INSTITUTION OF GAS ENGINEERS AND MANAGERS IGEM/TSP/24/248

Founded 1863

IGEM/GM/8 Part 4 Edition 3 **Royal Charter 1929**
Communication XXXX

Meter installations of flow exceeding 6 m^3 per hour

Part 4: Operation and Maintenance

DRAFT FOR COMMENT

1 This draft Standard IGEM/GM/8 Part 4 Edition 3 has been prepared by a Panel under the chair, David Harper.

2 This Draft for comment is presented to Industry for comments which are required by 4 February 2025, and in accordance with the attached Reply Form.

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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Andrew Richardson
IGEM
IGEM House
26-28 High Street
Kegworth
Derbyshire, DE74 2DA
Tel: 01509 678150
Email: andrew.richardson@igem.org.uk

Attached is the Draft for Comment of IGEM/GM/8 Edition 3 – "Meter installations of flow exceeding 6 m3 per hour" Part 4: Operation and Maintenance and the associated comment form.

We wish to make it as easy as possible for those of you representing industry bodies to issue the draft to your Members. You can either forward this email with attachment complete or forward it without the attachment and invite them to visit our website via https://www.igem.org.uk/technical/technical-services/comment-on-draft-standards.html where the Draft and Comment Form is posted.

Organisations to which this Draft has been circulated:

Organisation	Representative
AMO	ERIC FOWLER
BPEC	MALLY BUTTERS
BRITISH GAS	BRETT JOHNSON
CADENT	HILARY BUXTON
CMAP	JOHN HEYBURN
DNO COLLAB FORUM	HILARY BUXTON
EI	MARK SCANLON
ENA	JAMES EARL
EUA	STEVE SUTTON
EUSKILLS	RICHARD HARPER
GSR	JONATHAN PALMER
GISG	BOB MURRY
HHIC	STEVEN SUTTON
HSENI	SEAN KEOGH
*Large Business Forum	TREVOR SMALLPEICE
LLOYDS REGISTER	LES THOMAS
RETAIL ENERGY CODE (REC)	ERIC FOWLER
NGN	IAIN FOSTER
OFGEM	VIC TUFFEN
SGN	DOMINIC CUMMINGS
WALES & WEST	GRANT ROGERS
YPN	HARRIET GUIRY.

IGEM/GM/8 Part 4 Edition 3
Communication xxxx

Meter installations of flow exceeding 6 m3 per hour

Part 4 : Operation and Maintenance

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Royal Charter 1929
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Institution of Gas Engineers & Managers

IGEM/GM/8 Part 4 Edition 3
Communication xxx

Meter installations of flow exceeding 6 m³ per hour

Part 4 : Operation and Maintenance

DRAFT FOR COMMENT

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IGEM House
26-28 High Street
Kegworth
Derbyshire, DE74 2DA
Tel: 01509 678150
Email: technical@igem.org.uk

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SECTION 1 : INTRODUCTION

1.1 This Standard supersedes IGEM/GM/8 Part 4, Communication 1798, which is obsolete.

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

1.3 IGEM/GM/8 is published in 5 parts:

- Part 1 covering design
- Part 2 covering locations, housings and compounds
- Part 3 covering installation and commissioning
- Part 4 covering operation and maintenance
- Part 5 covering notices and labels.

1.4 This Standard covers the operation and maintenance of gas supply meter installations (see Sub-Section 2.1) of capacity exceeding 6 $m^3 h^{-1}$ and maximum operating pressure (upstream) (MOP_u) not exceeding 38 bar.

With the exception of the few installations of MOP_u exceeding 38 bar, the majority of industrial and commercial meter installations can be operated and maintained by following IGEM/GM/6 (for MOP_u not exceeding 100 mbar only) and/or IGEM/GM/8.

Note: IGEM Standards use pressure breaks as adopted in European standards. However, in the UK, the actual limit of pressure for IGEM/GM/6 designs is 75 mbar. In practice, it is rare for a meter installation to have MOP_u lying between 75 mbar and 100 mbar in the UK.

