

IGEM/GM/7B
Communication 1732

Hazardous area classification for gas metering equipment

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SECTION 1 : INTRODUCTION

1.1 IGEN/GM/7B supersedes the relevant scope i.e. hazardous area classification for gas metering equipment, of IGE/GM/7 Edition 2, Communication 1702, which is obsolete. The remaining scope of IGE/GM/7 Edition 2, i.e. electrical connections for gas metering equipment, has been superseded by IGEN/GM/7A, Communication 1731.

1.2 This Standard has been drafted by an Institution of Gas Engineers and Managers (IGEM) Panel, appointed by IGEM's Gas Measurement Committee, and has been approved by IGEM's Technical Co-ordinating Committee on behalf of the Council of IGEM.

1.3 This Standard has a similar scope to the relevant scope of IGE/GM/7 Edition 2, but includes additional and enhanced information.

It is written such that it complements the Office of Gas Supply (OFGAS) Codes of Practice (CoPs), the Office of Gas and Electricity Markets (Ofgem) MAMCoP and the Dangerous Substances and Explosive Atmospheres Regulations (DSEAR).

As such, the Standard will be of use to gas suppliers, end users, shippers, gas transporters (GTs), meter asset managers (MAMs), installation contractors, equipment manufacturers and consultants.

The Standard will also be of assistance to designers and manufacturers when designing or specifying associated equipment for use in hazardous areas.

1.4 This Standard is not retrospective. However, where work needs to be undertaken on a meter installation, it is recommended that such an installation be brought into line with this Standard.

1.5 The de-regulation of the metering market has led to the need for new sets of rules and Standards. This has been addressed by the Ofgem MAMCoP, developed to cover whole life management of gas meter installations. The OFGAS CoPs 1/a, 1/b and 1/c which cover the installation of the meter only, will continue to apply. Businesses installing meter installations are required to be an Ofgem Approved Meter Installer (OAMI). There has also been a review and harmonisation of industry standards and CoPs to reflect the needs of the changing market.

Note: Under the new arrangements, an Ofgem-approved MAM does not have to be an OAMI, but has an obligation to use an OAMI to install a meter.

Notwithstanding Sub-Section 1.9, total compliance with IGEN/GM/7B is necessary for installations and modules where the meter installation has to comply with the Ofgem MAMCoP, relevant scope.

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

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

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

- 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 it 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 not within their competence. There should be written procedures defining the extent to which "responsible engineers" can exercise their professional judgement. When "responsible engineers" are asked to undertake tasks which deviate from this, they should refer the matter for higher review.
- 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 in a more appropriate manner 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 regard be paid to HS(G)48.
- 1.9 Notwithstanding Sub-Section 1.5, this Standard does not attempt to make the use of any method or specification obligatory against the judgement of the responsible engineer. Where new and better techniques are developed and proved, they should be adopted without waiting for modification to this Standard. Amendments to this Standard will be issued when necessary, and their publication will be announced in the Journal of IGEM and other publications as appropriate.
- 1.10 Requests for interpretation of this Standard in relation to matters within its scope, but not precisely covered by the current text, should be addressed in writing to Technical Services, IGEM, Charnwood Wing, Holywell Park, Ashby Road, Loughborough, Leicester, LE11 3GH and will be submitted to the relevant Committee for consideration and advice, but in the context that the final responsibility is that of the engineer concerned. If any advice is given by or on behalf of IGEM, this does not relieve the responsible engineer of any of his or her obligations.

SECTION 2 : SCOPE

- 2.1 This Standard covers hazardous area classification for gas metering equipment.
- 2.2 This Standard applies to meter installations of maximum operating pressure (MOP) not exceeding 75 bar.
- 2.3 This Standard applies to meter installations containing Natural Gas (a 2nd family gas as defined by BS EN 437) in the gaseous state.

Note: This Standard does not apply to either compressed or liquefied Natural Gas (CNG or LNG) installations, for example as supplied at CNG vehicle filling stations.

Ambient temperatures are assumed to be in the range –25°C to 55°C.

