)**

HSWA applies to all persons involved with work activities, including employers, the self-employed, employees, designers, manufacturers, suppliers, etc. as well as the owners of premises. It places general duties on such people to ensure, so far as is reasonably practicable, the health, safety and welfare of employees and the health and safety of members of the public who may be affected by the work activity.

3.2.2 **Management of Health and Safety at Work Regulations (MHSWR)**

MHSWR impose a duty on employers and the self-employed to make assessments of risks to the health and safety of employees, and non-employees affected by their work. They also require effective planning and review of protective measures.

3.2.3 **Gas Safety (Installation and Use) Regulations (GS(I&U)R)**

3.2.3.1 GS(I&U)R are relevant statutory provisions of HSWA, setting out general and detailed requirements dealing with the safe installation, maintenance and use of gas systems (including gas fittings, appliances and chimneys).

3.2.3.2 GS(I&U)R place responsibilities on those installing, servicing, maintaining or repairing gas appliances, installation pipework, meters, etc. as well as on suppliers and users of gas.

3.2.3.3 GS(I&U)R defines the type of work that requires persons carrying out such work, or their employers, to be a "member of a class of persons". In Great Britain, Northern Ireland, the Isle of Man and the Channel Islands this means registration under the Gas Safe Register scheme.

3.2.3.4 The installer must check the safety of any appliance or pipework they install or work on and take appropriate action where they find faults. Where the premises are let or hired out, the landlord/hirer has special responsibilities to ensure that

any installer they use for gas fitting, service, maintenance or safety is an approved class of person if applicable (see Sub-Section 3.3) and is competent to carry out such work. If any serious fault is found, the installer must inform both the landlord/hirer, as well as the user, so that such faults can be rectified before further use. Reference should also be made to the current IGEM/G/11.

Note: L56 is an Approved Code of Practice (ACoP) and Guidance on GS(I&U)R.

3.2.3.5 Landlords must ensure that annual safety checks are carried on appliances/flues and that a record is kept and issued (or in certain cases, displayed) to tenants. In addition, landlords must ensure any necessary inspection and maintenance of associated installation pipework is carried out.

3.2.4 Electricity at Work Regulations

These Regulations apply to a wide range of electrical work, from overhead power lines to the use of office computers and batteries and include work on gas equipment using electrical energy.

The Regulations are concerned with the prevention of danger from electric shock, electric burn, electrical explosion or arcing or from fire or explosion initiated by electrical energy.

The Regulations impose duties on every employer, employee and self-employed person and require that persons engaged in electrical work be competent or be supervised by competent persons.

Note 1: HSR25 gives guidance on the Regulations.

Note 2: Organisations that operate approved competent person self-certification schemes for any electrical work at the time of publication of IGEM/G/5 Edition 3 are: BESCA, BSI, ELECSA, NAPIT and NICEIC.

3.2.5 Construction (Design and Management) Regulations (CDM)

3.2.5.1 CDM apply to almost all construction work and impose duties on designers, clients, developers and contractors. The client must appoint a principal designer and principal contractor in writing, who must be in place throughout the construction phase.

3.2.5.2 The Principal Designer shall plan, manage and monitor the pre-construction phase and coordinate matters relating to health and safety for different component parts of the project including those for the gas infrastructure.

3.2.5.3 The Principal Contractor shall manage, monitor and coordinate health and safety matters relating to the various construction activities including welfare facilities and engagement with workers, during the construction phase of the project.

3.2.5.4 Not all the Regulations apply to all construction projects~~,~~. ~~further information is given in HSL153.~~ For a notifiable project (as defined in CDM) the ~~p~~Principal ~~d~~Designer must notify HSE before construction work commences. ~~Construction includes the alterations, repair, redecoration, maintenance, decommissioning and demolition of a structure. It also covers installation, commissioning, maintenance or removal of gas services.~~

Note 1: Construction includes the alterations, repair, redecoration, maintenance, decommissioning and demolition of a structure. It also covers installation, commissioning, maintenance or removal of gas services.

Note 2: HSL153 is an ACoP and guidance on CDM. In particular, it not only specifies the roles and responsibilities of the Client, Principal Designer and Principal Contractor but it also specifies them for Designers and Contractors.

3.2.6 **Pipelines Safety Regulations (PSR)**

PSR provide a means of securing pipeline integrity by ensuring that a pipeline is designed, constructed and operated safely. PSR apply to all network pipes operated by a gas transporter (GT). Installations can vary in size and complexity, and installation designers have to give due consideration to the operating pressure (OP) and required gas flows.

Note: HSL82 give guidance on PSR.

In particular, PSR require that the operator ensures no fluid is conveyed in a pipeline unless the pipeline has been designed so that, as far as is reasonably practicable, examination and maintenance may be carried out safely. PSR also require that the operator ensures that a pipeline is maintained in an efficient state, in efficient order and in good repair.

Note 1: Regulation 5 of the PSR requires the operator and therefore the designer to ensure "...that no fluid is conveyed in a pipeline unless it has been so designed that, so far as is reasonably practicable, it can withstand-
(a) forces arising from its operation;
(b) the fluids that may be conveyed in it; and
(c) the external forces and the chemical processes to which it may be subjected."

Note 2: Regulation 7 of the PSR requires the design to take into account the need to facilitate the inspection and maintenance of the pipeline.

Note 3: These requirements are likely to be significant to a GT considering whether to adopt a network pipeline extension for which the key consideration is fitness-for-purpose of the pipeline and access for future inspection and maintenance.

3.2.7 **Pressure Systems Safety Regulations (PSSR)**

The aim of PSSR is to prevent serious injury from the hazards of stored energy as a result of failure of a pressure system or one of its component parts. With the exception of steam, PSSR do not consider the hazardous properties of the contents released following system failure. PSSR do not apply to the installations within main buildings covered by this Standard but may apply to such gas infrastructure as network pipelines and PRIs external to the building.

Note: HSL122 is an ACoP on PSSR.

3.2.8 **Building Regulations and Standards**

Although many of the requirements of the Building Regulations (England and Wales), the Buildings (Scotland) Regulations and Building (Amendment) Regulations (Northern Ireland) are similar, they sometimes differ in specific detail. The designer must refer to the appropriate Regulations and associated Approved Documents/Technical Standards for the country concerned.

3.2.8.1 *England and Wales (as Amended)*

3.2.8.1.1 Building Regulations are Statutory Instruments which have been enabled by The Building Act 184. They ~~that~~ must be followed when ~~engaged in~~ any building work is carried out. They are written in a format of broad often goal setting Regulations, setting out simple requirements in a separate schedule. Suggested ways of complying with these Regulations are contained in Approved Documents.

3.2.8.1.2 The Approved Documents that apply to gas work are:

- A (Structure)
- B (Safety in Fire)

Note: Volume 1 addresses fire safety in dwellings including blocks of flats. Volume 2, which addresses fire safety in other buildings, also applies to blocks of flats where the top storey is over 18m in hight.

- F (Ventilation)
- G (Hygiene)
- J (Heat producing Appliances)
- L (Conservation of Fuel and Power)
- M (Access to and use of buildings)
- P (Electrical Safety)
- 7 (Materials and workmanship).

Note 1: See Regulation 3(1) for a full definition of "building work".

Note 2: Further information is available from the Ministry of Housing, Communities and Local Government website.

Note 3: The power to make changes to the Building Regulations for Wales has been passed to Welsh Government. The power was exercised in 2019 by the publication of the Building (Amendment) (Wales) Regulations 2019 (SI 2019/1499 (W275)).

Note 4: The Welsh Government has published its own versions of the Approved Documents and these differ from those applicable to England. Reference is to also be made to Circulars published by the Welsh Government.

Note 5: At the time of publication of this Standard, the Regulations and the Approved Documents applicable to England are being reviewed by The Ministry of Housing, Communities and Local Government. Therefore, reference needs be made to correct Regulations and Approved Documents for the appropriate country.

3.2.8.2 *Building Standards (Scotland) Regulations and Amendments*

3.2.8.2.1 The Building Standards (Scotland) are written directly as Regulations within the Statutory Instrument. The Regulations can be satisfied by:

- compliance with Technical Standards published by the Scottish Government

  Note: The technical handbooks are available through the Scottish Government's website.
- conforming with the provisions of "deemed to satisfy" documents, for example British Standards
- other equivalent means.

3.2.8.3 *Northern Ireland (as amended)*

3.2.8.3.1 The Regulations can be satisfied by:

- compliance with Technical Booklets published by The Department of Finance and Personnel of the Northern Ireland Government

  Note1: Technical Booklet E addresses Fire Safety.

  Note 2: Further information is available from Northern Ireland Building Control website (see www.buildingcontrol-ni.com/regulations/technical-booklets).
- conforming with the provisions of "deemed to satisfy" documents, for example British Standards
- other equivalent means.

Note: Further information is available from the Department of Finance and Personnel website.

3.2.8.4 *Building Regulations for the Isle of Man*

These are statutory Regulations made by the Isle of Man Government.

3.2.9 **Dangerous Substances and Explosive Atmospheres Regulations (DSEAR)**

3.2.9.1 DSEAR apply to any workplace where there is present any substance or mixture of substances with the potential to create a risk from energetic (energy-releasing) events such as fire, explosions, etc. Such substances, known in DSEAR as dangerous substances, include NG. Installation of appliances manufactured to the Gas Appliances (Safety) Regulations is excluded from DSEAR, as is a "gas fitting" within the meaning of GS(I&U)R, at domestic premises. However, network pipes are not such gas fittings and any work carried out in domestic premises when network pipes contain gas is subject to DSEAR.

Note 1: HSL138 and INDG 370 contain details of DSEAR and their application.

Note2: Guidance in HSL138 states "In multi-occupancy premises, it is not expected that an explosive atmosphere would extend into shared common areas. However, the architect/Responsible Person should still carefully consider the potential for and effect of an incident involving dangerous substances on the rest of the premises including the common parts and liaise with the other occupants to ensure adequate emergency procedures are in place (see Section 3 of the HSW Act)".

3.2.9.2 For the purposes of this standard, rooms/enclosures containing meter banks shall be required to comply with DSEAR.

3.2.9.3 DSEAR require relevant pipes to be labelled, for example to indicate they contain gas.

Note: See Appendix 4 for a reproduction of Regulation 6. It refers to the containment of the dangerous substance, which is satisfied by a properly constructed pipe and dispersing any leakage by natural ventilation before any explosive atmosphere can be formed.

3.2.10 Gas Safety (Management) Regulations (GS(M)R)

3.2.10.1 GS(M)R place specific duties on GTs, or their emergency service providers (ESPs), for dealing with gas escapes from pipes on their network. The primary duty is to make the situation safe. GTs are responsible not only for dealing with escapes from their own pipes, but also for dealing with escapes from gas fittings supplied with gas from pipes on their network. In GS(M)R, the term "gas escapes" includes escapes or emissions of carbon monoxide (CO) from gas fittings.

3.2.10.2 Regulation 8 and Part 1 of Schedule 3 of GS(M)R requires gas to be at a suitable pressure to ensure the safe operation of any gas appliance which a consumer could reasonably be expected to operate.

3.2.11 Gas Act

The safe construction of a pipeline is an activity which a GT is entitled to undertake under the Gas Act 1986 as amended by the Gas Act 1995 and incorporating standalone provisions of the Utilities Act 2000.

The Gas Act enables the Secretary of State to make Regulations empowering authorised personnel to enter premises to inspect pipes, fittings, appliances and chimneys and to take action necessary to protect life and property.

The Gas Act places an obligation on GTs to develop and maintain an efficient and economical pipeline system for the conveyance of gas.

3.2.12 Rights of Entry (Gas and Electricity Boards) Act

This Act restricts the exercising of rights of entry. No right of entry shall be exercisable in respect of any premises except:

- with consent given by or on behalf of the occupier of the premises, or
- under the authority of a warrant

unless entry is required in a case of emergency.

3.2.13 **Gas Safety (Rights of Entry) Regulations 1996**

These Regulations provide the legal framework for the application of IGEM/G/11

In addition these Regulations confer rights of entry upon "gas transporters" and "relevant authorities" to enter premises for the purpose of preventing gas escapes, the examination and disconnection of "gas fittings" and other related purposes.

3.2.14 **Provision and Use of Work Equipment Regulations (PUWER)**

3.2.14.1 Work equipment has a wide meaning and includes machinery, ladders and lifting equipment and tools such as hammers and pipe clamps for use at work.

3.2.14.2 The Regulations place duties on employers in relation to selection, suitability, maintenance, inspection, installation, instruction and training, prevention of danger and control of equipment.

3.2.14.3 More information on the Regulations can be found in HSL22. Free leaflets include INDG291 and INDG229.

3.2.15 **Regulatory Reform (Fire Safety) Order**

3.2.15.1 The Regulatory Reform (Fire Safety) Order, commonly referred to as the "Fire Safety Order", applies in England and Wales to non-domestic properties, including common areas of multi-occupancy buildings.

Note : Reference may need to be made to the Housing Act for multi-occupancy buildings containing domestic dwellings.

3.2.15.2 The Fire Safety Order emphasises the prevention of fires and the reduction of risk, with the aim of reducing deaths, injuries and damage caused by fire.

3.2.15.3 The Fire Safety Order places duties on a 'Responsible Person' to ensure compliance with the Order. A 'Responsible Person' is any person, such as a Landlord or a Building Management Company, who has control over a building and in particular in the case of a multi-occupancy building, the common parts of the building.

Note 1: Article 3 defines a "Responsible Person". In practice, the "Responsible Person for the Building" may be the Owner, Local Authority, Housing Association, Landlord, Building Management Company or Facilities Manager.

Note 2: HM Land Registry e-services can be used to access The Land Registry on line to ascertain the identity of the owner of a building. In addition, some Local Authorities require all Landlords, not just those who let "Houses in Multiple Occupation", to register with them.

Note 3: Article 12 and Part 4 of Schedule 1 address the use of dangerous substances, such as natural gas, in relevant buildings. In summary, gas is to be contained [in a non-combustible pipe] and sufficient ventilation is to be provided to disperse any gas in air mixture well before the concentration reaches the lower flammable limit.

Note 4: Article 22 places a duty on all relevant persons to co-operate with one another. In addition, where the building remains occupied during replacement works, the Responsible Person for the Building is responsible for general fire precautions for the "construction site" as well as for the rest of the building.

Note 5 The enforcing authority for multi-occupancy buildings is the local Fire and Rescue Service. They have the power to issue Alteration, Enforcement and prohibition notices as appropriate on to the "Responsible Person".

Note 6: Guides for a range of premises are available from the Ministry of Housing, Communities and Local Government website.

Note 7: In Scotland the equivalent Legislation is the Fire (Scotland) Act 2005 and the Fire Safety (Scotland) Regulations 2006 except that they do not include common areas of blocks of flats.

Consequently, no fire risk assessments are required from a legal point of view for the common areas of blocks of flats nor are the fire safety measures imposed by the Fire Safety Order in England and Wales imposed under the Scottish legislation other than in respect of a requirement for the maintenance of facilities etc. for Firefighters.

However, it is often the practice for a group of owners in a tenement/block of flats to decide to hire someone to take care of the maintenance and repair responsibilities for them. These are called property factors (sometimes called property managers). Factors have to be registered on the Scottish Property Factor Register. Whilst not a legal requirement, the Scottish Government recommends Factors undertake a fire risk assessment of the common areas of a tenement/block of flats.

Note 8: In Northern Ireland compliance is with the Fire and Rescue Services (Northern Ireland) Regulations which are effectively a reproduction of the Scottish legislation. Consequently, blocks of flats are not in scope.

Note 9: Guidance may be found in the Health and Safety publication G168 - Fire Safety in Construction and BS 9991 – Fire Safety.

3.2.16 The Building Safety Bill

Commentary

For the purposes of this standard it is assumed that the Bill, which was published in July 2020, will not be amended significantly on its passage through Parliament before becoming an Act on receiving Royal Assent.

The purpose of the Bill is to put in place an enhanced safety framework for high risk buildings.

It is intended that descriptions of buildings to be designated as "High Risk" will be prescribed in Regulations. Initially, it is intended that High Risk Buildings will be high rise multi occupancy buildings where

c) The floor surface of the building ' s top storey is 18 metres or more above ground level (ignoring any storey which is a roof-top plant and machinery area or any storey consisting exclusively of plant and machinery rooms); or

d) the building contains more than 6 storeys (ignoring any storey which is below ground level).

The Bill establishes the Building Safety Regulator as a division within the Health and Safety Executive. The Building Safety Regulator has three broad functions. They are

a) Implementing the new, more stringent regulatory regime for higher-risk buildings.

b) Overseeing the safety and performance of all buildings.

c) Assisting and encouraging competence among the built environment industry, and registered building inspectors.

There will be an Accountable Person for each High Risk Building. The Accountable Person will be the duty-holder during the building's occupation and they will be responsible for

a) Registering the building with the Building Safety Regulator

b) Applying for a Building Assurance Certificate

c) Preparing and submitting safety case reports to the Building Safety Regulator that identify the specific safety risks applicable to the building and which demonstrate how those risks are managed.

In High Risk Buildings, in most cases the Accountable Person will be the same person as the Responsible Person for the Building under the Fire SafetyOrder.

There will be a Building Safety Manager who has to be registered with the Building Safety Regulator and whose role is to support the Accountable Person in the day to day management of the fire and structural safety of the building.

3.2.167 Housing Health & Safety Rating System (England) Regulations 2005

3.2.167.1 Part 1 of the Housing Act 2004 (the Act) introduced the Housing Health and Safety Rating System (HHSRS), an evidence-based system for assessing housing conditions. The HHSRS assesses 29 categories of housing hazard as specified in the HHSRS Regulations on the potential for harm that may result from exposure to the hazard.

3.2.167.2 Each hazard has a weighting which will help determine whether the property is rated as having risks which are either category 1 or category 2. Where a risk is deemed to be category 1, a local authority has a duty to take enforcement action; where a risk is deemed to be category 2, an authority has the power to take action. The options for enforcement following an HHSRS assessment are detailed in published Enforcement Guidance.

Note 1: A Class I harm is such extreme harm as is reasonably foreseeable as a result of the hazard in question, including death and 80% burns whilst a Class 2 harm is such severe harm as is reasonably foreseeable as a result of the hazard in question, including loss of consciousness for days.

Note2: Guidance on HHSRS is available on the Ministry of Housing, Communities and Local Government website.

3.2.167.3 The hazard categories most relevant to gas in multi-occupancy buildings are:

No.6 – Carbon Monoxide and Combustion Products,

No.9 – Non-combusted fuel gas – Asphyxiation,

No.24 – Fire,

No.27 – Explosion.

3.2.178 Work at Height Regulations

3.2.178.1 These Regulations apply to all work at height where there is a risk of a fall liable to cause personal injury. In the context of this standard the Regulations are particularly relevant to the installation, inspection and maintenance of external risers.

Note: Further information can be found in HSE Leaflet INDG 401.

3.2.189 Lifting Operations and Lifting Equipment Regulations (LOLER)

The Management Regulations require risks to be assessed to identify the nature and level of risks, including those associated with a lifting operation. They require the management of risks to reduce them as far as reasonably practicable. Action taken is to be proportionate to the risk identified. Trivial risks can usually be ignored, unless the work activity adds to those risks.

When deciding how to reduce the risks from using a particular piece of lifting equipment, consideration to be given to: (a) type of load being lifted, its weight, shape and what it consists of; (b) risk of a load falling, moving, breaking up or striking a person or object and the consequences; (c) risk of the lifting equipment

striking a person or an object and the consequences; (d) risk of the lifting equipment failing or falling over while in use and the consequences; and (e) risk of damage to the lifting equipment that could result in failure.

3.2.~~19~~20 Planning (Listed Building and Conservation Areas) Act 1990

3.2.~~19~~20.1 A 'listed building' is a building, object or structure that has been judged to be of national importance in terms of architectural or historic interest and which has been included on a special register, called the "List of Buildings of Special Architectural or Historic Interest".

3.2.~~19~~20.2 Listed building control is a type of planning control, which protects such buildings. These controls are in addition to any planning regulations which would normally apply. This special form of control is intended to prevent the unrestricted demolition, alteration or extension of a listed building without the express consent of the local planning authority or the Secretary of State. Listed building control extends to any works for the demolition or alteration or extension of a listed building in any manner likely to affect its character as a building of special architectural or historical interest.

3.2.2~~1~~0 **Confined Spaces Regulations**

These Regulations apply to a whole range of confined spaces. The supplier or designer of an enclosure and equipment within it is required to perform a risk assessment of the enclosure with respect to safe access and egress and to give clear instructions to operators on access/egress as well as to what actions to take in the event of a gas alarm occurring. Employers and the self-employed are required to prevent entry into confined spaces unless avoidance is not reasonably practicable and unless there is a system of work which renders the work safe.

3.2.2~~2~~1 Control Of Asbestos at Work Regulations

3.2.2~~1~~2.1 These Regulations set out standards for the identification, monitoring and assessment of work that may expose workers to asbestos and the measures needed to control the risk.

3.2.2~~1~~2.2 Employers cannot carry out any work that exposes, or is likely to expose, employees to asbestos unless an assessment of that exposure has been made. Employers have to set out steps to be taken to prevent, or reduce to the lowest level reasonably practicable, that exposure. Employers have to carry out medical surveillance of employees if they work over a certain time limit.

3.2.2~~1~~2.3 The Regulations impose a duty on those with responsibilities for the repair and maintenance of non-domestic premises to find out if there are, or may be, asbestos containing materials within them; to record the location and condition of such materials and assess and manage any risk from them, including passing of any information about their location and condition to anyone likely to disturb them.

Note: Old meter installations and installation pipework often contain flanged joints with asbestos gaskets.

3.2.2~~1~~2.4 Further information is available in HSG227. Other HSE documents associated with these Regulations are L143 and INDG 223.

3.2.2~~2~~3 Workplace (Health, Safety and Welfare) Regulations.

These regulations provide a definition of a workplace. A workplace includes the common area of a block of flats.

Note: See L24 for further guidance.

SECTION 4: RESPONSIBILITIES AND CONSULTATION

This Standard applies to a number of different scenarios. Responsibilities applicable to the most common ones are specified below. For any scenario not specified below, the principles underpinning this Standard shall be applied.

4.1 New Building Development with New Gas Supply

4.1.1 At the initial or concept stages of the building design and/or planning of the gas infrastructure, the Developer, who will often be assisted by an Architect, shall consult the relevant gas supplier or gas transporter to verify that the gas infrastructure can be designed and installed such that it will be compliant with this standard and relevant legislation

4.1.2 The Developer will normally undertake the role of "Client" under CDM. ~~They will often be assisted by an Architect and in~~ In accordance with CDM they shall appoint a Principal Designer and Principal Contractor. The Principal Designer shall plan, manage, monitor and co-ordinate the health and safety elements of the designs for different component parts of the development including those for the gas infrastructure. The Principal Contractor shall co-ordinate the various construction activities on site during the construction phase of the project.

4.1.3 The Developer shall be responsible for all liaison with Building Control and the local Fire and Rescue Service.

4.1.4 Where following the design risk assessment a GT provides a thermal cut off valve and/or an excess flow valve located immediately on the outlet of the ECV, it shall be either

a. an integral part of the ECV, or

b. a separate fitting connected directly to the outlet of the ECV with the joint protected with an anti-tamper type seal indicating the GT's ownership of the fitting.

In either case, it shall be the GT's responsibility to

a. account for the expected pressure drop of the fitting in the design of the network pipeline, and

b. inspect/maintain/replace the fitting as required.

In either case, the outlet of the fitting shall be designated as being part of the ECV and hence the end of the Network.

Note: See Appendix 3 for guidance on risk assessment.

Description (See Figures 1 – 4)	Responsibilities	
	Design Phase	**Installation & Commissioning Phase**
Network Pipelines, including the, emergency control valve (ECV) and any pipework and valves, upstream of the ECV.	Gas Transporter/Gas Conveyor. *Note 1: A Utility Infrastructure Provider may design the network for validation and adoption by the GT.* *Note 2: The organisation preparing the design, whether GT or UIP, will undertake the role of "Designer" under CDM and they will liaise with the Principal Designer and other discipline "Designers" as appropriate, particularly in regard to ventilation, inspection facilities, explosion and fire safety aspects of the design.* *Note 3: UIP designs are required to be validated by the adopting GT.*	Gas Transporter/Gas Conveyor. *Note 1: A Utility Infrastructure Provider may install and commission the network for adoption by the GT.* *Note 2: The organisation undertaking the work will undertake the role of "Contractor" under CDM.*
Primary meter installation *Note: The GT has responsibility for pressure control in all cases and others have to request permission from the GT to break a seal, set and seal a meter regulator.*	Gas Transporter/Gas Conveyor. *Note: The design of the network pipeline shall normally include the location and housing of primary meter installations as the MAM will not have been appointed at this stage.* Meter Asset Manager (MAM) *Note: The MAM will specify the equipment involved.*	Approved Meter Installer *Note: The Approved Meter Installer, who will be contracted to the GT, will be a Competent Person as defined in GS(I&U)R i.e. an appropriately qualified Gas Safe® Registered Gas Installer and they will undertake the role of "Contractor" under CDM.*
Meter House	Gas Transporter/Gas Conveyor. *Note 1: The organisation preparing the design will undertake the role of "Designer" under CDM and they will liaise with the Principal Designer and other discipline "Designers" as appropriate, particularly in regard to ventilation, inspection facilities, explosion and fire safety aspects of the design.* *Note 2: The GT is required to approve the design. See Paragraph 5(3)(b) of Schedule 2B of the Gas Act.* *Note 3: The GT's approval process is described in the Energy Networks Association (ENA) GT2 document.*	Developer *Note 1: With the agreement of the Developer the GT or Utility Infrastructure Provider may install the meter house at the same time as it installs the incoming network pipeline.* *Note 2: The organisation undertaking the work will undertake the role of "Contractor" under CDM.*

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	Note 4: Pre-installation the MAM, as a responsible and prudent operator, will confirm that the meter house is compliant with relevant legislation and standards.	
Description (See Figures 1 – 4)	**Responsibilities**	
	Design Phase	**Installation & Commissioning Phase**
Installation pipework (including secondary meter installations and energy centres)	Developer/M&E Contractor's Competent Person *Note 1: The organisation preparing the design will undertake the role of "Designer" under CDM and they will liaise with the Principal Designer and other discipline "Designers" as appropriate, particularly in regard to ventilation, inspection facilities, explosion and fire safety aspects of the design.* *Note 2: The Designer is required to be competent as defined in GS(I&U)R*	Gas Installer/Competent Person *Note: The organisation undertaking the work will undertake the role of "Contractor" under CDM.*
Appliance connector, appliance, flue/chimney	Developer/M&E Contractor's Competent Person /Appliance owner *Note: The specification of appliances may be undertaken by the Architect or M&E Contractor or other appointed organisation, in which case the organisation preparing the design will undertake the role of "Designer" under CDM. On the other hand, if the choice of appliances is left to individual dwelling occupiers after handover there is no CDM design role for that element of the work.*	Gas Installer/Competent Person *Note: The organisation undertaking the work shall undertake the role of "Contractor" under CDM.*
Ventilation - provision of and access to ducts, protected shafts, meters etc	Developer *Note: As a minimum, the design is required to be compliant with Table 1 of BS 8313.*	Developer *Note: Will be in place before commissioning of any gas infrastructure takes place.*
Fire stopping of gas pipe penetrations through compartment walls, ducts, protected shafts etc	Developer *Note: The design of fire stopping of compartment walls, ducts and protected shafts is expected to be the responsibility of a specialist contractor.*	Developer *Note 1: The fire stopping of compartment walls, ducts and protected shafts is expected to be the responsibility of a specialist contractor.*

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		Note 2: Will be in place before commissioning of any gas infrastructure takes place.
Description (See Figures 1 – 4)	**Responsibilities**	
	Design Phase	**Installation & Commissioning Phase**
Impact of other building services	Developer/Designer(s) of all building services *Note: For High ~~Rise~~Risk ~~–~~Buildings, clashes are likely to be able to be identified with the co-ordinated use of BIM Level 2 design information.*	Installers of other building services. *Note: ~~–~~Compliant solutions will be in place before commissioning of any gas infrastructure takes place.*
Gas Infrastructure Records	Gas Transporter/Gas Conveyor/UIP for network pipeline *Note: The GT/UIP Gas Designer will pass a suitable and sufficient risk assessment and sufficiently detailed drawings and schedules to the Principal Designer to enable them to co-ordinate the designs of all the disciplines involved in the development. The detailed drawings and schedules are also required to be passed to the gas infrastructure constructors to enable them to install the works as designed.* Developer/M&E Contractor's Competent Person *Note: Similarly, the Developer/M&E Contractor's Competent Person will pass a suitable and sufficient risk assessment and sufficiently detailed drawings and schedules to the Principal Designer to enable them to co-ordinate the designs of all the disciplines involved in the development. The detailed drawings and schedules are also required to be passed to the Gas Installer/Competent Person to enable them to install the works as designed.*	Gas Transporter/Gas Conveyor/UIP for network pipeline *Note: ~~–~~Each gas network pipeline constructor is required to provide "as installed" records to the GT and where appropriate to the Principal Contractor for inclusion in the "Health and Safety File" where such a file is required to be produced and given to the Client at the end of the project. As installed records are expected to be compliant with PAS 256. Relevant records are required to be passed on to the Responsible Person for the building in due course.* Gas Installer/Competent Person for installation pipework and appliances *Note: An "as installed" line diagram and any other specified records are required to be provided to the Principal Contractor for inclusion in the "Health and Safety File" where such a file is required to be produced and given to the Client at the end of the project.* Notes common to "installers" in all disciplines *Note 1: For High ~~Rise~~Risk Buildings it is expected that in due course all records will also be able to be incorporated into BIM Level 2 records that will be held by the Responsible Person for the building.*

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		Note 2: Under Regulation 38 of the Building Regulations the Responsible Person for the building should be provided with relevant fire safety information.

Note 1: The "Responsible Person for the Building" is the person with the responsibilities specified in the Regulatory Reform (Fire Safety) Order 2005. They may be the Owner, Local Authority, Housing Association, Landlord, Building Management Company or Facilities Manager. In buildings designated as "High Risk" following enactment of the Building Safety Bill and the passage of a relevant statutory instrument the role will be undertaken by the Accountable Person assisted by the Building Safety Manager. In the context of this standard, in Scotland the role will also be performed by the Factor.

Note 2: Article 22 of the Fire Safety Order places a duty on all relevant persons to co-operate with one another.

Note 3: An emergency control is defined by Regulation 2 of GS(I&U)R as "a valve for shutting off the supply of gas in an emergency, being a valve intended for use by a consumer of gas". The more commonly used term, emergency control valve (ECV), is used in this Standard. The outlet of the ECV denotes the end of the network. The term "consumer of gas" is taken to mean the person who uses the gas for heating, cooking, etc., i.e. the occupier of a dwelling. Guidance in HSE publication L56 states that an ECV has to be readily accessible to this consumer.

Note 4: Normally, the ECV is positioned at the inlet to the primary meter, either inside the dwelling itself or in a separate meter box/cupboard/room. However, frequently, there will be an additional valve (the inlet isolation valve (IIV)), near to the point where a network pipeline enters a building. This additional valve is often designated as being for use by someone other than the consumer, for example the GT, landlord or emergency services. This valve is not an ECV as defined and, therefore, it may be in a locked room etc. which is inaccessible to the building occupants.

Note 5: Any gas escape is to be reported to the National Gas Emergency number 0800 111 999 or Northern Ireland 0800 002 001

Note 6: Regulation 8(1) of GS(I&U)R prohibits anyone from carrying out any alteration to premises in which a gas fitting is already installed and which could compromise gas safety.

Note 7: The Building Safety Bill has introduced the designation of High Risk Building in England and Wales. It is intended that descriptions of buildings to be designated as "High Risk" will be prescribed in Regulations. Initially, it is intended that High Risk Buildings will be high rise multi occupancy buildings where the floor surface of the building's top storey is 18 metres or more above ground level, or the building contains more than 6 storeys. ~~In England and Wales buildings where the distance between ground level and the floor of the top most storey is 18 metres or more are categorised as high rise.~~ However, in Scotland a building where the distance between ground level and the floor of the top most storey is 11 metres or more is categorised as high rise (so will apply where there are five or more storeys).

TABLE 1 - RESPONSIBILITIES FOR THE DESIGN, INSTALLATION AND COMMISSIONING OF THE GAS INFRASTRUCTURE IN NEW MULTI-OCCUPANCY BUILDINGS

4.2 Existing Building with New First Time Gas Supply

4.2.1 In this scenario the initiator of the work to provide a new gas supply to and within the building, probably as part of a major regeneration project, would be the building owner or if the building is designated as "High Risk" the Accountable Person, who shall be the client under CDM.

4.2.2 With the exception of the change of identity of the client from Developer to Building Owner/Accountable Person, the responsibilities detailed in Table 1 in Section 4.1 above shall apply to this scenario.

4.3 Ongoing Operation, Inspection and Maintenance of Gas Infrastructure to and within a Multi-occupancy Building

Description (See Figures 1 – 4)	Responsibilities
Network Pipelines, including the, emergency control valve (ECV), and any pipework including the pipeline isolation valve (PIV) upstream of the ECV	Gas Transporter/Gas Conveyor. *Note 1: Access to common parts of the building and assistance with gaining access to individual dwellings where necessary is expected to be provided by the Responsible Person for the building or Building safety Manager if the building is designated as "High Risk".* *Note 2: In the event of access to common parts of the building being denied to the GT to carry out inspection and maintenance after repeated attempts to engage the Responsible Person for the building/Building Safety Manager, the GT may have to seek the assistance of the Building Safety Regulator or obtain a warrant to do so under the Rights of Entry (Gas and Electricity Boards) Act 1954 citing Regulation 7 of the Pipelines Safety Regulations in the process.*
Primary meter installation *Note: The GT has responsibility for pressure control in all cases and others have to request permission from the GT to break a seal, set and seal a meter regulator.*	Meter Owner/ Meter Asset Manager *Note: The meter owner may use a Meter Asset Manager (MAM) to carry out its obligations.*
Installation pipework (including secondary meter installations and energy centres)	The owner of the installation pipework is responsible for the continued integrity of that pipework whether it is located within dwellings or in a common area. *Note 1: The owner of the installation pipework may be the Responsible Person for the building or the owner of the building if different or the owner of the individual dwelling.* *Note 2: The owner of the installation pipework is expected to arrange for periodic inspection/testing by a Competent Person as defined in GS(I&U)R i.e. an appropriately qualified Gas Safe® Registered Gas Installer.*
Flue/chimney	Landlord (see clause 12.4.1) for any flue/chimney in a common area.

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Description (See Figures 1 – 4)	Responsibilities
Appliance connector and appliance	Owner of the appliance. *Note: The owner of the appliance is expected to arrange for periodic inspection/testing by a Competent Person as defined in GS(I&U)R i.e. an appropriately qualified Gas Safe® Registered Gas Installer.*
~~Description (See Figures 1 – 4)~~	~~Responsibilities~~
Ventilation - provision of and performance of. Access to ducts, protected shafts, meters, meter house etc.	Responsible Person for the Building
Fire stopping of pipe penetrations through compartment walls, ducts, protected shafts etc.	Responsible Person for the Building *Note: Any deficiencies identified by the GT during inspection will be communicated formally to the Responsible Person for the building for them to arrange for remediation works.*
Impact of other building services	Responsible Person for the building/installer of other building services *Note: Any deficiencies identified by the GT during inspection will be communicated formally to the Responsible Person for the building for them to arrange for remediation works.*
Gas Infrastructure Records	Gas Transporter/Gas Conveyor for network pipelines Responsible Person for the Building for all other records *Note: Relevant records e.g. line diagram, will be provided by a Competent Person as defined in GS(I&U)R i.e. an appropriately qualified Gas Safe Registered Gas Installer working for the Landlord/Responsible Person for the building.*

Note 1: The "Responsible Person for the Building" is the person with the responsibilities specified in the Regulatory Reform (Fire Safety) Order 2005. They may be the Owner, Local Authority, Housing Association, Landlord, Building Management Company or Facilities Manager. In buildings designated as "High Risk" following enactment of the Building Safety Bill and the passage of a relevant statutory instrument the role will be undertaken by the Accountable Person assisted by the Building Safety Manager. In the context of this standard, in Scotland the role will also be performed by the Factor.

Note 2: Article 22 of the Fire Safety Order places a duty on all relevant persons to co-operate with one another.

Note 3: An emergency control is defined by Regulation 2 of GS(I&U)R as "a valve for shutting off the supply of gas in an emergency, being a valve intended for use by a consumer of gas". The more commonly used term, emergency control valve (ECV), is used in this Standard. The outlet of the ECV denotes the end of the network. The term "consumer of

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gas" is taken to mean the person who uses the gas for heating, cooking, etc., i.e. the occupier of a dwelling. Guidance in HSE publication L56 states that an ECV has to be readily accessible to this consumer.

Note 4: Normally, the ECV is positioned at the inlet to the primary meter, either inside the dwelling itself or in a separate meter box/cupboard/room. However, frequently, there will be an additional valve (the inlet isolation valve (IIV)), near to the point where a network pipeline enters a building. This additional valve is often designated as being for use by someone other than the consumer, for example the GT, landlord or emergency services. This valve is not an ECV as defined and, therefore, it may be in a locked room etc. which is inaccessible to the building occupants.

Note 5: Any gas escape is to be reported to the National Gas Emergency number 0800 111 999 or Northern Ireland 0800 002 001. The GT conveying gas to the building is required to respond promptly to make the situation safe.

Note 6: For the purposes of this table, ongoing operation and maintenance includes repair work and where appropriate the initiation of replacement work.

Note 7: Regulation 8(1) of GS(I&U)R prohibits anyone from carrying out any alteration to premises in which a gas fitting is already installed and which could compromise gas safety.

Note 8: If it is deemed necessary following a risk assessment of the building (e.g. by the Responsible Person, MAM etc), that additional safety devices such as EFV/TCO are necessary, contact with the upstream GT is required for approval and installation.

TABLE 2 - RESPONSIBILITIES FOR THE ONGOING OPERATION OF THE GAS INFRASTRUCTURE IN MULTI-OCCUPANCY BUILDINGS

4.4 Replacement of Gas Infrastructure Initiated by Building Refurbishment

4.4.1 At the initial or concept stages of the building refurbishment design and/or planning of the gas infrastructure, the Building Owner, who will often be assisted by an Architect, shall consult the relevant gas transporter to verify that the replacement gas infrastructure can be designed and installed such that it will be compliant with this standard and relevant legislation.

4.4.2 The building owner or their nominee shall undertake the role of "Client" under CDM. ~~They will probably be assisted by an Architect and~~ In accordance with CDM they shall appoint a Principal Designer and Principal Contractor. The Principal Designer shall plan, manage, monitor and co-ordinate the health and safety elements of the designs for different component parts of the refurbishment including those for the gas infrastructure. The Principal Contractor shall co-ordinate the various construction activities on site during the construction phase of the project.

4.4.2 The building owner or their nominee shall be responsible for all liaison with Building Control and the local Fire and Rescue Service.

4.4.3 Where following the design risk assessment a GT provides a thermal cut off valve and/or an excess flow valve located immediately on the outlet of the ECV, it shall be either

a. an integral part of the ECV, or

~~a.~~

~~b.~~ a separate fitting connected directly to the outlet of the ECV with the joint protected with an anti-tamper type seal indicating the GT's ownership of the fitting.

b.

In either case, it shall be the GT's responsibility to

a. account for the expected pressure drop of the fitting in the design of the network pipeline, and

~~a.~~

b. inspect/maintain/replace the fitting as required.

In either case, the outlet of the fitting shall be designated as being part of the ECV and hence the end of the Network.

Note: See Appendix 3 for guidance on risk assessment.

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Description (See Figures 1 – 4)	Responsibilities	
	Design Phase	**Installation, Commissioning & Decommissioning Phase**
Network Pipelines, including the, emergency control valve (ECV) and any pipework and valves, upstream of the ECV.	Gas Transporter/Gas Conveyor. *Note: The GT/Gas Conveyor, will undertake the role of "Designer" under CDM and they will liaise with the Principal Designer and other discipline "Designers" as appropriate, particularly in regard to ventilation, inspection facilities, explosion and fire safety aspects of the design.*	Gas Transporter/Gas Conveyor. *Note: The GT/Gas Conveyor will undertake the role of "Contractor" under CDM.*
Primary meter installation *Note: The GT has responsibility for pressure control in all cases and others have to request permission from the GT to break a seal, set and seal a meter regulator.*	Gas Transporter/Gas Conveyor. *Note: The design of the network pipeline will normally include the location and housing of primary meter installations.* Meter Asset Manager (MAM) *Note: The MAM will specify the equipment involved.*	Approved Meter Installer *Note: The Approved Meter Installer, who will be contracted to the GT, will be a Competent Person as defined in GS(I&U)R i.e. an appropriately qualified Gas Safe® Registered Gas Installer and they will undertake the role of "Contractor" under CDM.*
Meter House	Gas Transporter/Gas Conveyor. *Note 1: The organisation preparing the design will undertake the role of "Designer" under CDM and they will liaise with the Principal Designer and other discipline "Designers" as appropriate, particularly in regard to ventilation, inspection facilities, explosion and fire safety aspects of the design.* *Note 2: The GT is required to approve the design. See Paragraph 5(3)(b) of Schedule 2B of the Gas Act.* *Note 3: The GT's approval process is described in the Energy Networks Association (ENA) GT2 document.* *Note 4: Pre-installation the MAM, as a responsible and prudent operator, will confirm that the meter house is compliant with relevant legislation and standards.*	Building Owner *Note 1: With the agreement of the Developer the GT or Utility Infrastructure Provider may install the meter house at the same time as it installs the incoming network pipeline.* *Note 2: The organisation undertaking the work will undertake the role of "Contractor" under CDM.*

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~~Installation pipework (including secondary meter installations)~~	~~Building Owner/M&E Contractor's Competent Person~~ ~~*Note 1: The organisation preparing the design will undertake the role of "Designer" under CDM and they will liaise with the Principal Designer and other discipline "Designers" as appropriate, particularly in regard to ventilation, inspection facilities, explosion and fire safety aspects of the design.*~~ ~~*Note 2: The Designer is required to be competent as defined in GS(I&U)R*~~	~~Gas Installer/Competent Person~~ ~~*Note: The organisation undertaking the work will undertake the role of "Contractor" under CDM.*~~
~~Appliance connector, appliance, flue/chimney~~	~~Building Owner/M&E Contractor's Competent Person /Appliance owner~~ ~~*Note: The specification of appliances may be undertaken by the Architect or M&E Contractor etc., in which case the organisation preparing the design will undertake the role of "Designer" under CDM. On the other hand, if the choice of appliances is left to individual dwelling occupiers there is no CDM design role for that element of the work.*~~	~~Gas Installer/Competent Person~~ ~~*Note: The organisation undertaking the work shall undertake the role of "Contractor" under CDM*~~
Description (See Figures 1 – 4)	**Responsibilities**	
	Design Phase	**Installation, Commissioning & Decommissioning Phase**
Installation pipework (including secondary meter installations)	Building Owner/M&E Contractor's Competent Person *Note 1: The organisation preparing the design will undertake the role of "Designer" under CDM and they will liaise with the Principal Designer and other discipline "Designers" as appropriate, particularly in regard to ventilation, inspection facilities, explosion and fire safety aspects of the design.* *Note 2: The Designer is required to be competent as defined in GS(I&U)R*	Gas Installer/Competent Person *Note: The organisation undertaking the work will undertake the role of "Contractor" under CDM.*
Appliance connector, appliance, flue/chimney	Building Owner/M&E Contractor's Competent Person /Appliance owner *Note: The specification of appliances may be undertaken by the Architect or M&E Contractor etc., in which case the*	Gas Installer/Competent Person *Note: The organisation undertaking the work shall undertake the role of "Contractor" under CDM*

	organisation preparing the design will undertake the role of "Designer" under CDM. On the other hand, if the choice of appliances is left to individual dwelling occupiers there is no CDM design role for that element of the work.	
Ventilation - provision of and access to ducts, protected shafts, meters etc	Building Owner ~~Developer~~ *Note: As a minimum, the design is required to be compliant with Table 1 of BS 8313.*	Building Owner ~~Developer~~ *Note: Will be in place before commissioning of any gas infrastructure takes place.*
Fire stopping of gas pipe penetrations through compartment walls, ducts, protected shafts etc	Building Owner ~~Developer~~ *Note: The design of fire stopping of compartment walls, ducts and protected shafts is expected to be the responsibility of a specialist contractor.*	Building Owner ~~Developer~~ *Note 1: The fire stopping of compartment walls, ducts and protected shafts is expected to be the responsibility of a specialist contractor.* *Note 2: Will be in place before commissioning of any gas infrastructure takes place.*
~~Impact of other building services~~	~~Developer/Designer(s) of all building services~~ ~~*Note: For High Rise Buildings, clashes are likely to be able to be identified with the co-ordinated use of BIM Level 2 design information.*~~	~~Installers of other building services.~~ ~~*Note: Compliant solutions will be in place before commissioning of any gas infrastructure takes place.*~~

Description (See Figures 1 – 4)	**Responsibilities**	
	Design Phase	**Installation, Commissioning & Decommissioning Phase**
Impact of other building services	Building Owner/Designer(s) of all building services *Note: For High ~~Rise~~ Risk Buildings, clashes are likely to be able to be identified with the co-ordinated use of BIM Level 2 design information.*	Installers of other building services. *Note: Compliant solutions will be in place before commissioning of any gas infrastructure takes place.*
Gas Infrastructure Records	Gas Transporter/Gas Conveyor for network pipeline *Note: The GT/Gas Conveyor's Gas Designer will pass a suitable and sufficient risk assessment and sufficiently detailed drawings and schedules to the Principal Designer to enable them to co-ordinate the designs of all the disciplines involved in the refurbishment. The detailed drawings and schedules are also required to be passed to the gas infrastructure constructors to enable them to install the works as designed.* Building Owner~~Developer~~/M&E Contractor's Competent Person *Note: Similarly, the Developer/M&E Contractor's Competent Person will pass a suitable and sufficient risk assessment and sufficiently detailed drawings and schedules to the Principal Designer to enable them to co-ordinate the designs of all the disciplines involved in the refurbishment. The detailed drawings and schedules are also required to be to the Gas Installer/Competent Person to enable them to install the works as designed.*	Gas Transporter/Gas Conveyor for network pipeline *Note: Each gas network pipeline constructor is required to provide "as installed" records to the GT and where appropriate to the Principal Contractor for inclusion in the "Health and Safety File" where such a file is required to be produced and given to the Client at the end of the project. As installed records are expected to be compliant with PAS 256. Relevant records are required to be passed on to the Responsible Person for the building in due course.* Gas Installer/Competent Person for installation pipework and appliances *Note: An "as installed" line diagram and any other specified records are required to be provided to the Principal Contractor for inclusion in the "Health and Safety File" where such a file is required to be produced and given to the Client at the end of the project.* Notes common to "installers" in all disciplines *Note 1: For High ~~Rise~~ Risk Buildings it is expected that in due course all records will also be able to be incorporated into BIM Level 2 records that will be held by the Responsible Person for the building.*

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		Note 2: Under Regulation 38 of the Building Regulations the Responsible Person for the building should be provided with relevant fire safety information.

Note 1: The "Responsible Person for the Building" is the person with the responsibilities specified in the Regulatory Reform (Fire Safety) Order 2005. They may be the Owner, Local Authority, Housing Association, Landlord, Building Management Company or Facilities Manager. In buildings designated as "High Risk" following enactment of the Building Safety Bill and the passage of a relevant statutory instrument the role will be undertaken by the Accountable Person assisted by the Building Safety Manager. In the context of this standard, in Scotland the role will also be performed by the Factor.

Note 2: Article 22 of the Fire Safety Order places a duty on all relevant persons to co-operate with one another.