It is the intention that IGEM/GM/6 be used for the largest proportion of installations that can be covered by "standard designs" for MOP_u not exceeding 75 mbar.

For 75 mbar < $MOP_u \leq$ 38 bar or where an installation is not a "standard design" as specified in IGEM/GM/6, IGEM/GM/8 applies (see also Note 4 to clause 2.1).

For a turbine meter installation of MOP_u not exceeding 75 mbar, there are no recognised standard designs i.e. IGEM/GM/6 does not apply. It is recommended that IGEM/GM/8 be used for all such installations.

For any meter installation of MOP_u exceeding 38 bar, IGE/GM/4 applies.

1.5 This Standard applies to new, onshore, gas supply meter installations only. It 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. In particular, any unregulated by-pass needs to be removed or a regulator installed in the by-pass.

When re-engineering or replacing legacy meter installations, consideration is to be given to bringing them in line with the standard arrangements within IGEM/G/1. Unless all involved parties are in agreement to continue the legacy arrangement, it is expected that if reasonably practicable such existing systems will be modified to meet the recommended approach.

Irrespective of whether an emergency control valve (ECV) is fitted to the inlet of the meter installation, it is recommended that modification work be undertaken in line with this Standard.

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Ownership and responsibility for new installations covered by this Standard has been liberalised from gas transporters (GTs) to Meter Asset Providers (MAPs) who are the title owner of the assets, and Meter Asset Managers (MAMs), responsible for management. The regulation authority, the Office of Gas and Electricity Markets (Ofgem) require that equipment managers and installers are separately accredited for the work they carry out. Accredited MAMs have operational and management responsibly while Accredited Meter Installers (AMI) carry out meter work, installation, modification, repair, maintenance and removal activities, both work to the Retail Energy Code Consolidated Metering Code of Practice (REC CoMCoP):

Licence conditions make gas suppliers responsible for coordinating the provision of metering services and have placed responsibilities on GTs to underpin the overall safety of the gas supply system from the distribution main to the inlet to the consumer's appliances.

Note: Under these arrangements, a REC MAM does not have to be an AMI, but has an obligation to use an AMI to carry out work on a meter installation or have the work inspected by an AMI within 20 days of the work.

Notwithstanding Sub-Section 1.11, total compliance with IGEM/GM/8 is necessary for installations and modules where the meter installation has to comply with the CoMCoP.

1.6 This Standard does not detail the management processes required for compliance with the Pressure Systems Safety Regulations (PSSR), such guidance is provided by IGEM/GL/5. It is intended that work carried out in accordance with this Standard and IGEM/GL/5 will conform to the requirements of PSSR.

1.7 Terms such as "maximum operating pressure" (MOP), "maximum incidental pressure" (MIP) and "operating pressure" (OP) are used to reflect gas pressure terminology used in European standards. These terms will arise in all relevant IGEM Standards and, possibly, in other standards. Other terms have been introduced to assist in recognition of design information to be transferred between interested parties.

Note: Appendix 11 of IGEM/GM/8 Part 1 shows an explanation of the terms used by setting out the definitions of the terms, explaining the suffixes, the relationship between the terms, and their significance.

1.8 This Standard makes use of the terms "must", "shall" and "should" when prescribing particular procedures. 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 procedure which, it is intended, will be complied with in full and without deviation
- the term "should" prescribes a procedure which, it is intended, will be complied with unless, after prior consideration, deviation is considered to be acceptable.

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

1.9 Notwithstanding Sub-Section 1.8, 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 approved, they are to be adopted without waiting for modification to this Standard. Amendments to this Standard will be issued when necessary, and

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their publication will be announced in the Journal of the Institution and elsewhere, as appropriate.

1.10 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.

1.11 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 HSG48.

1.12 Requests for interpretation of this Standard in relation to matters within their scope, but not precisely covered by the current text, should be addressed in writing to:

- Technical Services, The Institution of Gas Engineers and Managers, IGEM House, High Street, Kegworth, Derbyshire, DE74 2DA, or
- emailed to technical@igem.org.uk

and will be submitted to the relevant Committee for consideration and advice, but in the context that the final responsibility is that of the engineer concerned. If any advice is given by or on behalf of IGEM, this does not relieve the responsible engineer of any of their obligations.