- 2.4 This Standard applies to primary and secondary meter installations and associated volume conversion equipment and all associated electrical equipment and connections, in industrial and commercial premises and which have been installed to BS 6400-1, BS 6400-2, IGE/GM/4, IGE/GM/6, IGE/GM/8 and IGE/GM/5, as appropriate. These installations will also need to have been tested to and comply with IGE/UP/1A or IGE/UP/1B, as appropriate. However, it does **not** apply in the following circumstances when it will be necessary to use IGE/SR/25:

- ventilation is of the forced type
- MOP exceeds 75 bar
- creep relief vents terminate within a meter installation's housing
- a competent person considers there to be unusual site circumstances
- the installation is at a remote, unmanned, site
- it is considered that leaks may go undetected
- unodourised gas is metered.

Note 1: DSEAR does not apply to meter installations installed in domestic premises. Therefore, it is not intended that this Standard be used for hazardous area classification in such circumstances.

For the purposes of this Standard, a meter installation in domestic premises is an installation within, or near to, a domestic dwelling into which the installation supplies gas and where it is reasonable to expect that the householder will be in the vicinity of the installation on a regular basis. Such installations using a "domestic meter" will be installed in accordance with BS 6400.

Note 2: For the purposes of this Standard, a meter installation in industrial or commercial premises is an installation within the boundary of the premises within which the gas load is located and where it is reasonable to expect that passers-by will be in the vicinity of the gas installation on a regular basis. This is to distinguish this type of installation from a remote site, for example a National Transmission System above-ground installation where it is reasonable to expect that persons will not be present for long periods of time and when IGE/SR/25 will need to be applied.

- 2.5 This Standard may be applied for meter installations in existing premises where ventilation is present but where it is difficult or impossible to confirm that levels of ventilation comply with current design Standards.
- 2.6 This Standard uses a methodology that assumes meter installations are protected from external interference and located in populated areas, or sites are manned in industrial and commercial premises. Such conditions will lead to a high probability of detection of any gas leak and within a short time period. Where these conditions apply, such installations can be deemed to be visited (with reference to IGE/SR/25) on a regular basis.
- 2.7 All pressures quoted are gauge pressures unless otherwise stated.

- 2.8 Italicised text is informative and does not represent formal requirements.
- 2.9 Appendices are informative and do not represent formal requirements unless specifically referenced in the main sections via the prescriptive terms “should”, “shall” or “must”.

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SECTION 3 : LEGAL AND ALLIED CONSIDERATIONS

3.1 GENERAL

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

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

3.2 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 other persons such as members of the public who may be affected by the work activity.

3.3 DANGEROUS SUBSTANCES AND EXPLOSIVE ATMOSPHERES REGULATIONS (DSEAR)

DSEAR are concerned with protection against risks from fire, explosion and similar events arising from dangerous substances used or present in the workplace. The Regulations require that risks from dangerous substances are assessed, eliminated or reduced. They contain specific requirements to be applied where an explosive atmosphere may be present and require the provision of arrangements to deal with accidents, emergencies etc. and provision of information, training and use of dangerous substances. The Regulations also require the identification of pipelines and containers containing hazardous substances.

The following publications contain details of the Regulations and their application:

- HS(L)138
- HS(L)137
- HS(L)136
- HS(L)135
- HS(L)134
- INDG 370.

SECTION 4 : HAZARDOUS AREA CLASSIFICATION

Acronyms and abbreviations

ECV	=	emergency control valve
MOP	=	maximum operating pressure

Units

mbar	=	millibar
mm	=	millimetres

Symbols

$\leq$	=	less than or equal to
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The hazardous area classification will depend on MOP, complexity of the installation, level of ventilation and the dimensions of any housing. Figure 1 shows a flow chart to determine which procedure is applied.