Note 3: An emergency control is defined by Regulation 2 of GS(I&U)R as "a valve for shutting off the supply of gas in an emergency, being a valve intended for use by a consumer of gas". The more commonly used term, emergency control valve (ECV), is used in this Standard. The outlet of the ECV denotes the end of the network. The term "consumer of gas" is taken to mean the person who uses the gas for heating, cooking, etc., i.e. the occupier of a dwelling. Guidance in HSE publication L56 states that an ECV has to be readily accessible to this consumer.

Note 4: Normally, the ECV is positioned at the inlet to the primary meter, either inside the dwelling itself or in a separate meter box/cupboard/room. However, frequently, there will be an additional valve (the inlet isolation valve (IIV)), near to the point where a network pipeline enters a building. This additional valve is often designated as being for use by someone other than the consumer, for example the GT, landlord or emergency services. This valve is not an ECV as defined and, therefore, it may be in a locked room etc. which is inaccessible to the building occupants.

Note 5: Any gas escape is to be reported to the National Gas Emergency number 0800 111 999 or Northern Ireland 0800 002 001

Note 6: Regulation 8(1) of GS(I&U)R prohibits anyone from carrying out any alteration to premises in which a gas fitting is already installed and which could compromise gas safety.

Note 7: The Building Safety Bill has introduced the designation of High Risk Building in England and Wales. It is intended that descriptions of buildings to be designated as "High Risk" will be prescribed in Regulations. Initially, it is intended that High Risk Buildings will be high rise multi occupancy buildings where the floor surface of the building's top storey is 18 metres or more above ground level, or the building contains more than 6 storeys. However, in Scotland a building where the distance between ground level and the floor of the top most storey is 11 metres or more is categorised as high rise (so will apply where there are five or more storeys).
~~In England and Wales buildings where the distance between ground level and the floor of the top most storey is 18 metres or more are categorised as high rise. However, in Scotland a building where the distance between ground level and the floor of the top most storey is 11 metres or more is categorised as high rise (so will apply where there are five or more storeys).~~

TABLE 3 - RESPONSIBILITIES FOR WORKS RELATING TO THE REPLACEMENT OF GAS INFRASTRUCTURE IN EXISTING MULTI-OCCUPANCY BUILDINGS INITIATED BY BUILDING REFURBISHMENT

4.5 Replacement of Gas Infrastructure Initiated by GT

4.5.1 In this scenario the GT shall undertake the role of "Client" under CDM. It or its contracted "Design House" shall undertake the roles of Principal Designer and Designer. It or its contracted Construction Contractor shall undertake the role of Principal Contractor under CDM.

4.5.2 The Principal Designer shall liaise closely with the responsible person for the building to determine an optimum design compliant with this standard and The Building Regulations. The Principal Designer, with assistance from the responsible person for the building, shall be responsible for all liaison with Building Control and the local Fire and Rescue Service.

Note: See Regulation 3(1) of The Building Regulations for a full definition of "building work". In simple terms, replacement gas infrastructure in the same position without any alteration to the building's fire compartmentation generally will be regarded as a repair which will not require a building control application. However, if the replacement design involved a different route or if there was any alteration to the building's fire compartmentation, an application to Building Control will be required.

4.5.3 Where following the design risk assessment a GT provides a thermal cut off valve and/or an excess flow valve located immediately on the outlet of the ECV, it shall be either

a. an integral part of the ECV, or
a separate fitting connected directly to the outlet of the ECV with the joint protected with an anti-tamper type seal indicating the GT's ownership of the fitting.

b.

In either case, it shall be the GT's responsibility to

a. account for the expected pressure drop of the fitting in the design of the network pipeline, and
a. inspect/maintain/replace the fitting as required.

b.

In either case, the outlet of the fitting shall be designated as being part of the ECV and hence the end of the Network.

Note: See Appendix 3 for guidance on risk assessment.

4.5.4 The construction of the replacement gas network pipelines to and within the building shall be undertaken by the GT's Construction Contractor i.e. the Principal Contractor. Any sub-contractor employed by the Principal Contractor, such as a specialist welder or welding inspector, shall undertake the role of "Contractor" under CDM.

Note: Where the building remains occupied during replacement works, the Responsible Person for the Building is responsible for general fire precautions for the "construction site" as well as for the rest of the building.

4.5.5 It is not envisaged that this scenario will involve the specification and installation of appliances in dwellings.

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Description (See Figures 1 – 4)	**Responsibilities**	
	Design Phase	**Installation, Commissioning & Decommissioning Phase**
Network Pipelines, including the, emergency control valve (ECV) and any pipework and valves, upstream of the ECV.	Gas Transporter/Gas Conveyor. *Note: The GT/Gas Conveyor, will undertake the role of "Principal Designer" under CDM and they will liaise with the Responsible Person for the Building as appropriate, particularly in regard to ventilation, inspection facilities, explosion and fire safety aspects of the design.*	Gas Transporter/Gas Conveyor. *Note: The GT/Gas Conveyor will undertake the role of "Principal Contractor" under CDM.*
Primary meter installation *Note: The GT has responsibility for pressure control in all cases and others have to request permission from the GT to break a seal, set and seal a meter regulator.*	Gas Transporter/Gas Conveyor. *Note: The GT/Gas Conveyor, will undertake the role of "Principal Designer" under CDM and they will liaise with the MAM and the Responsible Person for the Building as appropriate particularly in respect of changed meter positions, ventilation, inspection arrangements explosion and fire safety elements of the design.* Meter Asset Manager (MAM) *Note: The MAM will specify the equipment involved.*	Approved Meter Installer *Note: The Approved Meter Installer, will be a Competent Person as defined in GS(I&U)R i.e. an appropriately qualified Gas Safe® Registered Gas Installer and they will undertake the role of "Contractor" under CDM.*
Installation pipework (including secondary meter installations)	Gas Transporter/Gas Conveyor's Competent Person *Note 1: The GT/Gas Conveyor, will undertake the role of "Principal Designer" under CDM and they will liaise with the Responsible Person for the Building as appropriate particularly in respect of changed pipe routes, ventilation, inspection arrangements, explosion and fire safety aspects of the design.* *Note 2: The Designer is required to be competent as defined in GS(I&U)R*	Gas Installer/Competent Person *Note: The organisation undertaking the work will undertake the role of "Contractor" under CDM.*

Description (See Figures 1 – 4)	**Responsibilities**	
	Design Phase	**Installation, Commissioning & Decommissioning Phase**
Ventilation - provision of and access to ducts, protected shafts, meters etc	Gas Transporter/Gas Conveyor in consultation with the Building Owner/Responsible Person for the Building *Note: As a minimum, the design is required to be compliant with Table 1 of BS 8313.*	Gas Transporter/Gas Conveyor in consultation with the Building Owner/Responsible Person for the Building *Note: Will be in place before commissioning of any gas infrastructure takes place.*
Fire stopping of gas pipe penetrations through compartment walls, ducts, protected shafts etc	Gas Transporter/Gas Conveyor in consultation with the Building Owner/Responsible Person for the Building *Note: The design of fire stopping of compartment walls, ducts and protected shafts is expected to be the responsibility of a specialist contractor.*	Gas Transporter/Gas Conveyor in consultation with the Building Owner/Responsible Person for the Building *Note 1: The fire stopping of compartment walls, ducts and protected shafts is expected to be the responsibility of a specialist contractor.* *Note 2: Will be in place before commissioning of any gas infrastructure takes place.*
Impact of other building services	Developer/Designer(s) of all building services *Note: For High ~~Rise~~ Risk Buildings, clashes are likely to be able to be identified with the co-ordinated use of BIM Level 2 design information.*	Installers of other building services. *Note: Compliant solutions will be in place before commissioning of any gas infrastructure takes place.*

Description (See Figures 1 – 4)	**Responsibilities**	
	Design Phase	**Installation, Commissioning & Decommissioning Phase**
Gas Infrastructure Records	Gas Transporter/Gas Conveyor *Note: The GT/Gas Conveyor's Gas Designer is expected to ensure that a suitable and sufficient risk assessment and sufficiently detailed drawings and schedules are produced. They are required to be passed to the gas infrastructure constructors to enable them to install the works as designed.*	Gas Transporter/Gas Conveyor for network pipeline *Note: Each gas network pipeline constructor is required to provide "as installed" records to the GT and the Principal Contractor. As installed records are expected to be compliant with PAS 256. Relevant records are required to be passed on to the Responsible Person for the building in due course.* Gas Installer/Competent Person for installation pipework and appliances *Note: An "as installed" line diagram and any other specified records are required to be provided to the Principal Contractor.* Notes common to "installers" in all disciplines *Note 1: For High ~~Rise~~ Risk Buildings it is expected that in due course all records will also be able to be incorporated into BIM Level 2 records that will be held by the Responsible Person for the building.* *Note 2: Under Regulation 38 of the Building Regulations the Responsible Person for the building should be provided with relevant fire safety information.*

Note 1: The "Responsible Person for the Building" is the person with the responsibilities specified in the Regulatory Reform (Fire Safety) Order 2005. They may be the Owner, Local Authority, Housing Association, Landlord, Building Management Company or Facilities Manager. In buildings designated as "High Risk" following enactment of the Building Safety Bill and the passage of a relevant statutory instrument the role will be undertaken by the Accountable Person assisted by the Building Safety Manager. In the context of this standard, in Scotland the role will also be performed by the Factor.

Note 2: Article 22 of the Fire Safety Order places a duty on all relevant persons to co-operate with one another.

Note 3: An emergency control is defined by Regulation 2 of GS(I&U)R as "a valve for shutting off the supply of gas in an emergency, being a valve intended for use by a consumer of gas". The more commonly used term, emergency control valve (ECV), is used in this Standard. The outlet of the ECV denotes the end of the network. The term "consumer of

gas" is taken to mean the person who uses the gas for heating, cooking, etc., i.e. the occupier of a dwelling. Guidance in HSE publication L56 states that an ECV has to be readily accessible to this consumer.

Note 4: Normally, the ECV is positioned at the inlet to the primary meter, either inside the dwelling itself or in a separate meter box/cupboard/room. However, frequently, there will be an additional valve (the inlet isolation valve (IIV)), near to the point where a network pipeline enters a building. This additional valve is often designated as being for use by someone other than the consumer, for example the GT, landlord or emergency services. This valve is not an ECV as defined and, therefore, it may be in a locked room etc. which is inaccessible to the building occupants.

Note 5: Any gas escape is to be reported to the National Gas Emergency number 0800 111 999 or Northern Ireland 0800 002 001

Note 6: Regulation 8(1) of GS(I&U)R prohibits anyone from carrying out any alteration to premises in which a gas fitting is already installed and which could compromise gas safety.

Note 7: The Building Safety Bill has introduced the designation of High Risk Building in England and Wales. It is intended that descriptions of buildings to be designated as "High Risk" will be prescribed in Regulations. Initially, it is intended that High Risk Buildings will be high rise multi occupancy buildings where the floor surface of the building's top storey is 18 metres or more above ground level, or the building contains more than 6 storeys. However, in Scotland a building where the distance between ground level and the floor of the top most storey is 11 metres or more is categorised as high rise (so will apply where there are five or more storeys).

~~In England and Wales buildings where the distance between ground level and the floor of the top most storey is 18 metres or more are categorised as high rise. However, in Scotland a building where the distance between ground level and the floor of the top most storey is 11 metres or more is categorised as high rise (so will apply where there are five or more storeys)~~.

TABLE 4 - RESPONSIBILITIES FOR WORKS RELATING TO THE REPLACEMENT OF GAS INFRASTRUCTURE IN EXISTING MULTI-OCCUPANCY BUILDINGS INITIATED BY THE GT

4.6 Decommissioning at End of Life

4.6.1 The GT shall be responsible for decommissioning network pipelines at the end of the building's life.

4.6.2 The Responsible Person for the building, using appropriately qualified competent personnel, shall be responsible for decommissioning installation pipework at the end of the building's life.

Note: See section 16 for requirements pertaining to decommissioning gas infrastructure.

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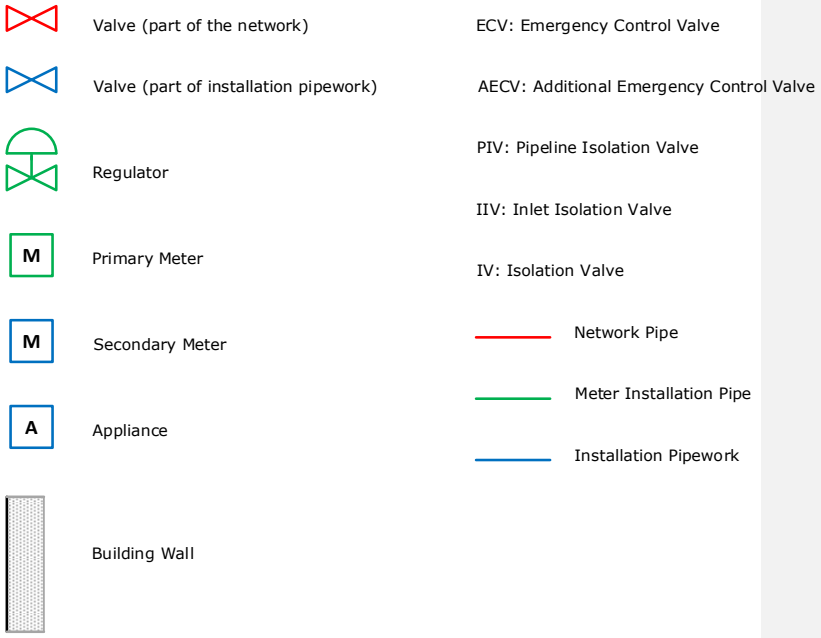
SECTION 5: TYPICAL INSTALLATIONS

5.1 With respect to requirements for emergency controls, compliance with PSR, GS(M)R and GS(I&U)R must be ensured.

The following diagrams represent typical arrangements for network pipelines, valves, regulators, meters, installation pipework and appliances. They show typical installations that may be derived from the "Standard gas supply arrangements" as described in IGEM/G/1.

The diagrams are schematic only and do not purport to show all required detail. For example, required ventilation is not shown and neither are above or below-ground entry arrangements.

Key to Figures 1 to 4



Note: IGEM/G/1 uses the terms "service isolation valve (SIV)" and "distribution main isolation valve (DMIV)". The term "pipeline isolation valve", embraces both SIV and DMIV.

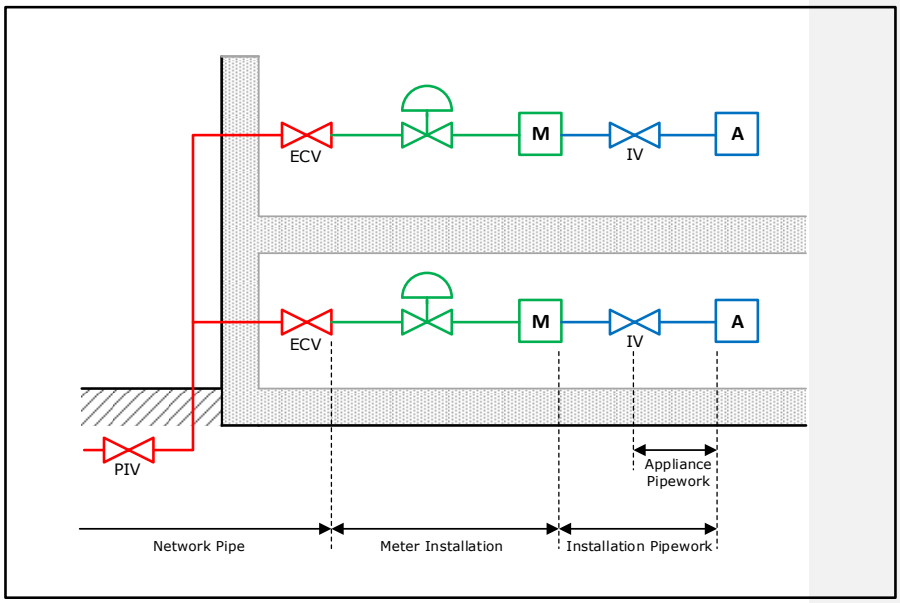


FIGURE 1 - TYPICAL INTERNAL METER INSTALLATIONS WITH ECVs WITHIN INDIVIDUAL DWELLINGS. EXTERNAL NETWORK RISER

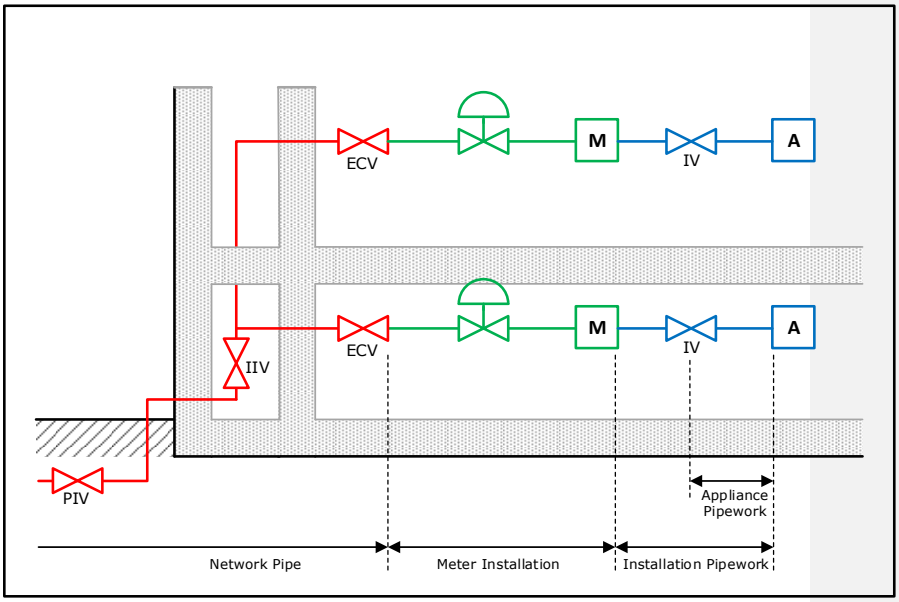
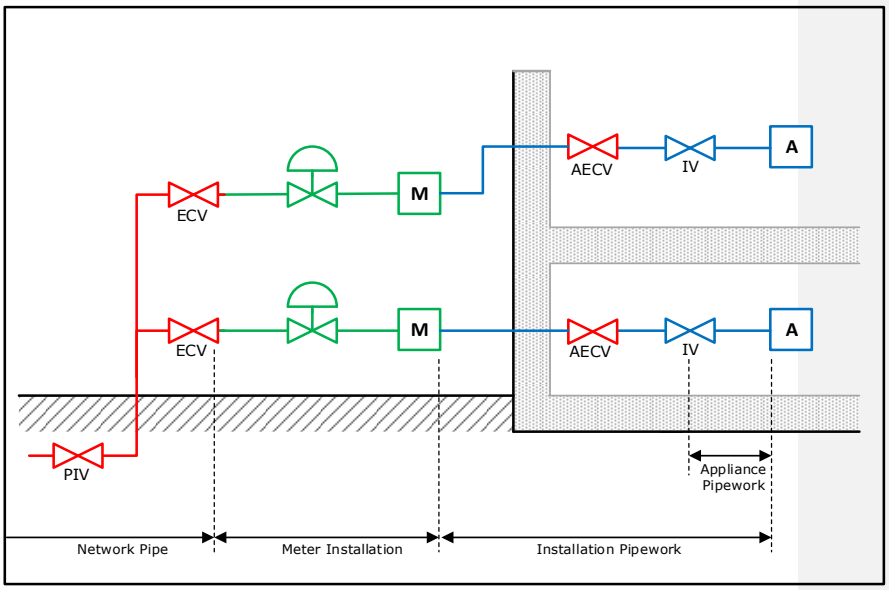


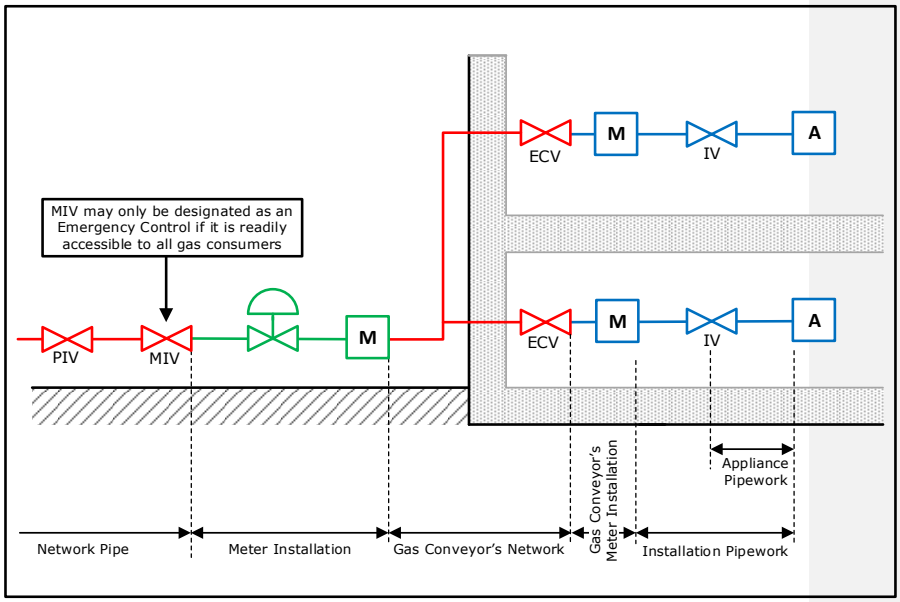
FIGURE 2 - TYPICAL INTERNAL METER INSTALLATIONS WITH ECVs WITHIN INDIVIDUAL DWELLINGS. INTERNAL NETWORK RISER



Note 1: Remote meters and ECVs may also be located within the building, for example in a dedicated meter room, but an IIV may then be required.

Note 2: Following risk assessment other valves such as an EFV or a TCO may be required.

FIGURE 3 - TYPICAL REMOTE METERS AND ECVs. AECVs FITTED WITHIN INDIVIDUAL DWELLINGS



Note 1: The primary meter installation's MIV can only be designated an emergency control if it is readily accessible to all end users, which is not normally the case.

Note 2: A Gas Conveyor is defined as a person who conveys gas through pipes and the Network and having duties under GS(M)R and PSR and who may also hold a Gas Transportation Licence. A Gas Conveyor is required either to have an approved Safety Case or to have been exempted from having to have one.

Note 3: The Gas Act 1986 Schedule 2a, paragraph 1a permits a landlord to be a gas conveyor without a gas transporter's licence. However, they would still be required to comply with GS(M)R (unless that pipework is adopted formally by an upstream conveyor), PSR and GS(I&U)R.

Note 4: In the context of this standard and for the purposes of compliance with GS(I&U)R, the Gas Conveyor's meter installations are secondary meter installations. Additional requirements for primary/secondary meter installations in a building are contained in GS(I&U)R, Regulations 16(1) and 17. See also HSE publication L56.

Note 5: There cannot be a gas conveyor on pipe designated as installation pipework.

Note 6: See IGEM/G/1 for more information.

FIGURE 4 - REMOTE BULK/PRIMARY METER WHERE GAS CONSUMERS DO NOT HAVE ACCESS TO THE METER CONTROL; ECVs AND SECONDARY METERS WITHIN INDIVIDUAL DWELLINGS

SECTION 6: COMPETENCY

6.1 Any person engaged in the design, construction, commissioning, inspection, maintenance, decommissioning and auditing of gas infrastructure in multi-occupancy buildings must be competent for the role they are undertaking.

Note: For the purposes of this standard, competence is defined as the combination of skills, knowledge and understanding required to enable an individual to perform consistently to current recognised standards.

6.2 Organisations shall:

- Have a documented process for determining competency that details minimum levels of training, experience, knowledge, understanding, qualification and professional registration as appropriate for each identified role.
- Establish and maintain sufficient, current, valid, credible and authentic evidence to demonstrate that individuals are competent to undertake their assigned role by:
    - Ensuring that the minimum documented competencies are satisfied;
    - Ensuring that individuals are trained and qualified for the work they are assigned to carry out;
    - Ensuring that a suitable Competent Person undertakes a documented assessment of each individual performing a role for which competencies have been set;
    - Arranging for the periodic documented review of each individual's competencies by a suitable Competent Person;
- Have a training programme in place that is adequate to close any competency gaps.

6.3 In addition to possessing knowledge and understanding of the properties, transportation and utilisation of gas, individuals should have knowledge and understanding appropriate to their role of:

- Risk assessment
- hazardous areas
- ventilation
- fire stopping, compartmentation and protected shafts;
- means of escape
- valves
- requirements for future inspection and maintenance
- records
- the legal duties of the different parties involved in the design, construction, day to day operation, inspection and maintenance of the gas infrastructure in multi-occupancy buildings.

6.4 Where gas installation work is carried out on pipework in properties covered by GS(I&U)R, the person carrying out that work must be a "member of a class of persons" i.e. Gas Safe Registered, as specified by GS(I&U)R.

Note: For the purposes of this Standard, GS(I&U)R covers any component downstream of the ECV and contains requirements for the ECV itself (see HSE publication L56).

6.5 Persons who are deemed competent to carry out gas work under GS(I&U)R are those who hold a current certificate of gas safety competence in the appropriate categories of work acceptable to Gas Safe Register which includes (without limitation) the Accredited Certification Scheme (ACS) and/or the Gas Services S/NVQ that has been aligned to ACS.

6.6 Where work not covered by GS(I&U)R, but covered by PSR, is carried out, the adopting GT must be satisfied that the installer is competent to do such work.

Note: For the purposes of this Standard, PSR cover any component upstream of, and including, the ECV.

6.7 **Commentary**

The Independent Review of Building Regulations and Fire Safety conducted by Dame Judith Hackitt included recommendations on competence in the report entitled "Building a Safer Future". In response to the report, the Competence Steering Group was established to take those recommendations forward.

The Competence Steering Group, in turn, produced a report entitled "Raising the Bar" in which more detailed recommendations were made. These recommendations dovetail with Government proposals for implementing "Building a Safer Future".

The Building Safety Bill, see paragraph 3.2.16, specifies that the Building Safety Regulator will "assist and encourage competence among the built environment industry, and registered building inspectors". The Bill creates powers to prescribe in building regulations competence requirements on the Principal Designer and Principal Contractor, and any prescribed person, and to impose duties on the persons appointing them to ensure they meet the competence requirements.

This is to ensure everyone doing design or building work on any type of building, whether new construction or in occupation, is competent to carry out that work in line with building regulations. Statutory guidance, in the form of an Approved Document, will be provided to support these requirements. The guidance may make reference to the competence framework and competence standards being developed by the British Standards Institution.

[illegible] and Gas Engineering Technicians working on or in buildings, IGEM will administer the a contextualised Register with oversight from the Engineering Council.

In the case of Installers, the Registers already operated by Gas Safe and EUSR appear to satisfy the majority if not all of the proposals.

SECTION 7 : PLANNING AND DESIGN OF NEW AND REPLACEMENT GAS INFRASTRUCTURE

7.1 GENERAL

7.1.1 The design objectives shall be to:

- ensure gas will be delivered to consumers at a suitable pressure to ensure the safe operation of any gas appliance which they could reasonably be expected to operate
- minimise the risk of fire and/or explosion resulting from the ignition of gas escaping from the proposed gas infrastructure
- minimise the risk of serious aggravation of any building fire
- ensure that additional third party safety risks are not created
- ensure that the gas infrastructure can be inspected and maintained in the future
- ensure the fire integrity of the building is not adversely affected.

7.1.2 Owners and operators of network pipelines, primary meter installations, installation pipework, appliances and chimneys have legal obligations with respect to safe operation and to maintenance. At the design stage, appropriate plans of the equipment, gas supply and building (as required by the future owner/operator of the particular asset) shall be made available to that owner/operator.

Note 1: As well as legal obligations, the future owner/operator may have a policy relating to the design of a particular section of the gas supply system. Nothing in this Standard imposes an obligation on the future owner/operator to "adopt" any section of the gas supply system.

Note 2: As examples:

- *a GT has legal obligations with respect to safe operation and maintenance of network pipelines under PSR (see clause 3.2.6)*
- *a MAM has obligations with respect to the design, safe operation and maintenance of meter installations under the SPAA MAMCoP*
- *a landlord for a block of flats, has obligations with respect to periodic inspections of installation pipework and appliances under GS(I&U)R.*

7.1.3 Any network pipeline, PRI, meter installation, installation pipework, appliance, chimney or ventilation shall be designed and installed in accordance with an appropriate standard, as shown in Table 2. In addition, all pipes, pipework, meter installations, appliances, chimneys and ventilation shall be installed in accordance with any further relevant clauses contained in this Standard.

COMPONENT	STANDARD
Network pipeline	IGEM/TD/3 IGEM/TD/4 IGEM/GL/1
PRI	IGEM/TD/13
Meter installation (see Note below)	BS 6400-1; BS 6400-2 IGEM/GM/6; IGEM/GM/8
Installation pipework	BS 6891; IGEM/UP/2
Appliances	See Table 10
Chimneys and ventilation	BS 5440-1; BS 5440-2; IGEM/UP/17; BS 8313

Note: This Standard assumes a "Standard gas supply arrangement" as described in IGEM/G/1.

TABLE 2 - NETWORK, METER INSTALLATION, INSTALLATION PIPEWORK, APPLIANCE AND CHIMNEY DESIGN AND INSTALLATION STANDARDS

7.1.4 The network designer should make the architect/building owner aware of the presence of any external steel riser to allow them to make an assessment of the

possible consequences for the lightning protection of the building. See BS EN 62305 for further guidance.

7.2 RISK ASSESSMENT

The legal requirements referred to in Sub-Section 7.1 are based on reducing risks "So Far As Is Reasonably Practicable", more commonly referred to as "As Low As Reasonably Practicable" (ALARP). With all multi-occupancy buildings a risk assessment must be undertaken to demonstrate the minimisation of risk.

Note 1: IGEM/G/7 provides more information on techniques used in risk assessment.

Note 2: IGEM/UP/16 covers the design of natural gas installations on industrial and commercial premises with respect to hazardous area classification and preparation of risk assessments.

Note 3: IGEM SR/25 covers hazardous area classification.

Note 4: IGEM/GM/7A covers electrical connections for gas metering equipment.

Note 5: IGEM/GM/7B covers hazardous area classification for gas metering equipment.

7.2.1 Minimising the risk

7.2.1.1 A risk assessment must be undertaken and the results recorded. The risk assessment should take account of the advice given in this Standard.

Note: CDM Regulation 9.2 and MHSWR Regulation 3 require risk assessments to be carried out.

Different installation design options result in different hazards and potentially different levels of risk. A systematic approach shall be undertaken to minimise the risk.

The risk assessment shall include the following elements:

- hazard identification
- hazard reduction, including the application of inherent safety principles
- evaluation of failure modes
- evaluation of release frequency
- evaluation of release consequences
- risk mitigation, consideration of risk reduction options
- an assessment of the significance of the risk.

Note 1: It may not be possible to quantify the risk of all elements, particularly for failure frequency (rate). Failure modes can generally be identified based on experience and engineering judgement, and the consequences of a release of Natural Gas are able to be assessed.

Note 2: While it is possible for the majority of detached, semi-detached and terraced houses to specify standard designs to readily meet this clause, for multi-occupancy buildings the variety of building types, configurations, methods of construction and patterns of residency make such specification more difficult.

The process is iterative at each stage, i.e. if the likelihood of failure appears unacceptable, the process is not continued, an alternative design is considered; likewise with the consequences. The process is concluded when the design can be demonstrated to be ALARP, when any further risk reduction is 'not reasonably practicable'.

Specialist advice should be sought, when considered necessary, to ensure a robust risk assessment is carried out. See Appendix 3 for further information on the risk assessment process.

7.2.1.2 A generic consideration of the hazards and risks from different supply options leads to a number of general principles:

- gas supplies shall be excluded from poorly ventilated or strongly confined spaces. The installation of gas infrastructure in basements and cellars should be avoided unless ventilation and confinement can be brought up to the required standard

  Note: The term "confined" in the context of this clause means a space where obstructions restrict or compromise the flow of the available ventilation air through the space thereby causing any gas cloud formed from a leak to be greater than it otherwise would be.

- consideration shall be given to the location of the supply with respect to the ability of the structure to withstand the consequences of an ignition in the event of a gas escape
- apparatus should be sited to avoid accidental damage or interference with the supply wherever possible
- gas supplies should, as far as possible, be sited externally to the building or in well ventilated spaces.

Note: These principles form the basis of identifying the preferred hierarchy of supply options.

7.2.1.3 The designer shall consider the most appropriate design option based on consideration of safety, security, future access and maintenance and the specific requirements of the adopting GT.

7.2.1.4 Consideration shall be given to the following examples of typical options available for the supply of gas to multi-occupancy buildings. They are presented as a general hierarchy relating to overall safety.

The following hierarchy is the order of preference and in general, the lower the option in the hierarchy the greater attention to risk mitigation is required

There are several factors which may have a bearing on overall safety such as:

- the presence of combustible cladding on external walls
- method of ventilation
- position of meters
- number of meters in a meter bank
- access to components
- number of joints
- length of pipe and pipework in buildings
- means of escape
- future access for inspection and maintenance
- type of chimney (individual or shared) etc.

Therefore, an overall risk assessment shall be carried out before deciding upon the final design. The hierarchy of designs given in this Standard are:

(a) External network pipeline (service) supplying an energy centre, located at or above ground level and which provides heating and hot water to the individual dwellings. Energy for cooking should be provided by another fuel.

Note 1: The advantages of this option include:

- *absence of gas infrastructure, which could leak or be the subject of vandalism, within common areas and individual dwellings*

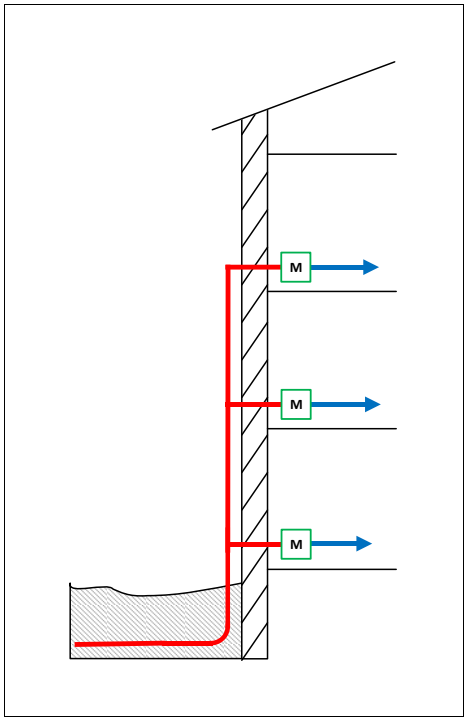
- *minimal hindrance to inspection and maintenance.*

Note 2: There are no disadvantages to this option from an overall safety ~~perspective~~ and it applies equally to ~~high rise and low rise~~ all buildings, whether or not they have been designated as "High Risk".

Note 3: Where there is proposal to locate the Energy Centre in a basement then the design would not be considered as an (a) level option and a detailed risk assessment would be required to be carried out.

Note 4: See Section 11 for requirements and guidance on Energy Centres.

(b) External network with laterals supplying primary meter installations located immediately on the inside of an external wall.



Note 1: The advantages of this option include:

- *any leak from the external network pipeline will disperse to atmosphere with minimal likelihood of it entering property*
- *ease of inspection of lower section of network pipeline*
- *low risk of interference with meter installations by third parties*
- *installation pipework and meter installation under the control of the consumer*
- *no pipework under the building*
- *minimal length of network pipeline within the building.*

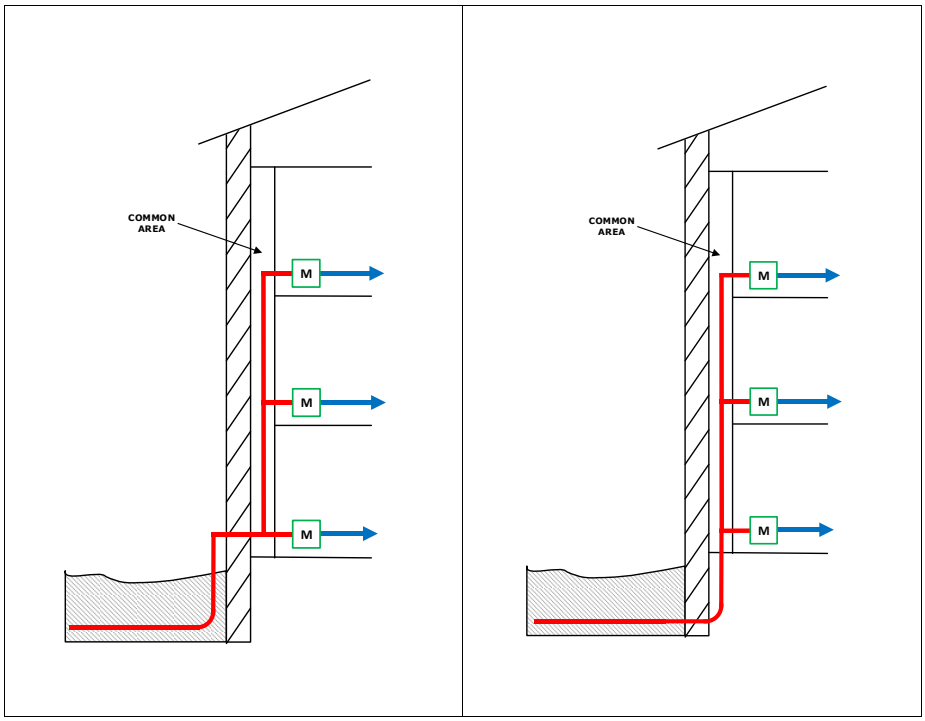
Note 2: The disadvantages of this option include:

- *riser may be at risk from vehicle damage*
- *PE riser at risk from ultra violet light, if not shrouded, vandalism and external fire*
- *PE riser and laterals may contribute to the risk of "flashover" in the event of fire if located in the vicinity of building openings such as windows*

- *construction, inspection and maintenance of network pipeline at height*
- *possible conflict with building's lightning protection*
- *expansion and contraction have to be accommodated*
- *corrosion risk from aggressive atmosphere such as at the coast*
- *sections of the network pipeline cannot be isolated for alteration and repair, the whole system would have to be shut down at the PIV*
- *high level pipes difficult to inspect and maintain.*

Note 3: For a low rise block of flats, a variation of this option would be a long horizontal external network pipeline attached to the outside wall with individual services dropping down to or rising to the individual flats.

(c(i)) Network pipeline with an above ground, or buried short length below-ground, entry serving internal network riser(s) accessible from a common area with lateral(s) supplying primary meter installations and connected to installation pipework for each individual dwelling.



Note 1: The advantages of this option include:

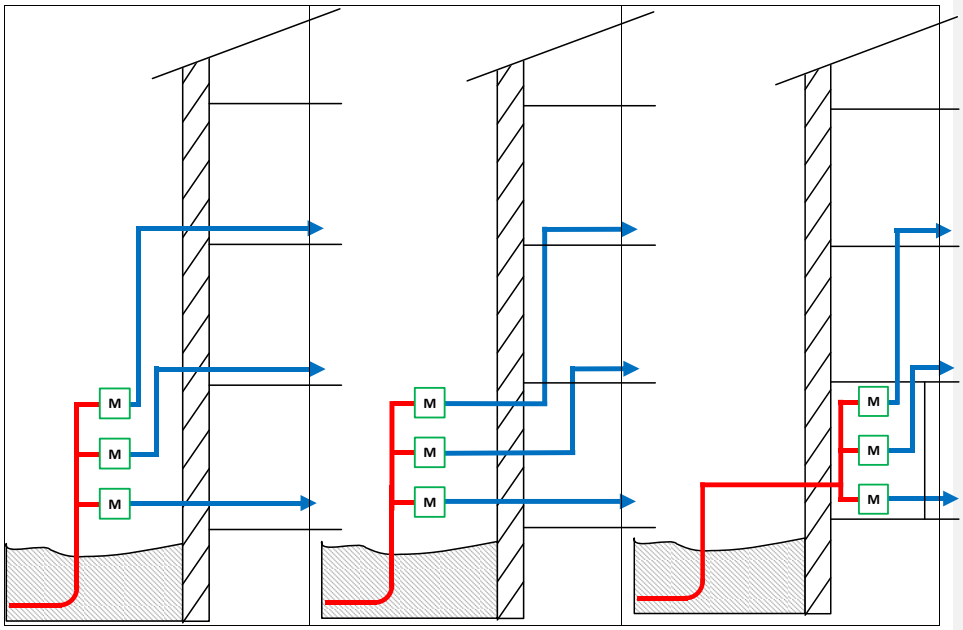
- *ease of inspection of network pipeline from common areas*
- *low risk of interference with meter installations by third parties*
- *riser not at risk from the elements*
- *installation pipework and meter installation under the control of the consumer.*

Note 2: The disadvantages of this option include:

- *short length of below ground pipe in right hand version of option may be difficult to inspect*
- *any leak from the network pipeline could build up to a dangerous level if adequate ventilation is not maintained*

- *building alterations may affect the environment in which the network pipeline resides.*

(c(ii)) Network pipeline supplying a bank of individual primary meter installations connected to individual external or internal installation pipework risers and laterals for each individual dwelling.



Note 1: In some cases, a network pipeline may supply an external bulk primary meter installation.

Note 2: The advantages of this option include:

- *ease of inspection of network pipeline*
- *riser not at risk from the elements*
- *Nominal Operating Pressure of gas in installation pipes within the building i.e. the vast majority of the pipework, will be 21 mbar*
- *individual installation pipework installations can be pressure tested as required*
- *ease of inspection where installation pipes are routed in a duct accessible from a common area*
- *meters can be read and inspected without gaining access to the dwellings.*

Note 3: The disadvantages of this option include:

- *external meters and meter housing may be at risk from vehicle damage*
- *common area ventilation and fire protection required for installation pipes located in a duct accessible from a common area*
- *risk of interference with meter installations*
- *long lengths of installation pipework need to be sized very carefully to ensure pressure drops are not excessive*
- *theft of high value installation pipe by third parties, particularly where externally located*
- *risk of misidentification of meters and installation pipes.*

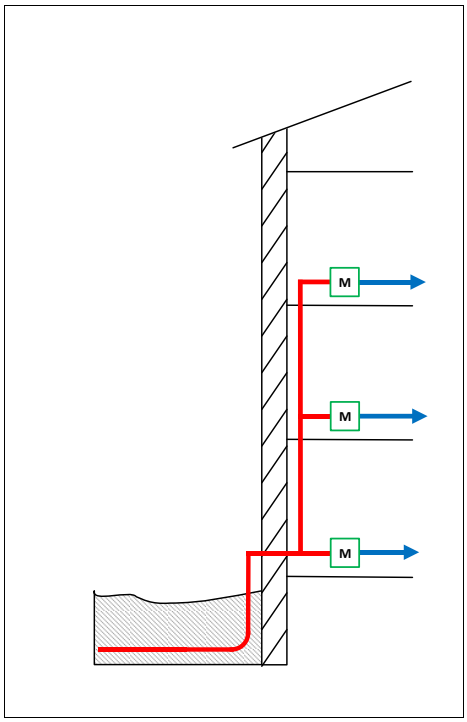
Note 4: BS 6891 requires any installation pipework carrying gas installed in or passing through a protected area to be either:

- *steel pipework with screwed joints, or*

- *steel pipework with welded joints, or*
- *continuous length of copper (no Joints), or*
- *continuous length of pliable corrugated (stainless steel) tubing compliant with fire test A of BS EN 1775:2007, Annex A.*

Options c(i) and c(ii) are nominally equal in the hierarchy – the actual preference would be based upon individual circumstances and the level of the risks such as susceptibility to vandalism, number and position of meters in groups etc.

(d) Network pipeline with an above ground entry, serving internal network riser(s) accessible from within the flat with lateral(s) supplying primary meter installations and connected to installation pipework for each individual dwelling.



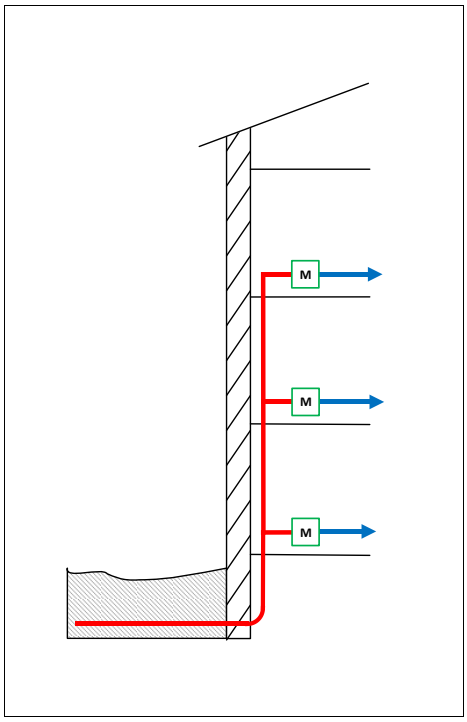
Note 1: The advantages of this option include:

- *low risk of interference with meter installations by third parties*
- *riser not at risk from the elements*
- *installation pipework and meter installation under the control of the consumer*
- *~~GS(I&U)R Reg 36~~ Landlord inspections, by prior agreement, may provide an additional inspection of the network pipeline and meter installation.*

Note 2: The disadvantages of this option include:

- *access required to individual dwellings to undertake inspection*
- *any leak from the network pipeline could build up to a dangerous level within the dwelling*
- *no suitable location for isolation valves between the PIV and the individual ECVs.*

(e) Network pipeline with Standard below ground entry serving network riser(s) with laterals supplying primary meter installations connected to installation pipework for each individual dwelling.



Note 1: The advantages of this option include:

- *low risk of interference with meter installations by third parties*
- *riser not at risk from the elements*
- *installation pipework and meter installation under the control of the consumer*
- *~~GS(I&U)R Reg 36~~ Landlord inspections, by prior agreement, may provide an additional inspection of the network pipeline and meter installation.*

Note 2: The disadvantages of this option include:

- *below ground pipework at building entry*
- *adequate ventilation of pipework in any basement or void is required to be maintained by the Responsible Person for the Building in order to prevent any leak building up to a dangerous level within that basement or void*
- *access required to individual dwellings to undertake inspection*
- *any leak from the network pipeline could build up to a dangerous level within the dwelling*
- *no suitable location for isolation valves between the PIV and the individual ECVs.*

A network pipeline entering a building below ground should be brought above ground as soon as is reasonably practicable and it shall be one continuous length or welded~~;~~. ~~m~~Mechanical joints shall not be used below ground. If this is achieved within 2 m of the building external wall, then the design generally may be placed in option (e). However, where this is not reasonably practicable, and

the length of pipeline under the building exceeds 2 m, there are several issues to bear in mind: the following issues shall be considered:

- this Standard does not fully address such designs and the risk assessment should consider this aspect in detail, particularly with regard to access for maintenance and inspection as required by PSR
- the GT may require evidence that it is not reasonably practicable to have a shorter distance of pipeline under the building
- the GT may consider the design to be unsuitable for adoption
- if as a result of deep penetration into a building, the resultant above ground network pipeline requires separate ducted ventilation, specialist advice will be needed.

Replacement designs and designs for new infrastructure in existing/refurbished buildings should not be configured in in accordance with either option (d) or option (e) unless specific legal or safety reasons preclude the adoption of either option (a) or (b) or (c(i)) or (c(ii)) as a basis for the design which will involve significant risk mitigation measures to be identified, implemented and maintained.

Note: Experience has shown that the likelihood of gaining access to individual flats in order to inspect internal network pipelines, which can only be accessed from within the individual flats, is very low. This means that compliance with Regulation 7 of PSR for the two configurations (d) and (e) may be difficult to achieve. Consequently for new gas infrastructure in new buildings, they are no longer considered to be appropriate.

Existing configurations where internal network pipelines which can only be accessed from within the individual flats are to be treated as legacy installations from the date of publication of this standard.

7.2.1.5 The lower the design is in the hierarchy, the greater is the importance of early communication and co-operation between the GT, Developer and Responsible Person for the building to establish acceptance in principle of, and/or any need for further mitigation measures. Consideration shall be given to the following typical areas that give rise to concern and which are not exhaustive:

(i) access arrangements for the inspection and maintenance of network pipelines within a building

(ii) ventilation of network pipelines and installation pipework. For example, ensuring vents do not become blocked over time and long lengths of ducted ventilation air are not preferred to simple ventilation direct to outside

(iii) gas installations within timber frame buildings

(iv) the location of meter installations in relation to common means of escape

(v) ready access by competent persons to valves such as the IIV, BIVs and LIVs and by consumers to their ECVs

(vi) more than one network pipeline entry into a common area of a building.