1.13 This Standard was published in xxxxx 20xx.

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SECTION 2 : SCOPE

2.1 This Standard applies to all onshore, gas supply meter installations (hereafter referred to as "installations") (and defined in IGEM/G/1) of flow rate (capacity) exceeding 6 $m^3 h^{-1}$ and MOP_u not exceeding 38 bar and complying with IGEM/GM/8 Part 1 (see also Note 7 below).

Installations with the following types of meter are covered:

- diaphragm
- rotary displacement (RD)
- turbine
- ultrasonic
- thermal mass.

Note 1: For installations of capacity not exceeding 6 $m^3 h^{-1}$, intended to carry Natural Gas (NG), BS 6400-1 or BS 6400-2 apply, as appropriate for MOP_u. For non-domestic premises there are additional legal requirements that may have to be met, e.g. Dangerous Substances and Explosive Atmospheres Regulations (DSEAR).

The requirements of this document may be applied to installations of capacity not exceeding 6 $m^3 h^{-1}$ and MOP_u exceeding 2 bar.

Note 2: For installations of MOP_u exceeding 38 bar, IGEM/GM/4 applies and IGEM/TD/13 may be used for the regulation of pressure. However, where the metering pressure is not exceeding 38 bar, this Standard applies. Where IGEM/TD/13 is used, the control and fault pressure ranges have to be acceptable to the consumer and it may be necessary to apply tolerances required by IGEM/GM/8 to IGEM/TD/13 control philosophy.

Note 3: Primarily, IGEM/GM/8 has been produced for primary meters and other meters used for billing purposes. However, the principles may be applied for other meters, for example appliance check meters or departmental charging meters, when certain procedures may not apply.

Note 4: IGEM/GM/6 provides procedures for "standard" installations of MOP_u not exceeding 100 mbar. For other, "non-standard", installations of MOP_u not exceeding 100 mbar, IGEM/GM/8 applies. See also the note within Sub-Section 1.4.

Note 5: For turbine meters and ultrasonic meters (USMs), in addition to IGEM/GM/8, some of the principles of IGE/GM/4 may apply and further useful information is also included.

Note 6: IGEM/GM/8 does not address the Network pipeline (see IGEM/TD/1, IGEM/TD/3, IGE/TD/4 and IGEM/G/5, as appropriate). IGEM/GM/8 does not address requirements for a pressure regulating installation (PRI) installed in a Network pipeline that is not part of the meter installation, when IGEM/TD/13 applies.

Note 7: It is appropriate to apply this Standard for existing installations complying with IGEM/G/1.

2.2 This Standard is primarily written to cover installations that are wholly downstream of the outlet of the ECV as recommended in IGEM/G/1 "Standard Arrangements", in which case the installation is not part of the Network. The owner or user of the installation would not, therefore, be a conveyor of gas on the Network and would not be subject to the general duties of the Gas Safety (Management) Regulations (GS(M)R). Similarly, the owner or user of the installation would not be an operator of a pipeline and, therefore, would not be subject to the requirements of the Pipelines Safety Regulations (PSR). However, the installation may be subject to the requirements of PSSR.

Edition 3 of IGEM/G/1 permits new meter installations to be installed upstream of the ECV, particularly where the downstream consumer's system has been defined as being a Network under GS(M)R. Also in some situations, where all parties agree, a legacy meter installation as defined in IGEM/G/1 may be replaced with a configuration that does not conform to the "standard arrangements" given in IGEM/G/1.

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IGEM/GM/8 may be applied when installing such new or replacement meter installations that do not have an ECV located on their inlet, but have a valve within the meter installation, or the consumer's system nominated as the ECV. In such installations, the section of the installation upstream of the ECV is defined as being "Network Pipework" and will be subject to the requirements of GS(M)R which will have to be complied with in addition to IGEM/GM/8.

Note 1: The responsibilities for the different sections of the system need to be clearly understood, in particular the upstream Network (GT) responsibility will stop at the inlet to the meter installation as defined in IGEM/GM/1.