4.1 When determining a hazardous area, the following steps shall be applied.

- (a) Establish whether the installation falls within the scope of IGE/GM/7B (see Section 2). If any one of the constraints given in Sub-Section 2.4 apply, refer to IGE/SR/25 or other appropriate standard.
- (b) If the installation falls within the scope of IGE/GM/7B then the hazardous area can be deemed to be Zone 2 with a minimum hazardous zoning distance of 150 mm if:
 - the installation has been designed, installed (including providing suitable ventilation), operated and maintained in accordance with IGE/GM/4, IGE/GM/6, IGE/GM/8, IGE/GM/5, BS 6400-1, or BS 6400-2 as appropriate, **and**
 - MOP does not exceed 75 mbar **and**
 - any installation pipework is designed, installed, operated and maintained in accordance with IGE/UP/2 **and**
 - any emergency control valve (ECV) is designed and installed in accordance with IGE/TD/4.
- (c) If there is any doubt whether the design installation and testing is in accordance with clause 2.4 and 4.1 (a) and (b) above, the full hazardous area classification steps given in Appendix 4 shall be applied to determine the hazardous area classification.

Note: Appendix 4 includes tables that show area classification for meter installations at a selection of commonly-used pressures. The height of the meter housing and level of ventilation also influence the classification and these parameters are also considered in Appendix 4. The tables show that areas near to sources of potential minor gas leaks, for example joints, may be classified as Zone 2 hazardous areas or the whole installation could be classified as Zone 1. Where the tables do not indicate a Zone 1 or Zone 2, it will be necessary to:

- re-design the provision of ventilation or
- use Ex ia equipment throughout (see IGE/GM/7A).

4.2 In some cases, an area which would, normally, be Zone 2 hazardous area classification, may have a Zone 1 area classification imposed by the gas user. In such circumstances, equipment connected to the meter shall be certified for use in Zone 1 applications (see IGE/GM/7A).

4.3 Electrical equipment (with suitable certification), when being used in conjunction with metering equipment, shall be installed in accordance with IGE/GM/7A.