Note: See Tables 1-4 for the delineation of responsibilities.

While not disallowing designs under options (e) and (f) for replacement designs and designs for new infrastructure in existing/refurbished buildings, this Standard does not fully address all the potential issues and in such cases specialist advice shall be sought.

7.2.1.6 Buildings whose design renders them susceptible to progressive or disproportionate collapse must not be supplied with gas unless a written assurance is obtained from the building designer/architect or owner or responsible person for the building that the building has been satisfactorily strengthened to ensure no such collapse is possible.

Note 1: The terms "progressive collapse" and "disproportionate collapse" are defined in Appendix 1. Building Regulations require disproportionate collapse to be taken into account in the design of new buildings.

Note 2: Following Ronan Point, The Building Regulations 1965 were amended in 1970 to address the risk of collapse from an explosion. These stipulated that all new buildings constructed after November 1968 and taller than 5 storeys, were required to be capable of resisting an explosive force of 34 kPa (4.9 psi). Existing buildings could be resistant to the lower force of 17 kPa (2.5 psi) if the gas supply was removed and flats were retrofitted with electric cooking and heating. Subsequently installing gas in such buildings would be deemed to be a breach of the Building Regulations.

7.2.1.7 Timber-framed buildings are subject to significant shrinkage movement and require special attention.

Note: See IGEM/UP/7 for guidance on gas supplies to timber frame buildings.

The hierarchy of clause 7.2.1.4 shall be considered for timber frame buildings. Each supply option has to address the expected differential movement between the timber frame (see Appendix 6) and the 'fixed' sections, i.e. the masonry outer walls, the inner common areas and the internal gas supply. Whichever option is chosen, provision shall be made to manage the differential movement and to accommodate any resultant stresses should the provision not be effective or cease to function.

7.2.1.8 Developments, whether new or refurbishment, require a high level of co-operation between the gas designer, the developer, the Responsible Person for the building and other utility providers above and beyond that required by CDM, especially where meters, and hence network pipelines, are proposed to be located within a building.

Any meter located inside a building shall be positioned with due regard to the following, which shall not be considered an exhaustive list:

- the nature and use of the building
- the type of occupants, including those with special needs
- the location and type of construction of all the gas pipework within the building
- the protection of the means of escape in the case of fire, explosion or other emergency
- the safe ventilation of potential gas leaks
- Building Regulations and Building Standards
- access to valves, pipes, meters, sleeves and ventilation systems, for inspection, maintenance and repair in the future
- connection and disconnection to network risers and laterals
- proximity to other services, appliances, chimneys etc.

The meter installation shall be installed in accordance with BS 6400, IGEM/GM/6 or IGEM/GM/8, as appropriate.

Note 1: The position of meters has an influence on the design hierarchy and hence on the risk reduction measures required. See also clause 7.2.1.4. ~~For example, groups of meters in meter rooms within a building may present a higher risk than individual meters installed at each individual dwelling which may, in turn, present a higher risk than meters installed outside a building, and so on.~~

Note 2: See also Tables 1-4 (responsibilities and consultation) and Sub-section 8.2 (siting of meters).

7.3 ASSESSMENT OF GAS LOAD

7.3.1 General

7.3.1.1 The gas load shall be assessed to determine the gas flow requirements of the network pipeline.

Note: Assessment of gas load is covered in IGEM/GL/1, IGEM/GM/8, IGEM/GM/6, BS 6400 and adopting GT publications.

7.3.1.2 The designer shall establish the system design minimum pressure (DmP).

Note: GTs will provide source pressure information to assist designers to size any network pipeline, meter bank, riser and lateral so that the pressure at any ECV is greater than or equal to DmP. On request, the relevant GT will provide the full range of operating pressures. IGEM/TD/101 gives information on obtaining pressure information.

7.3.2 **Diversity**

7.3.2.1 For supplies to a group of dwellings, reference should be made to the information on the design flow rate given in Appendix 5 of IGEM/GL/1, in the form of diversity curves, which relate the probable peak flow for groups of consumers.

7.3.2.2 Any system, including a meter bank manifold, shall be designed to meet at least the maximum diversified demand likely to be placed upon it.

7.3.2.3 Care should be taken when estimating the design load when 10 or fewer consumers are being supplied from a network pipeline or meter bank and/or where there is a possibility of large (e.g. 40 kW input) combination boilers being installed. Consideration shall be given to undertaking a sensitivity analysis using diversified and non-diversified loads.

7.3.2.4 For supplies to an individual dwelling, the design flow rate shall be based on the estimated maximum demand which should be assessed in accordance with BS 6400. Diversity shall not be applied to the design of installation pipework (see BS 6891).

7.3.3 **Flow Equation**

7.3.3.1 For the design of systems, the Smooth Pipe Law should be used (see IGEM/TD/3). This is the most appropriate for the partially turbulent flow conditions likely to be prevalent.

Note: There are numerous flow equations in existence although most are variations on, or approximations to, the Smooth Pipe Law.

7.3.4 **Pressure loss due to pipe components**

7.3.4.1 For valves, elbows, etc. an additional length shall be added to the estimated pipe length to compensate for the effects on pressure drop and for accuracy. Reference should be made to manufacturer's data. In the absence of manufacturer's data, advice may be sought from standards such as IGEM/UP/2 or Crane Technical Paper 410M.

Note 1: Given that the ratio of fittings per unit length of pipeline for internal network pipelines and meter banks is generally much higher than that for normal housing estate underground networks, the pressure loss through the fittings will be significant.

Note 2: Proprietary software systems are available for the analysis of pressures and flows within a model of a building's gas infrastructure. The contribution of valves and pipe fittings to pressure drop and gas velocity usually can be demonstrated in both tabular and graphical formats easily. In addition, some software systems may be used to simulate the operation of boosters on pressure control equipment and "reservoirs" where plant in an energy centre requires an elevated pressure for safe operation.

7.3.4.2 Where a design risk assessment indicates an excess flow valve (EFV) and/or a thermal cut-off device (TCO) is required, the pressure drop across the EFV/TCO shall be taken into account~~,~~ ~~and shall meet the overall requirements of:~~

Note: See also Section 4 for responsibility and end of network considerations and Appendix 3 for guidance on risk assessment.

7.3.5 **Effect of Altitude**

7.3.5.1 Consideration shall be given to compensating for the effect of altitude on riser systems. Lighter than air gases will show an increase in pressure due to altitude. The following formula may be used:

$$h = 0.123(1-s)H$$

h = pressure change due to altitude (mbar)
H = altitude change (m)
s = density of gas relative to air (dimensionless)

Note 1: The density of NG relative to air is 0.6.

Note 2: The pressure gain may be of use in the design of riser system, but checks will need to be made to ensure unacceptable pressures are not experienced at the appliance.

7.4 ACCESS FOR INSPECTION, MAINTENANCE, REPAIR AND SECURITY

7.4.1 Consideration shall be given to the structure and design of the building with respect to:

- access to gas supply system for maintenance
- action in emergencies
- the safety and security of gas pipes and associated equipment.

7.4.2 Provision must be made for safe and adequate access for the inspection of any riser, valve, lateral, meter, and other gas equipment.

7.4.3 Any means of access to network pipes and valves must comply with the Building Regulations and should be easily removable or openable by one person e.g. requiring standard tools. Gaining access to network pipes shall not impair the effectiveness of any seal.

7.4.4 Fire integrity and air tightness shall not be compromised by the design of the means of access.

7.5 RECORDS

7.5.1 Sufficiently detailed drawings and schedules shall be produced to enable the constructor to install the infrastructure as intended.

7.5.2 Copies shall be made available to the Principal Designer for the development or, in the case of replacement infrastructure, the Responsible Person for the Building.

Note 1: The Independent Review of Building Regulations and Fire Safety conducted by Dame Judith Hackitt included recommendations on the production and use of 3D BIM Level 2 records. It is expected that over time such records will become mandatory.

Note 2: BS EN ISO 19650-1 addresses concepts and principles of BIM and BS EN ISO 19650-2 addresses the use of BIM in the delivery phase of the assets.

7.6 INFORMATION FOR THE HEALTH & SAFETY FILE AND/OR RESPONSIBLE PERSON

7.6.1 Under CDM the Designer has a responsibility to provide information with the design to assist the Client/Responsible Person for the building to maintain the building/structure safely. Such information is placed in the "Health and Safety File" where such a file is required to be produced and given to the Client at the end of the project. Under Regulation 38 of the Building Regulations the Responsible Person for the building should be provided with relevant fire safety information.

Note: Where the building remains occupied during replacement works and where there is not a barrier between the "construction site" and persons in occupation, under the "Fire Safety Order", the Responsible Person for the Building is responsible for general fire precautions for the "construction site" as well as for the rest of the building. This is to ensure that if a fire on the "construction site" can affect persons within the occupied premises, or vice versa, then the general fire precautions are co-ordinated. (See HSG168.)

7.6.2 Information which should be passed to the Client/Responsible Person for the building includes:

- brief description of the works
- plans and/or line diagrams
- location of PIV marker plate
- confirmation that the works were designed and constructed in compliance with Pipeline Safety Regulations and/or the Gas Safety (Installation and Use) Regulations
- confirmation that the materials used within the building to convey the gas to the consumers are non-combustible and if steel were constructed with either welded or screwed joints as appropriate
- the location, function and the need for permanent access in the event of an emergency of the PIV
- location of supplementary valves and associated access requirements
- ~~Location of valves and associated access arrangements~~
- ventilation including its purpose, the requirement to maintain the free flow of air to disperse any credible leak, and the location and size of vents
- sealing/Fire stopping of sleeves where pipes breach internal compartment walls or floors
- access arrangements for future inspection to confirm the continued integrity of the installation as a whole.

7.6.3 ~~Consideration shall be given~~ A Memorandum of Understanding should be agreed between the GT and the Building Owner/Responsible Person for the building in order to facilitate future inspection and maintenance. An example is included as Appendix 10.

Note: A memorandum of understanding is a non-binding agreement between 2 parties or more. Its purpose is to help prevent any confusion, misunderstanding and disputes. It is structured to enable the expectations and responsibilities of the parties involved to be stated clearly.

SECTION 8 : METER INSTALLATIONS

8.1 GENERAL

Gas meter installations that supply gas to individual dwellings should be arranged as follows:

- individual primary meters within, adjacent to or remote from the individual dwellings they serve (see Figures 1 to 3 and Sub-Section 8.3) or
- multiple primary meter installations (meter banks) situated remote from the dwellings they serve (see Figure 3 and Sub-Section 8.4) or
- a bulk primary meter situated remote from, or adjacent to, the multiple individual dwellings it serves (see Figure 4, a secondary meter may not always be fitted).

Note 1: Whether within an individual dwelling, within the building or in a separate meter housing outside the building, the accommodation and construction of the meter housing has to be approved by the GT (Gas Act, Section 5, Schedule 2b).

Note 2: Where gas is supplied to a single primary meter serving communal heating plant or an energy centre, see Section 11.

Note 3: Information on AECVs is given in Section 10.7.

Note 4: Information on EFVs and TCOs is given in Sections 10.9.1 and 10.9.2 respectively. Responsibilities are detailed in Section 4.

8.2 SITING METHODS

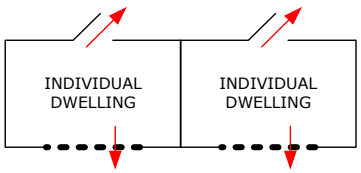
8.2.1 Definitions of means of escape

Building Regulations, GS(I&U)R and Standards adopt terms to describe types of means of escape. The terms adopted by this Standard may differ from official descriptions to aid clarity. The following terms are used in IGEM/G/5 and shall be referenced when designing a meter installation and/or determining the termination point(s) of the network.

Note: A lift is not considered to be a means of escape, under any circumstances.

(a) **Means of escape**

A route used for escape by occupants of one or more individual dwelling(s) from one area of a building to another and to a safe outside location. Figure 5 provides a simple example.

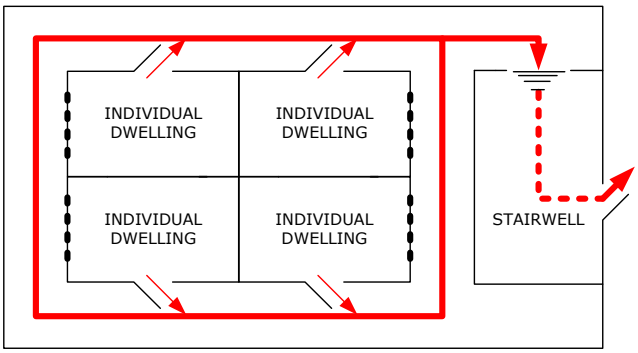


Door (all situations) and openable and suitably sized window (ground and 1st floor only)

FIGURE 5- EXAMPLE OF A "MEANS OF ESCAPE"

(b) **Common means of escape**

A route used for escape by occupants of more than one individual dwelling from one area of a building to another and to a safe outside location, and includes any area adjoining that route other than an individual dwelling. Figure 6 provides an example.



Note: This depicts a common means of escape (see clause 8.2.1 (b)) that is also a common sole means of escape (see clause 8.2.1 (d)).

FIGURE 6 - EXAMPLE OF A "COMMON MEANS OF ESCAPE"

(c) **Common alternative means of escape**

A route used for escape by occupants of more than one individual dwelling from one area of a building to another and to a safe outside location, where an alternative escape route exists. Figure 7 provides an example.

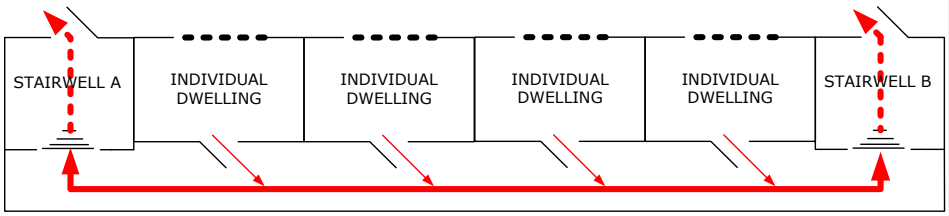


FIGURE 7 - EXAMPLE OF A "COMMON ALTERNATIVE MEANS OF ESCAPE"

(d) **Common sole means of escape**

A route used for escape by occupants of more than one individual dwelling from one area of a building to another and to a safe outside location, where no other route exists or where any other route is not a common alternative means of escape (see (c) above). Figure 8 provides an example.

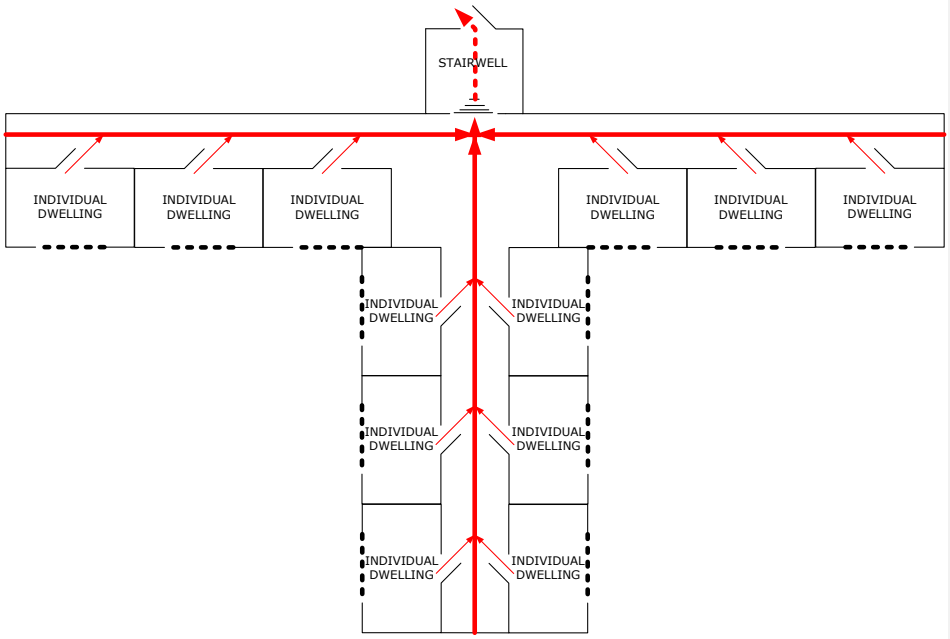


FIGURE 8 - EXAMPLE OF A "COMMON SOLE MEANS OF ESCAPE"

8.2.2 **Siting meters with respect to common escape routes**

8.2.2.1 Due account must be taken of relevant requirements in the Building Regulations. It may be necessary to install meters in meter rooms or compounds/enclosures.

Note: Paragraph~~s 3.80 2.42 and 4.40~~ of ~~Building Regulations~~ Approved Document B Volume ~~2~~1 prohibit~~s~~ the installation of gas pipes and associated meters within a protected stairway unless the installation is in accordance with PSR and/or GS(I&U)R.

8.2.2.2 New meters ~~shall~~ must not be sited on or under the stairway, or in any other part of the premises, where the stairway or that other part of the premises forms the **common sole means of escape** in case of fire. Neither shall a new meter be installed in any room, box, cupboard, or other compartment or compound/enclosure that opens onto a **common sole means of escape** or in a meter room where fire doors are used to create a false or intermediate lobby between the meter room and the **common sole means of escape**.

Note 1: New installations with two or more floors above the ground floor have to be installed in accordance with this clause (see Guidance Note 165 in ~~HS~~L56 to Regulations 12(1) and 12(2) of GS(I&U)R).

Note 2: In the context of this clause, a room is not intended to mean a room contained in an individual dwelling.

8.2.2.3 A meter shall not be installed in any **common alternative means of escape** unless:

- a risk assessment (see Sub-Section 7.2) indicates the risk of an incident removing all means of escape is as low as reasonably practicable **and**
- the **common alternative means of escape** is independent of the other **alternative means of escape** such that a fire or explosion in one means of escape will not affect escape by occupants of the building by the other means of escape ~~(such independent means of escape are rare with modern designs of buildings)~~ **or**
- the particular means of escape on which a meter is to be installed is largely exposed to outside air when escaping gas would quickly disperse, in addition, the meter shall be enclosed in a room, box, cupboard or other compartment (which may open onto the common alternative means of escape) that is at least 30 minute fire resistant to BS 476 and have a self-closing door **or**
- the particular means of escape on which a meter is to be installed is within the building, an EFV is installed. In addition, the meter either shall be enclosed in a room, box, cupboard or other compartment (which may open onto the **common alternative means of escape**) that is at least 30 minute fire resistant to BS 476 and have a self-closing door or the pipe immediately upstream of the meter installation, shall be provided with a TCO.

Note: Where fitted, the EFV and/or TCO need to comply with an appropriate Standard (see Section 10.9 and Table 11) and consideration needs to be given to the pressure drop (see clause 7.3.4.2).

8.2.2.4 If, in the case of a legacy installation and after undertaking a risk assessment, it is necessary to install a replacement meter on or under a stairway, or in any other part of premises, where the stairway or that other part of the premises forms the **common sole means of escape** in the case of fire:

(a) the meter shall be fire-resistant, and **either**

(b) the meter shall be housed in a fire-resistant compartment with automatic self-closing doors, **or**

(c) the pipe immediately upstream of the meter installation, shall be provided with a thermal cut-off device which is designed to automatically cut off the gas supply if the temperature of the device exceeds 95°C. The TCO shall be part of the ECV ~~or it shall be located between a Lateral Isolation Valve (LIV) and the ECV~~.

Note: A cupboard door with rising hinges does not qualify as a self-closing door.

8.2.2.4 If a building owner requires either an EFV or a TCO to be fitted retrospectively into the gas supply system, they shall obtain agreement from both the GT and the Gas Supplier's MAM

8.2.3 **Siting meters with respect to sole escape routes within individual dwellings**

8.2.3.1 If it is proposed to install a meter in a **sole means of escape** within an individual dwelling, the meter shall be fire resistant and **either**:

- the meter shall be enclosed in a box, cupboard or other compartment (which may open onto the sole means of escape from within the individual dwelling) which is at least 30 minute fire resistant to BS 476 and which has a self-closing door, i.e. one to which is fitted a closing device **or**
- the pipe immediately upstream of the meter installation, shall be provided with a TCO.

Note 1: For an individual dwelling situated at ground or 1st floor level, having an exit point other than the normal exit, the normal exit is not considered to be a sole means of escape.

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Note 2: Any meter installed inside the property also needs to be fire-resistant (see BS 6400). Meters marked with a "T" in accordance with BS EN 1359 or refurbished meters that have no "SJ" mark conforming to BS 4161-3 or BS 4161-5 can be considered fire resistant.

Note 3: Where fitted, the TCO needs to comply with an appropriate Standard (see Section 10.9 and Table 11) and consideration needs to be given to the pressure drop (see clause 7.3.4.2).

Note 4: A cupboard or compartment door with rising butt hinges does not qualify as a self-closing door.

Note 5: In order not to compromise the fire resistance of any box, cupboard or other compartment containing a meter, ventilation may be provided by high and low intumescent vents.

8.2.4 **Siting meters with respect to building structure and environment**

A meter shall not be installed:

- where the consequences of a gas escape, fire or explosion at the meter would compromise the integrity of the structure of the building
- in any area subject to excesses of moisture, corrosive materials, heat, etc.

If necessary, the advice of a structural engineer shall be sought to determine a satisfactory location.

8.2.5 **Siting individual meters with respect to electrical apparatus**

Where a gas meter and its associated fittings cannot be fitted more than 150 mm away from an electricity meter/electrical apparatus a fire-resistant partition made of an electrically insulating material shall be placed between them.

~~Where a~~A ~~gas meter and its associated fittings cannot~~shall ~~be fitted more than 150 mm~~ or more away ~~from an electricity meter/electrical apparatus. Where such cannot be achieved a non-combustible partition made of an electrically insulating material shall be placed between them.~~

~~or more than 25 mm away from the electricity supply and distribution cables, a non-combustible partition made of an electrically insulating material shall be placed between them.~~

A built in meter box shall not be inset into a structural timber panel.

Commented [ro6]: See comments 248 - 250 Agreed & Comment 251 partially agreed.

Commented [ro7]: See comment 253. Agreed

Note 1: Where a cladding of thickness less than 100 mm of masonry is used, the use of an inset meter box is not acceptable.

Note 2: See IGEM/UP/7 and Appendix 6 for further guidance on the supply of gas to and within timber framed buildings.

8.3 **INDIVIDUAL METER INSTALLATIONS**

8.3.1 **Domestic-sized meter installations (maximum capacity ≤ 6 $m^3 h^{-1}$)**

8.3.1.1 Any individual meter installation shall be installed in accordance with either BS 6400-1 or BS 6400-2 as appropriate. In particular it shall be installed in an area with adequate ventilation, such as:

- a purpose-made outside meter box or housing with purpose-provided ventilation
- for a single low pressure (≤ 75 mbar) meter installation only, an open area, or cupboard with adequate ventilation, within an individual dwelling.

Note 1: A normally-occupied individual dwelling is deemed to be adequately ventilated for the purposes of installing a domestic-sized low pressure meter supplying only that dwelling. Otherwise, adequate ventilation may be calculated in accordance with clause 8.3.2.1 and positioned so as not to compromise fire safety if located in a fire resistant hallway.

Note 2: BS 8499 specifies requirements for purpose made outside meter boxes for use with single meter installations conforming to BS 6400-1 and BS 6400-2.

Note 3: Meter installations complying with BS 6400-2 cannot be installed inside a building.

8.3.1.2 Any compound/enclosure/house for a meter installation shall be ventilated (see clause ~~5~~8.3.1.1) such that it can be designated hazardous area Zone 2.

8.3.2 **Other meter installations (maximum capacity > 6 m^3 h^{-1})**

8.3.2.1 The total effective ventilation area (free area) shall be not less than the lower of 2% of the ~~largest~~ internal floor area or its notional equivalent area.

Note:The notional equivalent floor area is the floor area of a typical pre-fabricated housing for the particular size of gas meter installation.

Where ventilation is provided in one wall only, the minimum total effective ventilation area shall be increased from 2% to 3%.

Any meter installation shall be installed in accordance with IGEM/GM/6 ~~and~~or IGEM/GM/8.

Note: Further information can be found in IGEM/GM/6 and IGEM/GM/8 as appropriate.

8.3.2.2 A hazardous area assessment shall be undertaken (see IGEM/GM/7B or IGEM/SR/25 as appropriate).

8.3.2.3 Where electrical equipment and/or other potential sources of ignition is/are to be installed in the enclosure, reference shall be made to IGEM/GM/7A, IGEM/GM/8 and BS 7671.

8.4 **MULTIPLE DOMESTIC METER INSTALLATIONS (METER BANKS)**

8.4.1 Meter banks shall be in a dedicated room~~/compound~~/enclosure/house. The room~~compound~~/enclosure/house shall comprise a room, cupboard or a secure area, designed and fit for the purpose.

Note 1: A meter bank has two or more primary meter installations in a single ventilated room/compound/enclosure/house. The meter installations are supplied from a manifold at the end of a single network pipeline.

Note 2: Individual meter installations located in outside meter boxes and which are supplied by individual services do not constitute a meter bank.

Note 3: BS 6400-2 prohibits multiple individual MP meter installations located in outside meter boxes and which are supplied by individual services, on the grounds that such a configuration would produce an unacceptably large hazardous area.

8.4.2 Meter banks shall have a low pressure (≤ 75 mbar) supply.

8.4.3 Meter bank rooms~~compound~~/enclosures/houses shall comply with Section 14 of IGEM/GM/6 and in particular shall have adequate natural ventilation direct to the outside as specified in clause 8.4.4 below.

~~*Note 1: Ventilation of car parks is addressed in section 11 of Approved Document B Volume 2 and section 6 of Approved Document F of the Building Regulations. Open sided car parks are specified to have an aggregate vent area of at least 5% of the floor area equally distributed over 2 opposing walls. Where car parks are not open sided but are deemed naturally ventilated, they are specified to have an aggregate vent area of at least 2.5% of the floor area equally distributed over 2 opposing walls.*~~

The total effective ventilation area (free area) shall be not less than 2% of the surface area of the room/enclosure/house having the largest dimensions (e.g. the rear wall of ~~the~~a room), or, if greater, 2% of the notional equivalent floor area taken from Table 3. (i.e. 0.5 m^2 per meter installation.)

Where ventilation is provided in one wall only, the minimum total effective ventilation area shall be increased from 2% to 3%.

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Commented [ro9]: Comment 260 Agreed

Commented [ro10]: See Comment 259. Agreed

Commented [ro11]: Comment 256 Agreed

Commented [ro12]: See Comment 263. Agreed

Commented [rh13]: The word compound has been removed from this section as clause 14.9.1 of IGEM/GM/6 prohibits the fitting of diaphragm meters in an outdoor compound.

Commented [ro14]: Comment 269 Agreed

Commented [rh15]: Given this requirement has been made here there is no need for repetition in clause 8.4.5.

Commented [ro16]: Comment 273 Agreed

Note 2: The level of ventilation specified in the Approved Documents B and F of the Building Regulations for car parks will exceed the ventilation requirements in clause 8.4.4.

NUMBER OF DOMESTIC METERS	NOTIONAL FLOOR AREA, AT 0.5 m² PER METER	TOTAL VENTILATION AREA AT 2% OF NOTIONAL FLOOR AREA	TOTAL VENTILATION AREA AT 3% OF NOTIONAL FLOOR AREA
2	1 m² (10,000 cm² or 1,000,000 mm²)	0.02 m² (200 cm² or 20,000 mm²)	0.03 m² (300 cm² or 30,000 mm²)
10	5 m² (50,000 cm² or 5,000,000 mm²)	0.1 m² (1,000 cm² or 100,000 mm²)	0.15 m² (1,500 cm² or 150,000 mm²)

Note: Actual ventilator dimensions will be larger than the calculated free area dimensions, as ventilators are partially restricted by the grille structure.

TABLE 3 - EXAMPLE NOTIONAL FLOOR AREAS AND VENTILATION AREAS

8.4.5 Other requirements for a meter room/enclosure/house housing a meter bank complying with Section 14 of IGEM/GM/6 include the following:

- Ventilation should be ~~apportioned~~ equally distributed at high and low level on all ~~four~~external walls and/or doors. Low level ventilators should be positioned 150mm above the floor. The high level openings should be situated as close as possible below. But not more than 10% of the total height below, the roof or ceiling level.

  Note: Appendix A 7.2 of IGEM/SR/25 provides further guidance on the determination of the adequacy of ventilation of any room/enclosure/house. ~~The split between high level and low level ventilators may be between 33% and 67% of the total free ventilation area irrespective of the number of walls available for ventilation~~ ~~(See A7.2.2 of IGEM/SR/25)~~

- ~~8.4.6~~ If ventilation is provided via one or more ducts, the duct(s) shall be fire resistant unless this is not required for fire protection purposes.

- ~~8.4.7~~ Where electrical equipment and/or other potential sources of ignition is/are to be installed in the room/compound/enclosure/house, it shall be suitable for a Zone 2 hazardous area.

- ~~8.4.8~~ The meter bank room~~/compound~~/enclosure/house ~~shall~~must be designed so that any escaping gas will not pass into any habitable part of the building and it shall be compliant with Sub-Section 8.2 above.

  Note: See Regulation 13(1) of GS(I&U)R.

- ~~8.4.9~~ The meter bank room~~/compound~~/enclosure/house door should be self-closing and self-latching and should be locked.

  Note ~~1~~: A cupboard or compartment door with rising hinges does not qualify as a self-closing door.

  ~~*Note 2: See clause 8.4.11 below.*~~

- ~~8.4.10~~ For a meter bank room~~/compound~~/enclosure/house large enough for persons to enter, it shall be possible to exit the room~~compound~~/enclosure/house without the use of keys, etc.

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- ~~8.4.11~~ The consumer and authorised persons shall have unrestricted access (for example, keys being readily available) to the meter bank room~~/compound~~/enclosure/house to gain access to read the meter and to enable them to operate their ECV in an emergency.

Commented [ro21]: See comment 284. Agreed.

8.4.~~6~~12 Smoking and the use of naked flames shall be prohibited in the immediate vicinity of the ~~compound~~room/enclosure/house.

8.4.~~7~~13 Each meter and its associated installation pipework shall be clearly and permanently identified to indicate which particular dwelling it serves.

Note: This may be best achieved during construction.

8.4.~~1~~84 A sign shall be placed in a prominent position outside the room~~compound~~/enclosure/house to advise the GT/ESP/Gas Conveyor/MAM/consumer/meter reader where the keys to the room~~compound~~/enclosure/house may be found.

8.4.~~9~~15 A label for the meter bank shall be placed in a prominent position, and should be within sight of the meters and ECVs. The label must provide the following information:

- actions to take in the event of a suspected gas escape
- line diagram.
- an EX label (indicates the presence of a hazardous area as defined in IGEM/G/4)
- "no smoking"~~ and "gas escapes"~~ label~~s~~.

Commented [ro22]: Comment 267 Agreed

The label should also provide the following information:

- gas pressures
- equipotential bonding
- security seals

Figure 9 provides a typical example of this comprehensive composite notice.

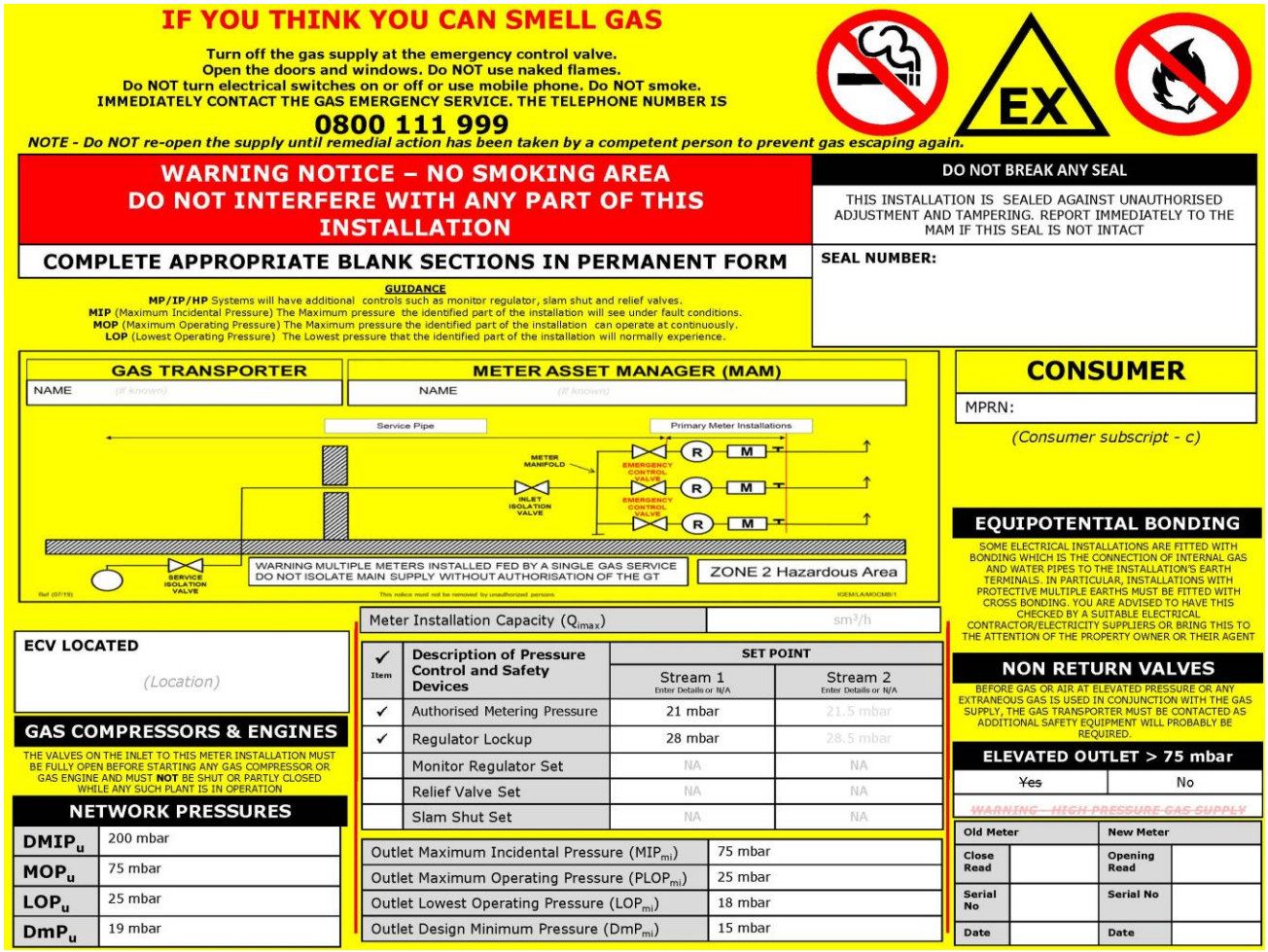

FIGURE 9 - COMPOSITE LABEL FOR METER BANK OF LP DOMESTIC METERS

SECTION 9 : NETWORK PIPELINES

This Section applies when considering entry and routing of a ~~a~~ new or replacement network pipeline into a multi-occupancy building up to the ECV. It equally applies, where relevant, when considering entry into a meter bank compound/enclosure attached to, or remote from, a multi-occupancy building.

9.1 GENERAL

9.1.1 Unless indicated to the contrary, references to steel pipe shall mean carbon steel pipe to GIS/L2 or similar and references to steel fittings shall mean fittings to BS 3799 or similar.

Note: See Table 11 also.

References to press-fit stainless steel shall mean pipe and fittings manufactured with CrNiMo steel type 1.4401 (grade 316) to BS EN 10088-2 and tested and approved to the draft EN standard prEN 10352.

Note: prEN10352 includes a 30 minute high temperature (650^{0}C) test at a specified pressure e.g. fittings marked GT/5 denote successful high temperature testing at 5bar.

9.1.2 Any network pipeline shall be installed only in a position in which it can be ~~used~~operated and maintained with safety, having regard to the position of other nearby services, for example electricity, water, etc. and to such parts of the structure of the building through which it is laid.

9.1.~~2~~3 The preferred hierarchy for the ~~approach,~~ entry (if chosen) and termination of a pipeline should be as given in Section 7.

Note: The Gas Act, PSR and IGE/TD/4 require the line of the service, from the distribution main, to take the shortest practicable route, notwithstanding diversion for obstructions such as manholes. This principle equally applies for a main that enters a building.

9.1.~~3~~4 Any network pipeline shall be installed so as not to impair the structure, fire resistance, thermal and sound insulation of the building. The annular space between the pipework and ~~the~~any sleeve shall be sealed at each end of the sleeve with a flexible fire-resistant compound. Similarly, the integrity of compartment walls, ground gas barriers or the damp proof course (DPC) shall not be compromised.

9.1.~~4~~5 Where a network pipeline passes through a fire resistant compartment wall/floor, the fire resistance classification of the wall shall be reinstated. This may require the installation of a suitable fire stopping solution. The chosen fire stopping solution should be third party certified, with a scope that covers the appropriate application. It should be installed by a contractor who has relevant third party certification for fire stopping installation and with the agreement of the Responsible Person for the Building. Where required to be fire resistant, materials and/or protection shall be in accordance with BS 476-20, 22 and 23 or BS EN 1366-3, and 4, as appropriate.

Note: Before using any product certified against any of the above standards the user is advised to seek confirmation that the tests used in the certification were representative of the proposed application. The dialogue with the product supplier will involve consideration of

a) Pipe material, outside diameter and wall thickness
b) Whether the pipe is insulated or not
c) Whether the penetrations are to be in walls or floors or both
d) Compartment wall/floor material and thickness
e) Size and shape of hole in the compartment wall/floor which is to be fire stopped
f) Provision of a sleeve including its material, outside diameter and wall thickness
g) Whether the sleeve will be flush with the two faces of the compartment wall/floor
h) Requirement for "~~backfill~~reinforcement material" between the ends of the sleeve.

9.1.~~5~~6Any network pipeline installed above ground level shall be so placed or protected as to

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ensure that accidental damage to the pipeline is ~~unlikely~~ reduced so far as is reasonably practicable.

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9.1.~~6~~7 Any network pipeline installed above ground level shall be properly supported as specified in the design.

Note 1: Support may be provided by one or a combination of the following methods, as appropriate:
- *for a vertical pipeline, at its base or from its top*
- *at various points along the pipeline (see Table 4).*

Note 2: The following criteria need to be met:
- *where the pipeline is attached to the building, the building structure needs to be capable of supporting the weight of the pipeline and building surfaces need to be suitable for attaching pipe supports*
- *the pipeline and its supports, joints and other components, such as valves, need to be strong enough to support the weight of the pipework and other stresses, such as those cause by unrestrained laterals*
- *pipeline supports need to permit pipeline expansion and building movement while limiting lateral movement of the pipeline.*

Note 3: Notwithstanding its withdrawal by BSI and it not being replaced, BS 394~~74~~74 provides relevant guidance.

Commented [ro31]: comments 320 - 321. agreed

Note 4: See also Sub-Section 9.4.

9.1.~~7~~8 Polyethylene (PE) pipe shall not be used within a building except when installed in a fire and corrosion–resistant gas-tight steel system approved by the GT and for the purposes of a pipeline entry only.

9.1.~~8~~9 Any PE pipe/fittings shall be shrouded or otherwise protected from sunlight.

9.1.~~9~~10 Any underground steel section, including steel sleeves containing PE pipe, shall be constructed in accordance with IGEM/TD/3 or IGEM/TD/4, as appropriate, with particular respect to grade of pipe, wrapping or coating, cathodic protection (CP) and electrical insulation joints.

9.1.1~~0~~1 Network pipelines shall not be installed in the cavity of a cavity wall unless it is to pass through the wall or floor from one side to the other.

9.1.1~~1~~2 A network pipeline passing through a cavity wall shall be sleeved in accordance with IGEM/TD/4.

9.1.1~~2~~3 Where a network pipeline is installed such that it passes through a solid compartment wall or floor:

- it shall be by the shortest practicable route
- it shall be enclosed in a sleeve and not contain mechanical joints
- the annulus between pipe and sleeve shall be sealed with a fire resistant, flexible material to BS EN 1366-3 and in accordance with manufacturer's instructions. Sealing shall be at both ends and "backfill materials" shall be installed between the seals as required
- the annulus between the sleeve and wall, and/or sleeve and floor, shall be sealed so as to prevent the passage of gas, with a fire resistant material to BS EN 1366-3. Sealing shall be at both ends and "~~backfill~~reinforcement materials" shall be installed between the seals as required
- allowance shall be made for normal movement of the pipe and the building.

Note: Before using any product certified against BS EN 1366-3 the user is advised to seek confirmation that the tests used in the certification were representative of the proposed application. The dialogue with the product supplier will involve consideration of:
a) Pipe material, outside diameter and wall thickness
b) Whether the pipe is insulated or not
c) Whether the penetrations are to be in walls or floors or both
d) Compartment wall/floor material and thickness
e) Size and shape of hole in the compartment wall/floor which is to be fire stopped
f) Provision of a sleeve including its material, outside diameter and wall thickness

g) Whether the sleeve will be flush with the two faces of the compartment wall/floor
h) Requirement for "~~backfill~~reinforcement material" between the ends of the sleeve.

9.1.1~~3~~4 Network pipelines shall not be installed in an unventilated void space, unless continuously contained in a gas-tight metallic duct through the void.

9.1.1~~4~~5 Pipe shall not be installed in or under the foundations of a building, nor under the base of a load bearing wall, nor under a raft foundation.

9.1.1~~5~~6 For a timber-framed building, particular attention should be given in the design and installation to accommodate differential movement between the timber frame and any masonry or other structure, for example an external leaf or a stairwell, and the pipeline.

9.1.1~~6~~7 Any network pipeline shall be installed in a position so as to allow adequate access for installation, inspection, maintenance and repair. Wherever possible, working in a confined space shall be avoided.

9.1.1~~7~~8 Where there is more than one network pipeline entering a common area of a building a warning notice shall be placed at each entry stating that further network pipelines into the building exist. A warning notice and a line diagram shall be provided at each building entry/IIV, depicting the dwellings served by that particular network pipeline.

9.1.1~~8~~9 Where a line diagram is provided, it shall be updated to reflect any alterations carried out to the network pipeline as part of a regular maintenance regime. Inspections shall be carried out to ensure that any line diagrams remain in place.

9.1.~~19~~20 ~~Consideration shall be given to labelling above ground network pipelines~~Above ground steel network pipelines should either be labelled or painted in yellow ochre to BS 4800 08 C35 to enable~~.~~ them to be identified as pipes containing gas. Press fit stainless steel pipelines should be labelled and should not be painted.

Note 1: See Regulation 10 and Schedule 5 of DSEAR.

Note 2: Manufacturers discourage the painting of press fit stainless steel joints.

Commented [ro32]: See comments 300 - 303. Partially agreed.

Commented [JM33]: Karl to send info on press fit joint painting not recommended to Rod for consideration

9.2 ABOVE-GROUND ENTRY

An above-ground entry provides easy access for maintenance and visual checks.

Note: Eliminating steel pipes below ground minimises the consequent risk of corrosion.

Principles of entry shall be as shown in Figures 10 and 11.

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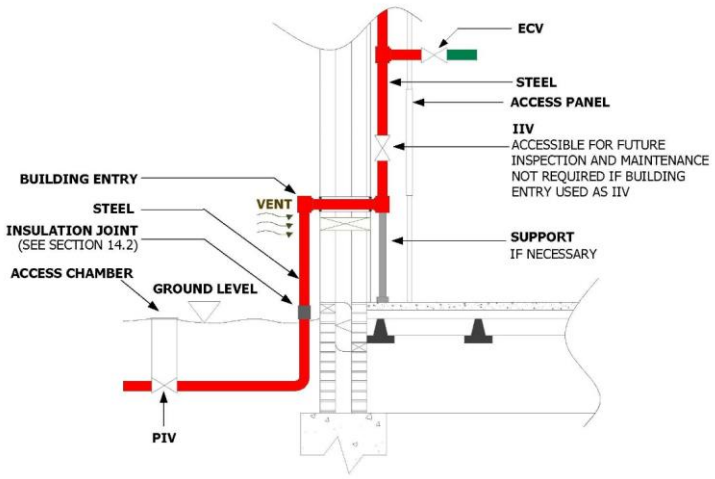

FIGURE 10: TYPICAL ABOVE-GROUND PIPELINE BUILDING ENTRY (STEEL PIPE)

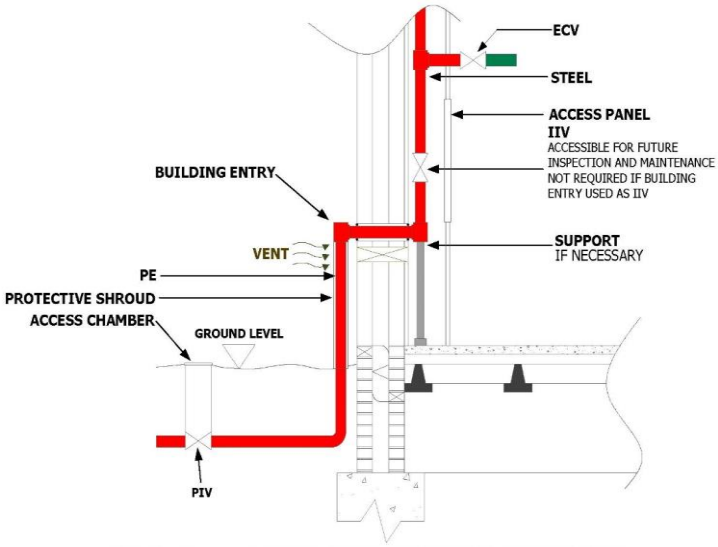

FIGURE 11 TYPICAL ABOVE-GROUND PIPELINE BUILDING ENTRY (PE PIPE UP TO BUILDING ENTRY)

9.3 BELOW-GROUND ENTRY

9.3.1 General

In designing ~~A~~any below-ground entry, the designer ~~shall be designed by a competent person who~~ shall give consideration to:

- access to enable the installer to make proper joints both inside and outside of the building, and for the GT to undertake inspection and maintenance activities once the pipeline ~~has been~~is in use
- minimising the length of pipe under a building (see clause 7.2.1.4 (f))

  Note: For network pipes, the GT may stipulate an allowable maximum length.
- risk of third party damage
- support for any riser
- ventilation of any duct or enclosed pipe
- corrosion, including wrapping and CP
- insulation joint to prevent stray current flow along metallic pipe or sleeve
- fire resistance of pipeline once inside of the building
- ~~access for future inspection and maintenance~~
- depth of pipe at the entry point
- any proposed future land and building use
- ensuring that, in the event of fire, safe egress from the building to a safe location is not compromised.

9.3.2 PE

9.3.2.1 The p~~P~~ipe beneath any building shall be within a corrosion-protected steel carrier pipe which extends to the outside of the building and which shall have been approved by the GT. The annular space between the PE and the sleeve should be filled with an inert material.

~~P~~The pipe should have a radius of curvature no tighter than 15 times its outside diameter. For ease of installation, consideration shall be given to the pre-fabrication and in-situ placement of larger-size entry fittings.

9.3.2.2 ~~P~~ The pipe shall terminate with an appropriate fitting, for example a service head adaptor (see GIS/PL-3), which will not allow gas to escape to inside the building in the event of fire.

9.3.2.3 Any building entry ~~Entry~~ should be in accordance with the principles shown in Figure 12.

Commented [JM35]: To be reworded to state consideration shall be given to…….