Note 2: Any part of the meter installation which is subject to the requirements of GS(M)R will have to be operated by an organisation holding a "Public Gas Transporters" licence (or that physically convey gas through pipes but are exempt from the need to hold a PGT licence) and will have to be operated under a suitable safety case, which will need to be agreed with the HSE.

2.3 This Standard applies to installations intended to carry NG (a 2nd family gas as defined by BS EN 437).

Note: The Gas Safety (Installation and Use) Regulations (GS(I&U)R) define "gas" to include 1st, 2nd and 3rd family gases as well as other gases. The principles of IGEM/GM/8 may be used for gases other than NG but suitable adjustments to parameters and requirements will need to be considered by a competent person.

2.4 This Part 4 of IGEM/GM/8 deals with the operation and maintenance of relevant installations.

2.5 All pressures are gauge pressures unless otherwise stated.

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

2.7 Appendices are informative and do not represent formal requirements unless specifically referenced in the main sections via the prescriptive terms "must", "shall" or "should".

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SECTION 3 : LEGAL AND ALLIED CONSIDERATIONS

3.1 GENERAL

3.1.1 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, where reference to appropriate national Legislation is necessary.

All relevant Legislation must be applied and relevant ACoPs, official Guidance and referenced CoPs, standards, etc. shall be taken into account.

Note: Appendix 2 is relevant in this respect.

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

3.1.2 Persons who operate and maintain meter installations must be competent to do so and have sufficient knowledge, skills and experience to carry out such work as is required. Compliance with GS(I&U)R must be achieved where those Regulations apply.

At the time of publication, the body with HSE approval to operate and maintain a register of businesses who are "members of a class of persons" is Gas Safe Register. Therefore, all businesses or self-employed gas fitters working on meter installations where GS(I&U)R apply must be registered with Gas Safe Register.

Persons deemed competent to carry out gas work are those who hold a current certificate of competence in the type of activity to be conducted, issued by a certification body accredited by the United Kingdom Accreditation Service (UKAS). UKAS issue certificates of competence under the National Accredited Scheme for Individual Gas Fitting Operatives (ACS).

Note: Where an ACS is not available for the activity, companies will need to ensure operatives have suitable competence to carry out maintenance and servicing.

3.1.3 Any meter installation shall be designed, installed, commissioned and maintained in accordance with the CoMCoP.

3.1.4 Most GTs operate a scheme under their Safety Case arrangements as a prerequisite for authorising an AMI to set any meter regulator or to break a regulator seal. Therefore, an AMI must seek authorisation from the relevant GT before carrying out such procedures.

3.2 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. They are also required to have specific emergency arrangements in place.

3.3 CONTROL OF ASBESTOS REGULATIONS

3.3.1 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.

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3.3.2 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, to that exposure. Employers have to carry out medical surveillance of employees if they work over a certain time limit.

3.3.3 These 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 on of any information about their location and condition to anyone likely to disturb it.

3.3.4 Further information is available in HSG227. Other HSE documents with these Regulations are L143 and INDG223.

3.4 CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS (COSHH)

3.4.1 These Regulations, which reinforce existing statutory obligations under Health and Safety at Work etc. Act (HSWA), impose a duty on employers to protect employees against risks to health, whether immediate or delayed, arising from exposure to substances hazardous to health, either used or encountered, as a result of a work activity. They also impose certain duties on employees.

3.4.2 Under COSHH, work is not to be carried out that is liable to expose employees to hazardous substances unless the employer has made a suitable and sufficient assessment of the risk created by the work and the steps that need to be taken to comply with these Regulations. After assessing the risk, it is necessary to inform employees of the risks and to carry out the appropriate training and instruction to ensure the risks are minimised. In certain cases, control measures such as ventilation or personal protective equipment may be necessary and, where provided, they are required to be used.

3.5 DANGEROUS SUBSTANCES AND EXPLOSIVE ATMOSPHERES REGULATIONS (DSEAR)

These Regulations 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. These Regulations also require the identification of pipelines and containers containing hazardous substances.