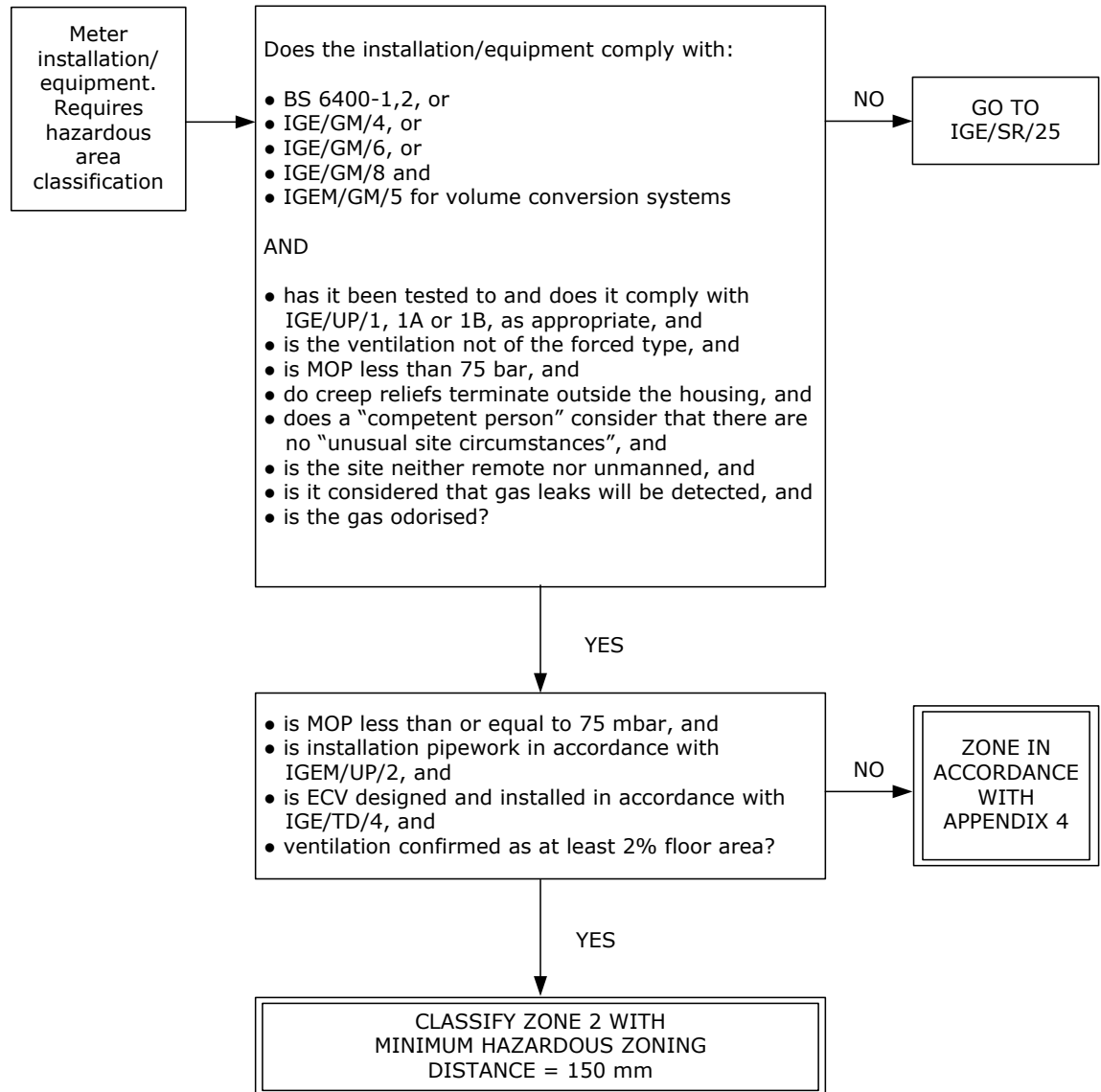


FIGURE 1 - SIGNPOSTS TO HAZARDOUS AREA CLASSIFICATION

APPENDIX 1 : GLOSSARY, ACRONYMS, ABBREVIATIONS, SUBSCRIPTS, UNITS AND SYMBOLS

A1.1 GLOSSARY

For the purpose of this Standard, the following definitions apply. The definitions are included as a general guide to terms used and are related to terms found in British Standards, etc.

IGEM/G/1 is freely available with copies of IGEM/GM/7B.

compound	An enclosed (usually by security fencing) area containing a group of buildings and/or gas metering equipment. <i>Note: Often, a compound is used for large, complex installations that include a pressure regulating installation (PRI) and associated metering streams.</i>
electrical equipment	One or more components assembled for a specific purpose, including electronic, for example gas volume conversion devices, data loggers, and optically-coupled equipment.
freely ventilated	More than adequately ventilated or installed outside.
hazardous area	An area in which explosive gas/air mixtures are, or may be expected to be, present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus or other sources of ignition. BS EN 60079-10 specifies hazardous areas by making reference to three sets of conditions which are recognised and defined: • Zone 0: An area in which an explosive air/gas mixture is continuously present or is present for long periods • Zone 1: An area in which an explosive air/gas mixture is likely to occur in normal operation • Zone 2: An area in which an explosive air/gas mixture is not likely to occur in normal operation and, if it occurs, it will exist only for a short time.
housing (as in "meter housing")	A purpose built building, including those of brick construction and pre-fabricated glass reinforced plastic boxes/buildings, that contain gas metering equipment. <i>Note: Part of a housing's construction may include the wall, or walls, of an adjacent building.</i>
non-hazardous area "safe" area	An area in which an explosive gas/air mixtures is not expected to be present in quantities such as to require precautions for the constant installation and use of apparatus.
maximum operating pressure (MOP)	The maximum pressure at which a system can be operated continuously under normal operating conditions.
meter installation	As defined in IGEM/G/1.

A1.2 ACRONYMS AND ABBREVIATIONS

ACoP	Approved Code of Practice.
ATEX	Atmospheres Explosibles.
CNG	Compressed Natural Gas.

CoP	Code of Practice.
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations.
ECV	Emergency control valve.
FAV	Free area of ventilation.
GB	Great Britain.
GT	Gas transporter.
HSE	Health and Safety Executive.
HSWA	Health and Safety at Work Act.
IGEM	Institution of Gas Engineers and Managers.
LNG	Liquefied Natural Gas.
MAM	Meter asset manager.
MI	Meter installation.
MOP	Maximum operating pressure.
OAMI	Ofgem approved meter installer.
OFGAS	Office of Gas Supply.
Ofgem	Office of Gas and Electricity Markets.
PRI	Pressure regulating installation.
Std	Standard.

A1.3 SUBSCRIPTS

in	inlet
out	outlet.