Commented [ro36]: comment 329 agreed

Commented [ro37]: See comment 327 Agreed

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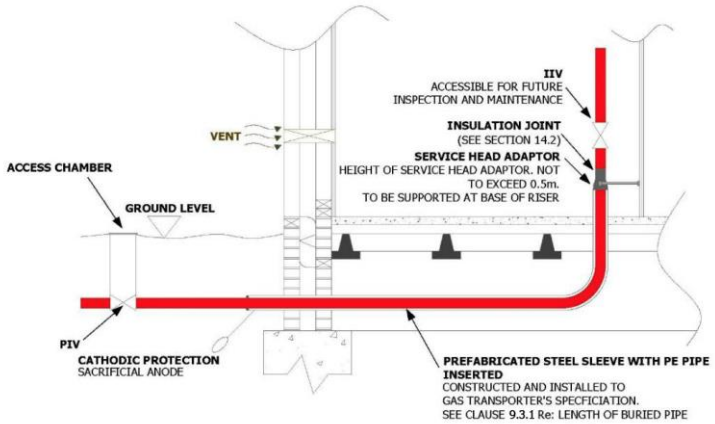

FIGURE 12 TYPICAL PRE-FABRICATED BELOW-GROUND ENTRY. PE PIPE IN A STEEL SLEEVE

9.3.3 **Steel**

9.3.3.1 Normally, ~~entry shall~~ the building entry should be in accordance with the principles of Figure 13, in which a welded steel pipe is laid within an impermeable/non-perforated sleeve terminating in a pit (typically 1 m by 1 m) which is large enough for the installer to work in safely and which allows adequate space for jointing and access for future inspection and maintenance.

Commented [ro41]: Comments 335 & 336 partially agreed

Commented [JM42]:

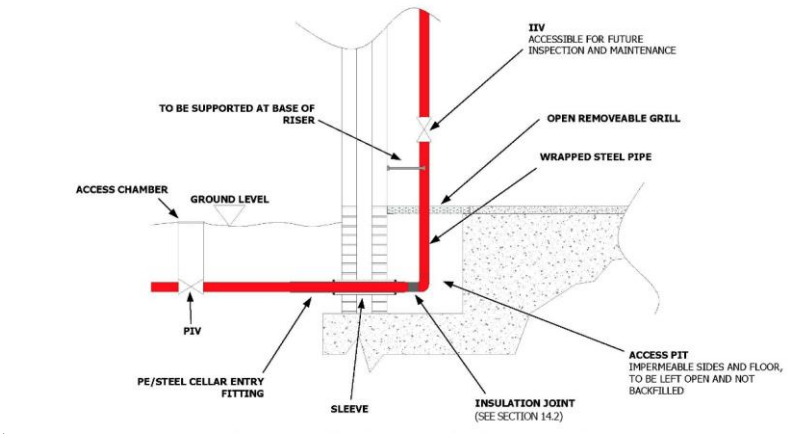

FIGURE 13 - TYPICAL BELOW-GROUND ENTRY. STEEL PIPE IN A SLEEVE

9.3.3.2 Alternative permitted below-ground entry methods include cellar (basement) entry fittings (see Figure 14). Such fittings shall be used only where the cellar or basement is adequately ventilated directly to outside air and no viable alternative exists.

Note: See section 7.2.1 for guidance on risk minimisation.

Commented [ro43]: Comment 338 partially agreed

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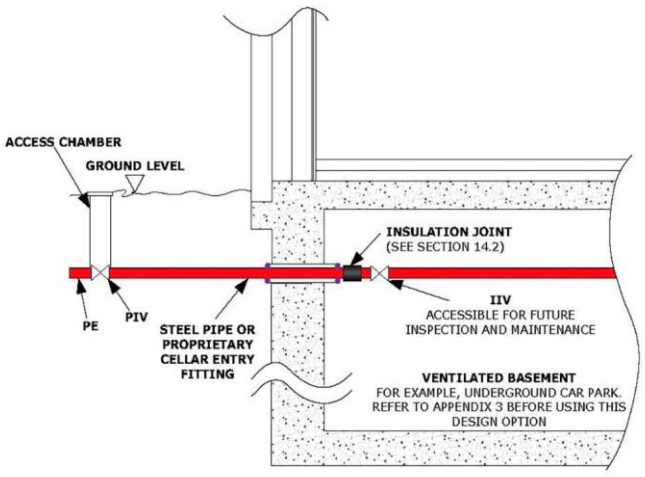

FIGURE 14 - TYPICAL ALTERNATIVE BELOW-GROUND ENTRY. STEEL PIPE. CELLAR/BASEMENT

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9.3.3.3 Press-fit stainless steel pipe and fittings shall not be buried below-ground.

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9.4 RISERS AND LATERALS

9.4.1 General

9.4.1.1 The following shall be taken into account when planning network pipeline risers and laterals:

- the ability of the building structure to accept the installation of pipe supports without imposing unacceptable stresses
- the proposed location of gas meters
- the proposed location and specification of ventilation ducts for pipeline risers and laterals
- the proposed location of all services, for example installation pipework, electricity, water, telecom, fire, soil and vent pipes, when reference should be made to IGEM/UP/2 and BS 8313
- ventilation requirements
- the provision for relative movement between pipes and building, for example thermal expansion and contraction, shrinkage in timber frame constructions (see Appendix 6) etc.

  Note: An allowance needs to be made for shrinkage of timber framing around lateral pipes and thermal movement..

- Building Regulations and standards for the appropriate area e.g. fire compartmentation or protected shaft
- PSR Regulation 5 (Design of pipeline), Regulation 7 (Access for examination and maintenance), Regulation 8 (Materials), Regulation 9 (Construction and Installation) and Regulation 13 (Maintenance)
- suitable and sufficient access to enable the installer to make joints safely
- space requirements for expansion joints, flexible metallic hoses and unrestrained laterals.

Commented [ro45]: Comment 340 Agreed

9.4.1.2 Network pipelines shall be suitably located, supported and protected against undue risk from accidental damage, tampering and vandalism.

NOMINAL BORE (mm)	MAXIMUM UNSUPPORTED LENGTH (m)				
	Screwed steel horizontal	Screwed steel vertical	Welded steel horizontal	Welded steel vertical	Proprietary systems
15	2.0	2.5	2.5	3.1	
20	2.5	3.1	2.5	3.1	
25	2.5	3.1	3.0	3.7	
32	2.7	3.3	3.0	3.7	
40	3.0	3.7	3.5	4.3	
50	3.0	3.7	4.0	5.0	See
65			4.5	5.6	Note
80			5.5	6.8	
100			6.0	7.5	
150			7.0	8.7	
200			8.5	10.6	
250			9.0	11.2	

Note 1: For proprietary systems (e.g. external PE riser and press fit ~~steel/~~stainless steel pipe), see the manufacturer's instructions

Commented [ro46]: Comment 345 agreed

Note 2: Support spacing may need to be reduced in order to spread the load on structures which are relatively weak.

TABLE 4 - SUPPORTING ABOVE-GROUND NETWORK PIPELINES

9.4.1.3 Consideration shall be taken of:

- the safe working load of the support

- the safe working load of the bolts used to fix the support to the building.

Note: Notwithstanding its withdrawal by BSI and it not being replaced, BS 394774 provides relevant guidance.

Commented [ro47]: See comments 348 - 350. Typo corrected.

9.4.1.4 Pipework support shall not be such as to prevent thermal movement. The method of restraining pipes within their supports shall not encourage corrosion or lead to failure of any pipework corrosion protection, pipes or supports.

Note: This can require the addition of a flexible layer of non-absorbent material e.g. PTFE between the support and the surface of the pipe or of its corrosion protection.

9.4.1.5 Anchor points and expansion devices shall be considered where expansion is likely to be excessive.

9.4.1.6 Internal network pipeline risers and laterals shall be constructed either in steel or stainless steel.

Commented [ro48]: See comments 352 - 354. Agreed

Note: ~~Neither~~ Pliable Corrugated Stainless Steel Tube ~~nor press fit stainless steel pipe is~~ is not permitted for network pipelines within buildings.

9.4.1.7 The materials of construction shall be chosen to take account of the environment and any potential hazard in the particular location.

9.4.1.8 Materials shall be inherently resistant to corrosion or be suitably protected against corrosion.

9.4.1.9 Above ground steel pipelines shall be protected against corrosion. Protection of steel pipe should be achieved either by the use of a paint system which complies with BS EN ISO 12944 or by a protective wrapping system which complies with BS EN 12068.

Note: BS EN ISO 12944 gives environmental categories C1 –C5 dependent upon the location of the pipework, for example:
- *pipes within habitable buildings, Category C2*
- *pipes within unheated external housings, Category C3*
- *external pipes, Category C5.*

Screw jointed galvanised steel pipe with a zinc rich cold galvanising coating to BS EN 1504-7 having been applied over any exposed threads may be used for pipe of 50mm diameter or less.

Note 1: Welding galvanised pipe generates a significant dangerous level of highly toxic fumes.

Note 2: The party responsible for protecting the network pipeline against corrosion is expected to obtain painting specifications from the manufacturer of the proposed paint system to suit the category.

Note 3: Painting specifications vary from product to product.

9.4.1.10 Any lateral should be as short as practicable.

9.4.1.11 Any lateral serving an individual dwelling and exceeding 2 m in length within the dwelling should:

- not contain any joints, or
- be all welded

until connection to an ECV (or maintenance valve and TCO if fitted immediately prior to the ECV).

9.4.2 **Design - external network pipelines (see Figure 15)**

9.4.2.1 Any external network pipeline must be compliant with The Building (Amendment) Regulations 2018. The regulations apply to attachments to external walls of buildings over 18m high. The regulations prohibit the use of materials which are

not non-combustible as defined under the European Classification System as set out in BS EN 1350-1.

PE Network Pipelines

9.4.2.2 PE pipe may be used on buildings less than 18m high. It should not be routed so as to traverse between any building openings, such as windows and balconies, due to the risk of a "coanda effect" fire emanating from the opening.

Note: The Building Research Establishment (BRE) has undertaken research into external fire spread from a fire escaping from a room through a window. BRE is on record as stating that "Flames can extend over 2m above [the] window opening. Regardless of [the presence of] cladding materials".

9.4.2.3 Any PE pipe shall be completely sleeved with fire retardant glass reinforced plastic and secured with wall-mounted retaining clips or as instructed by the manufacturer of the proprietary system.

Note: Special support may be required to resist the natural curvature of coiled pipe if straight lengths of pipe are not used.

All Network Pipelines

9.4.2.4 Corrosion-resistant fasteners, appropriate to the external surface of the building, shall be selected to suit the design life of the installation.

9.4.2.5 The design shall tolerate a range of temperatures that will depend on the location and orientation of the building.

Note: In the United Kingdom (UK), allowance for a maximum annual surface temperature variation of 80°C is recommended.

9.4.2.6 Entry of a lateral through an external wall shall be by means of an appropriate method, incorporating a properly supported sleeve with the hole appropriately sealed.

9.4.2.7 Where there is a risk of mechanical damage or vandalism, pipework at less than 3 m from the ground shall be constructed of steel unless a separate means of preventing mechanical damage is provided.

Note: Such means may include providing a rebate in brickwork, additional metal sleeving or guarding.

9.4.2.8 Any additional sleeving or other protection, as required under clause 9.4.2.7, shall be designed to permit the resultant enclosed space to be adequately ventilated, drained and maintained.

The enclosed space shall not contain any other service or cables unless adequate spacing is provided.

9.4.2.9 For an enclosed external riser, ventilation shall be in accordance with the procedures for enclosed internal risers (see clause 9.4.3).

~~9.4.2.1 Corrosion resistant fasteners, appropriate to the external surface of the building, shall be selected to suit the design life of the installation.~~

~~9.4.2.2 The design shall tolerate a range of temperatures that will depend on the location and orientation of the building.~~

Note: In the United Kingdom (UK), allowance for a maximum annual surface temperature variation of 80°C is recommended.

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9.4.2.4 Any PE pipe shall be completely sleeved with fire retardant glass reinforced plastic and secured with wall-mounted retaining clips or as instructed by the manufacturer of the proprietary system.

Note: Special support may be required to resist the natural curvature of coiled pipe if straight lengths of pipe are not used.

9.4.2.5 PE pipe should not be routed to traverse between any building openings. For example windows and balconies due to the risk of a "coanda effect" fire emanating from the opening.

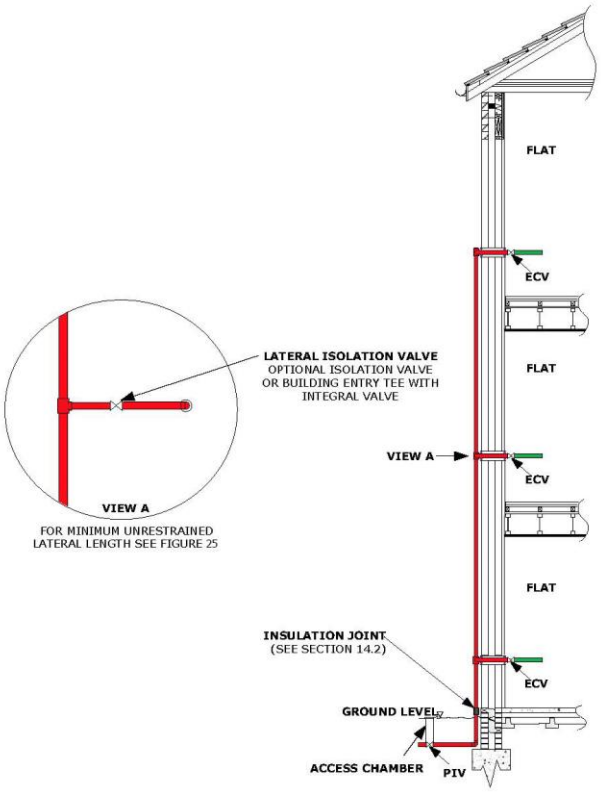
9.4.2.6 Where there is a risk of mechanical damage or vandalism, pipework at less than 3 m from the ground shall be constructed of steel unless a separate means of preventing mechanical damage is provided.

Note: Such means may include providing a rebate in brickwork, additional metal sleeving or guarding.

9.4.2.7 Any additional sleeving or other protection, as required under clause 9.4.2.5, shall be designed to permit the resultant enclosed space to be adequately ventilated, drained and maintained.

The enclosed space shall not contain any other service or cables unless adequate spacing is provided.

9.4.2.8 For an enclosed external riser, ventilation shall be in accordance with the procedures for enclosed internal risers (see clause 9.4.3).



Note 1: A PE riser would have to be enclosed and would not require an insulation joint (see Figure 11).

Note 2: ~~AThere is no maximum height for a~~ PE riser/lateral system cannot be installed on a building where the top storey is 18m or more above ground level.

Note 3: See 9.4.4.15-9.4.4.18 for more details.

FIGURE 15 - EXTERNAL STEEL OR PE NETWORK PIPELINE. CONVENTIONAL BUILDING CONSTRUCTION

9.4.3 **Design - internal network pipelines**

9.4.3.1 Ventilation shall be provided to prevent gas leaks causing the atmosphere to become unsafe.

Note: The levels of ventilation given are not intended to clear any major gas escape arising from catastrophic damage or failure of a gas pipe.

9.4.3.2 Ventilation shall be natural.

Note: Where appropriate, ventilation requirements may be determined from first principles in accordance with BS 5925 and IGEM/SR/25.

9.4.3.3 Any common stairwell, or other protected area/shaft, containing a network pipeline that is itself not contained in a sealed duct ventilated directly to outside, shall be ventilated directly to outside air (see Figures 18 and 19).

Note: Pipework is not considered to be contained within a protected area/shaft if the pipework is completely separated from that protected area/shaft by a fire resistant duct, which itself is adequately ventilated to outside air.

9.4.3.4 Any network pipeline incorporating a screwed, flanged or other joint capable of developing a leak (excluding screwed joints usually on the inlet of an ECV or associated with a TCO that are located within an individual dwelling) shall be ventilated directly to outside air (see Figure 17).

Note 1: For the replacement of existing installations see clause 2.2 and Sub-Section 7.2.

Note 2: A risk assessment will include consideration of issues such as accessibility for inspection and maintenance, build up/dispersion of gas from joint leakage, detection of that leakage and in the case of replacement activity welding within occupied dwellings.

9.4.3.5 Any network pipeline of all-welded construction or any continuous steel pipe without joints shall be ventilated either directly to outside air, or indirectly to outside air via an area that is normally-occupied (see Figures 18 and 19).

~~*Note1: For the purposes of this Standard, stairwells, or other shafts having well distributed (i.e. without any stagnant or dead areas) ventilation above 0.5 air changes per hour are normally deemed to be adequately ventilated.*~~

Note 1: For the purposes of this clause the term normally-occupied means an individual dwelling or an adequately ventilated area in which it is reasonably expected that passers-by will be in the vicinity e.g. regularly used common corridors or common lobbies. 'Normally-occupied spaces' does not include common/protected stairways which, when containing gas pipes, require ventilation in accordance with clause 9.4.3.3.

Note 2: All welded pipelines, are ones not containing screwed or flanged or press-fitted joints.

9.4.3.6 Irrespective of whether ventilation is directly or indirectly to outside air, adequate ventilation shall be provided within each area, duct, fire compartment or other area.

Note: It is preferred, where practicable, for ventilation to be distributed at high and low level. For the size of service duct vents see Table 5.

9.4.3.7 Any vertical duct containing a pipeline shall be ventilated in accordance with BS 8313. High and low ventilation levels are given in Table 5.

CROSS SECTIONAL AREA OF DUCT (m^2)	**MINIMUM FREE AREA OF EACH OPENING (m^2)**
not exceeding 0.05 *(500cm^2)*	Cross sectional area of duct
0.05 and not exceeding 7.5 *(500cm^2 – 75,000cm^2)*	0.05 *(500cm^2)*
exceeding 7.5 *(75,000cm^2)*	1/150th of the cross sectional area of duct

Note 1: Where the CSA of the duct varies along its length, the largest CSA will need to be used to calculate the required ventilation.

Note 2: CSA is measured perpendicular to the length.

Note 3: Calculations in accordance with A7.2.3 of IGEM/SR/25 may be used to confirm the adequacy of buoyancy driven ventilation of the duct provided by different sized openings.

Note 4: Clause 8.6.1 and Table 6 of BS 6891 allows ducts having a small CSA and volume (i.e a CSA of 0.01m^2 (100cm^2) or less and a total volume less than 0.1m^3 (100,000cm^3) to be ventilated by adventitious means and hence no additional openings are deemed to be required.

TABLE 5 - VENTILATION FOR VERTICAL DUCTS CONTAINING A NETWORK PIPELINE

9.4.3.8 For horizontal ducts, vents should be sized in accordance with Table 5, and installed at each end of the duct. In addition, openings ~~shall~~should be provided at intervals along the length of long horizontal ducts, preferably adjacent to potential leak sources such as joints. High ceiling voids ~~shall~~should be ventilated at high points to prevent the collection of flammable gases unless the pipe is all-welded.

Note 1: In general, the larger the interval between openings in horizontal ducts, the greater is the need for a vertical component to the duct to generate air movement.

Note 2: Welded pipework installed above a suspended ceiling which does not form part of the required fire/acoustic performance of the compartment floor can be vented into the corridor via vents inserted through the ceiling, provided the corridor is ventilated to outside air. Normally-occupied spaces' does not include common/protected stairways which, when containing gas pipes, require ventilation in accordance with clause 9.4.3.3.

Note 3: ~~Ducts longer than 15m require intermediate vents to be installed at 5 to 10 metre intervals, preferably adjacent to potential leak sources such as joints.~~ See BS 8313.

9.4.3.9 Any extension of intermediate storey floors or walls into a protected shaft shall not compromise the free movement of air over the entire length of the shaft.

Note: ~~A~~For example, a suitably designed grating or steel decking intermediate storey floor would enable people to enter the shaft to inspect or maintain the pipeline therein without falling and whilst not creating a confined leak location as per IGEM/SR/25.

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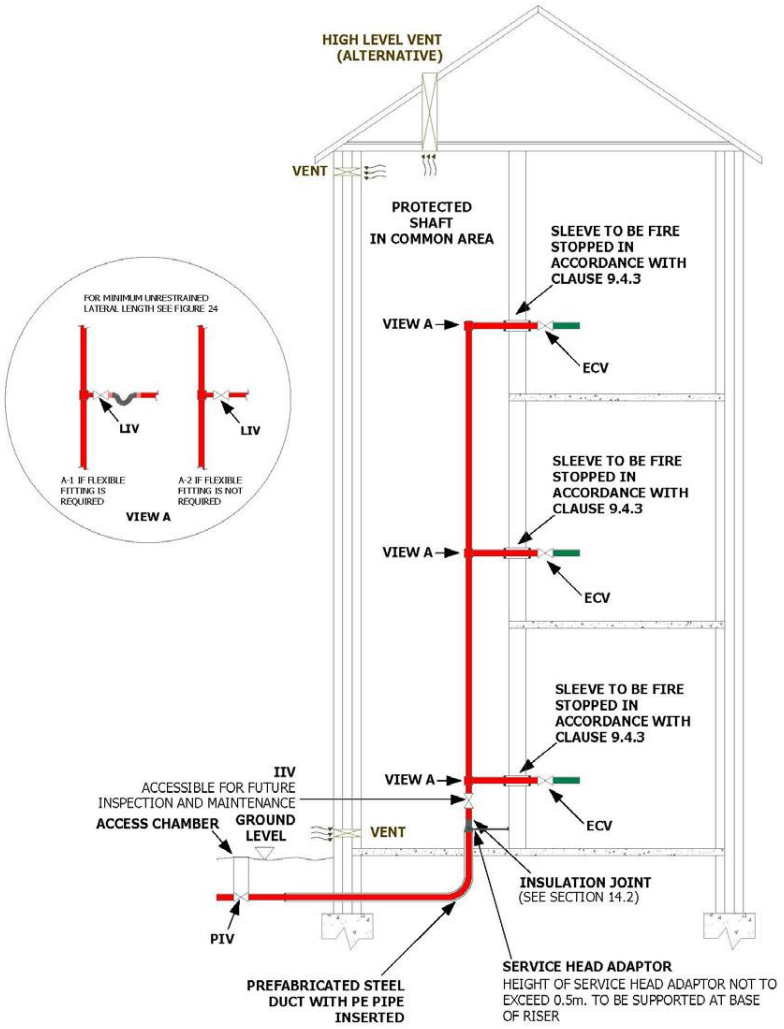
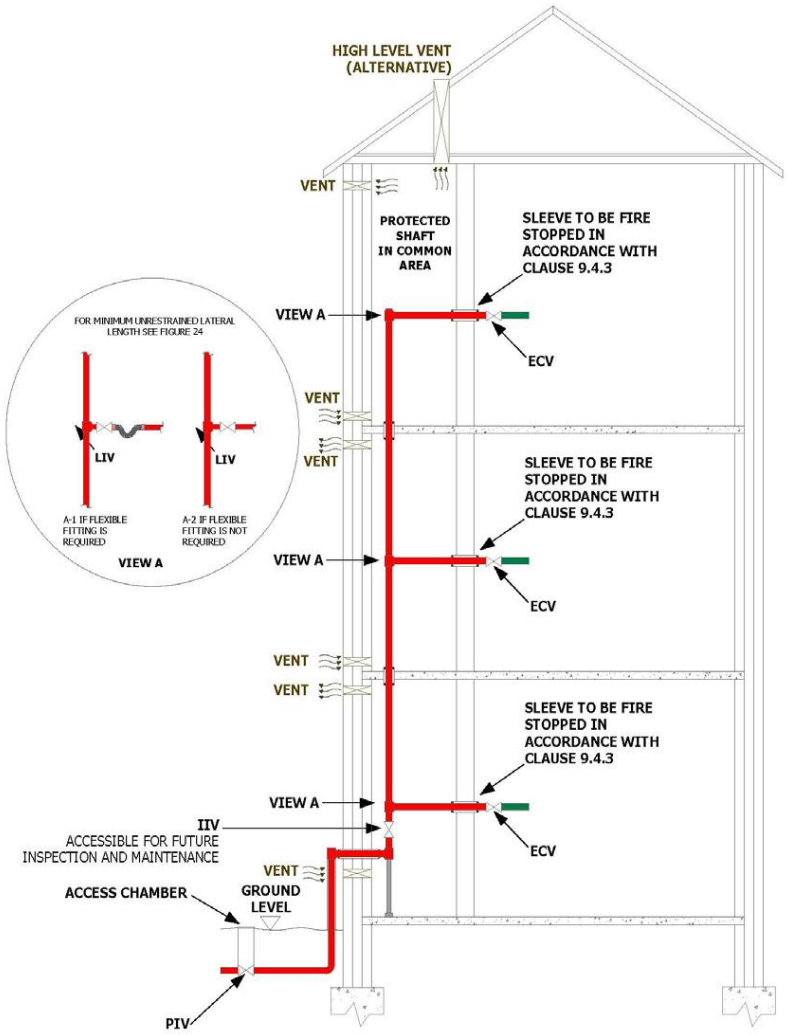


Note 1: Reference needs to be made to Clause 7.2.1.4

Note 2: See Clauses ~~8.40 and 8.41~~7.26 – 7.28 of volume ~~2~~1 of Approved Document B

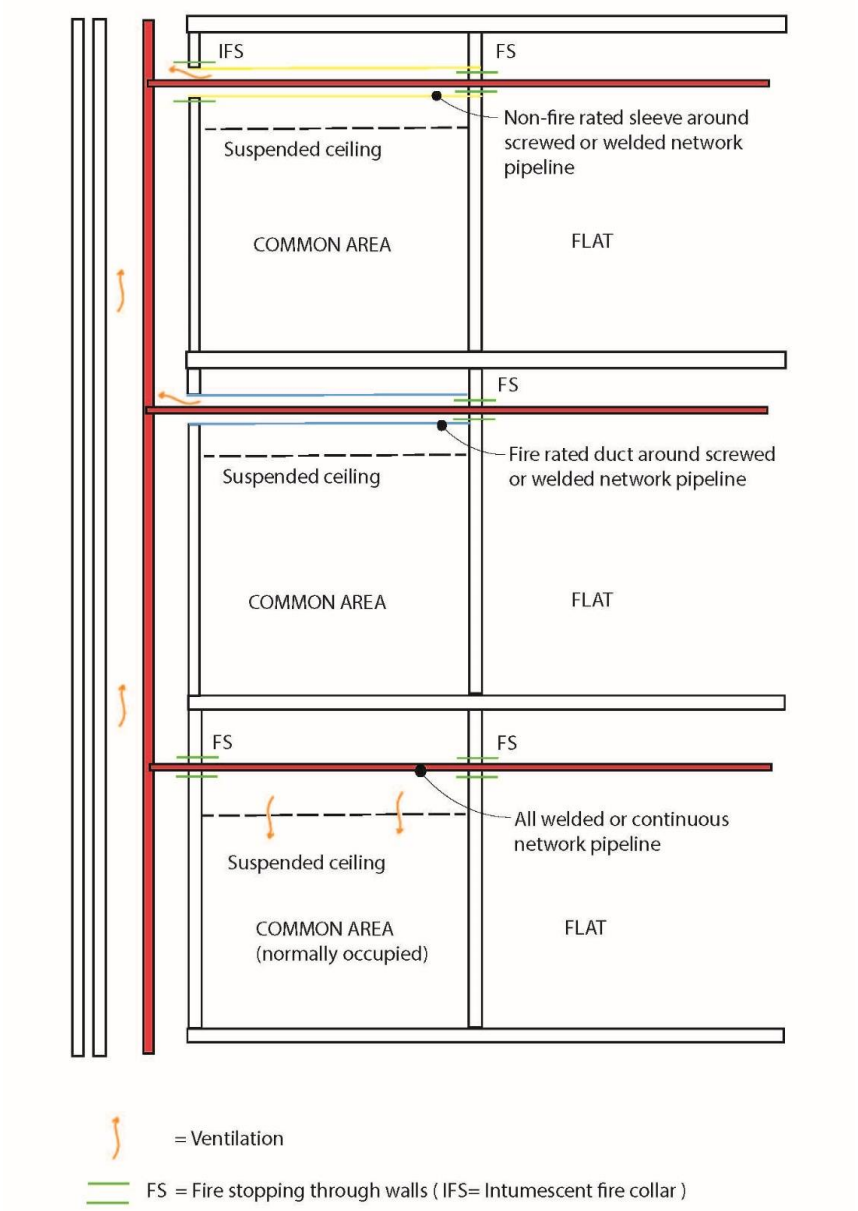
FIGURE 16 -INTERNAL SCREWED OR WELDED NETWORK PIPELINE. PASSING THROUGH A PROTECTED SHAFT (ON AN OUTSIDE WALL). VENTILATED DIRECTLY TO OUTSIDE AIR



Note 1: Reference needs to be made to Clause 7.2.1.4

Note 2: See Clauses 8.4 and 8.4.1 of volume 2 of approved document B.

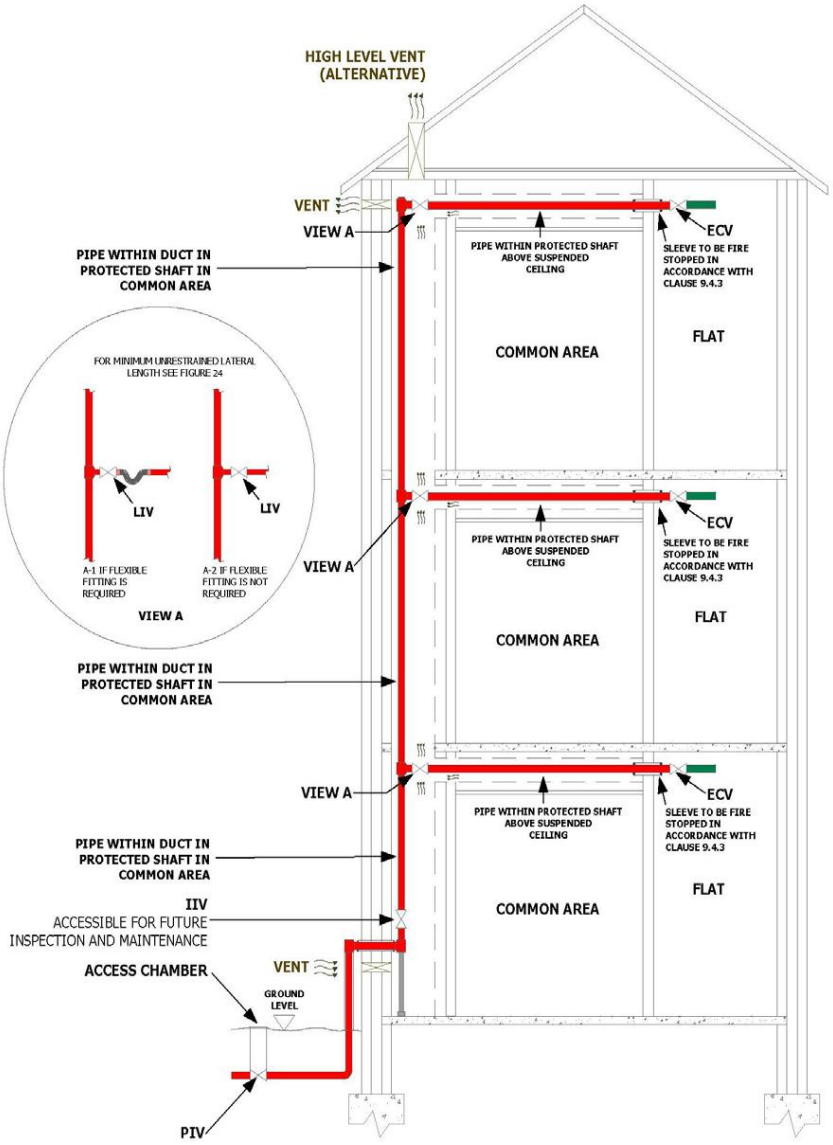
FIGURE 17 - INTERNAL SCREWED OR WELDED NETWORK PIPELINE. PASSING THROUGH A SERVICE DUCT (ON AN OUTSIDE WALL) WHICH IS FIRE STOPPED AT EACH LEVEL. VENTILATED DIRECTLY TO OUTSIDE AIR AT EACH LEVEL



Note 1: Reference needs to be made to Clause 7.2.1.4

Note 2: See Clauses 7.26 – 7.28 of volume 1 of ~~8.40 and 8.41 of volume 2 of~~ Approved Document B.

FIGURE 18 – INTERNAL SCREWED OR WELDED NETWORK PIPELINE WHICH IS FIRE STOPPED AT EACH LEVEL. VENTILATED DIRECTLY TO OUTSIDE AIR. PIPELINE PASSES THROUGH COMMON AREA

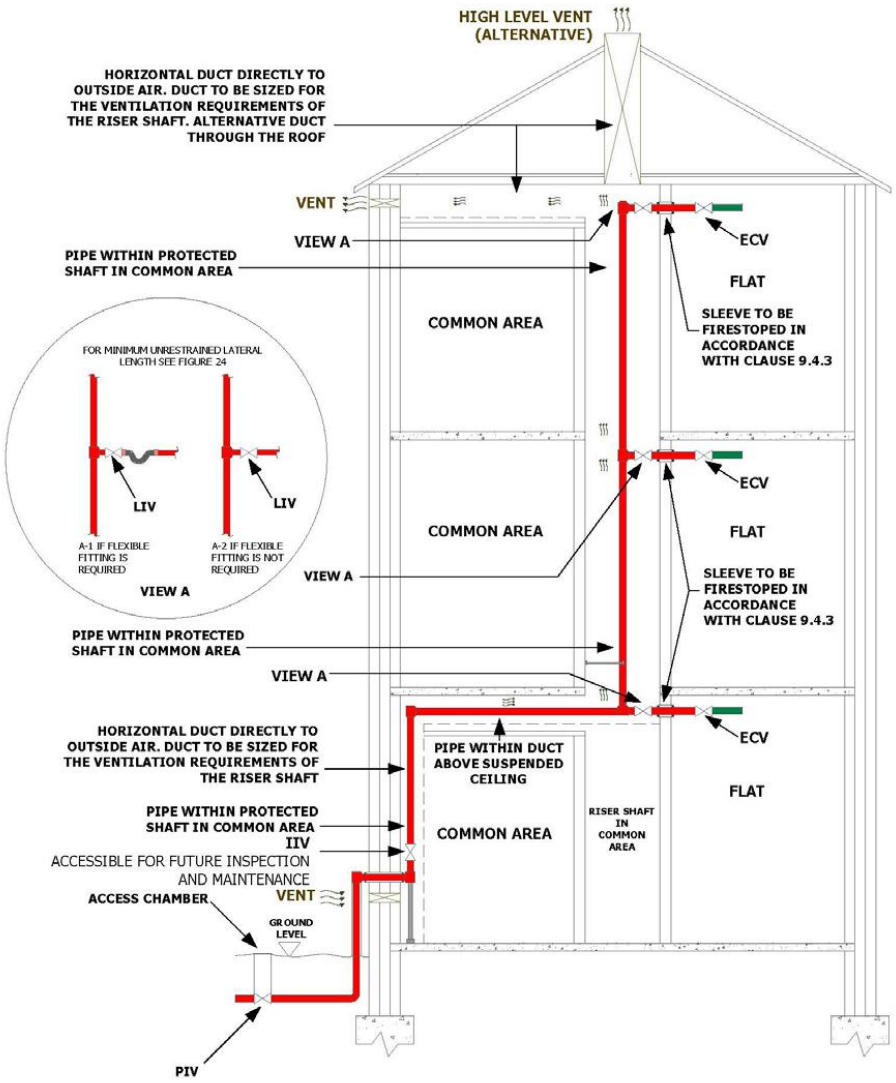


Note 1: Reference needs to be made to Clause 7.2.1.4

Note 2: See Clauses 7.26 – 7.28 of volume 1 of ~~See Clauses 8.40 and 8.41 of volume 2 of~~ Approved Document B.

FIGURE 19 INTERNAL SCREWED OR WELDED NETWORK PIPELINE. PASSING THROUGH A PROTECTED SHAFT (ON AN OUTSIDE WALL) WITH VENTILATION THROUGH EACH FLOOR. PIPELINE

PASSES THROUGH COMMON AREA WITHIN A PROTECTED SHAFT



Note 1: Reference needs to be made to Clause 7.2.1.4

Note 2: See Clauses 8.4 and 8.4.1 of volume 2 of approved document B

FIGURE 20 INTERNAL SCREWED OR WELDED NETWORK PIPELINE. PASSING THROUGH EACH FLOOR. PIPELINE PASSES THROUGH COMMON AREA WITHIN A DUCT.

9.4.3.10 Any pipeline riser or lateral shall be sleeved where it passes through any element, for example floor or wall, of a building (see Figure 21).

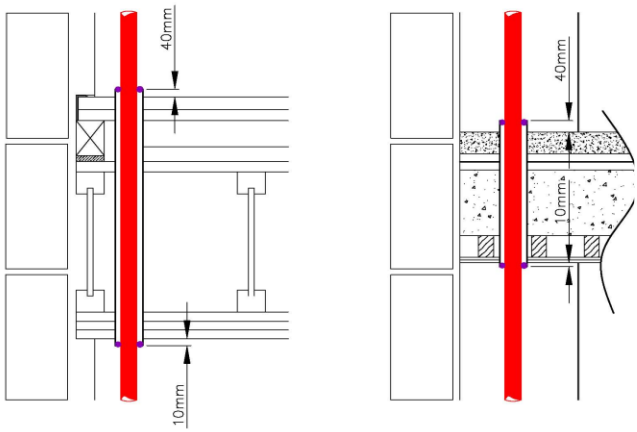
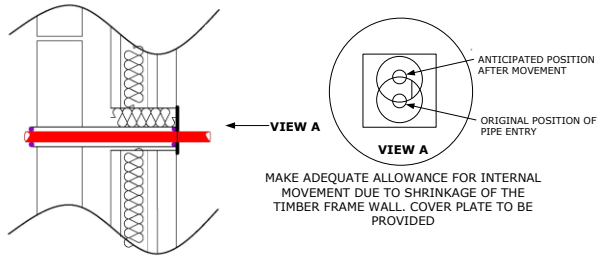
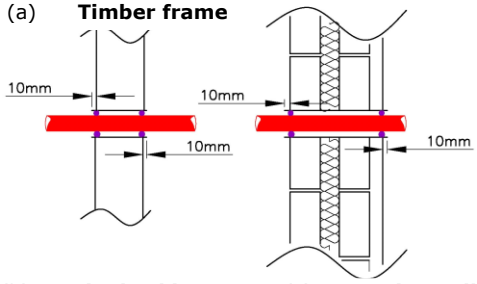


FIGURE 21 FIRE STOPPING AND SLEEVING. PIPELINE RISER BETWEEN FLOORS OR BETWEEN FIRE COMPARTMENTS

9.4.3.11 Any pipeline riser or lateral (or its duct if fitted) shall be fire stopped between fire compartments. The method should permit thermal movement of pipe (see Figure 22).



(a) **Timber frame**



(b) **Single skin** (c) **Cavity wall**

Note: See IGEM/UP/7 for further details.

FIGURE 22 FIRE STOPPING AND SLEEVING. PIPELINE LATERAL PASSING THROUGH WALLS OR BETWEEN FIRE COMPARTMENTS

9.4.3.12 Fire stopping shall involve:

- ensuring so far as is reasonably practical that the pipe is centred within the sleeve;
- ensuring the annular gap between the pipe and the sleeve is as small as practicable whilst enabling the sealant to penetrate well into the gap all around the pipe;
- sealing the annular gap between the pipe and the sleeve at both ends;
- sealing the gap between the sleeve and the wall or floor at both ends.

Note 1: See Tables 1 - 4.

Note 2: Sealing materials for pipe penetrations are expected to comply with BS EN 1366-3.

Note 3: Before using any product certified against BS EN 1366-3 the user is advised to seek confirmation that the tests used in the certification were representative of the proposed application. The dialogue with the product supplier will involve consideration of:

i) Pipe material, outside diameter and wall thickness
j) Whether the pipe is insulated or not
k) Whether the penetrations are to be in walls or floors or both
l) Compartment wall/floor material and thickness
m) Size and shape of hole in the compartment wall/floor which is to be fire stopped
n) Provision of a sleeve including its material, outside diameter and wall thickness
o) Whether the sleeve will be flush with the two faces of the compartment wall/floor
p) Requirement for "~~backfill~~reinforcement material" between the ends of the sleeve.

9.4.3.13 The design shall tolerate a range of temperatures that will depend on the use of the building. In calculating the effects of thermal expansion, due regard shall be paid to the ambient temperature at the time of construction.

Note: In the UK, allowance for a maximum annual temperature variation of 30°C is recommended.

9.4.3.14 Pipes may run in the same duct as most other services, including hot and cold water services, heating pipes, electrical conduits, soil and vent pipes (SVP), cables and pipes containing other fuels. However, there are some restrictions and, where pipes are to be routed in combination with other services, reference shall be made to BS 8313, where detailed guidance is given on spacing, provision for maintenance and restrictions on combinations of services etc.

In particular, the following services shall not be installed in the same duct as gas pipes:

- ventilation ducts and vacuum pipes that operate at sub-atmospheric pressure and that are not of all welded or all brazed construction
- services containing oxidising or corrosive fluids.

Note: BS 8313 requires flammable gases and liquids to be run in ducts reserved solely for that purpose or in ducts containing other flammable gases or liquids, cold water or group 4 substances. However they may be run in the same duct as any other service(s) if adequate precautions are taken to ensure that the combined installation is safe and that it does not contravene any Regulations or other Codes of Practice.

Following this standard satisfies the level of adequate precautions necessary to allow a combined installation.

9.4.3.15 Where a door or access panel is fitted to a duct (including those that are protected shafts) containing a pipeline riser or lateral, the door must comply with Building Regulation requirements and permit access to the GT when required (see also, clauses 7.4.2 and 7.4.4).

Commented [ro52]: Comment 372 Agreed

9.4.3.16 Unless pipes are separated by electrical insulating material, they shall be suitably spaced from other services. Electricity supply and distribution cables and other metallic services shall be spaced at least 25 mm from any pipework. A minimum

clearance of 150 mm shall be provided from electricity meters and other devices, such as excess current control devices and fuse boxes.

Note: Spacing will probably need to be increased in order that maintenance and inspection can be carried out easily, and without damaging services or their protective wrappings/coatings and without hazard to personnel.

9.4.4 **Jointing and flexibility**

9.4.4.1 Steel network pipelines of diameter exceeding 50 mm shall be welded.

9.4.4.2 All welding procedures and welder approvals shall conform to the base standard, see Table 2. All documentation relating to procedure approval welds, including the test results, shall be approved by the Adopting Gas Transporter/Asset Owner prior to the commencement of production welding and the approval of welders.

Any welder shall possess an appropriate certificate of competency demonstrating that they have been approved to weld approved welding procedures detailed in Table 6.

CONSTRUCTION STANDARD/CODE	WELDING PROCEDURE APPROVAL	WELDER APPROVAL
BS 2633	BS EN ISO 15614-1	BS EN 287-1/BS EN ISO 9606-1
BS 4677	BS EN ISO 15614-1	BS EN 287-1/BS EN ISO 9606-1
ANSI/ASME B31.1	ASME B&PV Section IX	ASME IX
ANSI/ASME B31.3	ASME B&PV Section IX	ASME IX
BS 2971	BS EN ISO 15614-1	BS EN 287-1/BS EN ISO9606-1
BS 4515-1	BS 4515-1	BS 4515-1
BS EN 12732	BS EN ISO 15614-1	BS EN 287-1/BS EN ISO 9606-1

TABLE 6 – WELDING COMPETENCE AND PROCEDURE APPROVAL STANDARDS

Welding Inspectors shall be certified to an appropriate level by an independent UKAS accredited certification body.

Welding procedures shall be produced and they shall be approved by independent personnel certified to an appropriate level by an independent UKAS accredited certification body..

Note: Such schemes in operation in the UK at the time of publication of IGEM/G/5 Edition 3 are the BGAS Inspector Approval Scheme and the Certification Scheme for Welding Inspection Personnel, both of which are administered by The Welding Institute (TWI).

9.4.4.3 Welding shall only be carried out by someone who has demonstrated their ability to produce welds meeting the requirements of the welding specification.

Note: This may either be by producing a satisfactory test weld against the approved procedure(s) on site in the presence of a qualified welding inspector or having been assessed in accordance with BS EN 287-1 at an approved Assessment Centre or on site by a qualified Welding Inspector within the previous 12 months. In the latter case, documentary evidence will be needed.

9.4.4.4 Unless otherwise specified by the adopting GT, the minimum level of inspection shall be as specified in BS EN 12732, from which Table 7 has been constructed.

TYPE/POSITION OF THE WELD JOINT	VISUAL INSPECTION BY WELDING INSPECTOR (See Note 6)	RADIOGRAPHIC AND ULTRASONIC EXAMINATION	SURFACE CRACK TEST
Unconcealed circumferential welds, branches, nozzles and fillet welds; longitudinal seams	10%	Minimum of 1 joint (see notes 1 & 2)	10%
Concealed pipe spans	100%	Minimum of 1 joint (see note 1)	100%

TABLE 7 – WELDING INSPECTION

Note 1: Provided the same welder works on a regular basis throughout a 12 month period on various sites, a single acceptable radiograph inspection (from the initial site) or suitable test radiograph would normally be acceptable to the GT provided there are no failures in production welding. Ultrasonic examination is required to be carried out on each job.

Note 2: The Adopting GT/Asset Owner may nominate a fillet joint to be sectioned for further examination.

Note 3: The Adopting GT/Asset Owner may require for additional radiography to be undertaken taking account of external loads, supports, ambient temperature differentials, etc.

Note 4: If the percentage of radiography reveals a defective weld, two welds on either side of this defective weld will need to be radiographed.

Note 5: If any of these additional welds contain an unacceptable defect, the level of radiography will need to be increased to 100% of completed welds. This level of radiography may only return to the standard level when the cause of the defect has been established and corrective action taken, or, if all the welds additionally inspected are acceptable, radiography can return to the standard level.

Note 6: A successful visual inspection would reveal

- *No cracks, notches or porosity.*
- *No electrode run points or other burnt areas.*
- *Smooth surface.*
- *No sharp transitions between weld beads.*

9.4.4.5 Non-destructive examination shall be carried out in accordance with one of the following standards:

- visual examination of joints: BS EN ISO 17637
- ultrasonic examination: BS EN ISO 17640
- radiographic examination: BS EN ISO 17636-~~2~~1
- magnetic particle examination: BS EN ISO 17638.

9.4.4.6 Non-destructive examination acceptance requirements for welds shall be in accordance with BS EN ISO 5817 or as required by the construction Standard/Code listed in Table 6.

9.4.4.7 Steel network pipeline sections of diameter not exceeding or equal to 50 mm shall be jointed as shown in Table 8.

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Commented [ro54]: See comment 409 Agreed.

PIPELINE LENGTH (m)	STEEL PIPE DIAMETER ≤ 50 mm (2 in)
≤ 20	Screwed, or end load resistant fittings or welded (see Note),
> 20 ≤ 40	End load resistant fittings, or Welded (see Note)
> 40	Welded

Note: In general, welded joints are preferred as, particularly for internal applications, they serve to enhance safety and generally to minimise future nuisance escapes. In any event, welding may be required under clause 9.4.3.

TABLE 8 - PERMISSIBLE JOINT TYPES IN STEEL NETWORK PIPELINES

9.4.4.8 For welded joints, materials shall be in accordance with IGEM/TD/3 or IGEM/TD/4, as appropriate. Welding shall be in accordance with Table 6.

9.4.4.9 For screwed joints heavy grade steel tube to BS EN 10255 (or equivalent) with either taper/parallel screwed and socketed threaded joints to BS EN 10226-1 or taper/taper screwed and socketed threaded joints to BS EN 10226-2 shall be used.

Note: The maximum size of new screw jointed pipe is 50mm.

9.4.4.10 End load resistant fittings shall be fire resistant and shall be approved by the GT. Tube shall be either heavy or medium grade BS EN 10255 (or equivalent). In addition, the fitting shall be compliant with the fire test in Annex A of BS EN 1775.

Note 1: Procedure A is generally applied to building products and Procedure B to pipework products.

Note 2: See section 13 for material specifications.

9.4.4.11 Threads shall be sealed with an appropriate sealant, for example conforming to BS 6956-5, or an appropriate gas tape to BS EN 751-3. Exposed threads shall be protected from corrosion either by the application of a suitable protective tape or a painting system.