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

- L138
- INDG370.

3.6 ELECTRICITY AT WORK REGULATIONS

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

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They 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.

They 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: A "Memorandum of Guidance on the Electricity at Work Regulations, 1989" HSR25 is available from HSE.

3.7 GAS ACT

The Gas Act, as amended, places duties on either the GT, gas supplier or consumer for meters to be kept in proper order. These duties are to ensure a meter by which the quantity of gas supplied is registered, is in proper order for correctly registering the quantity of gas supplied.

The relevant schedule of the Gas Act dealing with these issues is Schedule 2B, an extract of which is given in Appendix 4.

3.8 GAS (CALCULATION OF THERMAL ENERGY) REGULATIONS

These Regulations provide for the calculation of thermal energy of gas conveyed by GTs to premises, or to pipelines operated by other GTs, on the basis of the calorific values and volumes of gas conveyed. The calorific values of the gas may be either determined by, or declared by, the GT in accordance with the Regulations. The metered gas volumes may be adjusted for the temperature, pressure and compressibility factor of the gas.

Regulation 2 paragraph 4(b) allows, by agreement between a GT and relevant licence holder or owner, or occupier of a particular premises; for the calculation of the energy conveyed to those premises to be determined by apparatus operated and maintained only for the purposes connected with the conveyance of gas to those premises, i.e. calorific value specific to that site.

Information on converting the actual volume measured into the volume at standard conditions, the methods of determining daily calorific values, and the calculation of thermal energy, is given in IGEM/GM/8 Part 1.

3.9 GAS (METERS) REGULATIONS

These Regulations prescribe the standards for diaphragm and non-diaphragm gas meters for UK national requirements. They prescribe leakage requirements for all gas meters and pressure absorption limits for diaphragm meters. The Regulations are silent on pressure absorption limits with respect to other technologies.

These Regulations also cover:

- the re-examination of disputed meters
- the periodic overhaul of meters
- meters not stamped by, or on the authority of, a meter examiner.

These Regulations also give powers to the Secretary of State to revoke any approval of pattern and construction which was granted under the Gas Act.

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These Regulations state the offences on suppliers for not overhauling meters in accordance with requirements and not replacing meters subject to a revocation of approval within a required period.

Note: Section 17 and Schedule 2B of the Gas Act 1986 (see Appendix 4), as amended, deals with the meter testing and stamping for gas meters used for ascertaining the quantity of gas supplied through pipes and limits the maximum flow rate, if measured at a temperature of 15°C and a pressure of 1013.25 mbar, to 1600 m^3 h^{-1}.

3.10 GAS SAFETY (INSTALLATION AND USE) REGULATIONS (GS(I&U)R)

3.10.1 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 flues.

Note: GS(I&U)R do not apply to factories, quarries and mines. However, the CoMCoP requires the principles of GS(I&U)R to be applied to meter installations in such premises.

3.10.2 GS(I&U)R define the type of work that requires persons carrying out such work, or their employers, to be an "approved class of person", i.e. Gas Safe registered.

3.10.3 The installer is required to check the safety of any meter installation they install or work on and take appropriate action where they find faults. Where the premises are let or hired out, the landlord or hirer has special responsibilities to ensure that any installer they use for the gas fitting, service or maintenance or safety is a member of an approved class of persons and is competent to carry out such work. If any serious fault is found, the installer is required to inform both the landlord/hirer, as well as the user, so that such faults can be rectified before further use.

3.11 GAS SAFETY (MANAGEMENT) REGULATIONS (GS(M)R)

3.11.1 GS(M)R place specific duties on GTs, or their emergency service providers (ESPs), for dealing with gas escapes from pipes on their network. Their primary duty is to make the situation safe. They 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.

3.11.2 The ESP has specific duties to:

- provide a continuously staffed and free telephone service to enable persons to report gas escapes and
- pass such reports on to the person who has the responsibility for dealing with the escape.

In addition, there are duties imposed on gas suppliers and GTs to notify the ESP should they, rather than the ESP, receive a report of an escape from the consumer.