A1.4 UNITS

ft ³ /h	cubic feet per hour
m	metre
m ²	square metres
mbar	millibar
mm	millimetres
mm ²	square millimetres
m ³ /h	cubic metres per hour
m ³ h ⁻¹	cubic metres per hour
°C	degrees Celsius.

A1.5 SYMBOLS

≤	less than or equal to
>	greater than
d	zoning distance
Ex ia	Apparatus incapable of causing ignition in normal operation, with a single fault and with any combination of two faults and as defined in BS EN 60079-11 (see IGEN/GM/7A)
h	height
l	length
w	width.

APPENDIX 2 : REFERENCES

A2.1 LEGISLATION

- Health and Safety at Work etc. Act 1974
- Dangerous Substances and Explosive Atmospheres Regulations 2002, incorporating:
 - ATEX Directive 94/9/EC (ATEX 95) – Safety of Apparatus
 - ATEX Directive 99/92/EC (137A)M - Safety of Installation
 - Chemical Agents Directive 98/24/EC.

A2.2 HSE ACoPs AND GUIDANCE

- HS(G)48 Human Factors in Industrial Safety. Guidance
- HS(L)138 Dangerous Substances and Explosive Atmospheres Regulations 2002. ACoP and Guidance
- HS(L)137 Safe maintenance, repair and cleaning procedures; Dangerous Substances and Explosive Atmospheres Regulations 2002. ACoP and Guidance
- HS(L)136 Control and mitigation methods; Dangerous Substances and Explosive Atmospheres Regulations 2002. ACoP and Guidance
- HS(L)135 Storage of dangerous substances; Dangerous Substances and Explosive Atmospheres Regulations 2002. ACoP and Guidance
- HS(L)134 Design of plant, equipment and workplaces; Dangerous Substances and Explosive Atmospheres Regulations 2002. ACoP and Guidance
- INDG 370 Fire and explosion; How safe is your workplace? A short guide to the Dangerous Substances and Explosive Atmospheres Regulations 2002.

A2.3 OFGAS/Ofgem

- COP 1/a Code of Practice for Low Pressure Diaphragm and Electronic Meter Installations with Badged Meter Capacities not Exceeding 6 m³/h (212 ft³/h)
- COP 1/b Code of Practice for Low Pressure Diaphragm and Rotary Displacement Meter Installations with Badged Meter Capacities Exceeding 6 m³/h (212 ft³/h) but not Exceeding 1076 m³/h (38000 ft³/h)
- COP 1/c Code of Practice for all Higher Pressure and all other Low Pressure Meter Installations not covered by COP 1/a and COP 1/b
- MAMCoP Meter Asset Managers Code of Practice.

A2.4 IGEN STANDARDS

- IGE/GM/6 Specifications for diaphragm and rotary displacement meter installations with badged meter capacities exceeding 6 m³/h (212 ft³/h) but not exceeding 1076 m³/h (38000 ft³/h)
- IGE/GM/7A Electrical connections for gas metering equipment
- IGE/GM/8 Non-domestic meter installations. Flow rate exceeding 6 m³ h⁻¹ and inlet pressure not exceeding 38 bar.
- IGE/SR/25 Hazardous area classification of Natural Gas installations.
- IGE/UP/1 Edition 2 Strength and tightness testing and purging of industrial and commercial gas installations
- IGE/UP/1A Edition 2 Strength and tightness testing and direct purging of small, low pressure industrial and commercial Natural Gas installations.

- IGE/UP/1B Edition 2 Tightness testing and purging of domestic sized Natural Gas installations
- IGE/UP/2 Edition 2 Gas installation pipework on industrial and commercial premises
- IGE/TD/4 Edition 4 Steel and PE gas services and service pipework
- IGE/TD/13 Pressure regulating installations for transmission and distribution systems
- IGE/G/1 Defining the end of the Network, a meter installation and installation pipework.

A2.5

BRITISH STANDARDS INSTITUTION (abbreviated titles)

- BS 6400 Domestic sized meter installations
- BS EN 437 Test gases
- BS EN 60079-10 Electrical apparatus for explosive gas atmospheres. Classification of hazardous areas
- BS EN 60079-11 Explosive atmospheres. Equipment protection by intrinsic safety "i".