9.4.4.12 Press-fit stainless steel pipes and fittings shall be jointed in accordance with the German worksheet/technical standard DVGW G 5614.

9.4.4.~~12~~13 Gasket materials for flanged joints shall be appropriate for the gas being conveyed and should be resistant to high temperature. Appropriate standards include:

- BS 7531; Rubber bonded fibre jointing for industrial and aerospace purposes – specification
- BS EN 1514; spiral wound gaskets for use with steel flanges
- BS EN 10497; testing of valves: fire type-testing requirements
- BS ISO 19921; Ships and marine technology. Fire resistance of metallic pipe components with resilient and elastomeric seals
- API 6FB; Fire test for end connections
- DIN 30653; Seals with higher thermal resistant for unions and flanges in connection with gas meters and pressure regulators as well as flange connections in gas installations.

In particular:

- flat face flanges shall conform to the dimensions given in BS 10, BS 1560, BS EN 1514, as applicable
- raised face flanges shall conform to the dimensions given in BS 1560 or BS EN 1514, as applicable

Commented [ro55]: See comment 410. Agreed

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- BS EN 1092 flange gasket material shall be in accordance with BS EN 1514
- joint rings for ring type joint (RTJ) flange assemblies and spiral wound gaskets raised face (RF) flange connections gasket material shall be in accordance with a suitable standard such as BS EN 1514.

Note: See Appendix 8 for more information on fire testing standards.

Commented [ro58]: See comment 398. Partially agreed.

9.4.4.~~13~~14 Flange gaskets shall not be re-used. All surfaces shall be clean and dry before the assembly of flange joints. Compounds shall not be applied to the gasket or gasket seating surfaces.

9.4.4.~~14~~15 The standards for flange nuts and bolts shall be as follows:

a) Bolts, screws and studs for carbon steel/non-ferrous material flanges shall conform to BS EN ISO 898-1 or equivalent.

b) Nuts for carbon steel flanges shall conform to BS EN ISO 898-2 or equivalent;

c) Bolts, screws and studs and nuts for stainless steel flanges shall conform to BS EN 1515 Grade A2 (SS304) or A4 (SS316) or equivalent.

d) In situations where vibration can occur, the nuts shall be locked effectively.

e) In exceptional cases where smaller diameter bolts are used for insulating flanges, they shall be of sufficiently higher grade so that at least the same torque can be applied.

9.4.4.~~15~~16 ~~Thermal expansion and contraction of metallic risers and laterals should be accommodated by using either:~~The design of the metallic risers and laterals shall take account of thermal expansion and contraction. Thermal expansion and contraction should be accommodated by using either:

Commented [ro59]: See comment 400. Agreed

- unrestrained laterals; see Figures 24 and 25, or
- corrugated stainless steel hoses; see Figure 23, or
- metallic expansion bellows.

coefficient of thermal expansion of CrNiMo steel grade I.4401 (316) is 0.0165mm/m/^{0}C.

Note 2: See BS 6129-1: 1981 Code of Practice for the selection and application of bellows expansion joints etc. for more information relating to expansion bellows.

9.4.4.~~16~~17 If a metallic hose assembly is used, it shall be braided and shall comply with BS EN ISO 10380 – Corrugated metal hose and hose assemblies. The selected hose shall be either flexibility type 1 or 2 and it shall be fitted in accordance with BS 6501-1 or to the manufacturer's instructions, as appropriate.

Commented [ro60]: See comment 401. Response from Bob Hipkiss requested.

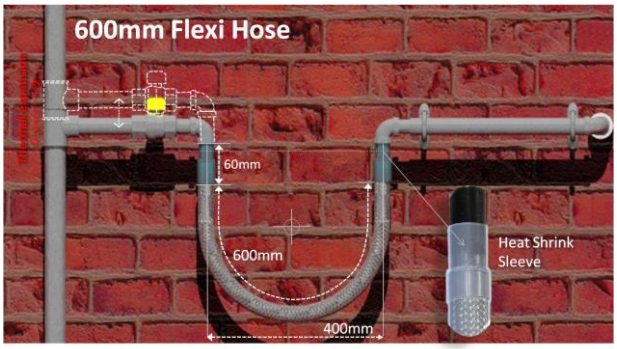


FIGURE 23 - Example of a corrugated stainless steel hose

9.4.4.~~17~~18 Pliable hose assemblies designed as meter connections i.e. flexibility type 3 hoses conforming either to BS EN ISO 10380 or to IGEM/GM/PRS/6 shall not be used to accommodate thermal expansion and contraction of risers and laterals.

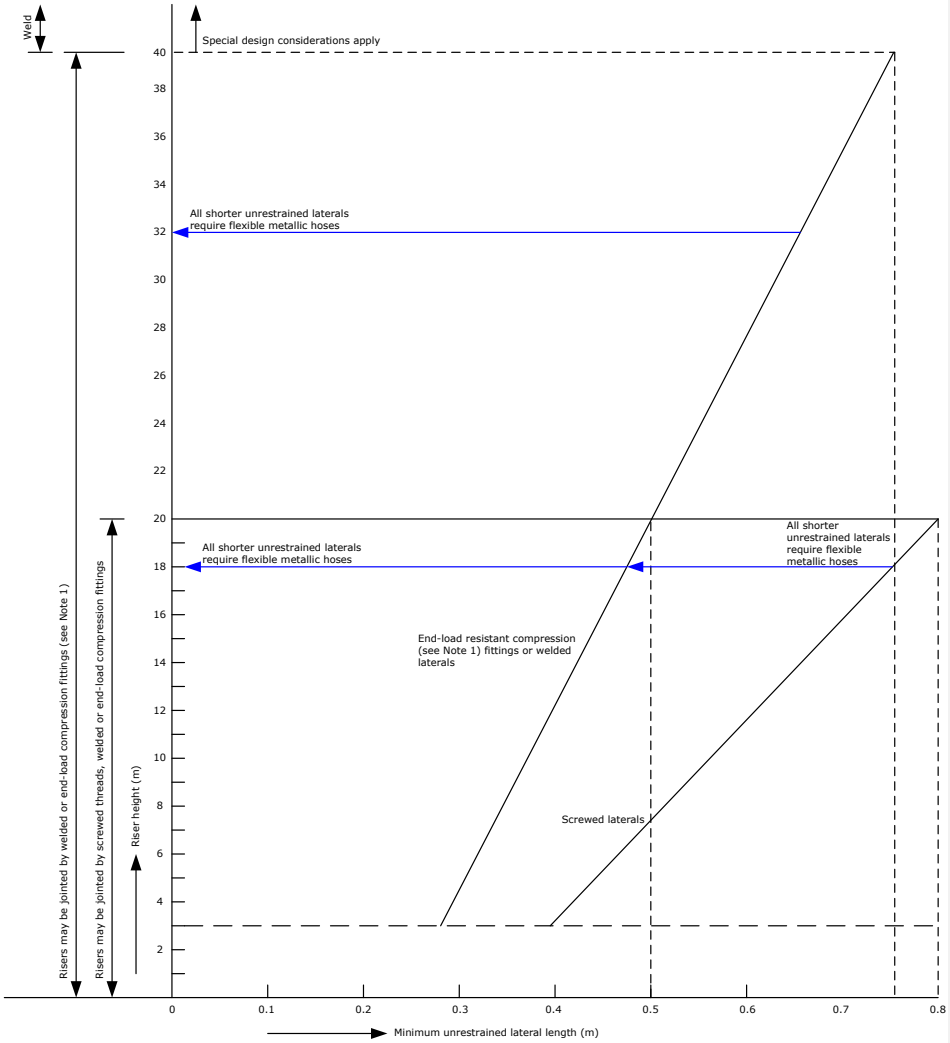
9.4.4.~~18~~19 Where a screwed steel riser is proposed to be longer than 20 m or welded steel one is proposed to be longer than 40 m, one design solution is to split the riser into shorter sections and install expansion bellows between each section. Metallic expansion bellows shall comply with BS 6129-1: Code of Practice for the selection and application of bellows expansion joints for use in pressure systems. In addition it shall be compliant with the fire test in Annex A of BS EN 1775.

Note: Procedure A is generally applied to building products and Procedure B to pipework products.

9.4.4.~~19~~20 The number of joints in any pipeline riser or lateral should be minimised. Prior to jointing, all threads shall be checked for damage.

9.4.4.~~20~~21Electrical safety measures, including any protective equipotential bonding, shall be taken in accordance with Section 14.

Commented [ro61]: Comment 315 partially agreed as previously panel agreed that the correct term was protective equipotential bonding.



Note 1: Compression fittings are not permitted within common means of escape such as stairwells, corridors and foyers.

Note 2: Assumes thermal expansion of steel to BS EN 1337.

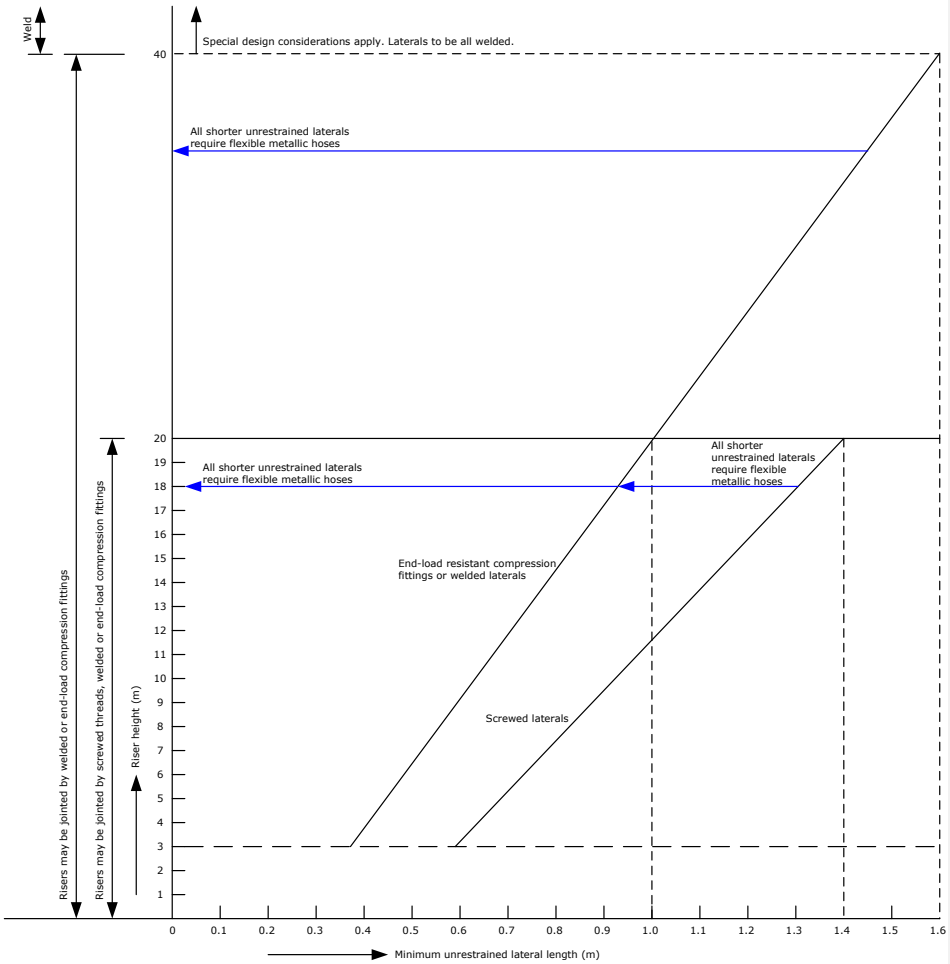
Note 3: This graph applies to laterals of maximum nominal diameter 25 mm.

Note 4: This graph is based on research carried out by the British Gas Engineering Research Station (see A2.9, 'ERS R4088').

Example: For an 18 m high riser, thermal expansion is accommodated by unrestrained welded laterals at least 475 mm long or unrestrained screwed laterals at least 750 mm long.

Commented [ro62]: Comment 408 Agreed

FIGURE 24 - USING UNRESTRAINED LATERALS TO ACCOMMODATE THERMAL EXPANSION AND CONTRACTION. INTERNAL STEEL NETWORK PIPELINES



Note 1: Assumes thermal expansion of steel to BS EN 1337.

Note 2: This graph applies to laterals of maximum nominal diameter 25 mm.

Note 3: This graph is based on research carried out by the British Gas Engineering Research Station (see A2.9, 'ERS R3845').

Example: For an 18 m high riser, thermal expansion is accommodated by unrestrained welded laterals at least 940 mm long or unrestrained screwed laterals at least 1.32 m long.

Commented [ro63]: See Comment 408 which also applies to this figure.

FIGURE 25 - USING UNRESTRAINED LATERALS TO ACCOMMODATE THERMAL EXPANSION AND CONTRACTION. EXTERNAL STEEL NETWORK PIPELINE

SECTION 10 : ISOLATION VALVES FOR NETWORK PIPELINES, METER INSTALLATIONS AND INSTALLATION PIPEWORK

Valves enable parts of gas supply systems to be safely isolated from the upstream system.

10.1 GENERAL

10.1.1 Isolation valves shall be provided to permit the following to be achieved:

- stopping of existing gas escapes, thus minimising the possibility of explosion and fire (or further explosion and fire)
- removal of the possibility of gas escapes in circumstances where conditions are unknown
- removal of the possibility of other gas-related emergencies, for example carbon monoxide (CO) poisoning
- removal of the possibility of gas escapes when a building, or a part of it, is unoccupied or ceases to use gas
- carrying out of alterations and maintenance in gas-free conditions
- isolate sections of a building.

Commented [ro64]: Comment 418. Agreed

10.1.2 Isolation valves shall be installed in accordance with IGEM/TD/3, IGEM/TD/4, BS 6400, IGEM/GM/6, IGEM/GM/8, BS 6891 and IGEM/UP/2 as appropriate.

Commented [ro65]: Comment 419 Agreed

10.2 KEY HOLDING

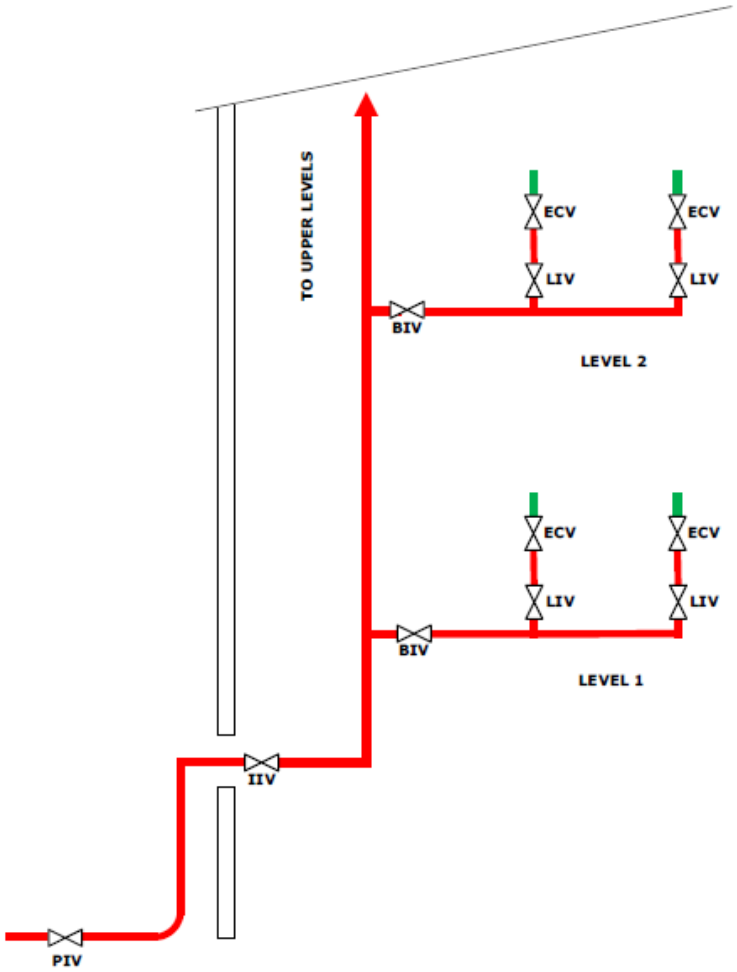
10.2.1 The GT or other gas conveyor and the ESP shall hold valve keys to all relevant valves upstream of any primary meter.

10.2.2 The Responsible Person for the building shall hold keys to locked areas containing gas isolation valves of any description. They should not hold gas valve keys that permit the valves to be operated unless they are competent (see Section 6) to make safe and restore gas supplies or that they can keep the keys in a secure location for use by the GT or Emergency Services.

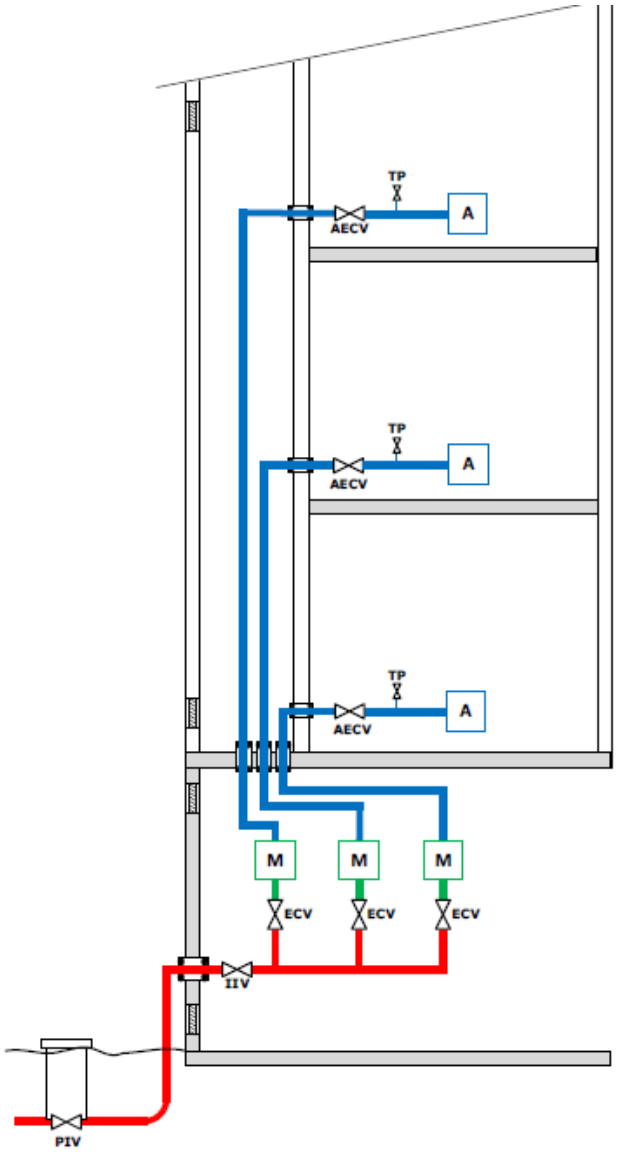
10.2.3 Gas consumers must be provided with keys to any locked area containing the ECV and/or gas meter supplying their dwelling.

Commented [ro66]: See comment 421 Agreed

10.2.4 A sign should be placed in a prominent position to advise the appropriate party (GT/ESP/Gas Conveyor/MAM/consumer/meter reader) where the keys to any locked area containing isolation valves can be found.



Valves on a Network Pipeline Supplying Flats Directly



Valve Arrangement in Multi-occupancy Building Supplied from Meter Bank.

10.3 **PIPELINE ISOLATION VALVE (PIV)**

The PIV enables that part of a building complex being fed by a pipeline to be isolated without the need for entry into the building for emergency, maintenance or safety reasons. It is not an emergency control as defined in PSR and GS(I&U)R.

Commented [ro67]: See comment 423 Agreed

10.3.1 Where a network pipeline supplies a multi-occupancy building, a PIV shall be installed outside the building to enable isolation of the building complex.

Note 1: Unless identified as a mitigation requirement during the design risk assessment, a A service supplying only one or more external individual domestic meter boxes does not require a PIV.

Commented [ro68]: See comment 424 Partially agreed.

Note 2: A house or building entry tee with an integral valve is not permitted to serve as a PIV.

10.3.2 Any PIV shall be of a type that can be operated by a key held by the GT/gas conveyor and the ESP. The design or position of the valve shall resist efforts by persons who are not competent to restore gas supplies, such as building occupants or members of the public, to operate it with standard tools.

Commented [ro69]: See comment 427 Agreed

Note: For example, the valve may be installed underground.

10.3.3 Any PIV shall be protected with a valve cover and ~~should~~shall be identified permanently. ~~using:~~

Commented [ro70]: See comments 428, 430 - 432. Partially agreed

FIGURE ?? - EXAMPLE OF A WALL OR POST MOUNTED LABEL

10.3.4 The location of the PIV shall permit access to it in normal circumstances or in an emergency.

Commented [ro71]: See comments 433 - 435. Partially agreed

In selecting the location of the PIV:

- it shall be sited as near as is practicable to the boundary of the property
- the effect of a building fire on its operability shall be considered
- it shall not be positioned where vehicles are likely to stop or park.
- if positioned in a landscaped area additional measures should be installed to prevent accidental valve cover removal.

The PIV's position, function and the requirement that access to it should not be blocked should be communicated to the responsible person for the building.

Note: The GT may consider it prudent to have a contingency plan to call upon if it is not possible to get to the PIV in the event of a building fire.

10.3.5 Subject to the considerations of clause 10.3.4 and with reference to Figure 26, the PIV should be located in the following order of priority:

- in, or in line with, the footway nearest the building (Figure 26, C, F, J, M, N)
- inside the property boundary, but not in planted areas such as borders or hedges (Figure 26, A, D, G)
- elsewhere within the property boundary, preferably at least 5 m from the building (Figure 26, B, E, H)
- where the section of pipeline is long and has been laid in a non-standard orientation, in the two most appropriate positions (using the guidelines above) at both ends of the section of pipeline, so as to indicate the line of the pipeline (Figure 26, K, L).

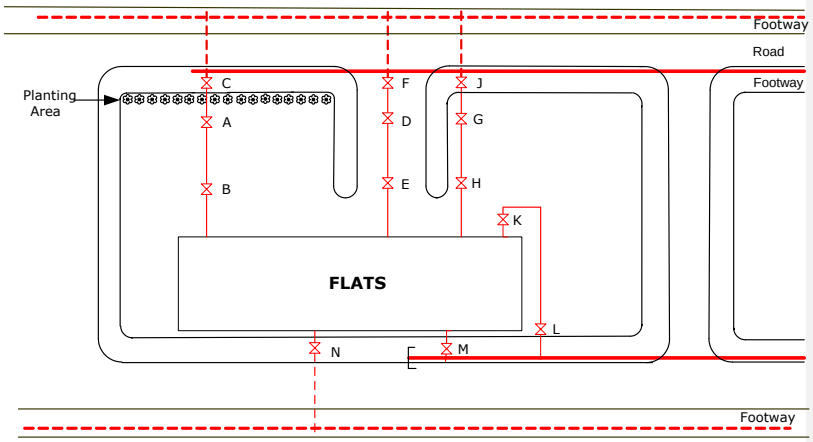


FIGURE 26 - PREFERRED PIV LOCATIONS

10.3.6 As installed records of ~~newly installed/replacement~~ PIVs shall be maintained and be available for inspection by Emergency Service Providers and other appropriate persons. Records should be made available as soon as reasonably practicable.

Note 1: *See PAS 256: Buried Assets – Capturing, recording and sharing of location information and data – Code of Practice.*

Note 2: *Utility works which take place in England need to be made available within 30 working days of the s74 NRSWA closure of works notice. In Scotland, the 30 days will commence immediately following reinstatement.*

10.4 INLET ISOLATION VALVE (IIV)

The IIV enables that part of a building complex being fed by a network pipeline to be isolated for maintenance or safety reasons. It is not an emergency control as defined in PSR and GS(I&U)R.

10.4.1 An IIV should be located near to the point of entry of a network pipeline into a multi-occupancy building.

10.4.2 Any IIV shall:

- be clearly identified as a gas valve
- resist the efforts of any person not competent to restore gas supplies from re-opening a closed IIV
- be accessible for maintenance purposes and the Responsible Person's gas competent person
- not be accessible to members of the public

- normally, be located inside the building. Where this is impracticable, consideration shall be given to locating the IIV in a locked outside compartment at the point where the pipeline enters the building
- ~~give consideration to enclosing the IIV in a standard gas meter box or equivalent structure~~ where there is a low risk of vandalism or misuse and where the IIV is to be located outside of the building, be considered for enclosure in a standard gas meter box or equivalent structure
- have access to the IIV restricted by means of a locked door or an equivalent device where vandalism or misuse is considered a possibility
- have any other required labelling displayed at the IIV e.g. line diagram to identify more than one network entry into the building.
- ~~preferably be fire resistant.~~

10.4.3 Any IIV shall be one of the following:

- an integral valve of a building (house) entry tee, operable only by a special key, or
- when a 90° lever action ball valve is used, it locks shut when operated, or
- require a security key to close and re-open it, or
- when a wheel valve is used, it has a lockshut wheel fitted and provided a key which is readily available, is chained in the open position or sited in a position to prevent unauthorised tampering.

10.4.4 An IIV which is not in the scope of GIS/V7-3 should be certified as "Fire Safe" in accordance with either BS EN ISO 10497 or BS ISO 19921 or procedure B of Annex A of BS EN 1775. If the IIV is not so certified then other appropriate steps ~~shall~~should be taken to mitigate the risk of aggravating a building fire.

10.5 **BRANCH ISOLATION VALVE (BIV)**

10.5.1 Where multiple network pipeline risers or major laterals are controlled by a common IIV, each should be fitted with a branch isolation valve (BIV) to facilitate maintenance. A BIV should be located as near as practicable to the point where the branch is connected to the upstream pipe.

Note 1: BIVs permit the maintenance of individual risers and laterals with the minimum of inconvenience and danger.

Note 2: Where deemed necessary, BIVs may be fitted at any further pipe branches to permit maintenance of those branches with the minimum of inconvenience and danger.

10.5.2 Any BIV shall:

- be clearly identified as a gas valve
- prevent any person not competent nor authorised to restore gas supplies from operating a closed BIV
- be accessible for maintenance purposes
- not be accessible to members of the public
- have access to the BIV restricted by means of a locked door or an equivalent device where vandalism or misuse is considered a possibility
- have a permanent identification notice posted on or near the BIV
- have any other required labelling displayed at the BIV

~~be fire resistant.~~

10.5.3 Any BIV shall be one of the following:

- an integral valve of a building (house) entry tee, operable only by a special key, or
- when a 90° lever action ball valve is used, it locks shut when operated, or

Commented [ro72]: See comment 439 agreed

Commented [ro73]: See comment 445 partially agreed

Commented [ro74]: See comment 446 & 448 partially agreed

Commented [ro75]: See comments 453 - 455. Consistency with IIVs agreed

- require a security key to close and re-open it, or
- when a wheel valve is used, it is locked in the open position or it has the handle removed and secured away from the valve spindle.

10.5.4 A BIV which is not in the scope of GIS/V7-3 should be certified as "Fire Safe" in accordance with either BS EN ISO 10497 or BS ISO 19921 or procedure B of Annex A of BS EN 1775. If the IIV is not so certified then other appropriate steps ~~shall~~ should be taken to mitigate the risk of aggravating a building fire.

Commented [ro76]: See comment 458 Consistency with IIV. Agreed

10.5.5 Where an expansion joint is fitted, the BIV should be located upstream of that joint.

10.5.6 Where a welded riser has been specified, the introduction of a screwed or flanged BIV, and its inherent propensity to leak, shall be considered and, if appropriate, the BIV should not be fitted or its connection should be by welding.

Note: This is of particular importance if ventilation is not direct to outside.

10.6 LATERAL ISOLATION VALVE (LIV)

10.6.1 Where a lateral supplies an individual dwelling, consideration shall be given to the installation of a lateral isolation valve (LIV) for isolation or maintenance purposes.

Note 1: LIVs permit the safe maintenance of individual laterals with the minimum of inconvenience and danger.

Commented [ro77]: Comment 461 agreed

Note 2: LIVs may be of particular value when the gas supply to an individual dwelling has to be isolated. For example, to comply with Regulation 16(3) of GS(I&U)R, isolation or service disconnection has to be carried out before a period of 12 months has elapsed since the removal of a primary meter or for the replacement of a TCO if fitted before the ECV.

Commented [ro78]: Comment 462 agreed

10.6.2 Any LIV shall be located as near as practicable to the pipe to which the lateral is attached.

10.6.3 Any LIV shall comply with GIS/V7-3 and shall otherwise meet clauses 10.5.2 to 10.5.6.

Commented [ro79]: See comment 460. Agreed

10.7 EMERGENCY CONTROL VALVE (ECV) AND ADDITIONAL EMERGENCY CONTROL VALVE (AECV)

10.7.1 An ECV shall be installed at the inlet to each individual meter installation.

10.7.2 Any ECV must be located so that it will be readily accessible for use by the consumer i.e. the end-user, of gas.

Note: An appropriate height for an ECV not contained in an external meter box is between 450mm and 1450mm above floor level.

Commented [ro80]: Comment 465 partially agreed

10.7.3 The outlet of any ECV shall:

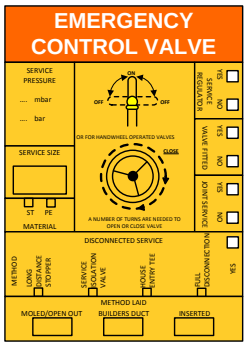
- be either a flanged or threaded connection,
- allow a meter installation to be installed in accordance with BS 6400, IGEM/GM/6 or IGEM/GM/8, as appropriate
- be of a type acceptable to the GT.

10.7.4 Any ECV shall be suitable for the network pressure.

10.7.5 The key, lever or hand wheel of the ECV must be compliant with Regulation 9(2) of GS(I&U)R. It must ~~shall~~ be securely attached to the operating spindle. Any key or lever ~~should~~must move downwards from the vertical ON position to the OFF position unless it can only move in the horizontal plane. The ON/OFF label or indicator shall be fixed to the ECV (see Figure 27), or inlet or outlet pipe, at

Commented [ro81]: Comment 466 partially agreed.

the time of installation and such that it can easily be seen. The label shall be attached so as to correspond to the exact movement of the control.



FRONT

REAR

Minimum dimensions: 105 x 148 mm

Note 1: The label/notice is fitted by the GT.

Note 2: It is not permitted to include this notice in a composite notice.

Note 3: GS(I&U)R and IGEM/G/1 detail the first emergency control as a valve accessible to the consumer, downstream of the distribution main and which marks the interface between the service (pipe) and a meter installation. Where there is no meter installed, the notice satisfies the requirements of GS(I&U)R detailing the status of the incoming supply and advising the number to contact in case of an escape of gas.

Note 4: The use of ON/OFF marker tape is also permitted.

FIGURE 27 - TYPICAL LABEL FOR AN ECV

10.7.6 An AECV shall be fitted in each individual dwelling where a primary meter installation and the ECV is ~~not~~ located remote from the ~~within a~~ dwelling it serves. (e.g. in a meter bank~~s~~ or individual remote meter~~s~~ box).It shall comply with GIS/G7-3.

Commented [ro82]: Comments 467 & 468 Agreed

~~*Note 1:This may be waived where the consumer has ready access to their nearby ECV, for example when a ground floor flat has an outside meter box located near to an external doorway to the flat.*~~

~~*Note 2:It is appropriate to install an AECV where the meter installation and the ECV is sited 6 m or more from the entrance to the building/dwelling.*~~

Note: An appropriate height for an AECV is between 450mm and 1450mm above floor level.

10.7.8 Any ECV or AECV located within an individual dwelling shall not be capable of being locked shut.

10.7.9 A permanent notice shall be attached to the valve giving the following information:

a) advice that the valve is an "an additional emergency control for gas consumers' use"

b) details of the parts of the installation isolated by the valve

c) the telephone number of the National Gas Emergency Call Service

d) advice to the gas consumer on actions to be taken if they think they can smell gas

e) advice as to the location of the designated ECV.

Commented [ro83]: See comments 467 & 469 Agreed

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10.8 FEATURES OF LOCK-SHUT AND OTHER SECURITY VALVES

10.8.1 General

10.8.1.1 Any lock-shut or other security valve shall:

Commented [ro84]: Comments 470 & 471 Agreed

- Comply with GIS/V7-3
- be clearly identified as a gas valve
- have the open and closed positions of the valve either indicated or obvious, both when any handle is in place and when the valve stem is being accessed for operation with the key or tool
- in the UK, not be able to be operated with standard UK meter box keys conforming to BS 8499
- have a shroud, as indicated in Figure 28, or other means of preventing operation of the valve with conventional tools
- have a stem or recess that is able to be operated with a standard security valve key as shown in Figure 29, or another special tool
- have access to the valve stem restricted by a mechanical barrier. A standard tool shall be required to remove the barrier.

Note: Where desired, the valve may incorporate a "block and bleed" vent between two sealing edges to facilitate any future pipework testing.

10.8.2 Lock-shut valves

10.8.2.1 Lock-shut valves are intended to be used for maintenance or safety reasons but not as ECVs.

10.8.2.2 The handle of the lock-shut valve shall move through a $^1/_4$ turn to shut against a stop.

10.8.2.3 Where Allen screws are used to secure the mechanical barrier, the Allen key size shall be 2.5 mm.

10.8.2.4 Lock-shut valves shall be able to be opened by the use of a standard security valve key.

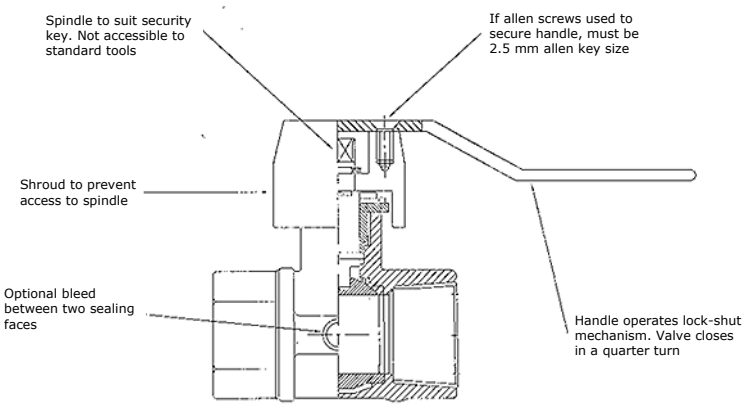

FIGURE 28 - FEATURES OF LOCK-SHUT VALVES

10.8.3 **Ball-type security valve**

10.8.3.1 Ball-type security valves are intended to be used for maintenance or safety reasons but not as ECVs. They shall not be fitted with handles permanently.

Commented [ro85]: Comment 472 partially agreed.

10.8.3.2 The valve stem shall move through a $^{1}/_{4}$ turn to both shut and open against stops.

10.8.3.3 Ball-type security valves shall be able to be re-opened by the use of a standard security valve key.

10.8.4 **Standard security valve key**

10.8.4.1 The standard security valve key is used to operate standard lock-shut and ball-type security valves. It shall be fabricated to the general dimensions and minimum length shown below.

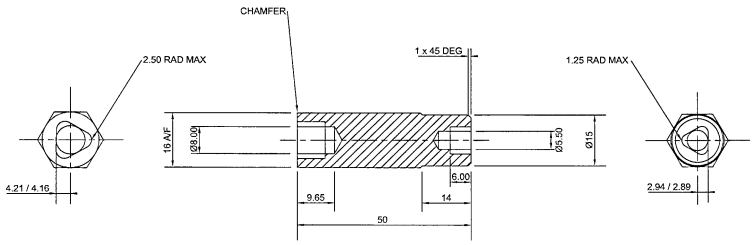

FIGURE 29 - STANDARD SECURITY VALVE KEY

10.8.5 **Riser security valve**

10.8.5.1 An alternative to lock-shut and ball-type security valves is the riser security valve, incorporating an integral shut-off valve. The valve may be used for risers, branches and laterals as appropriate.

Riser security valves are intended to be used for maintenance or safety reasons but not as ECVs.

Access to the integral shut-off valve shall require the prior removal of a secure cap or plug. Removal of the cap or plug and operation of the valve shall require the use of one or more tools.

10.8.5.2 If release of gas is possible during the operation of the valve, the operating tool shall incorporate a sealing arrangement to prevent such a release.

10.8.5.3 Threaded riser security valves (d ≤ 50mm) shall comply with GIS/V7-3. In addition they shall comply with the pressure drop requirements contained within GIS/PL3.

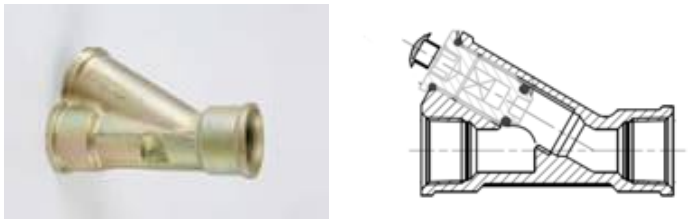

FIGURE 30 - RISER SECURITY VALVE

10.8.6 Gate-type security valve

10.8.6.1 Gate-type security valves are intended to be used for maintenance or safety reasons, but not as ECVs. The valve is supplied with an anti-tamper hand wheel, which will close the valve when rotated in a clockwise direction. The hand wheel will run on a ratchet and the spindle will not move when the hand wheel is rotated in an anti-clockwise direction.

10.8.6.2 Gate-type security valves shall be able to be re-opened by the use of a special tee key.

10.8.6.3 A standard hand wheel shall not be attached to a valve considered as an IIV or other security valve.

10.9 **OTHER VALVES**

10.9.1 **Calibrated excess flow valve (EFV)**

10.9.1.1 As described in Sub-Section ~~8~~7.2 and Appendix 3, a GT or MAM may determine that calibrated EFVs are to be installed at primary meter installations for safety reasons.

Note: Where fitted, consideration needs to be given to the pressure drop (see clause 7.3.4.2).

Any EFV shall be of proven reliability and shall be specified to meet a recognised national or international standard to the satisfaction of the adopting GT or MAM, even in instances where it may be fitted downstream of the ECV.

10.9.1.2 Calibrated EFVs shall be the "weep reset" type and shall trip at an appropriate flow rate (see Table 11 and A3.5.1).

Note 1: Valves need to be specified that operate between 15 and 100 mbar and with a closing flow factor of 1.3 - 1.45. These criteria are met by DIN 30652-1 Type K valves which are permitted by DVGW to be used in association with metallic installation pipework.

Note 2: Additionally, valves need to be specified to suit the desired orientation (i.e. to suit horizontal, vertically upwards or vertically downwards gas flows). The manufacturer may combine some permitted orientations, e.g. a particular valve may work correctly for both horizontal and vertically upwards gas flows.

Note 3: Where an EFV is fitted directly to the outlet of an ECV, the EFV installation may be more secure if an ECV with a BSP thread is used.

10.9.1.3 The selected EFV shall comply with an appropriate Standard, for example DIN 30652 -1 (see Table 11).

10.9.1.4 Where an EFV is fitted downstream of an ECV, it shall be either an integral part of the ECV or a separate fitting connected directly to it and where the joint is protected with an anti-tamper type seal indicating the GT's ownership of the fitting. C ~~c~~onsideration shall be given to fitting a notice to it to advise a meter fitter who ~~-~~has been instructed to exchange the gas meter to leave the device in situ so as to avoid an inadvertent negation of the risk mitigation identified by the design risk assessment.

Note: In certain circumstances where the gas meter is located remotely from the flat, such as in a meter bank, a risk assessment may indicate that an EFV is required to be fitted within the flat. Such an EFV may be fitted in the installation pipework either immediately upstream or downstream of the AECV.

10.9.1.5 Where an EFV is fitted upstream of an ECV, consideration shall be given to installing an upstream maintenance valve to permit the EFV to be exchanged without decommissioning the riser system.

Note: An upstream "weep reset" EFV will reset automatically once the ECV has been closed.

10.9.2 **Thermal cut-off device (TCO)**

10.9.2.1 As described in Section 8, a GT or MAM may determine that TCOs are to be installed at primary meter installations for safety reasons.

Note 1: Where fitted, consideration needs to be given to the pressure drop (see clause 7.3.4.2).

Note 2: In certain circumstances where the gas meter is located remotely from the flat, such as in a meter bank, a risk assessment may indicate that a TCO is required to be fitted within the flat. Such a TCO may be fitted within the installation pipework either immediately upstream or downstream of the AECV.

Any TCO shall be of proven reliability and shall be specified to meet a recognised national or international standard (see Table 11) to the satisfaction of the adopting GT or MAM, even in instances where it may be fitted downstream of the ECV.

10.9.2.2 TCOs shall be designed to cut off the gas supply automatically if the temperature exceeds 95^0C.

10.9.2.3 The selected TCO shall comply with an appropriate Standard, for example DIN 3586 (see Table 11).

10.9.2.4 Where a TCO is fitted downstream of an ECV, it shall be either an integral part of the ECV or a separate fitting connected directly to it and where the joint is protected with an anti-tamper type seal indicating the GT's ownership of the fitting. Consideration shall be given to fitting a notice to it to advise a meter fitter who has been instructed to exchange the gas meter to leave the device in situ so as to avoid an inadvertent negation of the risk mitigation identified by the design risk assessment.

10.9.2.5 Where a TCO is to be fitted upstream of an ECV and there is no LIV, consideration shall be given to installing an upstream maintenance valve to permit the TCO to be exchanged without decommissioning the riser system.

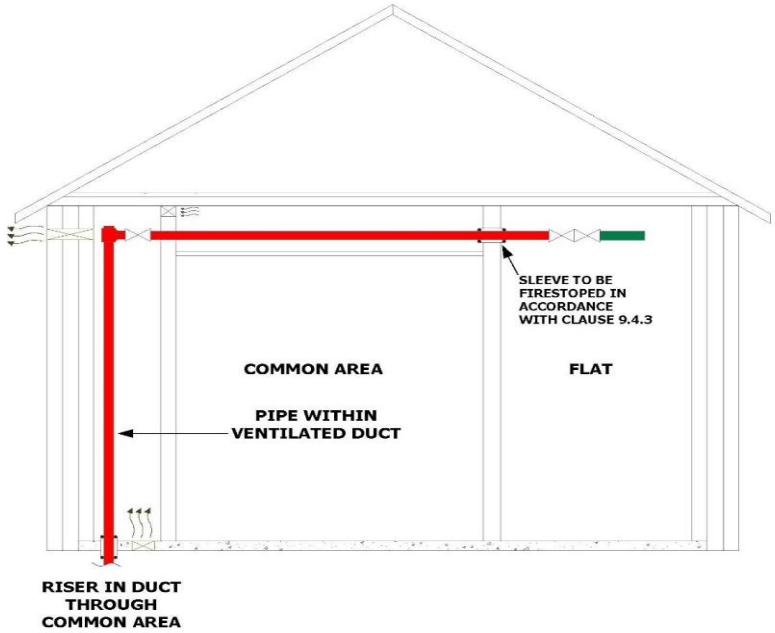

FIGURE 31 – TCO FITTED UPSTREAM OF THE ECV WITH LIV INSTALLED AT GAS RISER CONNECTION

10.9.3 **Butterfly valves**

10.9.3.1 Butterfly valves shall not be fitted in network pipelines.

SECTION ~~11 :~~11: ENERGY CENTRES

An energy centre is a central facility generating heat or heat and power from a boiler or engine installation. The equipment used is generally industrial or commercial in nature.

The provision of energy through a centralised installation will have the effect of reducing the scale and scope of the overall gas installation in the building, particularly if there is no provision for cooking. Although, this may reduce the range of hazards involved together with issues around access for inspection and maintenance, any remaining hazards still need to be identified and managed.

11.1 GENERAL

11.1.1 Non-domestic plant and equipment should not be installed in a location that would be readily accessible to the occupants of the domestic premises and where the nature of the installation imposes a risk to the domestic dwellings and their occupants.

Commented [ro86]: See comment 488 Agreed

11.1.2 An energy centre shall be located in a plant room or compound/enclosure. The energy centre will be located either as part of the building or separately from it. Either of these locations shall be considered to be a place of work with respect to installation, commissioning, inspection and maintenance and hence the requirements of DSEAR must be complied with. (See L138 and Appendix 4).

Note 1: A plant room is deemed a "place of special fire hazard" in Approved Document B and hence it will be a fire compartment in its own right.

Note 2: A comparison may be made with Article 12 and Part 4 of Schedule 1 of the Fire Safety Order.

11.1.3 The specific hazards, and consequent risks, of a centralised installation of non-domestic plant shall be identified and managed. The design intent shall be to reduce risk to as low as is reasonably practicable during the life cycle of the energy centre.

11.1.4 DSEAR requires a risk assessment to be carried out. The risk assessment shall include

- the identification of the hazards,
- the analysis and evaluation of the risk, and
- the mitigation of the residual risk, (see Appendix 3 and IGEM/G/7).

The risk mitigation includes the hazardous area classification of the pipework and components in accordance with IGEM UP/16 and where required IGEM SR/25.

IGEM/UP/16 provides guidance on ventilation design and ongoing controls such that the installation can be classified and maintained as being in a Hazardous Area Zone 2NE.

11.1.5 The risk assessment required by DSEAR shall be carried out by a competent person, be kept up to date, and it must be available for examination by a regulatory authority.

Note 1: DSEAR is primarily concerned with the protection of people at work. However, for an installation serving a domestic building, the public will also be affected. Regulation 6 is concerned with the "Elimination or reduction of risks from dangerous substances". It refers to the elimination, substitution, or reduction of the dangerous substance, or, where this is not reasonably practicable, to control risks and mitigate the detrimental effects. A priority order of measures to reduce risk is given, and also a list of mitigating measures. The specific requirements are reproduced in Appendix 4.

Note 2: Hazardous Area Classification or (zoning) is concerned with eliminating or controlling potential sources of ignition in situations where releases of flammable fluids are considered credible. Credible releases are generally small; larger or catastrophic releases which may be considered 'non credible' in normal operation shall be addressed by plant layout and explosion protection approaches. The outcome of a zone classification, is the division of the installation into zones within which the electrical equipment and other sources of ignition are specified. IGEM/SR/25 deals with this topic as applied to all NG systems within its scope; IGEM/GM/7B for meter installation and IGEM/UP/16 for industrial and commercial premises.

Note 3: The specific reference to the installation of a gas booster in IGEM/UP/16 is due to the hazards of rotating machinery. A booster installation may also incorporate flexible connections. These hazards are recognised in the standard for this equipment, BS 8487, and are leaking seals, and failed castings due to mechanical stress or damage from a loose impeller. Incidents have resulted from these causes and can result in gas release rates in excess of those expected from an Energy Centre not containing a booster.

11.1.6 The installation shall comply also with IGEM/UP/2 and IGEM/UP/10 as appropriate.

Commented [ro87]: See comment 487. Partially agreed

11.1.7 The associated meter installation may be in the same compound/enclosure or preferably in a separate meter compound/enclosure/house. DSEAR must be complied with.

~~*Note: A plant room is deemed a "place of special fire hazard" in Approved Document B and hence it will be a fire compartment in its own right.*~~

Commented [ro91]: See comments 491 - 494 Partially agreed

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~~N~~

need to locate plant rooms and gas supplies for energy centres where they impose a hazard to a minimum number of persons and for the mitigation of the effect of a release of gas which if ignited results in fire or explosion. This is to prevent the consequences significantly affecting the domestic parts of the building or any area where members of the public may be present (see 11.3 below). Consideration shall be given to the following hierarchy:

(a) At ground or rooftop level in a separate (separated or adjoining) compound/enclosure from the domestic building.

(b) At ground level in a ~~compound/enclosure on~~room with an external wall isolated from the rest of the building and with sufficient weak elements in the building structure (e.g. combustion air vents, access doors, weak panels, windows) to protect the overall structure of the building in the event of an explosion.

Note 1: Installation in a space not on an external wall will not meet the requirements of this section.

Note 2: Access cannot be possible from domestic areas of the building.

(c) Where there is no suitable alternative, a basement location may have to be proposed~~.~~ ~~,~~ ~~I~~In this case there ~~shall~~should be free access for the relief of any explosion overpressure to the atmosphere (as for a ground level location) via plant access or a freely venting and ventilated car park.