3.11.3 GS(M)R require GTs to investigate fire and explosion incidents upstream of the ECV and to send a report of the investigation to HSE. GTs are also required to investigate fire and explosion incidents downstream of the ECV but this is limited to establishing whether the seat of the fire or explosion was in an appliance (and if so, which one) or in the installation pipework.

3.11.4 Responsibility for investigating RIDDOR reportable incidents (see Sub-Section 3.16) as a result of an escape of incomplete combustion, escape of gas or inadequate removal of products of combustion is placed on gas suppliers. HSE is required to be notified before such investigations commence.

Note: Advice on dealing with gas escapes is contained in IGEM/SR/29.

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3.12 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.

3.13 MANAGEMENT OF HEALTH AND SAFETY AT WORK REGULATIONS (MHSWR)

In addition to specific duties under GS(I&U)R (see Sub-Section 3.10) 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.

3.14 PRESSURE EQUIPMENT (SAFETY) REGULATIONS (PE(S)R)

These Regulations cover pressure equipment manufactured for a maximum allowable pressure greater than 0.5 bar. The Regulations deal with the manufacture, design and supply of pressure equipment. They impose duties on the responsible person.

Note: A "responsible person" is defined as "the manufacturer or his authorised representative established within the Community; or where neither the manufacturer nor his authorised representative is established within the Community, the person who places the pressure equipment or assembly on the market or puts it into use as the case may be."

"Pressure equipment" is defined as "vessels, piping, safety accessories and pressure accessories; where applicable, pressure equipment includes elements attached to pressurised parts, such as flanges, nozzles, couplings, supports, lifting lugs and similar."

The duties on the "responsible person" are to ensure that pressure equipment:

- satisfies the relevant essential requirements
- has undergone the relevant conformity assessment procedure, if applicable
- has had the UKCA or European Community (CE) mark affixed by the manufacturer, if applicable
- has had the declaration of conformity drawn up by the manufacturer that the equipment is, in fact, safe.

Note: Not all pressure equipment is covered by PER. There are 21 categories of exceptions, detailed in Schedule 1 of PER.

The relevant conformity assessment procedure is determined by the classification of the pressure equipment according to criteria laid down in these Regulations. The classification system results in equipment being placed in one of five categories depending on the inherent level of hazard within the system.

The category then determines the range of conformity assessment modules relevant to that equipment. The modules are designed to allow the manufacturer to choose between a quality assurance route or type testing.

3.15 PRESSURE SYSTEMS SAFETY REGULATIONS (PSSR)

3.15.1 These Regulations impose duties on designers, importers, suppliers, installers and user or owners to ensure that pressure systems do not give rise to danger. This is done by the correct design, installation and maintenance, provision of information, operation within safe operating limits and, where applicable, examination in accordance with a Written Scheme of Examination (WSoE) drawn up or approved by a competent person (as defined by PSSR).

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PSSR are applicable to pipelines and pressure systems comprising one or more pressure vessels and associated pipework where the pressure system MOP exceeds 0.5 barg. There are certain exceptions. For example, a pipeline of MOP not exceeding 2 barg (or 2.7 barg MIP if the nominal pressure does not exceed 2 barg and the overpressure is caused solely by the operation of a protective device) is excluded from the Regulations and pressure systems incorporating pressure vessels of MOP exceeding 0.5 barg where the product of the pressure and the internal volume is less than 250 bar litres are not required to comply with Regulations 5(4), 8 to 10 and 14.

A meter installation is, generally, installed downstream of the ECV that terminates the pipeline. However, for existing installations (legacy installations – see IGEM/G/1) exceptions may arise.

3.15.2 More information is available in L122 and some information is presented in the HSE free leaflets INDG261 and INDG178.

3.16 REPORTING OF INJURIES, DISEASES AND DANGEROUS OCCURRENCES REGULATIONS (RIDDOR)

3.16.1 RIDDOR require employers, self-employed people or those in control of work premises to report certain work related accidents, diseases and dangerous occurrences.