Commented [ro92]: see comment 497 and 503. partially agreed

Note 1: An installation within the main structure of the building may result in noise or vibration issues. The solutions to these are likely to compromise the ability to adequately address the safety issues.

Note 2: The allowed maximum operating pressure of the supply into a multi-occupancy building is 75 mbar (see clause 2.6).

11.3 **EXPLOSION RELIEF/MITIGATION**

Commented [ro93]: See comment 505, 507, -513.

11.3.1 A risk assessment addressing the consequences of a release of gas within the plant room/compound/enclosure must be carried out.

11.3.2 ~~plant room will be a confined space, which due to the requirement to minimise external noise, and for thermal insulation and security reaso~~ catastrophic failure of either the pipework or machinery inside the plant room/compound/enclosure being ignited and resulting in an explosion. ~~–~~This is regardless of the hazardous area classification of the installation or the assessed likelihood of a flammable mixture being produced.

11.3.~~3~~2 The protection of the structure of the building from the pressure which could be generated in an explosion ~~shall~~should be demonstrated in the risk assessment. This is likely to require an area close to that of one face of the compound/enclosure. Adequate relief will not be provided by high level ventilation openings or ducts. An installation in an enclosed basement is unlikely to be acceptable (see A3.2.1.3).

Note: See Appendix 2.9, "The investigation and control of gas explosions in buildings and heating plant" and NFPA 68.

11.3.~~4~~3 Explosion relief is normally provided by a purpose designed "weakness" in the structure such as a lifting roof or lifting panel in the roof, or a weak panel in one or more walls. Relief can also be provided by doors and windows such as the plant access doors where these comprised a large a large part (50% or more) of the area of a wall.

11.3.~~5~~4 The action or a relief operation should be restrained so as to prevent missiles providing a hazard.

11.3.~~6~~5 Explosion reliefs should not vent directly into a public space.

11.3.~~7~~6 Guidance on explosion reliefs can be obtained from the reference in A2.~~10~~9 referred to above and in Section 14 and Appendix 3 of IGEM/GM/8, Edition 2, Part 2. Where the provision of relief is not straightforward specialist guidance from a qualified structural engineer may be required.

11.3.~~8~~7 Explosion relief is a last resort mitigation of an unlikely event, which should not occur in the lifetime of the installation. While the operation of a relief will compromise the security of the installation, there need not be a requirement for the relief mechanism to "reseat", particularly if this requirement makes the design of the relief difficult or less effective. The occurrence of the explosion will be readily apparent and emergency response initiated, in addition resetting the relief may confine again the release which resulted in the explosion.

11.3.9 Other mitigation measures which should be adopted include:
~~Installation in accordance with IGEM/UP/2 and IGEM/UP/10~~

- More than adequate high and low ventilation to outside
- Automatic Isolation Valve linked to gas detectors and building energy management system
- Monthly visit and leakage check by a competent person
- Annual maintenace by a competent person
- Regular programmed replacement of parts subject to vibration

11.3.~~10~~8 Where a separate meter room or enclosure is used both the meter enclosure and the plant room should separately meet the requirements of this section. The meter enclosure should not vent into the plant room if the plant room is ~~not~~ required to be a Hazardous Area Zone 2NE.~~.~~

Commented [ro94]: See comment 514 Parially agreed.

11.4 **NETWORK PIPELINE ENTRY**

11.4.1 The requirements of Section 9 shall be met.

~~11.4.2The network pipeline should enter the meter/plant room directly, it should not pass through any other part of the building.~~

11.5.1 The meter installation shall comprise a meter, regulator(s), isolation valves and where required, safety devices and a bypass facility. The meter installation shall conform to IGEM/GM/8 or IGEM/GM/6, IGEM/GM/7B and where appropriate, IGEM/GM/7A.

11.5.2 The meter room shall be secure from unauthorised entry. However, provision must be made for access by an authorised person in the event of an emergency.

11.5.3 The meter room shall be naturally ventilated direct to outside air.

11.5.4 The requirements of Section 7 of IGEM/GM/8 Part 1 and of IGEM/GM/8 Part 2 will apply to any meter compound/enclosure.

11.5.5 When selecting a gas meter the maximum and minimum capacity of the meter (Q_{max} and Q_{min}) shall be considered to ensure the gas usage is accurately ~~captured~~measured. As such, a number of factors have to be reviewed by the designers and advised to the GT, MAM and Gas Supplier.

Commented [ro96]: Comment 523. Agreed

When designing the meter installation, information concerning the energy centre system shall be provided by the energy centre designer to the MAM and should include:

- the estimated maximum flow rate (which is not necessarily a summation of the total connected load) to ascertain the meters Q_{max}
- the minimum flow rate anticipated (a realistic assessment and not a zero flow rate) to ascertain the meters Q_{min}
- the number and type of each unit of plant, their maximum and minimum operating pressures, and, where available, the anticipated load pattern for each
- where necessary, peak flow likely to occur for a short period, infrequently, possibly in excess of the meter's Q_{max} but not in excess of 1.2 Q_{max}
- establishing that appliances/plant/equipment will operate satisfactorily when the meter installation provides the minimum pressures.

Note: In GB, for a low pressure meter installation the lowest pressure that would be expected at the outlet of the meter installation under lowest~~normal~~ operating conditions is 18 mbar (LOP_{mi}). Under abnormal conditions this could be as low as 15 mbar (DmP_{mi}).

Commented [ro97]: Comments 524 & 525. Agreed

11.6 **INSTALLATION PIPEWORK**

11.6.1 The pipework from the meter to the appliance isolation valve shall conform to IGEM/UP/2 and BS 6891 where appropriate.

11.6.2 As part of the gas supply, there may be the requirement for a booster which introduces additional requirements. The installation of the booster shall be in accordance with IGEM/UP/2.

11.6.3 Where the installation includes a booster on the gas supply, the increased possibility of a significant gas escape or a catastrophic failure shall be taken into account in the risk assessment and in the design of the installation and the plant room.

11.6.4 The ~~I~~installer shall provide the Client/Responsible Person for the ~~B~~building with an appropriate Technical File as specified in Section 18 of IGEM/UP/2.

11.7 **COMBUSTION EQUIPMENT**

11.7.1 The combustion equipment shall conform to the appropriate ~~s~~Standards for gas fired boilers or for gas fuelled engines.

11.7.2 When selecting equipment for energy centres, the minimum operating pressure of the boilers or CHP engines shall be considered.

Note: Boilers and engines need to ~~light~~ light smoothly or fail to safety~~operate safely~~ at 14 mbar (Pign) and~~,~~ be both safe~~ly~~ and efficient~~ly~~ at 17 mbar (Pmin). Where these pressures are not suitable for the appliance, other methods of increasing the pressure may need to be considered for example, installing a booster in accordance with IGEM/UP/2 or obtaining higher pressure from the GT via a gas supply ancillary pressure agreement.

11.7.3 Account shall be taken of the required maximum gas flow rate and an allowance should be made for any possible increase in the load.

Note 1: Where the development is of a known size additional load increases for energy centres are not normally required.

Note 2: The maximum gas flow rate may be less than the total connected load. For example if, standby boilers are specified in the design and are not intended to be operated at the same time as other gas equipment. In this instance there will need to be appropriate systems in place to ensure that appliances cannot operate at the same time~~, which could lead to an unsafe situation developing~~.

This can be achieved ~~in a number of ways ranging from having the standby appliances physically disconnected from the gas supply to by~~ having a sophisticated building management system (BMS) controlling the ignition sequences.

Note 3: With regard to commissioning the system, the Responsible Person will need to ensure that each appliance can be operated safely when individually connected to the gas supply and that the BMS manages the rotation between 'in use' and 'standby' modes of operation automatically. The latter is particularly relevant when the sum of the appliance consumption rates exceeds the design flow rates of the meter and gas installation pipework. Further guidance is contained in IGEM/UP/4 and IGEM/UP/10.

Commented [ro98]: Comment 528 Agreed

Commented [ro99]: Comment 530. Agreed

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SECTION 12 : INSTALLATION PIPEWORK, GAS APPLIANCES AND CHIMNEYS

12.1 INSTALLATION PIPEWORK

12.1.1 Installation pipework must be installed and maintained in accordance with GS(I&U)R and shall be in accordance with BS 6891 or IGEM/UP/2, as appropriate.

12.1.2 The design maximum pressure loss between the outlet of the primary meter installation and the point to be connected to any appliance inlet connection shall not exceed 1 mbar at the design installation flow rate.

12.1.3 Where the meter installation is remote from the dwelling, the designer and/or the installer of the installation pipework shall determine the pipe diameter and installation volume.

Where the pipe diameter exceeds 35 mm, the installation shall be designed and installed in accordance with IGEM/UP/2 and a notice should be placed near or adjacent to the meter outlet point indicating that the pipework diameter exceeds 35 mm.

Where the installation volume exceeds 0.035 m^3, the installation shall be tested and commissioned in accordance with either IGE/UP/1 or IGE/UP/1A; and a notice shall be placed near or adjacent to the meter outlet point indicating that the installation volume exceeds 0.035 m^3.

12.1.4 Particular attention is drawn to the following:

- An additional emergency control valve (AECV) shall be fitted where the ECV is located remotely from the dwelling/building it serves (see BS 6891)
- A pressure test point shall be fitted for the purpose of gas tightness testing. Where there is no meter installed that includes a test point, a test point shall be fitted not more than 300mm downstream of any AECV (see BS 6891)
- Purge points shall be fitted where the installation pipework is greater than 35mm diameter or 0.035m^3 in volume (see IGEM/UP/2)
- pipe and fittings of steel, continuous Pliable Corrugated Stainless Steel Tube, malleable iron or copper may be used.
- only screwed, welded, or end load and fire resistant iron/steel fittings shall be used for pipework installed in, or passing through, a protected shaft containing a stair ~~and/or lift~~ or other protected escape route, common areas, escape routes, or individual dwellings not supplied by the pipework

  Note 1: The intention of this is to:
  - *restrict the use of non-steel pipes to individual consumers' pipework within their own dwelling*
  - *maximise the fire safety and general integrity of gas pipework in common areas.*

  Note 2: Compression fittings are not allowed in protected shafts i.e. the pipe needs to be continuous.

  Note 3: Access to screwed joints will be required for inspection and maintenance.

- where pipework passes through a dwelling other than the one it supplies, it shall be enclosed in a purpose-provided duct designed and constructed in accordance with relevant standards.
- pipework passing through a wall or floor shall be sleeved and take the shortest practical route

  Note: The coating on Pliable Corrugated Stainless Steel Tube/copper does not fulfil such a purpose and a purpose designed sleeve has to be applied i.e. the sleeve needs to be corrosion resistant, impermeable to gas and protecting the enclosed pipe against failure by movement of the structure.

Commented [ro101]: Review font size and spacing between bullits.

Commented [ro102]: See comment 533. Agreed

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- any duct or other void such as a ceiling void containing installation pipework shall be ventilated in accordance with IGEM/UP/2 or BS 6891 as appropriate.

  Note: Additional information is given in BS 8313.

- Pipework within a protected corridor/lobby, including any suspended ceiling void above the protected area, can be contained within a duct which is vented to outside air either directly or indirectly via another ventilated area. Any ducting is required to be of fire-resisting construction to the level of the fire resistance of the protected area it passes through or of an alternative material with fire stopping where the duct passes through the compartment walls/floors.

- any protected shaft containing installation pipework should be ventilated at high and low level direct to outside air to the levels given in IGEM/UP/2, or BS 6891, or BS 8313 as appropriate. Horizontal ducts should be ventilated at each end
- pipework shall be fire-stopped as it passes from one fire compartment to another unless it is in its own ventilated protected duct which is ventilated top and bottom directly to outside air. When pipework from a continuous duct enters a dwelling, it shall be fire-stopped at the point of entry
- pipework shall not be installed in a ventilation or air-conditioning duct and shall be physically spaced from other services such as water, electricity, telecommunication and drainage

  Note: Additional information is given in BS 8313

- pipework shall be supported adequately along its length (see Table 9)
- for a meter not located within a dwelling, pipework shall be marked clearly (adjacent to the meter) to indicate the dwelling it supplies
- pipework supports shall be suitable for the environment in which they are installed. The support shall remain stable for the lifetime of the installation.
- Where the supports are installed in a protected area, they shall be fire resistant.
- The supports shall prevent pipework from coming into contact with the structure which are likely cause corrosion
- Pipework shall be routed such as to avoid the risk of mechanical damage

NOMINAL BORE (mm)	MAXIMUM UNSUPPORTED LENGTH (m)					
	Screwed steel horizontal	Screwed steel vertical	Welded steel horizontal	Welded steel vertical	~~External PE~~Copper horizontal	Copper/ ~~corrugated stainless steel~~vertical
15	2.0	2.5	2.5	3.1	1.5	~~1.2~~2.0
20	2.5	3.1	2.5	3.1	2.0	~~1.8~~2.5
25	2.5	3.1	3.0	3.7	2.0	~~1.8~~2.5
32	2.7	3.3	3.0	3.7	2.5	2.5
40	3.0	3.7	3.5	4.3	2.5	2.5
50	3.0	3.7	4.0	5.0	2.5	2.5
65			4.5	5.6	~~See~~	~~2.5~~
80			5.5	6.8	~~Note~~	~~2.5~~
100			6.0	7.5		
150			7.0	8.7		
200			8.5	10.6		
250			9.0	11.2		

Note: For proprietary systems (e.g. ~~external PE riser systems~~pliable corrugated stainless steel tube), see the manufacturer's instructions.

Commented [ro104]: Comment 550. Agreed

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Commented [ro105]: Comment 551. Agreed.

Commented [ro106]: Comment 535 Using UP2 rather than BS 6891.

Commented [ro107]: Insert figures from Table 17 of IGEM/UP/2 into the column for horizontal copper

Commented [ro108]: Comment 536. Agreed

TABLE 9 - SUPPORTING ABOVE-GROUND INSTALLATION PIPEWORK

12.2 SELECTION AND INSTALLATION OF GAS APPLIANCES

BS 5440 and IGEM/UP/17 provide additional requirement and detailed advice on shared flue systems, flue termination positions and air supply routes which may require particular attention in multi-occupancy buildings.

12.2.1 Selection

Any new appliance shall be ~~CE~~appropriately marked and be suitable for use in the particular circumstances that apply in multi-occupancy buildings with regard to flueing and ventilation.

Commented [ro109]: Comment 557 Partially agreed

For all appliances, particular attention is drawn to the following:

- flueing and ventilation shall be in accordance with BS 5440. Where a shared flue system is to be employed, only appliances that are specified by the appliance manufacturer as being suitable shall be used
- any appliance intended for fitting in a room containing a bath or shower must be room sealed
- any gas fire, space heater, central heating boiler or water heater of net heat input exceeding 12.7 kW, intended for fitting in a room used or intended to be used as sleeping accommodation, must be room sealed
- any gas fire, space heater or water heater of net heat input not exceeding 12.7 kW net, intended for fitting in a room used, or intended to be used, as sleeping accommodation, must be room sealed or incorporate a safety control device which will shut down the appliance before there is a build-up of a dangerous amount of products of combustion in the room concerned
- where a gas cooker is to be installed into an internal kitchen, ventilation must be provided in accordance with appropriate Building Regulations and shall be in accordance with BS 5440-2
- A new or replacement gas cooker hose for a cooker installed in a multi-occupancy building shall be to BS EN 14800.

  Note: gas cooker hoses to BS EN 14800 are fire resistant in accordance with procedure B in Annex A of BS EN 1775.

Commented [ro110]: from BSI via JS

- any flueless appliance shall have a F~~f~~lame S~~s~~upervision D~~d~~evice (FSD) fitted to each burner (except for cooker oven burners of uncontrolled heat input less than 0.6 kW)

Commented [ro111]: Comment 554 agreed

  Note 1: A FSD is a device, including a sensing element, which causes the gas supply to a burner to be opened or closed according to the presence or absence of the flame which activates the sensing element.

  Note 2: A device that only attempts automatically to re-light gas does not satisfy this clause.

- where the appliance is to be installed in a timber framed building, the appliance manufacturer's instructions shall advise that the appliance is suitable for installing in such a building
- Where a replacement appliance is to be installed, a check should be made to confirm that the size of the installation pipework that will be feeding it remains ~~-~~adequate.

Commented [ro112]: Comment 558. Agreed

12.2.2 Installation

Appliances shall be installed in accordance with the manufacturer's instructions and the relevant British Standards given Table 10.

APPLIANCE TYPE	REFERENCE
Fires, convector heaters, fire/back boilers and decorative fuel effect gas appliances	BS 5871-1, 2, 3 and 4

Water heaters	BS 5546
Central heating boilers	BS 6798
Ducted warm air heaters	BS 5864
Cookers	BS 6172
Catering appliances	BS 6173
Tumble dryers	BS 7624

TABLE 10 - APPLIANCE INSTALLATION STANDARDS

12.3 **MAINTENANCE OF GAS APPLIANCES**

12.3.1 Any person carrying out maintenance of a gas appliance must be competent to carry out the work and be a member of a class of persons approved by the HSE in accordance with GS(I&U)R.

12.3.2 Maintenance of any gas appliance shall be in accordance with the manufacturer's instructions.

12.3.3 As part of a maintenance schedule, any operative undertaking gas work must ensure that:

- the effectiveness of the chimney is satisfactory

Note 1: Attention is drawn to the requirements of the Building Regulations and the information provided in TB 008 regarding flues in voids

Note 2: Where the chimney is located in a void, inspection hatches will be required.

- there is an adequate supply of combustion air
- the appliance operating pressure or heat input (or where necessary both) is correct
- the appliance is operating safely and efficiently
- if it is not reasonably practicable to examine the operating pressure or heat input (or where necessary both), its combustion performance should be checked.

Commented [ro113]: Comment 561 Agreed

12.4 **LANDLORD'S GAS SAFETY CHECKS**

12.4.1 The landlord must ensure that:

- any gas installation and fittings are maintained in a safe condition
- each appliance and chimney is checked for safety within the periods specified by Regulation 36 and 36A of GA(I&U)R. Generally, this is at intervals of not more than 12 months although specific tolerances are allowed. ~~of the appliance being installed and at intervals of not more than 12 months since it was last checked for safety~~

Commented [ro114]: Comment 564. Partially agreed.

- a record is made in respect of any appliance or chimney so checked and this record is retained for a period of two years from the date of that check
- a copy of the record is given to the tenant within 28 days of the date of the check or, where a tenant occupies the premises for a period of less than 28 days, a notice is displayed in a prominent position in the premises
- all gas work and safety checks are carried out by a class of persons as defined in GS(I&U)R

Note 1: Further guidance is contained in L56. Attention is specifically drawn to the guidance to Regulations 36, 36A and 39. Additional guidance for Landlords is provided in the answers to frequently asked questions on the HSE web site link www.hse.gov.uk/gas/domestic/faqlandlord.htm

Note 2: Where a Landlord has difficulty gaining access to a property to undertake the gas safety check of the appliances and installation pipework, they have to show that they took all

reasonable steps to comply with the law. Force cannot be used to enter the property. The following actions are recommended:

- *Keep a record of all correspondence with the tenants.*
- *Leave the tenant a notice stating that an attempt was made to complete the gas safety check and provide your contact details.*
- *Write to the tenant explaining that a safety check is a legal requirement and that it is for the tenant's own safety. Give the tenant the opportunity to arrange their own appointment.*
- *It is understood that HSE inspectors will look for repeated attempts to complete the gas safety check, including the above suggestions and taking appropriate legal action after repeated failure to gain access. However, the approach will need to be appropriate to each circumstance. It would ultimately be for a court to decide if the action taken was reasonable depending upon the individual circumstances.*

Note 3: The landlord has a duty of care to ensure that installation pipework and appliances are maintained in accordance with GS(I&U)

Note 4: The term "Landlord" as used above is as defined in GS(I&U)R. It is not used in other Legislation referenced in this Standard. A Landlord is usually, but is not necessarily, the Responsible Person for the building who has the responsibility under Article 4 of the Fire Safety Order for General Fire Precautions. Where different persons undertake the roles of Landlord and Responsible Person for the building, they are expected to co-operate with one another over the inspection, maintenance and renewal of installation pipework located in common parts of the building (see Regulation 22 of the Fire Safety Order).

12.5 CHIMNEYS

Commented [ro115]: Comments 559, 566 & 567 Agreed

12.5.1 A new shared flue system (CFS) shall be designed and installed in accordance with BS 5440-1 or BS EN 15287-1 as appropriate. Its ventilation requirements shall conform to BS 5440-2.

12.5.2 The use, maintenance and decommissioning of shared flue systems comprising ~~shall be carried out in accordance with IGEM/UP/17.~~

- Shunt ducts
- Se-ducts
- U-ducts
- fabricated shared chimney/flue systems (communal flue systems) (CFSS)

installed in buildings containing multiple individual dwellings shall be in accordance with IGEM/UP/17 Edition 2. ~~.~~

12.5.3 Once a new shared flue system (CFS) is in place, IGEM/UP/17 Edition 2 shall apply to its subsequent use, maintenance and de-commissioning.

~~*Note 1: IGEM/UP/17 does not address the installation of new shared flue systems. It applies to their use, maintenance and decommissioning subsequent to them being put in place.*~~

Note 12: IGEM/UP/17 addresses in particular:

- *responsibilities including inspection and maintenance*
- *recognition of different types of shared or common flue systems*
- *what type of appliance can and cannot be fitted to different types of flue system*
- *content of an inspection and maintenance regime*
- *labelling*
- *fire stopping of flues penetrating fire compartment walls and floors*
- *Access to roofs*
- *Condensate drain design*

Note 23: In addition, see BS 5440-1.

Note 3: CFSs in dedicated shafts require to be able to be accessed for inspection, maintenance and replacement.

12.5.~~2~~4 Unless an exemption is granted to the contrary, ~~A~~any flue in or attached to an external wall of a High Rise Building i.e. one in England where the top storey is 18 metres or more above ground level or one in Scotland where the top storey is 11 metres or more above ground level, ~~containing 6 or more storeys above ground level and is 18 metres or more high,~~ must be constructed in non-combustible material.

Note: ~~S~~For England, see The Building (Amendment) Regulations 2018. The Regulations require materials to have been classified A2-s1, d0 or A1 in accordance with BS EN 13501-1:2007 + A1:2009 - Fire Classification of Construction Products and Building Elements.

Commented [ro116]: Comments 568 - 571. Agreed in principle.

SECTION 13 : MATERIALS AND COMPONENT SPECIFICATIONS

13.1 Components shall be selected to an appropriate Standard. Examples are given in Table 11.

COMPONENT	STANDARDS
PE pipe and fittings Pipe Electrofusion fittings Mechanical transition fittings Butt fusion fittings PE valves (≤ 63 mm diameter)	GIS/PL2-1 - PE pipes and fittings, general GIS/PL2-2 - PE pipes and fittings, pipes GIS/PL2-4 - PE pipes and fittings, fusion fittings GIS/PL2-6 - PE pipes and fittings, spigot end fittings GIS/PL2-8 - PE pipes and fittings, pipes up to 7 bar GIS/PL3 - PE pipes and fittings, self-anchoring mechanical fittings GIS/V7-2 - PE Plastic bodied valves
Steel line pipe and fittings Threaded pipe and fittings	GIS/L2 - steel pipe (21.3 mm to 1219 mm) up to 7 bar API 5L –steel line pipe ASTM A106 Grade B – Steel pipe GIS/F7 - steel welding pipe fittings BS EN 10253-1 – Butt welding pipe fittings ASME/ANSI B16.9 – Butt welding fittings BS 3799 –Steel pipe fittings: screwed and socket welding ASME/ANSI B16.11 – Steel pipe fittings: Socket welding & threaded BS EN 10255 (Ø < 50 mm), (medium/heavy grade CAT 3 & complying with either BS EN 10217-2 or BS EN 10216-2)
Pliable Corrugated Stainless Steel Tube and fittings	BS 7838 - Partially replaced by BS EN 15266 BS EN 15266 - Stainless steel pliable corrugated tubing kits in buildings for gas with an operating pressure up to (≤ 0.5 bar)
Pliable stainless steel	BS EN ISO 10380 - Corrugated metal hoses and hose assemblies BS EN ISO 10806 - Fittings for corrugated metal hoses
Press-fit Stainless Steel	BS EN 10088-2 CrNiMo steel type 1.4401 (grade 316) tested & approved to peEN 10352
Thermal cut-off devices (TCO)	DIN 3586 - Thermal cut-off devices *Note: It is possible to select TCOs that produce pressure drops of the order of 0.2 mbar or considerably less at the design flow.*
Excess flow valves (EFV)	DIN 30652-1 - Excess flow valves
Inlet Isolation valves (IIV)	BS EN 331 - Ball valves for gas installations in buildings BS 1552 - Taper plug valves PRS 1/E - Brass and copper fittings GIS/V7 - Distribution valves
Pipeline isolation valves (PIV)	GIS/V7 or V4, as appropriate
Emergency control valves (ECVs) Labelling ECVs Outlet connectors for ECVs	BS EN 331 - Ball valves for gas installations in buildings GIS/V7-3 - Brass valves and associated fittings up to 5 bar BS 1552 - Taper plug valves PRS1/E (≤ 50 mm (2 in) diameter) - Brass and copper fittings Union boss to BS 746, Comply with BS EN 331 or BS 1552
Meters	BS EN 1359 - Diaphragm gas meters BS EN 14236 - Domestic ultrasonic gas meters BS EN 12405 - Volume conversion devices BS EN 12480 - Rotary displacement gas meters
Meter housings	BS 8499 - Meter boxes and bracket IGEM/GM/6; IGE/GM/8 - Non-domestic meter installations
Domestic gas appliances	BS EN 30-1-1 - Domestic cooking appliances burning gas See Table 10
Electrical insulation joints	GIS/E17-2 2018 - Specification for insulation joints. Joints operating at pressures not greater than 7 bar
Chimneys	BS EN 1856 Chimneys

TABLE 11 - STANDARDS FOR MATERIALS AND SPECIFICATION OF COMPONENTS

Commented [ro117]: Comment 397 Agreed in principle

Commented [ro118]: Comment 575 Agreed

SECTION 14 : ELECTRICAL SAFETY

14.1 GENERAL

14.1.1 A gas pipe shall not be used as an earth electrode *(see BS7671).*

14.2 INSULATING FITTINGS

14.2.1 Insulating fittings shall be installed in metal gas pipes, whether gas-carrying or containing a PE liner, capable of providing electrical continuity between earth and the above-ground pipework.

Note 1: Earth in this context includes the ground and contiguous masonry such as a building wall and paving.

Note 2: This is a requirement of IGEM/TD/4.

14.2.2 An insulating fitting is not required where an alternative, reliable means of preventing electrical continuity between the installation piping and earth has been provided, for example, by a PE Riser or an above ground entry connected to a GRP sleeved PE network pipe.

14.2.3 An insulating fitting shall be installed in an accessible location, as close as possible to the pipe's entry into the building or to the pipe's exit from the ground and upstream of any ECV. The uninsulated section of the pipe shall be as short as practicable.

Note 1: Insulating fittings complying with GIS/E17-2:2018 are suitable for use inside buildings. Fittings complying with GIS/E17-2:2006 are not suitable for use inside buildings.

Note 2: In all circumstances, particularly where they are installed outside buildings, insulating fittings have to be protected from the accumulation of debris and moisture which may compromise their insulation properties.

Note 3: Having regard to other features of the electrical and gas systems, the Competent Person may require the installation of additional insulation fittings within the gas network or installation piping.

14.2.4 All exposed metallic pipe between the ground and the insulation fitting (including, where necessary, the metal body of the fitting itself) shall be encapsulated in an approved insulating sleeve or otherwise protected to prevent physical contact with the surface of the pipe. The wrapping or other protection shall be marked: "Electric shock hazard, do not remove this sleeve/guard.".

14.3 ELECTRICAL CONTINUITY BONDING

14.3.1 GS(I&U)R require that a temporary bond be used to maintain electrical continuity wherever a meter, section of pipe or fitting is removed or disconnected.

14.3.2 Bonding conductors shall be to a design approved for that purpose, comprising a length of flexible insulated cable complete with clamps or other retaining devices at each end and sized in accordance with the requirements for a for the electrical installation (See Chapter 54 main protective bonding conductor and Table 54.8 of BS7671).

Note: The purpose of the bond is to maintain the flow of stray currents to prevent a potential difference across a gap in the pipework.

14.3.3 The temporary bonding conductor must be fitted before any part of any metallic pipework is cut or removed.

14.3.4 A bonding conductor must never bridge an insulating fitting except during initial installation or when an insulating fitting is being replaced.

14.3.5 Expansion joints and hoses fitted in internal pipework shall be permanently cross-bonded unless the design already provides electrical continuity. If the joint or hose itself provides electrical continuity, then additional temporary cross bonding shall be provided before the component is removed.

Note: The typical design of joint already provides electrical continuity.

14.4 CHECKING FOR ELECTRICAL FAULTS

14.4.1 Prior to starting work, all exposed metal parts shall be checked for the presence of current using a non-contact voltage detector. These checks shall include all electrically conductive parts such as metal pipes, emergency controls, metal sinks, domestic appliances etc.

Note: The use of a non-contact voltage detector (single pole) capable of indicating voltages of 50V or greater on all exposed metalwork in the work area assists in the detection of stray voltage that might be harmful. It should be noted that such voltage detectors are not designed to respond to current flow and should be used in accordance with the manufacturers' instructions.

14.4.2 Where any doubt about the electrical installation exists, the advice of a competent electrician shall be sought.

14.4.3 In addition, a visual inspection shall be made to determine the presence of any Protective Equipotential Bonding connection and their condition.

14.4.4 Work shall cease until the installation has been checked and made safe by a qualified electrician where:

- A non-contact voltage detector indicates the presence of stray voltage or
- The bonding connection is missing or shows signs of damage or deterioration.

Note: For further information on electrical safety, see Appendix 5.

SECTION 15 : TESTING AND COMMISSIONING

15.1 GENERAL

15.1.1 Any person employed for testing or commissioning must be competent to carry out the work.

15.1.2 Testing and commissioning shall be carried out in accordance with the Standards listed in Table 12 and appropriate and full records shall be kept.

Commented [ro119]: Comment 602 partially agreed

COMPONENT	STANDARDS
Network pipeline	IGEM/TD/3 or IGEM/TD/4, as appropriate (see Note) IGEM/GL/6
Meter installation	IGEM/UP/1 or IGEM/UP/1A or IGEM/UP/1B or IGEM/UP/1C BS 6400 or IGEM/GM/6 or IGEM/GM/8, as appropriate
Installation pipework	IGEM/UP/1 or IGEM/UP/1A or IGEM/UP/1B, as appropriate

Note 1: As required by IGEM/GL/6 Edition3 an authorised RO procedure and associated risk assessment is required for the testing and commissioning of network pipelines in multi-occupancy buildings.

Note 2: The pipe downstream of the PIV has to be tested at 350 mbar. Where the ECV is a plug valve to BS 1552 with a MOP of 200mbar, the pipe is required to be tested initially without the ECV fitted, for 10 minutes, followed by a second test at 100 mbar with the ECV fitted in the open position and capped, for a further 10 minutes.

Note 3: Where the ECV is a ball valve to BS EN 331 with a MOP of 500mbar the pipe and ECV are required to be tested at 350mbar ~~is designed to withstand a normal operating pressure in excess of 350 mbar, a GT may allow a combined test of 350 mbar~~ for 10 minutes with the ~~service offtake capped and the~~ ECV in the open position and its outlet capped. ~~Before carrying this combined procedure, agreement of the test method will be required from the adopting GT.~~

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Commented [ro120]: Comment 603 + conversation with LT. Agreed

TABLE 12 - TESTING AND COMMISSIONING STANDARDS

15.1.3 No gas shall be allowed to flow to an ECV until the network installer is satisfied that the installed network pipeline (see Table 1) complies with this Standard and the approved design.

Note: Compliance with this Standard also requires satisfactory completion of ancillary features, for example ducting, ventilation, etc.

15.1.4 Commissioning of network pipelines shall be carried out in accordance with an authorised written procedure. See IGEM/GL/6 for further details.

15.1.5 Fire stopping ~~shall~~should be ~~installed~~completed prior to commissioning.

Commented [ro121]: Comments 604 & 605 agreed

15.1.6 Commissioning of any gas appliance shall be in accordance with the manufacturer's instructions.

15.1.7 Safety checks must be made to ensure that:

- appropriate labelling is provided and, for multiple meter installations, the meter identification notice correctly shows the individual dwelling/unit served
- the operation of the chimney is satisfactory

- there is an adequate supply of combustion air
- the appliance operating pressure and heat input is correct
- the appliance is operating safely and efficiently
- any equipotential bonding arrangements are not adversely affected
- An AECV with appropriate test and purge points have been installed.

15.2 **EXISTING NETWORK PIPELINES**

15.2.1 The following re-commissioning criteria apply for existing pipeline systems:

(a) where all accessible pipework is observed to be in good condition and a risk assessment indicates that disturbance of joints could create a leak and the above ground network pipeline has been decommissioned either:

- due to the inadvertent operation of the PIV or IIV, or
- due to a leak on the pipeline upstream of the PIV, or
- where decommissioning was required to accommodate other works such as mains replacement activity

a pneumatic tightness test shall be applied and shall be carried out at maximum operating pressure or higher before re-commissioning.

Commented [ro122]: Comment 607 agreed

(b) where the reason for decommissioning was for any of the reasons given in (a) above and where:

- any section of the accessible pipeline is observed to be in poor condition, or
- the leak was found to be on the pipeline downstream of the PIV, or
- a visual examination of large lengths of the above ground system is not possible

Commented [ro123]: Comment 608 Agreed

a successful combined strength and tightness test in accordance with the GT's procedures shall be applied before re-commissioning.

For both situations, prior to re-commissioning, consideration shall be given to applying other protective measures, such as "fill and drain" internal joint sealing techniques.

SECTION 16 : RECORDS, INSPECTION, MAINTENANCE, ~~AND~~ MONITORING AND DECOMMISSIONING ~~OF NETWORK PIPELINES~~

Commented [ro124]: Comment 613 Agreed

16.1Network Pipelines

16.1.1 Any person carrying out inspection, maintenance, ~~or~~ monitoring or decommissioning of network pipelines must be competent to carry out that work.

16.1.2 Installers and GTs shall ensure that adequate records of network pipelines in multi-occupancy buildings are made and maintained. Where practicable this should contain the following information:

- building address
- MPRNs
- Floor plans
- Schematics
- construction details including pressure testing and welding records
- access details for maintenance and inspection
- plant location e.g. pipelines, meters, valves etc.
- building construction
- number of floors and the number of dwellings per floor
- construction details
- method of pipeline entry
- subsequent alterations.

For High ~~Rise~~ Risk Buildings, where possible the records ~~shall~~should include BIM level 2 records~~, to BS EN ISO 19650 – 1 or BS EN ISO 19650 – 2 as appropriate.~~

Note 1: The Independent Review of Building Regulations and Fire Safety conducted by Dame Judith Hackitt included recommendations on the production and use of 3D BIM Level 2 records. It is expected that over time such records will become mandatory.

Note 2: BS EN ISO 19650-1 addresses concepts and principles of BIM and BS EN ISO 19650-2 addresses the use of BIM in the delivery phase of the assets.

Commented [ro125]: See comments 617 & 618. Partially agreed.

The GT shall set out a reasonably practical procedure for gaining access to the building.

Note: This will involve identifying the Responsible Person for the building, not least because they will need to be informed of any identified ventilation, passive fire protection and DSEAR compliance deficiencies. This information can be obtained from a number of sources, for example, the original developer, the Land Registry or any other previous records.

Record details shall be adequate to enable the ~~operator~~GT to carry out required inspection and maintenance.

Commented [ro126]: Comment 616. Agreed

The GT shall set out a reasonably practical procedure for recording the location of and accessibility of valves.

16.1.3 Reference should be made to Section 7.5 above for details of the information which should be passed initially to the Client/Responsible Person for the Building in the project's Safety File. The Responsible Person for the Building also should be provided with appropriate details of subsequent inspections, not least so that they can ensure any necessary remedial works can be carried out.

16.1.4 ~~Consideration should be given to entering into a Memorandum of Understanding with the GT and the Building Owner/Responsible Person of the Building should~~ attempt to enter into a Memorandum of Understanding in order to clarify accountabilities, contact details and access arrangements formally. An example, which is applicable to England and Wales, is included as Appendix 10.

Note: A memorandum of understanding is a non-binding agreement between 2 parties or more. Its purpose is to help prevent any confusion, misunderstanding and disputes. It is structured to enable the expectations and responsibilities of the parties involved to be stated clearly.

Commented [ro127]: Comments 620 - 624. Partially agreed.

16.1.5 The GT shall consider both how and when both above and below ground network pipelines will be surveyed and examined to validate and maintain it in a safe condition, in accordance with Regulation 13 of PSR.

Commented [ro128]: Comment 625 Agreed

Note: Further information can be found in HSL82, guidance notes 59 to 63.

16.1.6 A written ~~procedur~~ framework document ~~e~~ for the inspection, maintenance and monitoring of ~~the~~ network pipelines to and within multi-occupancy buildings shall be drawn up. The ~~procedure~~document shall consider the following:

- post commissioning inspection to confirm that the design intent has been achieved and that completed building works have not compromised the safety of the network pipeline to the building.

Note: Pre-commissioning inspection will have been undertaken as part of the RO procedure referred to in paragraph 15.1.4 above.

Commented [ro129]: Comment 627 Agreed

- Subsequent inspection frequency. The frequency of periodic inspection of an installation will depend on
    - the type of installation,
    - number of floors,
    - location,
    - the number of persons affected,
    - building use,
    - the frequency and quality of maintenance,
    - operational history;
    - condition as reported on previous inspection;
    - changes in risk profile;
    - external influences to which it is subjected such as
        - building movement,
        - thermal cycling
        - and the ambient environment e.g. proximity to a coastal salt laden atmosphere.

  Separate inspection frequencies may be considered for

    - accessibility and operability of PIVs;
    - Internal network pipelines and associated valves;
    - meter banks.

  Note: Consideration may be given, where appropriate and feasible, to co-ordinating inspections with the Landlord' safety inspections.

- what kind of monitoring system ~~will~~shall be employed. Consideration ~~may~~should be given to
    - undertaking a visual inspection,

- measuring the pipe wall thickness where there are signs of corrosion
- testing the atmosphere with a leakage detector.

Note: Portable remote methane leakage detectors using laser technology known as Tuneable Diode Laser Absorption Spectroscopy may be used to detect gas leaks in hard to reach locations.

- what parts of the installation and its environment ~~will~~shall be inspected. This ~~may~~should include:
  - building layout,
  - confirmation that specified ventilation has been maintained,
  - confirmation of valve accessibility,
  - building type/use,
  - materials,
  - pipe diameters,
  - joint type,
  - corrosion protection,
  - pipe supports,
  - sleeve sealing/fire stopping,
  - Electrical bonding
  - signage/labelling.
- how the inspection ~~will~~shall be carried out.
  - Visual inspection
  - Use of a duct camera may enhance the visual inspection of pipework in ducts
  - Calipers and/or ultrasonic gauges to measure pipe wall thickness
  - Proportion of the network pipeline to be examined, both above and below ground, in communal areas and individual dwellings, especially if there are access difficulties
  - Use of a small unmanned aircraft (drone) may enhance the visual inspection of external network pipelines.

Note: The use of drones comes under the Civil Aviation Authority Air Navigation Order 2016. Organisations flying drones for such inspection work will be deemed to be doing so for commercial work and as such will have had to have been granted Standard Permission to do so by the Civil Aviation Authority (CAA). Special permission has to be obtained in order to fly drones in a congested area i.e. closer than 50m from a building. See CAA publication CAP 722 for more information.

- what ~~is to~~should be recorded
  - Observations and where appropriate measurements, prompted by a structured ~~C~~checklist
  - Photographs
- Inspection and maintenance history
- formulation and implementation of a maintenance action plan following inspection and analysis of the results of that inspection
  - criteria to trigger maintenance and/or replacement activity,

Note: the criteria may vary with the expected remaining service life of the network or building

  - risk ranking.
- determination of the appropriate standards and procedures that wiil be applied.

Commented [ro130]: Comment 629. Agreed

Commented [ro131]: Comment 633 & 636 partially agreed.

Commented [ro132]: Comment 630. Agreed

Commented [ro133]: Comment 634 agreed

Commented [ro134]: Comment 635 agreed

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Note: A risk based rationale may be applied where access to all flats is not reasonably practicable.

16.1.7 **Actions resulting from GT inspections**

16.1.7.1 The GT shall have robust processes in place to ensure that any remedial works relating to the network pipeline identified during inspections are recorded and monitored to completion within a reasonable timeframe. A risk-based approach should be applied to prioritise any remedial works in line with the identified risk. This should include consideration of the building occupancy, environment, ventilation, asset integrity, access to emergency valves, fire stopping or deferment with increased frequency of inspection.

16.1.7.2 The GT ~~shall~~should advise the Responsible Person for the Building of the results of its inspection ~~and~~and it shall arrange to obtain access to carry out any remedial works that are required.

16.1.8 **~~-~~Network Pipeline Replacement Works**

16.1.8.1 Where it is necessary to replace any of the existing network pipeline, due to emergency works or programmed condition replacement, the GT shall liaise with the Responsible Person for the Building to ensure that the works are programmed with minimum disruption to existing customers and the fire integrity and ventilation of the building are not compromised.

16.1.9 **~~Redundant~~Decommissioning Network ~~Gas~~Gas Pipeline ~~Infrastructure~~**

16.1.9.1 Where existing gas network pipes~~,~~ and fittings ~~or appliances~~ are no longer to be used~~. :~~

16.1.9.2 If a redundant gas network pipeline~~infrastructure~~ including associated fittings is to be left in place, it shall, in so far as is reasonably practicable, be clearly identified as serving no ~~function~~function and a record should be kept and maintained. A risk assessment shall be undertaken to assess if the continuing presence of the redundant infrastructure would affect the safety of the building.

Note: See Regulation 14 of PSR.

16.2 Domestic Gas Infrastructure

16.2.1 Domestic gas infrastructure i.e. gas meters to BS 6400-1, installation pipework to BS 6891 and domestic gas appliances, shall be inspected and maintained in accordance with sections 12.3 and 12.4 above.

16.3 Energy Centres and Associated Installation Pipework

16.3.1 Inspection and maintenance shall ensure that the design ventilation continues to be provided, is not faulty, remains correctly interlocked, as may be required, and has not been locked up.

16.3.3 The site technical file shall indicate which pipework is considered as Zone 2 NE. Gas installations shall be properly maintained and checked for gas leakages on a regular basis by competent persons to ensure the continuing safety of the installation.

Note: See IGEM/UP/2, IGEM/UP/10 and IGEM/UP/16 for further guidance.

longer to be used the redundant infrastructure shall be permanently decommissioned in accordance with IGE/UP/1, IGE/UP/1A, IGEM/UP/1B,

Commented [ro136]: Comment 647 agreed

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Commented [ro138]: See comments 651 & 653. Agreed

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Commented [ro139]: See comment 611. Agreed

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IGEM/UP/1C or IGEM/UP/17, as appropriate and it shall, in so far as is reasonably practicable, be removed.

Note: Legal notification requirements are in the Gas Meters (Information on Connection and Disconnection) Regulations.

APPENDIX 1 : GLOSSARY, ACRONYMS, ABBREVIATIONS, UNITS, SYMBOLS AND SUBSCRIPTS

GLOSSARY

Anchor A securing device to maintain in a pipeline a ~~fixed~~ point fixed both in position and direction under the design conditions of temperature and loading.

Commented [ro140]: Comment 666. Partially agreed - defininition is now an eact reproduction from BS 3974

Design Validation The process by which the asset owner checks whether the design will meet their needs.

High Risk Building A high rise multi occupancy buildings where the top storey is 18 metres or more above ground level or where the building contains more than 6 storeys.

Lateral Horizontal pipe, connected to a riser, which conveys gas along one floor level within a building.

Note: For the purposes of this standard, a lateral is a network pipeline, typically horizontal, serving one dwelling and connected to a riser.

Responsible Person for building Person with the responsibilities specified in the Regulatory Reform (Fire Safety) Order 2005. They may be the Owner, Local Authority, Housing Association, the Landlord, Building Management Company or Facilities Manager.

Commented [ro141]: Comment 660 Agreed - already actioned

Note 1: In the context of this standard, in Scotland the role will also be performed by the Factor.

~~*It is considered likely that changes to Building and Fire Safety Legislation in England, Wales, Scotland and Northern Ireland post publication of this standard will result in changes to role terminology and responsibilities.*~~

Riser Vertical pipe that carries gas between floors within a building.

Note: For the purposes of this standard, a riser is a network pipeline, typically vertical, serving one or more dwellings. Horizontal sections may be present; see Figure 20.

Commented [ro142]: See comment 661 Agreed

Self closing door one that is fitted with a closing device, i.e. not fitted with rising butt hinges.

Support a permanent device for retaining a pipe in a particular ~~manor~~manner or position.

Commented [ro143]: Comment 659 Agreed

Ventilation "more than adequate" if the ventilation achieves a bulk gas concentration in the enclosure equal to or less than 10% LFL

"adequate" if it achieves a bulk gas concentration in the enclosure equal to or less than 25% LFL

"inadequate" if it achieves a bulk gas concentration in the enclosure of more than 25% LFL

"poor" if it achieves a bulk gas concentration in the enclosure of more than 50% LFL.

Note 1 ; In the context of this standard the purpose of ventilation is to disperse gas from credible leakage to atmosphere before the gas in air concentration reaches LFL.

Commented [ro144]: Comment 656 Partially Agreed

Note 2: See 5.5.1.3 and A7.2 of IGEM/SR/25 for more information on the adequacy of ventilation.

The following terms are used in the Building Regulations, the associated Approved Document B and by fire protection specialists.

Fire retardant	Able to slow or check the spread of fire.
Fire resistant	Able to satisfy for a stated period of time the appropriate criteria specified in the relevant parts of BS 476 or BS EN 1363. *Note: For example, a meter box is required to be 30 minute fire resistant to BS 476.*

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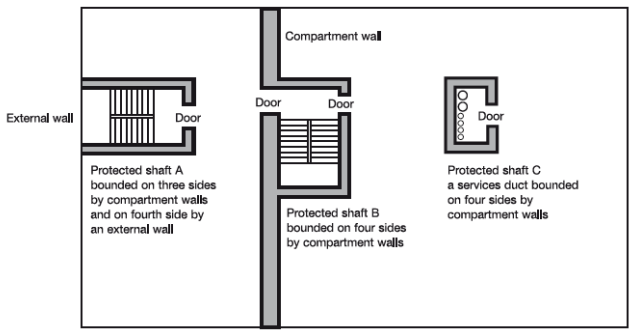
	The following criteria are applied to **Fire Stopping**: **Integrity** – the ability of a separating element e.g. fire compartment wall, when exposed to fire on one side, to prevent the passage of flames and hot gasses through and to prevent the occurrence of flames on the unexposed side. **Insulation** - the ability of a separating element e.g. fire compartment wall, when exposed to fire on one side, to restrict the temperature rise on the unexposed face to below~~@~~ 1. 140^{0}C as an average value above ambient &/or 2. 180^{0}C as a maximum value above ambient at any one point. Fire resistance is measured in minutes. This time relates to elapsed time in the test and it should not be confused with real time. *Note: See section ~~10~~9 of Volume ~~2~~1 of Approved Document B.*
Compartmentation	The sub-division of a building into compartments separated from one another by walls and/or floors of fire resistant construction. In buildings containing flats the following should be constructed as compartment walls or compartment floors: a. Every floor (unless it is within a flat i.e. between one storey and another within one individual dwelling); and b. Every wall separating a flat from any other part of the building; and c. Every wall enclosing a refuse storage chamber. *Note: See section ~~8~~7 of Volume ~~2~~1 of Approved Document B.*
Protected shaft	Space that connects compartments such as stairways and service shafts and which are protected to restrict fire spread between compartments. Any wall or floor bounding a protected shaft is considered to be a compartment wall or floor. *Note 1: Gas pipes in protected shafts are to be:* • *Constructed in steel, which is classified as non-combustible;* • *Compliant with either PSR or GS(I&U)R as appropriate;* • *Ventilated to outside air in accordance with BS 8313;* • *Fire stopped wherever the pipe exits the shaft.* *Note 2: A continuous duct containing a gas pipe that traverses from one fire compartment to another fire compartment is a protected shaft. Fire stopping is not required to be installed within the duct, thereby making it non-continuous, where the duct passes through the compartment wall/floor.* *Note 3: See Section ~~8~~7 of Volume ~~2~~1 of Approved Document B.* 

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	FIGURE 32- FLOOR PLAN OF PROTECTED SHAFTS (Reproduced from Approved Document B)
Collapse – Disproportionate	A building is designed to be robust against Disproportionate Collapse when the ability of a structure to withstand events like fire, explosions, impact or the consequences of human error without being damaged to an extent disproportionate to the original cause.
Collapse – Progressive	A situation where local failure of a key element leads to the collapse of adjoining members which in turn leads to the collapse of the entire structure or a disproportionately large part of it i.e. progressive collapse is also disproportionate and more extreme.
Cavity barrier	Any construction provided to seal a cavity against the penetration of fire and smoke or to restrict its movement within the cavity. *Note: See Section ~~9~~8 of Volume ~~2~~1 of Approved Document B.*
Non-combustible	Material, such as cast iron, copper and steel pipes, which if exposed to a temperature of 800^{0}C will not soften or fracture to the extent that flame or hot gas will pass through it i.e. the pipe wall.
Means of Escape	See Figures 5 – 8 inclusive.

Reference may be made also to BS EN ISO 13943: Fire Safety Vocabulary and BS 4422: Fire Vocabulary.

All other definitions are given in IGEM/G/4 which is freely available by downloading a printable version from IGEM's website www.igem.org.uk.

Standard and legacy gas metering arrangements are given in IGEM/G/1 which is freely available by downloading a printable version from IGEM's website.

ACRONYMS AND ABBREVIATIONS

ACoP	Approved Code of Practice
AC	alternating current
ACS	Accredited Certification Scheme
AD	approved document
AECV	additional emergency control valve
BIM	Building Information Modelling
BIV	branch isolation valve
BMS	building management system
CDM	Construction (Design and Management) Regulations
CHSWR	Construction (Health, Safety and Welfare) Regulations
CNE	combined neutral and earth
CO	carbon monoxide
CP	cathodic protection
CSA	cross sectional area
~~CSST~~	~~Corrugated Stainless Steel Tubing~~
DMIV	distribution main isolation valve
DMP	design minimum pressure
DPC	damp proof course
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations
ECV	emergency control valve
EFV	excess flow valve
ENA	Energy Networks Association
ESP	emergency service provider (gas)

EUSC	Energy and Utility Skills Council
FSD	flame supervision device
GB	Great Britain
GS(I&U)R	Gas Safety (Installation and Use) Regulations
GS(M)R	Gas Safety (Management) Regulations
GT	gas transporter
HSWA	Health and Safety at Work etc. Act
HSE	Health and Safety Executive
IET	Institution of Engineering and Technology
IGEM	Institution of Gas Engineers and Managers
IIV	inlet isolation valve
IV	isolation valve
LFL	Lower Flammable Limit
LIV	lateral isolation valve
LOP	lowest operating pressure
MAM	meter asset manager
MHSWR	Management of Health and Safety at Work Regulations
MOP	maximum operating pressure
MPRN	meter Point Reference number
NG	Natural Gas
NVQ	national vocational qualification
OP	operating pressure
PCSST	Pliable corrugated stainless steel tube
PE	polyethylene
PIV	pipeline isolation valve
PME	protective multiple earthing
PRI	pressure regulating installation
PSR	Pipeline Safety Regulations
PSSR	Pressure Systems Safety Regulations
PVC	polyvinylchloride
SIV	service isolation valve
SNE	separate neutral earth
SPAA	Supply Point Administration Agreement
SVP	soil and vent pipe
TCO	thermal cut off device
TWI	The Welding Institute
UIP	Utility Infrastructure Provider
UK	United Kingdom.

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UNITS

A	ampere
cm	centimetre
cm^2	square centimetre
in	inch
kW	kilowatt
m	metre
mbar	millibar
mm	millimetre
mm^2	square millimetre
m^2	square metre
m^3	cubic metre
$m^3\ h^{-1}$	cubic metre per hour
°C	degrees Celsius.

SYMBOLS


valve


regulator

primary/secondary meter

appliance


building/individual dwelling within the building (as appropriate)

network
meter installation
installation pipework

<	less than
≤	less than or equal to
>	greater than
Ø	diameter
H	altitude change
h	pressure change due to altitude
P	pressure
Q	flow rate
s	density of gas relative to air.

SUBSCRIPTS

ign	ignition
max	maximum
mi	meter installation
min	minimum.

APPENDIX 2 : REFERENCES

A2.1 LEGISLATION

This sub-appendix lists Legislation referred to in these Standards as well as Legislation not referenced but which may be applicable.

- Control of Pollution Act 1974, as amended
- Environment Act 1995
- Environmental Protection Act 1990
- Gas Act 1986 as amended by the Gas Act 1995 and incorporating stand-alone provisions of the Utilities Act 2000
- Health and Safety at Work etc. Act 1974
- New Roads and Street Works Act 1991
- Pipelines Act 1962
- Town and Country Planning Act 1990
- Water Resources Acts 1963 and 1991
- Utilities Act 2000
- Building Regulations (England and Wales) 2010 as amended
- Building (Scotland) Regulations 2004 as amended
- Control of Substances Hazardous to Health Regulations 2002
- Construction (Design and Management) Regulations 2015
- Dangerous Substances and Explosive Atmospheres Regulations 2002
- Electrical Safety, Quality and Continuity Regulations
- Electricity at Work Regulations 1989
- Fire (Scotland) Act 2005
- Fire Safety (Scotland) Regulations 2006
- Gas Appliances (Safety) Regulations
- Gas Meters (Information on Connection and Disconnection) Regulations 1996
- Gas Safety (Installation and Use) Regulations 1998
- Gas Safety (Management) Regulations 1996
- Gas Safety (Rights of Entry) Regulations 1996
- Housing Act 2004
- Lifting Operations and Lifting Equipment Regulations 1998
- Management of Health and Safety at Work Regulations 1999
- Manual Handling Operations Regulations 1992
- Noise at Work Regulations 1989
- Personal Protective Equipment at Work Regulations 1992
- Pipelines Safety Regulations 1996
- Pressure Equipment Regulations 1999
- Pressure Systems Safety Regulations 2000
- Provision and Use of Work Equipment Regulations 1998
- Regulatory Reform (Fire Safety) Order 2005
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013
- Rights of Entry (Gas and Electricity Boards) Act 1954
- Work at Height Regulations 2005
- Workplace (Health, Safety and Welfare) Regulations 1992, as amended by the Health and Safety (Miscellaneous Amendments) Regulations 2002.

A2.2 **HSE ACoPs AND GUIDANCE**

- HSG48 Human factors in industrial safety. Guidance
- HSG168 Fire Safety in Construction
- HSL56 Safety in the installation and use of gas systems and appliances. Gas Safety (Installation and Use) Regulations. ACoP and Guidance
- HSL82 Pipelines Safety Regulations. Guidance
- HSL122 Safety of pressure systems. Pressure Systems Safety Regulations 2000. ACoP
- HSL138 Dangerous Substances and Explosive Atmospheres Regulations 2002. ACoP and Guidance
- HSL153 Managing Health and Safety in Construction. Construction (Design and Management) Regulations 2015. ACoP and Guidance
- HSR25 Memorandum of Guidance on the Electricity at Work Regulations
- INDG370 Fire and explosion; How safe is your workplace? A short guide to the Dangerous Substances and Explosive Atmospheres Regulations 2002
- R2P2 Reducing risks, protecting people. HSE's decision making process.

A2.3 **IGEM STANDARDS**

- IGE/TD/3 Edition 5 Steel and PE pipelines for gas distribution
- IGE/TD/4 Edition 4 PE and steel gas services and service pipework
- IGEM/TD/13 Edition 2 Pressure regulating installations for Natural Gas, Liquefied Petroleum Gas and Liquefied Petroleum Gas Air
- IGEM/GM/6 Edition 2 Non-domestic meter installations. Standard designs
- IGEM/GM/7A Edition 2 Electrical connections for gas metering equipment
- IGEM/GM/7B Edition 2Hazardous area classification for gas metering equipment
- IGEM/GM/8 Parts 1 to 5 Non-domestic meter installations. Flow rate exceeding 6 m^3 h^{-1} and inlet pressure not exceeding 38 bar
- IGEM/GM/PRS/1 Meter Installation fittings
- IGEM/GM/PRS/3 Meter Regulators for gas flow rates not exceeding 6m^3 h^{-1} and inlet pressures not exceeding 75mbar
- IGEM/SR/25 Edition 2 Hazardous area classification of Natural Gas installations
- IGE/UP/1 Edition 2 Reprint with Amendments Strength and tightness testing and direct purging of industrial and commercial gas installations
- IGE/UP/1A Edition 2 Reprint with Amendments Strength and tightness testing and direct purging of small low pressure industrial and commercial Natural Gas installations

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- IGEM/UP/1B Edition 3 — Tightness testing and direct purging of small Liquefied Petroleum Gas/Air, Natural Gas and Liquefied Petroleum Gas installations
- IGEM/UP/1C — Strength testing, tightness testing and direct purging of meter installations of maximum operating pressure not exceeding 7 bar
- IGEM/UP/2 Edition 3 — Installation pipework on industrial and commercial premises
- IGE/UP/7 Edition 2 — Gas installations in timber framed and light steel framed buildings
- IGEM/UP/16 — Design for Natural Gas installations on industrial and commercial premises with respect to hazardous area classification and preparation of risk assessments
- IGEM/UP/17 — Shared chimney and flue systems for domestic gas appliances
- IGE/GL/1 Edition 2 — Planning of gas distribution systems operating at pressures not exceeding 16 bar
- IGEM/G/1 — Defining the end of the Network, a meter installation and installation pipework.
- IGEM/G/4 — Definitions
- IGEM/G/7 — Risk assessment techniques
- IGEM/G/11 — Gas Industry Unsafe Situations Procedure

A2.4 **BRITISH STANDARDS (abbreviated titles)**

- BS 21 — Pipe threads for tubes and fittings
- BS 476 — Fire tests on building materials and structures
- BS 746 — Gas meter unions and adaptors
- BS 951 — Electrical earthing clamps
- BS EN 1504-7 — Products and systems for the protection and repair of concrete structures
- BS 1552 — Taper plug valves
- BS 1560-3.2 — Circular flanges for pipes, valves and fittings
- BS 1640-3 — Steel butt welding pipe fittings
- BS EN ISO 17636-2 — Non-destructive testing of welds. Radiographic testing
- BS EN ISO 17637 — Non-destructive testing of welds. Visual testing
- BS EN ISO 17638 — Non-destructive testing of welds. Magnetic particle testing
- BS EN ISO 17640 — Non-destructive testing of welds. Ultrasonic testing.
- BS 2971 — Arc welding of carbon steel pipework
- BS 3799 — Steel pipe fittings, screwed and socket-welding
- BS 3974 — Pipe supports
- BS 4422 — Fire Vocabulary
- BS 4872 — Approval testing of welders
- BS 5440-1 — Flues and ventilation
- BS 5440-2 — Ventilation
- BS 5546 — Installation of hot water supplies
- BS 5864 — Installation of gas fired ducted air heaters
- BS 5871 — Installation of gas fires, convector heaters, etc.

- BS 5925 Ventilation principles and designing for natural ventilation
- BS 6001 Procedure for inspection by attributes
- BS 6129-1 Selection and application of bellows expansion joints
- BS 6172 Installation of domestic gas cookers
- BS 6173 Installation of catering appliances
- BS 6400-1 Domestic-sized gas meters – low pressure
- BS 6400-2 Domestic-sized gas meters – medium pressure
- BS 6501 Metallic hose assemblies
- BS 6798 Installation of gas fired boilers
- BS 6891 Low pressure gas pipework in domestic premises
- BS 6956 Jointing materials and compounds
- BS 7281 PE pipes
- BS 7624 Installation of tumble dryers
- BS 7671 IET Wiring Regulations
- BS 7838 Corrugated stainless steel semi rigid pipe
- BS 8313 Building services in ducts
- BS 8499 Domestic gas meter boxes and meter brackets
- BS EN 30-1-1 Domestic gas cooking appliances
- BS EN 287-1 Testing of welders. Fusion welding
- BS EN 331 Ball valves
- BS EN 751 Sealing materials
- BS EN 1359 Diaphragm gas meters
- BS EN 1366 -3 Penetration seals
- BS EN 1366-4 Linear gap seals
- BS EN 1092-1 Flanges and their joints
- BS EN 1337 Structural bearings
- BS EN 1775 Gas pipework in buildings
- BS EN 1776 Gas Meters
- BS EN 1995-1 Design of timber structures
- BS EN 10253-1 Butt-welding pipe fittings
- BS EN 10255 Non-alloy steel tubes suitable for welding and threading
- BS EN 12068 External coating of pipelines
- BS EN 12405 Gas meters – volume conversion devices
- BS EN 12436 Ultrasonic domestic gas meters
- BS EN 12480 Rotary displacement gas meters
- BS EN 12732 Gas supply systems - Welding steel pipework
- BS EN ISO 12944 Corrosion protection by painting
- BS EN 13501-1 Fire classification of construction products and building elements
- BS EN 15266 Stainless steel pliable corrugated tubing kits in buildings for gas
- BS EN 62305 Protection against lightning
- BS EN ISO 10380 Corrugated metal hose and hose assemblies
- BS EN ISO 10497 Testing of valves; fire type testing
- BS EN ISO 10806 Fittings for corrugated metal hoses

- BS EN ISO 13943 Fire Safety Vocabulary
- BS EN ISO 15614-1 Welding procedures. Arc welding.
- BS EN ISO 19650 Building information modelling
- BS ISO 19921 Fire resistance of metallic pipe components.

A2.5 **INTERNATIONAL STANDARDS (abbreviated titles)**

- DIN 3586 Thermal cut-off devices
- DIN 30652-1 Excess Flow valves
- ISO 7-1 Pipe threads.

A2.6 **GAS INDUSTRY STANDARDS**

- GIS/L1 Seamless line pipe 40 mm to 100 mm inclusive nominal size for operating pressure greater than 7 bar
- GIS/F7 Steel welding pipe fittings 15 mm to 450 mm inclusive nominal size for operating pressures not greater than 7 bar
- GIS/L2 Steel pipe 15 mm to 450 mm inclusive nominal size for services at pressures up to 7 bar supplementary and amending specification to BS 3601
- GIS/PL2-1 Polyethylene pipes and fittings for natural gas and suitable manufactured gas pipes for use at pressures up to 5.5 bar
- GIS/PL2-3 Polyethylene pipes and fittings for natural gas and suitable manufactured gas butt fusion tooling and ancillary equipment
- GIS/PL2-4 Polyethylene pipes and fittings for natural gas and suitable manufactured gas fusion fittings with integral heating element(s)
- GIS/PL2-6 Polyethylene pipes and fittings for natural gas and suitable manufactured gas spigot end fittings for electrofusion and/or but fusion purposes
- GIS/PL2-8 Polyethylene pipes and fittings for natural gas and suitable manufactured gas pipes for use at pressures up to 7 bar
- GIS/PL3 Self anchoring mechanical fittings for polyethylene pipe for natural gas and suitable manufactured gas
- GIS/V7-1 Technical specification for distribution valves Metal bodies line valves for use at pressures up to 16 bar and construction valves for use at pressures up to 7 bar
- GIS/V7-2 Technical specification for distribution valves Plastic bodied valves of sizes up to 63 mm suitable for operations at pressures not exceeding 5.5 bar
- GIS/V7-3 Specification for distribution valves. Part 3: Brass valves and associated fittings for pressures not exceeding 5 bar
- GIS/V4 Specification for Service isolation valves up to 50 mm diameter for use up to 7 bar maximum operating pressures.

A2.7 **SPAA**

- MAMCoP Meter Asset Manager's Code of Practice.

Note: The Supply Point Administration Agreement (SPAA) sets out the inter-operational arrangements between Gas Suppliers and Transporters in the UK retail market. It is a multi-party

agreement to which all Domestic Gas Suppliers and all Gas Transporters are required by their Licences to accede.

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A2.8 **RESEARCH REPORTS**

- ERS R3845 Riser and lateral finite element analysis
- ERS R4088 Design guidelines for internal steel riser laterals
- HSE RR630 Area classification for secondary releases from low pressure natural gas systems.

A2.9 **MISCELLANEOUS (abbreviated titles)**

- The investigation and control of gas explosions in buildings and heating plant (Harris, R.J., 1983)
- NFPA68- Standard on explosion protection by deflagration venting
- Flow of fluids through valves, fittings and pipe. Crane Co. Technical Paper No 410M.
- CIBSE Guide E – Fire Safety Engineering.

APPENDIX 3 : RISK ASSESSMENT

All Ss~~s~~tandards aim to ensure the safety of persons and buildings. However, certain types of property (related to public access and/or the local environment) are at a higher risk of interference with the gas supply; multioccupancy buildings concentrate large numbers of residents who can be affected; and, depending on the type of construction, an incident can cause significant damage beyond the source. Catastrophic failure of the gas supply to or within a multioccupancy building is defined as a more serious failure than would normally be expected during the life of the installation, from whatever cause, and is perceived to be a greater risk than for traditional housing. It is clearly the case that the gas supply in a multioccupancy building is a greater societal risk, and it is societal risk which is more of a driver for gas safety since the individual risk from the gas supply is at a level which would be considered acceptable.

This ~~s~~Standard provides additional requirements for multioccupancy buildings such as for components used in the installation and the siting of gas supplies. However, it is not possible to cover the whole range of situations to be addressed in a specific way. Therefore, it is important that the designer of the installation be able to demonstrate that the hazard arising from the installation and the risk of a gas release leading to a fire or explosion with unacceptable consequences are adequately controlled. This will require a risk assessment to be carried out, either for a generic design or for the individual installation. The requirement is set out in Section 7. This Appendix provides guidance for those specific issues related to multi-occupancy buildings to assist in meeting this requirement. Further general guidance can be found in IGEM/G/7.

A3.1 RISK ASSESSMENT PROCEDURE

A3.1.1 Hazard identification

The hazard to be addressed is a release of containment from the gas supply as a result of the failure of a pipe or fitting or joint leading to an uncontrolled gas release which, on ignition, results in a fire or, more seriously, of the release of gas into a confined space within a building space or compartment in a quantity capable of forming a flammable mixture which on ignition leads to an explosion resulting in damaging overpressures. The factors which contribute to this are the:

- likelihood of a release from pipework or component failure. This is a function of the diameter and wall thickness of the pipework, the integrity with respect to corrosion and fatigue, and the location with respect to the possibility of accidental damage or of interference
- credible failure modes from the failure causes, whether a minor leak or a break
- gas release rate on failure, which is a function of the failure size, the upstream supply system and the supply pressure
- ventilation in any enclosure where a release could occur. The ventilation flow acts to dilute and disperse any gas released
- degree of confinement (ability to vent an explosion overpressure) of any compound/enclosure where gas could be released or could accumulate. This is a function of the failure pressure of elements of the compound/enclosure, such as windows, doors or lightweight panels which could act as vents, their weight per unit area, and their area as a proportion of the dimensions of the compound/enclosure
- contribution to the integrity of the building of any compound/enclosure in which an explosion could occur and result in damage to structural elements.

Further guidance on confined spaces, particularly below ground spaces, is given in Section A3.2 below.

A3.1.2 **Hazard reduction**

Following the identification of the hazards and the means by which these may be realised it is important as a next step to consider ways of reducing or eliminating (designing out) hazards before considering means to assess or mitigate the likelihood of their occurrence (the risk). Means of hazard reduction would include:

- locating pipework out of doors
- keeping pipework out of strongly confined spaces, for example avoiding below ground entries
- minimising pipe lengths
- restricting the extent of the installation.

A3.1.3 **Risk evaluation**

A3.1.3.1 *Failure mode*

The possible failure modes of the system will be determined by the effect of the causes of failure which can be identified for the system, and the properties of the materials employed i.e. whether there is leak before break behaviour or where an immediate complete break (catastrophic failure) is possible.

A3.1.3.2 *Failure frequency*

Failure frequency data relevant to the installation ought to be used however it is recognised that these may be difficult to obtain. It may not be possible to go further than rank, in a qualitative but supportable way, the likelihood of failure of the different pipe lengths and components.

A3.1.3.3 *Failure consequences*

The consequences of releases into confined compound/enclosures: the build up of a flammable mixture; the propagation of a flame through the mixture; and the generation of an explosion overpressure, can be complex but are able to be estimated with reasonable confidence. Studies have been carried out over a number of years by DNV GL and its predecessors, HSE, and the Building Research Establishment; see for example: Appendix 2.9, "The investigation and control of gas explosions in buildings and heating plant".

A3.1.4 **Mitigation**

After the proposed design and location of the pipework installation has taken into account the risk of a gas release, mitigation measures can be taken at this stage to reduce the risk further, applied both to the likelihood of failure and the consequences. Measures which can be adopted include: increased pipe wall thickness, welded joints instead of screwed joints, excess flow valves, and increased ventilation.

A3.1.5 **Significance of risk**

At each stage of the above process it may be demonstrated that the design results in an unacceptable result and the design needs to be revisited. In addition the risk assessment process is iterative and for each mitigation measure considered the reduction in either the frequency or consequences is evaluated until the final design of the supply can be demonstrated to comply with the "So Far As Is Reasonably Practicable" requirement of UK Health and Safety legislation, usually referred to as "As Low as Reasonably Practicable" or ALARP. For further guidance see A2.2 R2P2.

A3.2 SPECIFIC AREAS REQUIRING CONSIDERATION

A3.2.1 Confined spaces

A3.2.1.1 *Introduction*

The sections in the Standard on service entries and service risers intentionally favour the installation of external risers as being the more inherently safe option. Where risers are to be internal it is recommended that the service entry be above ground. The option remains however for service entries to be below ground or through below ground spaces such as car parks or basements. This section gives additional guidance on confined spaces in general; this is most relevant to below ground spaces because of their location with respect to the main structural elements of the building. For below ground entries a specific risk assessment will be required for such installations.

The position of the service entry may in turn determine the location of the meter installation.

A3.2.1.2 *Hazard*

The most significant hazard is, as described in Appendix 3.1.1 above, that of a gas release into a confined space leading to the formation of a flammable mixture which on ignition could lead to an explosion. The specific features which can increase the hazard are related to the following:

- **the failure causes**
  The access to, and security of, the installation influence the possibility of the occurrence of accidental or deliberate damage.

  The environment in below ground spaces may influence the likelihood of corrosion.

- **the gas release rate**
  The below ground level installation will include the inlet supply hence will include the largest pipe sizes and highest pressures involved.

- **the formation of a flammable mixture**
  The formation of a flammable mixture is a function of the gas release rate, the volume of the compound/enclosure, and the ventilation air rate. Ventilation of below ground spaces is very variable, that of basements and service spaces may be limited whereas a car park, depending on its design, may be very well ventilated. Note that ventilation provided for below ground spaces may not be guaranteed if there are problems of vandalism or rubbish.

- **the pressure generated**
  The pressure generated in an explosion is related to the ability to vent any pressure rise. Many below ground spaces will not incorporate elements which can fail at a low pressure and therefore vent any pressure rise to outside the structure. The pressure rise is therefore likely to be higher than for above ground sections of the building, hence potentially leading to damage to structurally stronger elements, and with venting being more likely to be upwards into the above ground section of the building. As with ventilation the effects will be most serious for confined basements and service spaces and least with more open areas such as car parks.

- **the resultant damage**
  The response of the structure to the overpressure generated depends on the design of the structure and the contribution to the structural strength of those parts likely to fail. The elements which will experience most damage are likely to be those having the largest areas such as walls and ceilings. The effect on the structure will, therefore, depend on whether these elements

provide the integrity of the structure or whether this is provided by, for example, a steel or reinforced concrete frame.

As confinement increases, the increased pressure generated will result in a greater degree of damage to the structure and to damage to more structurally significant elements. Failure of higher strength components of the structure may then lead to further structural failure.

A3.2.1.3 *Mitigating measures*

The risk to persons and property from the hazard of an explosion in a confined space can be mitigated by a number of measures, the most obvious being to remove or reduce the hazard by excluding gas supplies from such spaces, particularly those below ground.

- **likelihood of failure**
  Consideration needs to be given to the mechanical integrity of pipes and fittings, for example by increasing the wall thickness of pipes and using all welded construction. Potential sources of release such as the meter installation will require special consideration (see A3.3.2 below).

  In addition to the mechanical strength and the integrity of the installation, the influence of human factors, problems arising from maintenance or interference also have to be considered.

- **consequences of failure**
  - *Release rate*: The release rate on failure is a function of the upstream supply and can be restricted by the fitting of an appropriately sited calibrated EFV in the gas supply to an individual dwelling (see Sub-Section A3.5 below).
  - *Formation of flammable mixture*: The most important means of addressing this is with ventilation, normally wind driven natural ventilation. A below ground car park, with openings on all sides, may have sufficient ventilation to prevent the formation of a flammable mixture from a complete break in the supply, however other spaces may have limited ventilation which may become blocked over time.

    Options for preventing or mitigating the formation of a flammable mixture through a below ground space include isolating (or separating) the pipework installation and providing a dedicated direct access for ventilation to the outside, for example a duct. Other means such as mechanical ventilation, or gas detection and isolation, could be used, however these are not normally practical options in domestic situations.

  - *Ignition*: Ignition sources can be minimised but cannot normally be controlled in domestic buildings.

  - *Generation of overpressure*: The behaviour of a gas-air mixture on ignition is complex. It is a function of the mixture concentration, the volume of the compound/enclosure, the generation of turbulence, and the presence and location of weaker elements of the structure which will fail and initiate venting of the overpressure.

    For above ground rooms and communal spaces, weaker elements such as doors and windows can act as vents and fail, thus reducing the overpressure generated. However, where a flammable mixture can form in more than one room or in a room not directly ventilated to outside, the effects of such vents is reduced.

    For below ground spaces the presence of weaker elements such as doors, windows or lightweight panels is less likely and any access doors or ventilators are unlikely to be of adequate size to have any significant effect. Venting may be present (the case of car park spaces has already

been referred to) or it may be possible to ensure the presence of vents such as ventilation openings. Separation or isolation of the installation, such as with a duct as previously noted for mixture build up, will also mitigate this by preventing the mixture being present. The access to the outside from this has to however be such as to be able to vent any overpressure in this (probably much smaller) isolated volume to the outside without venting into the below ground space.

In summary gas supplies in below ground spaces need to be avoided where there is a practicable alternative. Where installations are to be sited below ground it can be seen that "openness" in terms of ventilation and venting is a key element in mitigation of the risk. A suggested alternative is the isolation (or separation) of the installation from the below ground space.

It is likely that gas supplies in well ventilated car park spaces will be acceptable, having due regard to the hazards inherent in such situations, whereas supplies will be unacceptable in strongly confined spaces where there is no provision to protect the integrity of the structure from the overpressure generated in an explosion.

A3.3 CHECKLIST OF FACTORS TO BE CONSIDERED AND DESIGN OPTIONS

A3.3.1 Network Pipelines

A3.3.1.1 *Factors*

- access for maintenance/inspection of condition
- the required location of meters i.e. external or internal
- risk of vandalism
- whether buildings in which pipe is installed are occupied
- degree of simplicity of ventilation
- the location of means of escape
- whether areas into which a pipeline enters are "confined"
  - length of buried pipe
  - pipe material and jointing method
  - potential for corrosion.

A3.3.1.2 *Options*

- external rather than internal risers
- internal risers near the outside rather than deep within buildings/building complexes (so decreasing the length of buried pipe and generally improving ease of access)
- simple ventilation methods rather than ducted air, and using ventilation directly, rather than indirectly, to outside air.

A3.3.2 Meter Installation

A3.3.2.1 *Factors*

- accessibility of the meter/housing, for example is it accessible to all building occupants or just one dwelling's occupants?
- any history of unauthorised interference in that geographical area
- any obvious concentration of criminal activity (including theft, vandalism and incompetent/unauthorised working) in that neighbourhood
- are the occupants of the building generally at higher risk in the event of an incident, for example are they generally older or infirm?
- does the location give concerns for the impairment of the means of escape in the event of an incident resulting in fire, explosion or structural damage?

- risk of flooding e.g. meter regulators, basement meter rooms.

A3.3.2.2 *Options*

- relocation to outside the building
- relocation to a more appropriate place within the building
- additional security, making access more difficult
- fitting of TCOs
- inclusion of calibrated EFVs
- locate meter installation above anticipated flood level.

A3.3.3 **Installation Pipework**

A3.3.3.1 *Factors*

- access for maintenance/inspection
- risk of vandalism
- access to the ECV(s) and additional emergency control valves (AECVs)
- the location of means of escape
- length of pipework to which access is difficult
- the number of AECVs
- pipe material and jointing method
- degree of simplicity of ventilation
- potential for corrosion
- potential load.

A3.3.3.2 *Options*

- using external rather than internal installation pipework risers
- additional security, making access more difficult
- using steel rather than copper/Pliable Corrugated Stainless Steel Tube pipework
- simplifying ventilation methods.

A3.3.4 **Appliances**

A3.3.4.1 *Factors*

- type and age of chimneys, including shared chimneys and flues
- type and age of appliances
- safety devices fitted in rooms, on appliances and for chimneys
- vulnerability of the occupants, for example in relation to age, physical capability, etc.

A3.4 **EXCESS FLOW VALVES**

A3.4.1 **Introduction**

Sub-Section 7.2 requires that specific consideration be given in the risk assessment to the meter installation and the risk of a gas release into an individual dwelling. One particular need is that of determining the requirement for the fitting of an EFV. Since these devices have not historically been fitted but are now becoming increasingly available and specified further guidance on their properties and application, with respect to the risk from the gas supply, is given here.

A3.3.2.~~3~~2 includes the installation of calibrated EFVs as one of the options where the risk assessment shows that there is a "significantly higher risk of theft or

Commented [ro150]: Comment 677 Agreed

vandalism" (compared to a typical average installation). Other options are quoted, however for a meter installation which has been sited inside a multioccupancy building or within an individual dwelling in a multioccupancy building the fitting of an EFV is likely to be one of the options requiring consideration. See Appendix 3.5 for a description of the operation and properties of EFVs in the context of this application.

A3.4.2 **Hazard**

The specific hazard addressed in this section is that of a failure of the gas supply at or downstream of the meter installation within a dwelling leading to a gas release into the dwelling. The cause of failure is most likely to be from interference, whether accidental or deliberate and including theft, vandalism, poor installation practice, but could also result from a fire not initially involving the gas supply.

A3.4.3 **Risk Assessment**

The most effective means of controlling risk is to remove either the cause(s) of failure and/or the consequences whereas EFVs simply mitigate the consequences. Where the possibility of failure of the gas supply is prevented or made non-credible by other protective means, or the meter is sited in a location where the consequences of a gas release are limited, as set out in clause ~~7~~8.2.2 the fitting of an EFV would not be necessary. Normally it is not possible to prevent failure, or to limit the consequences, for an internal meter location.

Commented [ro151]: See comment 678 Agreed

The purpose of this Section is to give guidance on the relative risk of different installations with reference to the need to install EFVs.

- **failure frequency**
  No data on the number of incidents of gas release, fire or explosion in blocks of flats have been available in the preparation of this Section. Data may be available within the industry or from emergency call out records which could assist with a quantitative risk assessment of EFVs.

  While the overall risk of explosion is low, incidents have occurred and the general factors which contribute to the risk are known. In the first instance the assessment will probably have to be qualitative and based on the relative contribution of factors to the likelihood and the consequences of an incident. If gas release or incident data become available a more quantitative assessment would be possible.

  Commented [ro152]: Comment 679 Agreed

  Assuming an initially correctly installed gas supply system, failure would be predicted to result from deliberate or accidental damage. Failure is therefore more likely:
  - where there is ready or public access to the meter installation
  - where vandalism of the installation is credible
  - where installation pipework and/or appliances can be removed as a result of theft
  - where appliances and, possibly, pipework may be removed by occupants e.g. on moving premises
  - where DIY on the gas installation is likely.

- **consequences of release**
  The consequences of concern are those of a gas aided fire, or of an explosion, which can cause structural damage leading either directly to personal injury or indirectly due to the blocking of escape routes. The consequences of releases have been discussed in the preceding sections of this Appendix; they will be greater, on ignition, if a gas release is into a relatively strongly confined space, a poorly vented space, or a space with no direct access (vent) to outside i.e. an "enclosed" room.

From a consideration of the likelihood and consequences of failure, as discussed above, it is possible to identify examples of installations which can be considered as being of "lower risk" and of "higher risk".

A3.4.4 General guidance

- **Locations at "lower risk"**
  - Where a release from a meter installation cannot enter a confined "inhabited" space e.g. from an external meter box or a remote meter room i.e. the structure of the flats is not at risk from a gas escape.
  - Low rise properties of similar construction to normal housing where the hazard and risk would be the same as for normal housing.
  - Installations with external risers with the gas installation confined to rooms with an outside wall and window(s). The installation inside the property is limited and is in a location where the effects of an incident would be limited.

- **Locations at "greater risk"**
  - Where a meter installation is accessible and a release can enter a confined inhabited space, e.g. internal meter, meter in common entrance area.
  - Installations with internal risers with the gas installation on the "inside" of the property, e.g. internal kitchens. A release could be into a confined space with limited natural ventilation and venting only into another room.
  - Properties where an explosion can affect several dwellings, or the escape route(s). This will depend on the method of construction of the property.

- **Additional factors**
  Regardless of the above, EFVs would likely be specified in blocks of greater than around 5 storeys (18 m - taken to be the limit of rescue from outside the building), where the need to protect escape routes is greater; and in blocks where the occupants are more likely to result in damage/interference with the installation e.g. transient populations, students, problem tenants.

A3.5 PROPERTIES OF AN EFV

A3.5.1 Introduction

An excess flow valve provides a safeguard against downstream escaping gase exceeding a pre-determined rate, typically a sensible margin above either the maximum demand or the rating of the installed meter; e.g. for a typical 6 $m^3 h^{-1}$ domestic meter, the use of an EFV that trips in the range 7.8 to 8.7 $m^3 h^{-1}$ would be expected (a lower value could be selected where the demand is and will remain) significantly less than the meter capacity). This will protect the supply against catastrophic failure from causes such as:

- meter theft
- accidental damage
- vandalism
- the effects of fire.

Protection may also be provided against theft or damage to appliances and appliance connections. This is however dependent on the flow rate at the point of release which is a function of the installation. An open ended installation pipe would in many cases result in a release rate which exceeds the trip setting however it is self-evident that leaks with a flow rate of less than the calibrated trip setting of the EFV will not be protected against.

Commented [ro153]: See comment 680 Agreed

While EFVs have a positive role, there are factors which may militate against their universal installation:

- the low risk of gas release and explosion would not suggest the need for universal additional safeguards
- there is a cost involved in their installation. This is not a large sum per installation but may represent a significant "industry" investment
- their installation increases the pressure drop across the meter installation; this could be a problem where the available pressure drop is limited
- there is a potential ongoing maintenance requirement.

For the purposes of this application of EFVs, it is assumed that they are of the weep reset type, installed upstream of the meter and as part of the ECV.

Commented [ro154]: See comment 681 Agreed in principle.

A3.5.2 **Effectiveness**

A Failure Mode and Effect Analysis, on the general application of EFVs, has been carried out by the Health and Safety Laboratory (HSL) and reviewed specifically in the context of this application and for the type of EFV assumed. This has shown that:

- if a valve fails to operate on demand the situation is no worse than with no valve installed
- if a valve operates prematurely or due to surge the result is a nuisance isolation of the supply which will self-reset if the downstream supply is isolated.

The review concluded that there are no identified failure modes which, for practical purposes, increase the risk from the installation.

There is a possible increase in the risk of unauthorised interference and of maloperation e.g. reset of a nuisance (rather than real) trip by using the ECV. This is an unlikely event and is unlikely to result in a serious hazard. It is covered by the requirement for flame failure devices on burners of unflued appliances.

There may be a problem with the pressure drop across the installation. This would not normally result in a hazard since appliances are required by standards to operate safely or to shut down on reducing supply pressure. All appliances, with the exception of cookers and some types of space heaters, are assumed to be connected to a chimney.

A3.5.3 **Reliability**

The type of EFV being considered is a simple device. The reliability of EFVs is not known with sufficient confidence to predict the behaviour of a large population of valves in service for tens of years; however growing populations exist in other countries from which reliability data is beginning to emerge. Data on reliability currently available does not indicate any problems for a correctly specified and installed valve.

A3.5.4 **Summary**

On the basis of the above, and for the purposes of this appendix, it can be assumed that:

- the installation of an EFV does not increase risk, it reduces risk, or on failure has no effect on risk
- EFVs can be assumed to be reliable.

A3.6 THERMAL CUT OFF VALVES

A3.6.1 Introduction

Sub-Section 7.2 also notes the need to consider the fitting of a TCO if the risk assessment requires it. A TCO has been a specific requirement for installations where a fire involving the gas supply can impair the availability of a means of escape such as a timber stairway. For a multi dwelling building this should not present the same problem within a dwelling however the risk of escalation beyond the dwelling may indicate the need for a TCO. A TCO may also be required to be fitted to a meter bank installation where the risk of damage or interference is identified as an issue.

A3.3.2.2 above identifies a TCO as a mitigation of the risk at a meter installation. Where an EFV and a TCO are both indicated a combined valve can be installed which would reduce the combined pressure drop from separate valves.

A3.6.2 Hazard

The purpose of a TCO is to isolate the gas supply in the event of an external fire. This could in theory result from an ignited gas escape downstream however the most likely cause is a non gas related "domestic" fire which engulfs or impinges on the gas supply. Failure of a component of the gas supply could result in an external release of gas which will be ignited and hence escalate the fire. In order for this to happen it would be assumed that the fire is well developed.

The normal procedure in the event of a fire in a multi dwelling building has been to evacuate the individual dwelling involved, raise the alarm and isolate the supplies, probably at the entry to the building. The installation of a TCO would result in the local isolation of the gas supply, which could be before or after the building isolation has taken place.

A3.6.3 Risk Assessment

Unlike EFVs the risk is not generally due to an event on the gas supply system but an external event. Its purpose is to isolate the gas supply from the event and prevent an escalation due to the involvement of the gas supply.

A3.6.3.1 *Failure frequency*

Data on the reliability of operation on demand, or failure to operate, are not available to help with this Section, data or individual descriptions of incidents may be available from emergency call out reports. The assessment must necessarily be largely qualitative.

Assuming a demand on the system i.e. an external fire, the likelihood of operation of the valve depends on its location with respect to the location and development of the fire and components which are more likely to fail in the event of fire and lead to a release of gas; this is more likely in the meter area. Where, in a dwelling, a fire involves a downstream component such as on an appliance a failure could occur before the TCO is involved. In this case an EFV, if fitted and is assumed to be close to the TCO, may operate to isolate the supply.

Assuming an initially correctly installed gas supply system the addition of a TCO would be indicated in a dwelling where:

- The gas supply contains components which could fail in the event of a fire, for example if the meter is located in the dwelling
- The fire hazard is deemed higher than normal

- A fire in the dwelling has the potential to affect other dwellings or escape routes
- A TCO is capable of being activated; if the meter installation and associated components are in a fire rated enclosure which is deemed to be secure the TCO may not operate in the time scale of other measures to be taken.
- There is a commercial advantage in limiting the potential damage from a fire.

A3.6.3.2 *Consequences of release*

The consequences related to the requirement for a TCO are from a gas release supporting, and hence accelerating, a pre-existing fire. This could result in reducing the time available for decisions about evacuation and increasing the difficulty in fighting the fire. The consequences may also be mitigated by the isolation of the gas supply in the building or from the operation of an EFV.

Examples of "lower risk" and "higher risk" locations with respect to installing a TCO are general as for EFVs in A3.4.4 above. Additional factors would be whether the location, e.g. in a secure meter room is susceptible to the occurrence of a fire, and whether the TCO is remote or separated from the space or dwelling being considered.

A3.6.4 **Properties of a TCO**

A TCO isolates the gas supply when its temperature reaches a pre-set value, typically around 95°C. It comprises a valve which is prevented from closing under the action of a spring by a fusible element which melts under the action of heat and releases the spring. The valve then remains closed and cannot be reset, this will not be an issue if the installation overall has suffered fire damage. If it has closed for any other reason the valve will need to be replaced.

APPENDIX 4 : REGULATION 6 OF DSEAR

The following is an extract from DSEAR and is reproduced for ease of reference.

Note: For further information see HSL138.

(1) Every employer shall ensure that risk is either eliminated or reduced so far as is reasonably practicable.

(2) In complying with his duty under paragraph (1), substitution shall preferably be undertaken, whereby the employer shall avoid, so far as is reasonably practicable, the presence or use of a dangerous substance at the workplace by replacing it with a substance or process which either eliminates or reduces the risk.

(3) Where it is not reasonably practicable to eliminate risk pursuant to paragraphs (1) and (2), the employer shall, so far as is reasonably practicable, apply measures, consistent with the risk assessment and appropriate to the nature of the activity or operation –
(a) to control risks, including the measures specified in paragraph (4); and
(b) to mitigate the detrimental effects of a fire or explosion or the other harmful physical effects arising from dangerous substances, including the measures specified in paragraph (5).

(4) The following measures are, in order of priority, those specified for the purposes of paragraph (3)(a) –
(a) the reduction of the quantity of dangerous substances to a minimum;
(b) the avoidance or minimising of the release of a dangerous substance;
(c) the control of the release of a dangerous substance at source;
(d) the prevention of the formation of an explosive atmosphere, including the application of appropriate ventilation;
(e) ensuring that any release of a dangerous substance which may give rise to risk is suitably collected, safely contained, removed to a safe place, or otherwise rendered safe, as appropriate;
(f) the avoidance of –
(i) ignition sources including electrostatic discharges; and
(ii) adverse conditions which could cause dangerous substances to give rise to harmful physical effects; and
(g) the segregation of incompatible dangerous substances.

(5) The following measures are those specified for the purposes of paragraph (3)(b) –
(a) The reduction to a minimum of the number of employees exposed;
(b) The avoidance of the propogation of fires or explosions;
(c) The provision of explosion relief arrangements;
(d) The provision of explosion suppression equipment;
(e) The provision of plant which is constructed so as to withstand the pressure likely to be produced by an explosion; and
(f) The provision of suitable personal protective equipment.

(6) The employer shall arrange for the safe handling, storage and transport of dangerous substances and waste containing dangerous substances.

(7) The employer shall ensure that any conditions necessary pursuant to these Regulations for ensuring the elimination or reduction of risk are maintained.

(8) The employer shall, so far as is reasonably practicable, take the general safety measures specified in Schedule 1, subject to those measures being consistent with the risk assessment and appropriate to the nature of the activity or operation.

APPENDIX 5 : GUIDANCE ON ELECTRICAL SAFETY

This section is intended to provide the gas engineer with an insight into the requirements for electrical safety of a gas installation; in particular, the requirements of BS 7671:2018 Requirements for Electrical Installations. IET Wiring Regulations, with respect to protective equipotential bonding of network and installation pipework. Authority for the design of the building's electrical system rests with a qualified electrical engineer or other Competent Person working in accordance with BS 7671:2018.

Should any of the instructions in this section conflict with BS7671:2018, then BS7671:2018 will always take precedence.

A5.1 **GENERAL**

In order to provide protection against electric shock, BS7671 requires the creation of equipotential zones within buildings. Extraneous-conductive-parts, i.e. those which could conduct electricity from outside the zone, need to be bonded to earth. Equipotential bonding shall be provided according to the following clauses.

A5.2 **PROTECTIVE EQUIPOTENTIAL BONDING**

In all cases, the protective bonding conductor connection is to be made as near as practicable to the point of entry into the building or dwelling. The connection is to be made to hard metal pipework free from paint or other covering and not to any soft or flexible metal connections and before any branch pipework. Where practicable, the connection is to be made within 600mm of the meter outlet union or the point of entry into the building or dwelling if the meter is elsewhere. See clause 544.1.2 of BS7671:2018.

The protective bonding conductor connection shall be in an accessible and visible position and shall be permanently fitted with a durable label to BS 951 with the words: "Safety Electrical Connection – Do Not Remove".

The size of the bonding conductors shall be in accordance with BS7671.

A5.2.1 Where the incoming pipe is fitted with an insulating fitting or is otherwise electrically insulated according to clause 14.2 above, equipotential bonding is not required.

A5.2.2 When required, the protective bonding conductor shall be fitted so as to connect the incoming gas piping to the building's main earthing terminal.

A5.2.3 There are two locations for protective bonding conductor connections to gas pipes:

(a) Where the meter or meters are located adjacent the point of entry into the building or dwelling, the protective bonding conductor connections shall made on the outlet side of each meter.
(b) Where the meters are elsewhere, the connection shall be made on the network pipeline or installation pipework at its point of entry into the building or dwelling.

A5.2.4 Unless a local insulating section is fitted at the entry into each dwelling, the pipe entering the dwelling becomes an extraneous conductive part and is to be bonded to the dwelling's earthing terminal.

A5.2.5 Meter Banks: Where a meter bank and the point of entry are adjacent, the equipotential bonding is to be fitted to the outlet of each meter according to

clause 5.2.3 (a) above, unless the incoming pipe is fitted with an insulating connection as clause 5.2.1 above. See Fig.39.

A5.2.6 Where a network pipe enters the building within a dwelling, unless the incoming pipe is fitted with an insulating connection as clause A5.2.1 above, the pipeline is to be bonded to the building's main earthing terminal as clause A5.2.3 (b). In addition, the installation pipes within the flat are to, if appropriate under clause A5.2.4, be bonded to the dwelling's own earthing terminal according to clauses A5.2.3 (a) or (b).

A5.2.7 With both internal and external metal risers, protective bonding conductor shall be fitted in accordance with clause A5.2.4 above at the pipe's entry into each dwelling. The bonding connection shall comply with A5.2.3 (a) or (b) as appropriate. For external PE risers, no such bonding is required.

A5.2.8 For external meter boxes, the protective bonding conductor connection should be inside the building and as near as practicable to the pipe's entry into the building. Alternatively, the connection should be made within the box/housing. It is essential that neither the bonding conductor can become damaged nor the integrity of the box/housing and the sealing of any sleeve become compromised.

A5.2.9 Where the meters are installed in a separate building, equipotential bonding will depend on the arrangement of the pipes connecting the separate building to the main building.

- The incoming network pipe shall be fitted with an insulating joint installed according to clause 14.2 or shall be fitted with a main equipotential bond as clause A5.1.
- Where the connecting pipes are metal and in contact with the ground, then insulating joints installed according to clause 14.2 shall be installed at each end as they emerge from the ground. Equipotential bonding is not required.
- Where the connecting pipes are metal but not in contact with the ground, they remain extraneous conductive parts and shall be fitted with insulating joints complying with clause 14.2 or bonded as they enter each building (see note below).
- Where the connecting pipes are PE and no conductive parts are below ground, then no equipotential bonding is required in either building.

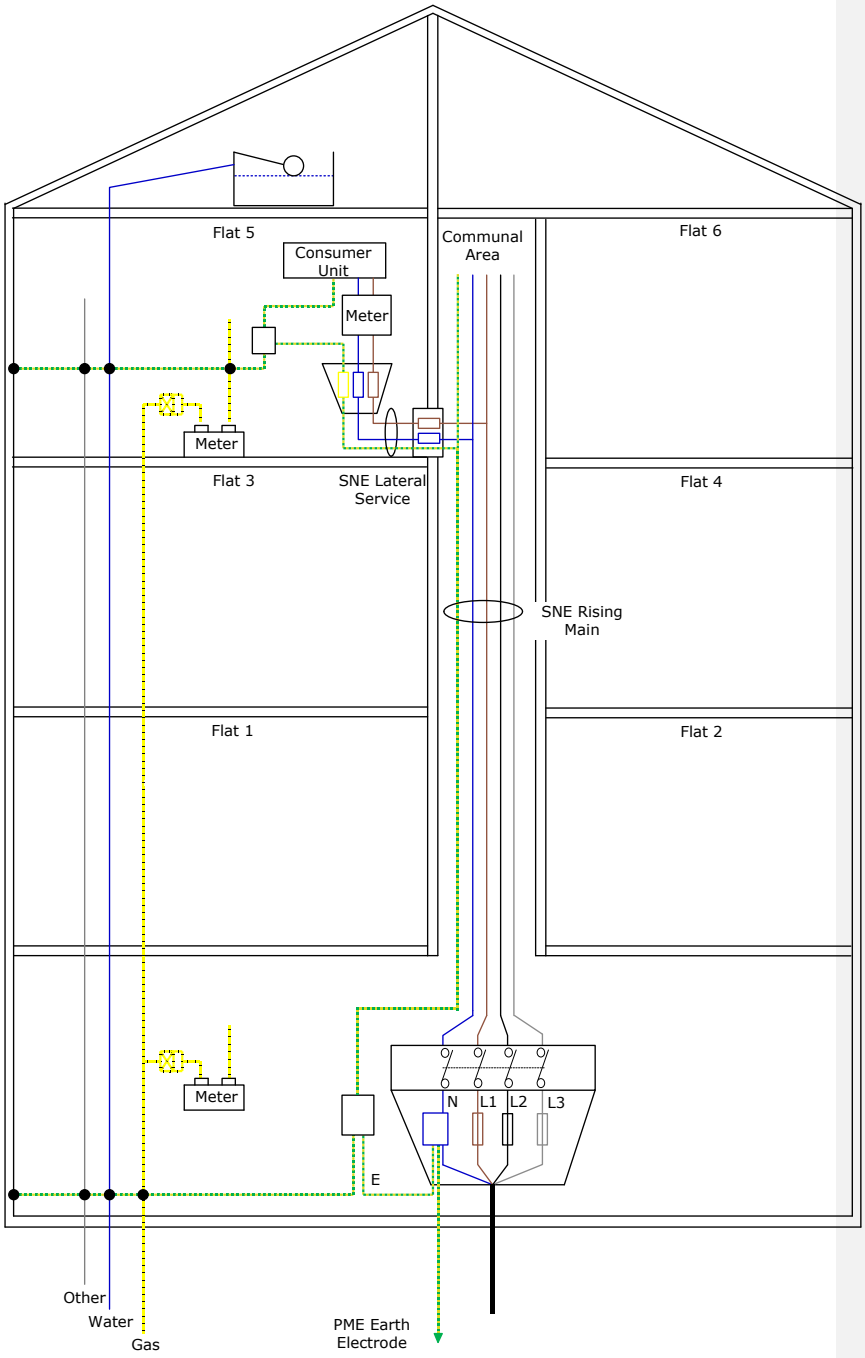
Note: If the separate building's electrical supply is connected to the main building using the TT system, the two buildings' earthing systems are not to be connected by any bonding conductor or electrically conductive pipework. All exposed conductive interconnecting pipework is to be fitted with at least one insulating joint complying with clause 14.2. It cannot be possible to touch exposed conductive parts of the two bonding systems simultaneously – see BS7671:2008 chapter 41.

Any bonding conductor in the separate building is not to be connected to that building's own earthing terminal and thence to a separate earth electrode. See BS7671:2018, chapter 54.

A5.2.10 All electrical work shall comply with BS7671 and must be carried out in accordance with the law, all H & S Regulations and best practice. Among these requirements, the employer must ensure that:

- staff are competent to carry out the work they are given,
- safe working practices are adopted, and
- all electrical equipment and wiring, including the installation, are maintained in a safe condition.

The safety of persons using and maintaining the gas installation must always be considered.



Note: This figure has been reproduced with the permission of the Energy Networks Association.

FIGURE 33 - BONDING ARRANGEMENTS FOR UTILITIES IN FLATS

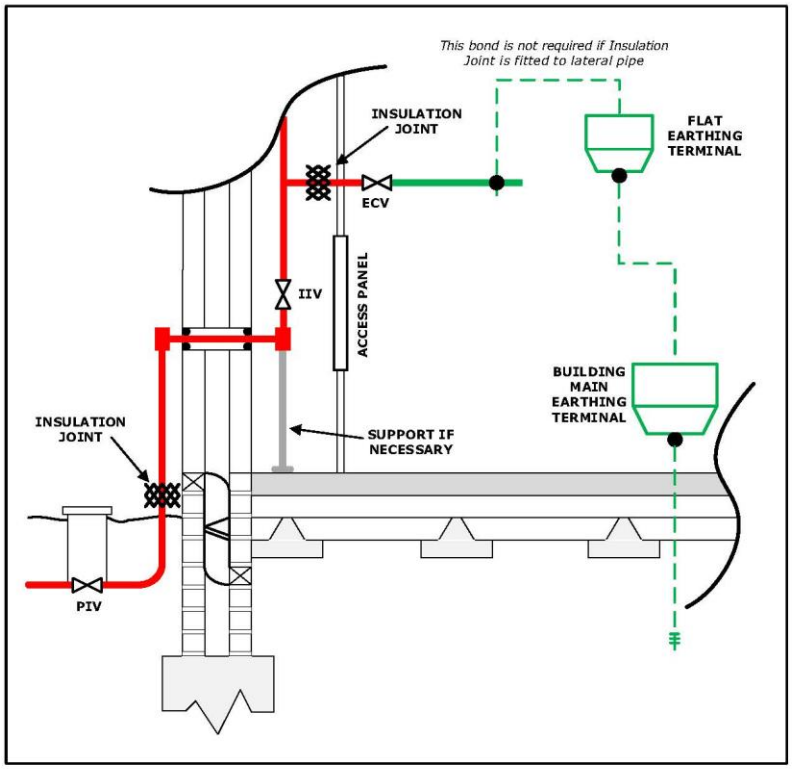


FIGURE 34- ELECTRICAL BONDING FOR ABOVE-GROUND PIPELINE BUILDING ENTRY (STEEL PIPE)

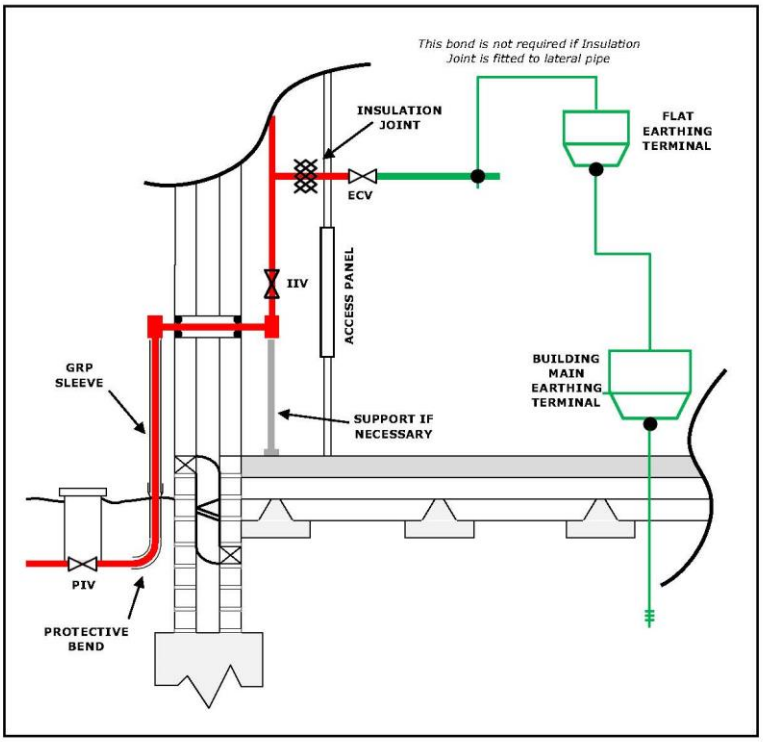
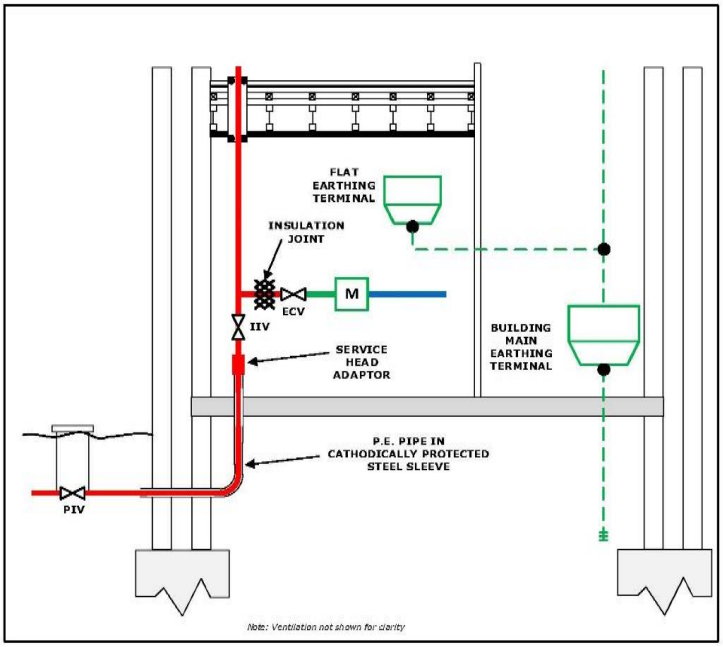
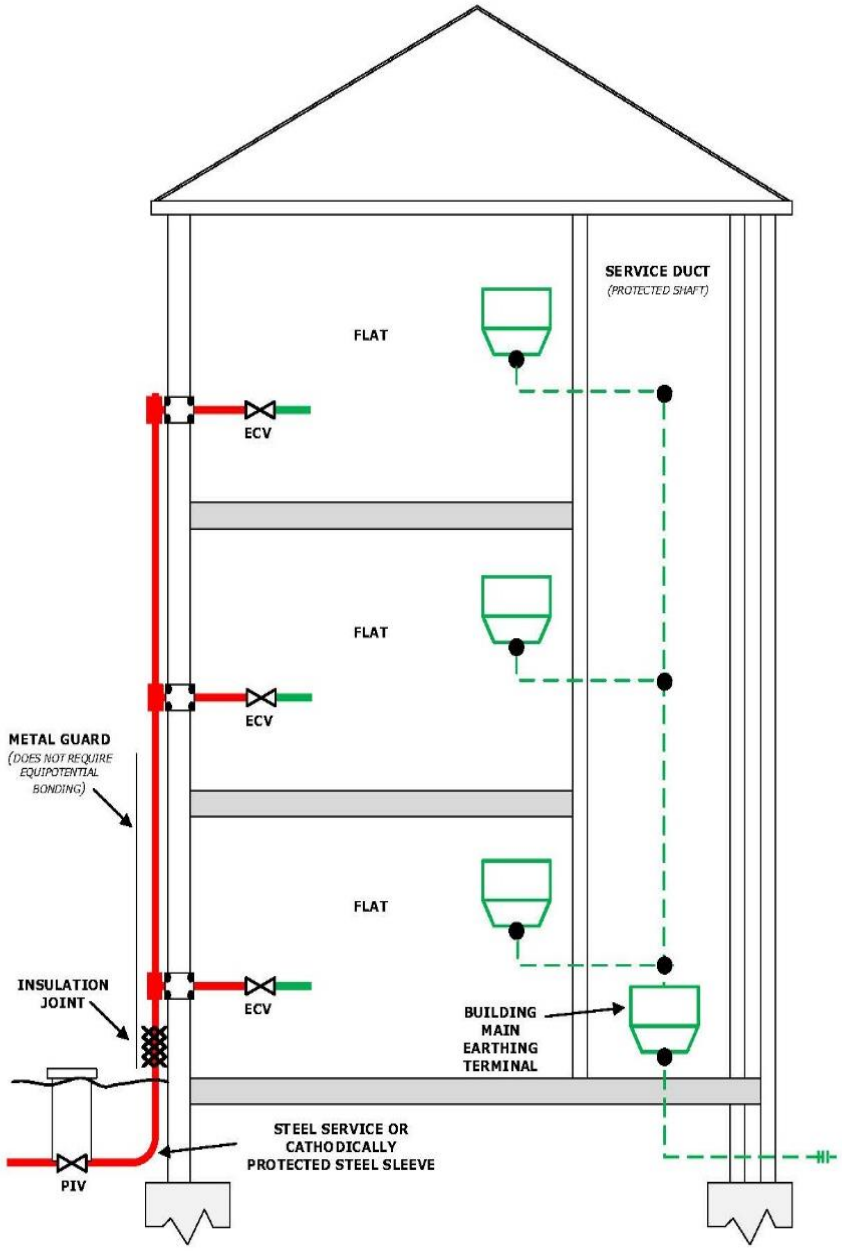


FIGURE 35 - ELECTRICAL BONDING FOR ABOVE-GROUND PIPELINE BUILDING ENTRY (PE PIPE UP TO BUILDING ENTRY)



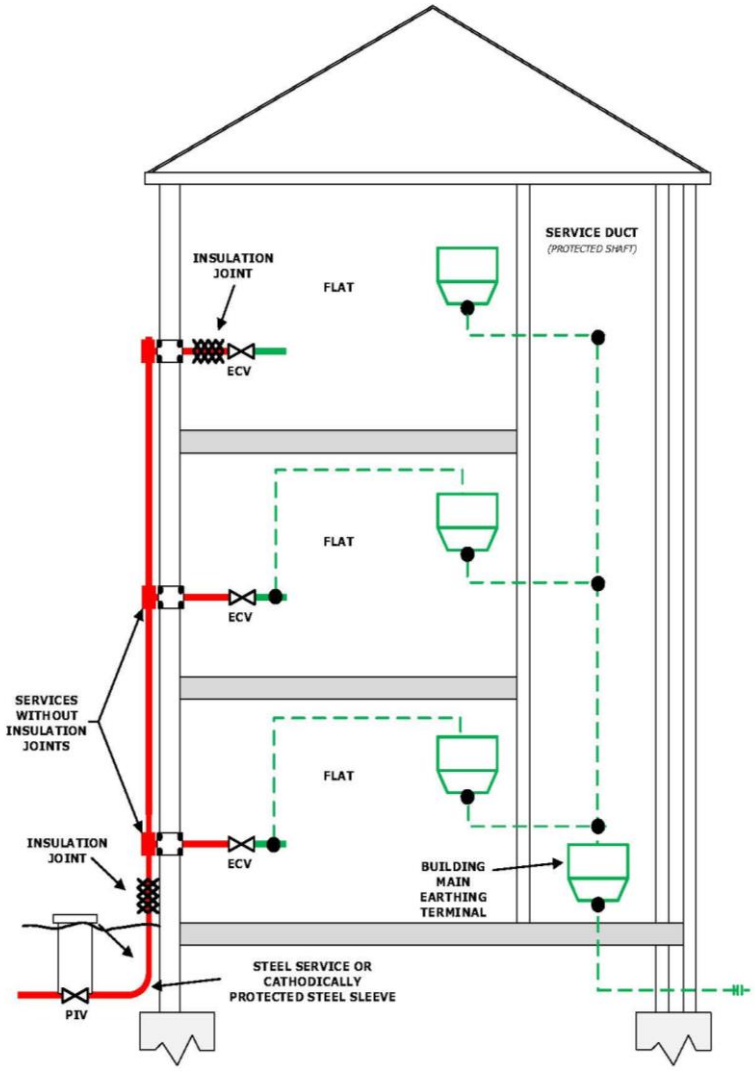
Note: Ventilation is not shown, for clarity.

FIGURE 36 - ELECTRICAL BONDING OF A BELOW-GROUND ENTRY SYSTEM AND INTERNAL RISER



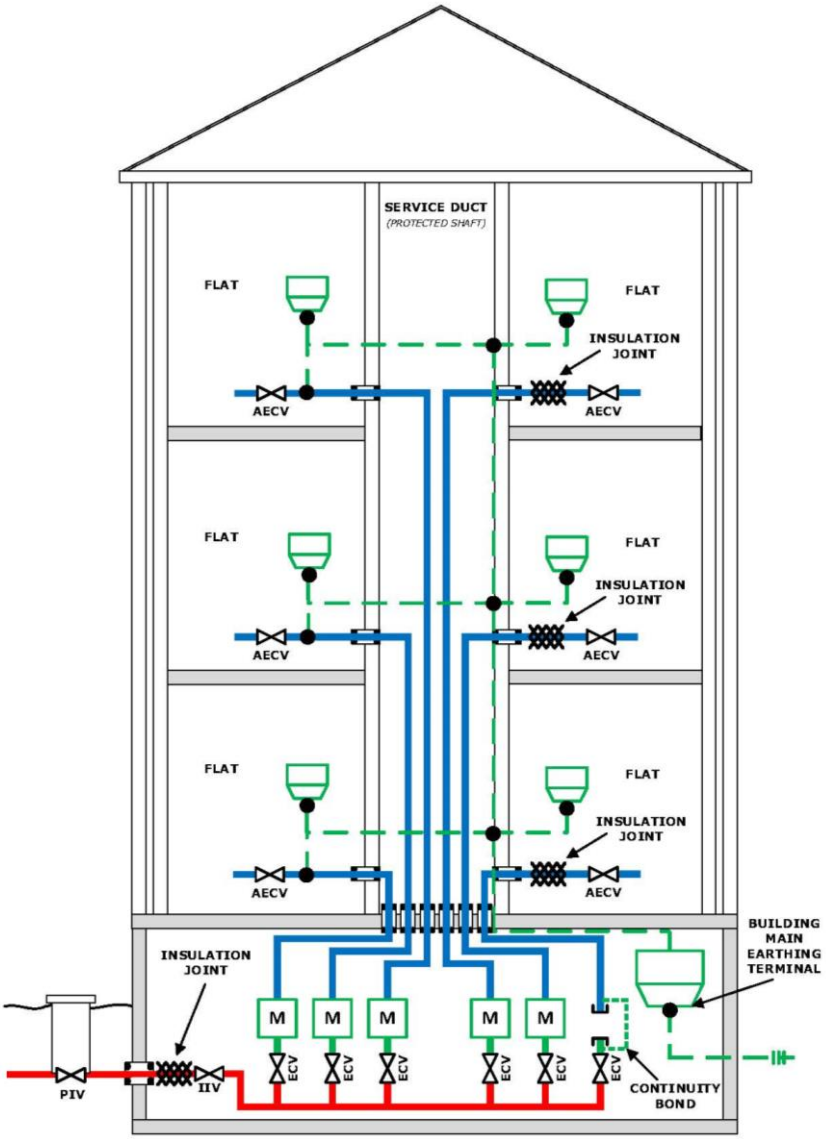
Note: Ventilation is not shown, for clarity.

FIGURE 37 - EQUIPOTENTIAL BONDING. EXTERNAL PE NETWORK RISER WITH GUARD AND CATHODICALLY PROTECTED BELOW-GROUND PIPE OR PROTECTION SLEEVE



Note: Ventilation is not shown, for clarity.

FIGURE 38 - EQUIPOTENTIAL BONDING. EXTERNAL STEEL NETWORK RISER WITH CATHODICALLY PROTECTED BELOW-GROUND PIPE OR PROTECTION SLEEVE



Note 1: Ventilation, TCOs & EFVs are not shown, for clarity.

Note 2: Main protective bonding requires a competent electrical engineer to provide specific advice on the most appropriate solution. The completed works need to meet the requirement of the latest edition of BS 7671.

FIGURE 39 - MAIN PROTECTIVE BONDING CONDUCTOR. REMOTE METER INSTALLATION. INTERNAL METALLIC INSTALLATION PIPEWORK - METERS IN SAME BUILDING

APPENDIX 6 : TIMBER FRAMED BUILDINGS

GAP LOCATION	OPENING AND CLOSING GAPS (mm)	
	Floor joists	
	Solid timber (mm)	Engineered I-joist (mm)
Eaves/verge	Add 5 mm to gap dimension at level below	
Sixth storey	Specialist calculations to be submitted	61
Fifth storey		53
Fourth storey		45
Third storey	45	35
Second storey	35	25
First storey	20	15
Ground storey*	5	5

**Ground storey or lowest level of timber frame.*

TABLE 13 - DIFFERENTIAL MOVEMENT OF TIMBER FRAMED BUILDINGS

The gap sizes are based on the following:

- timber joist and rim beam/header joist maximum depth 240 mm
- timber frame floor cross section is as shown below with maximum 45 mm deep timber plates/binders
- single head binder at the eaves. Maximum double sole plates
- calculations, where required, to be based on BS EN 1995-1-1
- timber components are not saturated and normal moisture contents at the time of construction (e.g. less than 20%) and tight jointed construction
- movement gaps in excess of 35 mm should be protected by cover strips
- the table allows for a 2 mm thickness of compressible material in closing gaps. Check the manufacturer's product details
- outer leaf brickwork with expansion rates no greater than 2.5 mm per storey
- brickwork up to 5 storeys with lightweight cladding above 5 storeys
- lightweight cladding - floor level joints to be 15 mm for solid timber and 10 mm for engineered I-joists
- the ground floor is concrete. For ground floors of timber joists add 15 mm for solid timber and 10 mm for engineered I-joists.

Note: Further guidance on installations in timber framed buildings is given in IGE/UP/7.

APPENDIX 7 – HIGH TEMPERATURE RESISTANCE OF VALVES AND END CONNECTIONS

This appendix reviews the standards associated with the ability of a valve and an end connection i.e. flange joint gasket, to resist high temperatures. It is provided as background information for Gas Engineers who may not have specialised in fire safety engineering and who need to liaise with such specialists.

Commented [ro155]: See comment 711. Reason given

There are many standards associated with such requirements and all are not consistent with each other. Not all of those standards use the same temperatures. Some tests use a constant temperature whilst others use a ramp test where the furnace is required to rise in temperature throughout the test.

A number of European Standards use a test temperature of 650^{0}C, which is the self-ignition temperature of natural gas. On the other hand, tests in British and Gas Industry (GIS) Standards use a test temperature of 800^{0}C or 850^{0}C on the grounds that Approved Document B to the Building Regulations refers to 800^{0}C in the definition of a "High Melting Point Metal" pipe in the section of the document addressing "Protection of Openings and Fire Stopping".

Note: The definition in Approved document B is "A high melting point metal means any metal (such as cast iron, copper or steel) which, if exposed to a temperature of 800°C, will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe".

Commented [ro156]: See comment 710.

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BS EN 1775 Annex A: Procedure A

The pipework component is connected to inlet and outlet joints and the complete assembly is installed in the centre of the furnace using supports if necessary. With the discharge valve closed the pipework component is subjected to a pressure of 50 mbar and its leak-tightness is checked.

With the pipework component subjected to a pressure of 50 mbar, the temperature of the furnace is increased by 821 K (548^{0}C) in 30 min in accordance with the curve specified in ISO 834-1.

During the increase in temperature, the internal pressure of the pipework component is maintained at 50 mbar by means of the discharge valve and the leakage rate recorded on a flow meter is checked.

This test is deemed to be passed if the leakage rate of the pipework component, measured under specified conditions, does not exceed 150 dm^3/h or the value specified in the European Standard for the pipework component, during and after the 30 min increase in temperature in accordance with the curve specified in ISO 834-1 and under a constant pressure of 50 mbar.

Procedure A is generally applied to building products and Procedure B to pipework products.

BS EN 1775 Annex A: Procedure B

The pipework component is connected to inlet and outlet joints and the complete assembly is installed in the centre of the furnace using supports if necessary. With the discharge valve closed the pipework component is subjected to a pressure of 100 mbar with nitrogen and its leak-tightness is checked.

With the pipework component subjected to nitrogen pressure at the test pressure of 100 mbar, the temperature of the furnace is increased in accordance with the ISO 834-1 curve. When the temperature of the pipework component reaches 650 °C in the coolest part, the temperature of the furnace is adjusted to maintain this temperature at a constant level on the pipework component for 30 min.

Throughout the test the pressure is maintained at a constant level in the pipework component by means of the discharge valve and the leakage rate is monitored at all times by successive measurements with each measurement time being less than 5 min.

The leakage rate is the ratio of the volume of nitrogen measured to the measuring time.

This test is deemed to be passed if the leakage rate of the pipework component, measured under the specified test conditions, does not exceed 150 dm^3/h or the value specified in the EN standard of the pipework component.

Procedure A is generally applied to building products and Procedure B to pipework products.

BS 1552 Open bottomed taper plug valves

At an internal air pressure of 50 mbar, subject one open valve and one closed valve to a fire resistance test for a period of 30 min, in accordance with the standard time/temperature relationship given in A.2.2 of BS 476 : Part 20 : 1987.

Measure the furnace temperature with thermocouples placed symmetrically about and (25 ± 2) mm from the surface of the valve. Ensure that the final temperature does not exceed 850°C.

Monitor the leakage during the test and, after cooling to room temperature, measure the total leakage at an internal air pressure of 50 mbar.

After cooling to room temperature, close the open valve and measure the total leakage of each valve at an internal air pressure of 50 mbar.

Meter controls and other valves which are declared to be fire resistant shall not melt nor show any sign of deformation during the test specified in this standard and the total leakage, i.e. let-by and soundness, from each valve shall not exceed 0.14 m^3/h at an internal air pressure of 50 mbar.

After cooling to room temperature, the total leakage shall remain within this limit. It shall then be possible to close the open valve by use of the handle or a commercially available spanner or wrench, and the total leakage through the closed valve shall not exceed 0.14 m^3/h.

BS EN 331: 2015 - Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings

This standard uses Procedure B from BS EN 1775 Annex A.

GIS:V7 -3 Brass bodied manually operated ball & taper plug valves MOP 5 bar & d ≤ 50mm

GIS V7-3 specifies that ball and plug valves used as ECVs shall comply with the test requirements of BS 1552 but with a test temperature rise of 800˚C above ambient temperature for 30 minutes.

IIVs, BIVs and LIVs are specified to be tested by Procedure B from BS EN 1775 Annex A.

BS EN ISO 10497 – Fire Type Testing of Valves

This standard is applicable to all sizes of valve.

The test is undertaken on a closed valve. It is completely filled with water under pressure and then it is completely enveloped in flames with an environmental temperature in the region of the valve of 750°C to 1000°C for a period of 30 min. After cool-down from the fire test, the valve is hydrostatically tested to assess the pressure containing capability of the valve body, seats and seals.

Potential pipework to valve end connection joints i.e. the valve's flange connections, are not intended to be evaluated as part of the test.

Note: API 6FA is a very similar test of the fire resistance of a valve.

BS EN 19921 - Ships and marine technology. Fire resistance of metallic pipe components with resilient and elastomeric seals. Test methods.

This standard applies to a wide range of pipe fittings including flanges, gate valves, butterfly valves and filters. It also applies to metallic expansion joints and other flexible parts, excluding hoses and hose assemblies.

The component under test shall be completely enclosed by flames.

Water shall flow through the test piece during the test.

Test criteria include:

- Flame temperature – 800^0C ± 50^0C
- Maximum water temperature – 85^0C
- Working pressure – at least 5 bar ± 0.2 bar
- Duration – 30 minutes
- Tightness test at end of exposure to fire and at ambient temperature – at least 1.5 x working pressure.

API 6FB - Test for End Connections

Separate test temperatures are specified for on shore and off shore application. The on shore test involves heating a $1^1/_2$" steel calorimeter block under the flanged joint to 650^0C within 15 minutes from the start of the test.

The Fire Test requires that any sealing end connection hold for 30 minutes whilst being enveloped by a flame and then hold for a cool down period. After the test piece assembly is cooled down to room temperature the line is depressurized and then re-pressurized. During all facets of the test the gasket must not exceed an API specified leak rate.

In the fire test, the flange is pressurized with a test pressure of 75% of the API rated working pressure. The test pressure is maintained during the burn and cool-down periods.

After 5 minutes a fire is established and the flame temperature is monitored. The average of the thermocouples measuring the flame temperature must reach 760°C within 2 minutes and the average of the calorimeter under the flange shall reach 650°C within 15 minutes. The burn period shall last for 30 minutes. After the burn period the connection is air-cooled down to 100°C or less. After cooling down the test piece is depressurized and the pressure is increased again to the test pressure and held for 5 minutes.

The maximum allowable leak rate is 1 ml/min/inch of mean gasket circumference.

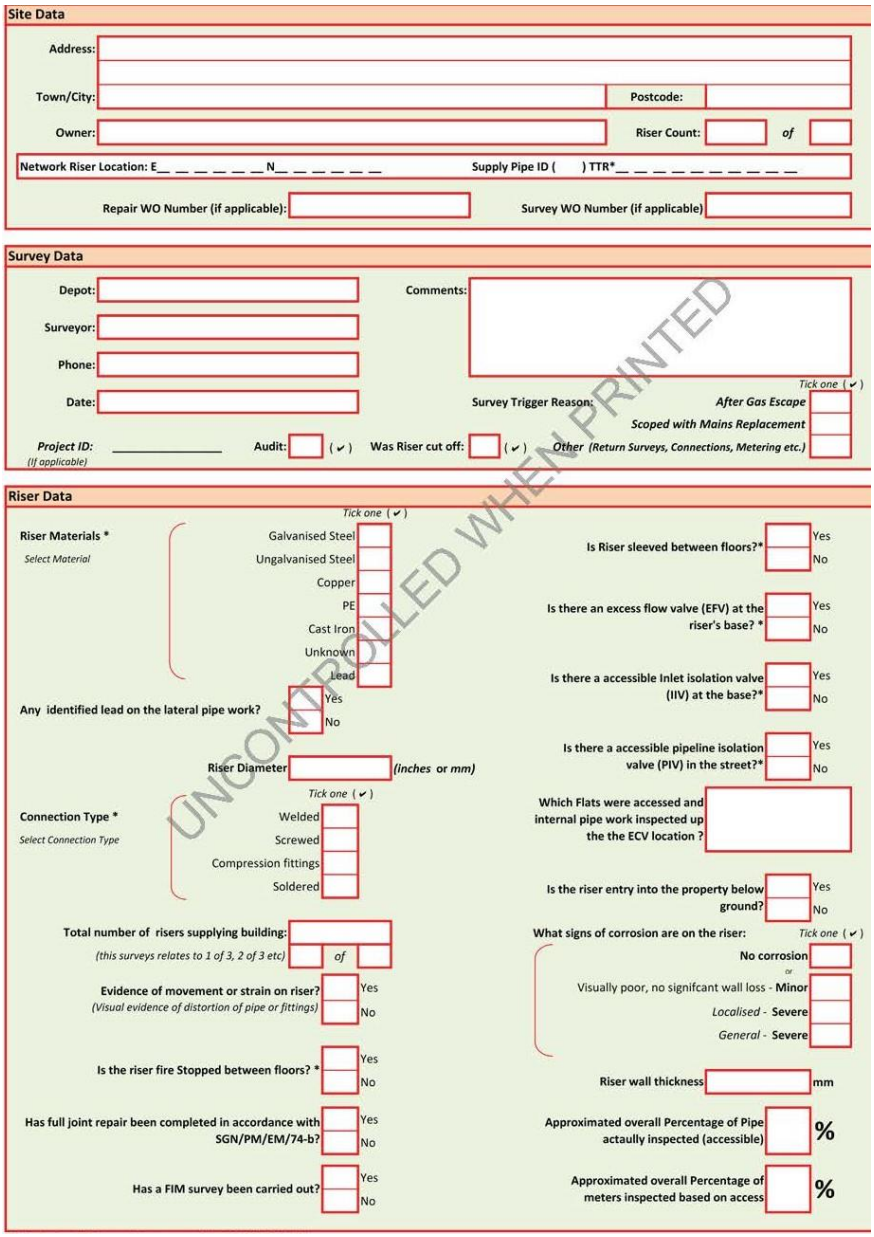
APPENDIX 8 – EXAMPLE POST CONSTRUCTION INSPECTION CHECKLIST

Project Title:			**Project Number:**		
Block Name/Number:			**Design Revision:**		
No. of Gas Supplies:		**No. of Floors in the Building:**		**Building Use:**	
Building Type:	☐ Reinforced Concrete Framed ☐ Steel Framed ☐ Timber Framed ☐ Cross Laminated Timber ☐ Double Brick & Block ☐ Other please define				
Location of Installation:	☐ Underground Car Park ☐ Basement ☐ Within Individual Dwellings ☐ Meter Room Ground Floor ☐ Meter Room Each Floor				
Type of System:	☐ Domestic Meterbank ☐ Commerical Meterbank ☐ Internal Riser ☐ External Riser				
Type of Construction:	☐ Welded Steel ☐ Screwed Steel		**Type of Entry:**	☐ Above ☐ Below (sealed 32mm) ☐ Below (basement) ☐ Below (other)	

Is the Pipeline Isolation Valve(PIV) visible and accessible?	YES / NO	If No, record defect on iaudit	Mitigating action to resolve?	
Is the Installation Inlet Valve(IIV) visible or accessible?	YES / NO	If No, record defect on iaudit	Mitigating action to resolve?	
Is the riser pipework fully accessible for inspection?	YES / NO	If No, record defect on iaudit	Mitigating action to resolve?	
Is the installation ventilation still sufficient and not blocked?	YES / NO	If No, record defect on iaudit	Mitigating action to resolve?	
For meterbank, do customers have access to their ECV?	YES / n/a / NO	If No, record defect on iaudit	Mitigating action to resolve?	
Is there adequate separation distance from other utilities?	YES / n/a / NO	If No, record defect on iaudit	Mitigating action to resolve?	
All sleeves properly fitted and sealed. All pipework exit routes are firestopped	YES / NO	If No, record defect on iaudit	Mitigating action to resolve?	
All required labelling is still in place?	YES / NO	If No, record defect on iaudit	Mitigating action to resolve?	
Managing Agent Identified?	YES / NO	Contact Details:		
Any other issues?	YES / NO	If Yes, record defect on iaudit	Mitigating action to resolve?	

Gas Network Auditor or Project Manager: (NAME)		**Signed:**		**Date:**

APPENDIX 9 - EXAMPLE OF A SURVEY FORM FOR EXISTING NETWORK PIPELINE



Site Data

Address:

Town/City: Postcode:

Owner: Riser Count: of

Network Riser Location: E__ _ _ _ _ _ _N__ _ _ _ _ _ _ Supply Pipe ID ( ) TTR*__ _ _ _ _ _ _ _ _ _ _

Repair WO Number (if applicable): Survey WO Number (if applicable)

Survey Data

Depot: Comments:

Surveyor:

Phone:

Date: Survey Trigger Reason: Tick one (✔)

After Gas Escape

Scoped with Mains Replacement

Project ID: (If applicable) _____ Audit: (✔) Was Riser cut off: (✔) Other (Return Surveys, Connections, Metering etc.)

Riser Data

Riser Materials * (Select Material) — Tick one (✔)

Galvanised Steel
Ungalvanised Steel
Copper
PE
Cast Iron
Unknown
Lead

Any identified lead on the lateral pipe work? Yes / No

Riser Diameter (inches or mm)

Connection Type * (Select Connection Type) — Tick one (✔)

Welded
Screwed
Compression fittings
Soldered

Total number of risers supplying building: (this surveys relates to 1 of 3, 2 of 3 etc) of

Evidence of movement or strain on riser? (Visual evidence of distortion of pipe or fittings) Yes / No

Is the riser fire Stopped between floors? * Yes / No

Has full joint repair been completed in accordance with SGN/PM/EM/74-b? Yes / No

Has a FIM survey been carried out? Yes / No

Is Riser sleeved between floors?* Yes / No

Is there an excess flow valve (EFV) at the riser's base? * Yes / No

Is there a accessible Inlet isolation valve (IIV) at the base?* Yes / No

Is there a accessible pipeline isolation valve (PIV) in the street?* Yes / No

Which Flats were accessed and internal pipe work inspected up the the ECV location ?

Is the riser entry into the property below ground? Yes / No

What signs of corrosion are on the riser: Tick one (✔)

No corrosion

or

Visually poor, no signifcant wall loss - Minor

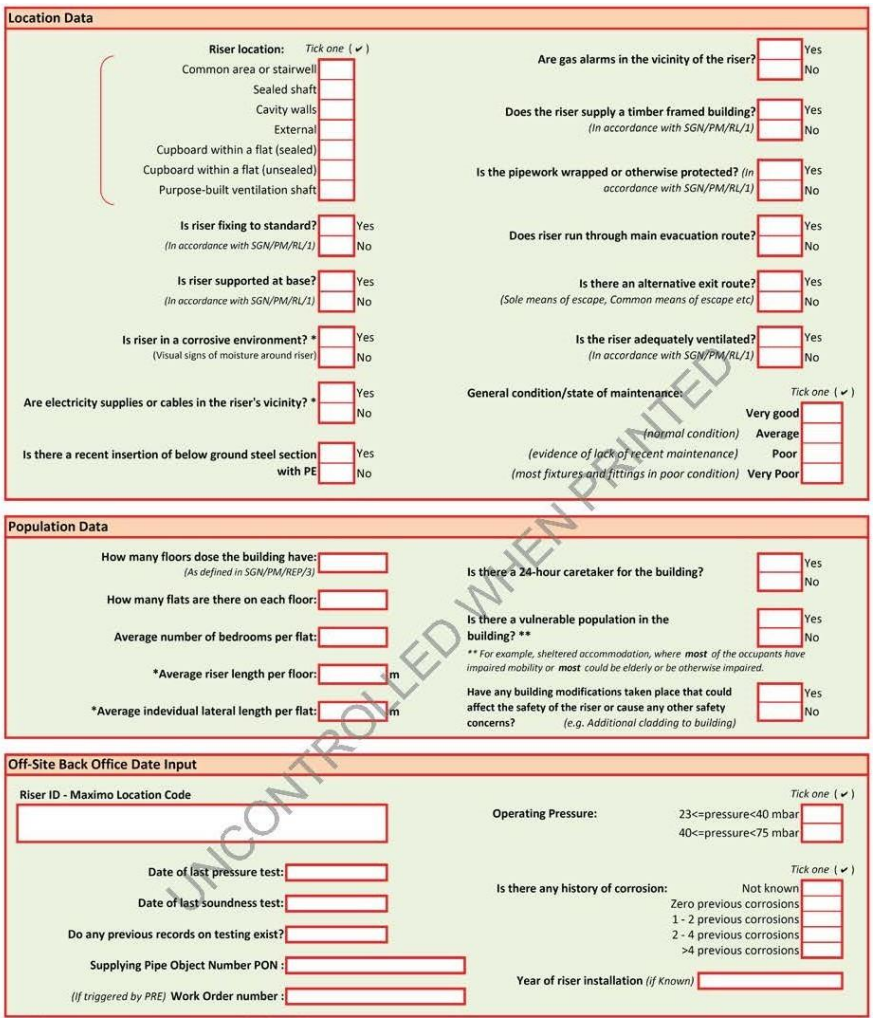
Localised - Severe

General - Severe

Riser wall thickness mm

Approximated overall Percentage of Pipe actaully inspected (accessible) %

Approximated overall Percentage of meters inspected based on access %



Location Data

Riser location: *Tick one (✔)*

- Common area or stairwell
- Sealed shaft
- Cavity walls
- External
- Cupboard within a flat (sealed)
- Cupboard within a flat (unsealed)
- Purpose-built ventilation shaft

Are gas alarms in the vicinity of the riser? Yes / No

Does the riser supply a timber framed building? *(In accordance with SGN/PM/RL/1)* Yes / No

Is the pipework wrapped or otherwise protected? *(In accordance with SGN/PM/RL/1)* Yes / No

Is riser fixing to standard? *(In accordance with SGN/PM/RL/1)* Yes / No

Does riser run through main evacuation route? Yes / No

Is riser supported at base? *(In accordance with SGN/PM/RL/1)* Yes / No

Is there an alternative exit route? *(Sole means of escape, Common means of escape etc)* Yes / No

Is riser in a corrosive environment? * (Visual signs of moisture around riser) Yes / No

Is the riser adequately ventilated? *(In accordance with SGN/PM/RL/1)* Yes / No

Are electricity supplies or cables in the riser's vicinity? * Yes / No

General condition/state of maintenance: *Tick one (✔)*

- **Very good** *(normal condition)*
- **Average** *(evidence of lack of recent maintenance)*
- **Poor** *(most fixtures and fittings in poor condition)*
- **Very Poor**

Is there a recent insertion of below ground steel section with PE Yes / No

Population Data

How many floors dose the building have: *(As defined in SGN/PM/REP/3)*

How many flats are there on each floor:

Average number of bedrooms per flat:

***Average riser length per floor:** m

***Average indevidual lateral length per flat:** m

Is there a 24-hour caretaker for the building? Yes / No

Is there a vulnerable population in the building? ** Yes / No

*** For example, sheltered accommodation, where **most** of the occupants have impaired mobility or **most** could be elderly or be otherwise impaired.*

Have any building modifications taken place that could affect the safety of the riser or cause any other safety concerns? *(e.g. Additional cladding to building)* Yes / No

Off-Site Back Office Date Input

Riser ID - Maximo Location Code

Operating Pressure: *Tick one (✔)*

- 23<=pressure<40 mbar
- 40<=pressure<75 mbar

Date of last pressure test:

Date of last soundness test:

Do any previous records on testing exist?

Is there any history of corrosion: *Tick one (✔)*

- Not known
- Zero previous corrosions
- 1 - 2 previous corrosions
- 2 - 4 previous corrosions
- >4 previous corrosions

Supplying Pipe Object Number PON :

(If triggered by PRE) **Work Order number :**

Year of riser installation *(if Known)*

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APPENDIX 10 – EXAMPLE MEMORANDUM OF UNDERSTANDING BETWEEN A GAS TRANSPORTER AND A MULTI-OCCUPANCY BUILDING OWNER

Commentary

A memorandum of understanding (MOU) is a non-binding agreement between two parties or more. Its purpose is to help prevent any confusion, misunderstanding and disputes. It is structured to enable the expectations and responsibilities of the parties involved to be stated clearly.

The following example is based upon the legal framework applicable to England. It may be used with appropriate amendments in other jurisdictions.

Parties may agree to vary the level of detail contained within and/or the order in which topics are addressed in the MOU.

Example Memorandum of Understanding

Parties

The parties agreeing to this Memorandum of Understanding (MOU) are:

1. [Name of Gas Transporter] (GT)
2. [Name of Building Owner or Responsible Person for the Building under ~~the Fire~~the Fire Safety ~~O~~order, if different] (RP)

Purpose

Under the Regulatory Reform (Fire Safety) Order both parties have a duty to co-operate with one another.

The purpose of the MOU is to:

1. Provide a framework to enable the parties to co-operate with each other ~~efficiently.~~effectively
2. Facilitate the inspection and maintenance of the GT's gas infrastructure into and within multi-occupancy buildings under the control of the RP.
3. Assist the RP to discharge their duties in so far as they are related to the gas infrastructure into and within all the relevant multi-occupancy buildings under their control.

Statutory Obligations

In addition to general health and safety obligations under the Health and Safety at Work Act (HASWA), each party has specific statutory obligations relevant to their activities in multi-occupancy buildings as follows:

- Under the Gas Act, the GT shall develop and maintain an efficient and economic pipeline system for the conveyance of gas to consumers;
- Under the Pipeline Safety Regulations, the GT shall ensure that a pipeline may be examined and work of maintenance may be carried out safely. In addition, the pipeline shall be maintained in an efficient state, in efficient working order and in good repair;
- Under the Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) the GT shall ensure that a pipeline within a building is adequately ventilated such that in the event of a credible gas leak the resulting gas in air mixture will be dispersed before an explosive atmosphere is created;
- Under the Gas Safety (Management) Regulations, the GT has a Safety Case which has been accepted by the Health and Safety Executive (HSE). The Safety Case is required to address the inspection and maintenance of the GT's gas network, including that

Commented [ro157]: See Comments 720 & 722. Partially agreed

Commented [ro158]: See comment 713 .Agreed

part of the network conveying gas to and within multi-occupancy buildings, before the HSE will accept it.

- Under the Regulatory Reform (Fire Safety) Order, which applies to common parts of a multi-occupancy building, the RP shall ensure that;
    - a gas pipe within a building is adequately ventilated such that in the event of a reasonably foreseeable gas leak the resulting gas in air mixture will be dispersed before an explosive atmosphere is created;
    - general fire precautions are identified and implemented;
    - regular fire risk assessments are carried out and any identified remedial works are implemented, such as fire stopping, ventilation and landscaping works which have buried PIV valve boxes.

Gas Safety Systems

The GT maintains a 24/7 gas emergency service to deal with gas leaks, loss of supply and other gas incidents. In the event of any such incident the gas emergency service should be contacted via the 0800 111999 telephone number.

The standards of service are that uncontrolled gas escapes shall be visited within one hour of being reported and controlled escapes i.e. those which have been made safe by the consumer turning off their gas supply at the Emergency Control Valve (ECV) at the inlet to their gas meter, shall be visited within two hours of being reported.

The underground gas pipeline bringing gas into the building has an isolation valve, known as a Pipeline Isolation Valve (PIV), fitted in line, a short distance from the building. This valve is the principal safety system controlling the gas into the building and access to that valve via a surface valve box by the Emergency Operative is essential for the continued safety of the residents of the building.

There are often other valves located immediately inside the building just after the building entry, on branches and on individual lateral pipes immediately before they enter dwellings. These valves are not intended to be accessible to the individual consumers. They are intended to be used by Emergency Operatives or other competent persons in an emergency, if it is appropriate to do so, or for maintenance purposes.

Ventilation is required to disperse any reasonably foreseeable gas leak before it is able to build up to the lower explosive limit. The GT shall be responsible for specifying ventilation requirements of the gas infrastructure and checking the adequacy of existing ventilation whilst the RP shall be responsible for ensuring that adequate ventilation is provided.

Inspection is carried out to

- confirm the continued accessibility of PIVs;
- confirm the continued accessibility of other internal valves;
- check for leakage with appropriate instrumentation;
- check for the presence and extent of corrosion, particularly at those locations where corrosion is most likely to occur such as at the base of any riser, where the pipe exits a floor and on the shoulders of socketed joints.
- confirm the adequacy of ventilation of the pipework;
- check the pipe is adequately supported;
- check that other utilities have not impeded access to the pipe to carry out any maintenance;
- check that appropriate plans/diagrams and signage are in place;
- check that compartment wall penetrations remain fire stopped.

Records

The GT shall provide the RP with a record of the inspection and, if relevant, details of any ventilation and fire stopping deficiencies that were observed during the inspection.

Prior to the inspection the RP shall provide details of any asbestos suspected to be present in the building.

Access and Liaison with Residents

The RP shall

- provide access to the GT to common areas of multi-occupancy buildings;
- assist the GT to liaise with residents to gain access to gas infrastructure located within flats. This may involve accompanying the GT's inspectors to flats where the residents may be considered to be vulnerable or assisting in the making of appointments with individual residents;
- assist the GT in communicating generally with residents e.g. to explain what the GT will be doing and why.

The GT shall co-operate with the RP regarding resident liaison.

Remedial Work

The responsibility for carrying out any remedial work on the gas infrastructure shall lie with the GT.

The responsibility for carrying out any remedial work on the fabric of the building such as the rectification of ventilation and fire stopping deficiencies shall lie with the RP.

Commented [ro159]: See comment 720. Agreed

Timing

Unless otherwise agreed, this MOU shall be in place for one year from the date of its signing. It shall be reviewed annually thereafter.

Contact Details

Gas Emergencies shall be reported promptly to 0800 111999.

Should access be required to a building in an emergency, contact should be made with [insert 24/7 telephone contact details for RP's representative]

The GT's Multi-occupancy Buildings Co-ordinator is [insert name, telephone number and e-mail address]

The RP is [insert name, telephone number and e-mail address]

Signed

For and on behalf of [Name of Gas Transporter (GT)]

Date……

For and on behalf of [Name of Building Owner or Responsible Person for the Building under the Fire Safety Order, if different (RP)]

Date……..