3.16.2 Other people have duties to report certain gas incidents which may not appear to be work related:

- death, major injury, lost consciousness, or being taken to hospital for treatment to an injury arising out of the distribution, filling, import or supply of NG are to be reported by the conveyor for NG and the filler, importer or supplier for Liquefied Petroleum Gas (LPG)
- dangerous gas fittings (as defined in RIDDOR) should be reported by a "member of a class of persons". Gas Safe registered engineers are to provide details of any gas appliances or fittings that they consider to be dangerous, to such an extent that people could die, lose consciousness or require hospital treatment. The danger could be due to the design, construction, installation, modification or servicing of that appliance or fitting, which could cause:
- an accidental leakage of gas
- incomplete combustion of gas or
- inadequate removal of products of the combustion of gas.

3.16.3 Major injuries, death and dangerous occurrences must be notified immediately, for example by telephone, to the enforcing authority by the "responsible person" as defined by RIDDOR. Reports can be made to the Incident Contact Centre:

- for fatal and major injuries only, telephone on 0345 300 9923 (opening hours Monday to Friday 8.30 am to 5 pm) and complete appropriate online form
- all other reports at HSE website www.hse.gov.uk.

  Complete the appropriate online report form listed below:

  - report an injury
  - report of a dangerous occurrence
  - report of an injury offshore
  - report of a dangerous occurrence offshore
  - report of a case of disease

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- report of a flammable gas incident
- report of a dangerous gas fitting.

3.16.4 The form will then be submitted directly to the RIDDOR database and a copy issued to the person making the report.

3.16.5 Online written reports are to be submitted within the required timescale (10 days, or 14 days for dangerous gas fittings). Other reports need to be made as soon as practicable and within 10 days of the incident.

3.16.6 INDG453 contains detailed guidance on RIDDOR, including a full list of injuries etc. that need reporting.

3.16.7 IGEM/GL/8 provides guidance on the reporting and investigation of gas-related incidents.

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SECTION 4 : GENERAL

4.1 GENERAL OBJECTIVES

The aims of operation and maintenance are to ensure that any meter installation:

- operates in a safe and environmentally sound manner
- offers sufficient reliability for the operating conditions within which it is used and will continue to operate until the next maintenance
- is in sound mechanical condition and operates at the appropriate set points
- is installed correctly
- provides a continued acceptable level of accuracy including, for instance, load changes
- data transmission system functions satisfactorily.

4.2 LEGAL OBLIGATIONS

4.2.1 General

Inspection is the process that ensures that the installation is suitable for further operation within the design or performance limits specified by the designer or competent person.

Reference shall be made to requirements under DSEAR (see Sub-Section 3.5).

4.2.2 Pressure Systems Safety Regulations

It shall be determined whether an installation is within the scope of PSSR and, if so, safe operating limits shall be specified and where required, a WSoE must be available prior to commissioning.

Where required, examination and inspection shall be carried out at the frequency within the WSoE and in accordance with written procedures.

4.2.3 Electricity at Work Regulations

4.2.3.1 The interval between safety inspections, maintenance and testing of electrical systems and equipment associated with, or in, hazardous areas should be no greater than two years. BS EN IEC 60079-17 allows for an extension of the maintenance and testing interval to three years, provided that a regular review of the results of the safety inspections, maintenance and tests can be produced that show that the condition of the electrical systems and equipment on site are to an acceptable standard.

The interval between safety inspections, maintenance and testing of all other electrical equipment and systems should be no greater than three years.

4.2.3.2 Comprehensive records shall be kept of safety inspections, maintenance and test visits.

4.2.3.3 Information from safety inspections, maintenance and tests shall be continually reviewed to determine appropriate future actions, for example replacement or increased inspection frequencies.

4.2.3.4 An appropriate inspection and testing regime should be applied to portable equipment and tools.

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4.3 GENERAL PRINCIPLES

4.3.1 A procedure shall be established for inspection and maintenance of any meter installation, to ensure a continued high level of reliability and that no unacceptable degradation in measurement accuracy or data transmission occurs with time.

4.3.2 Metering equipment should be maintained in accordance with the manufacturers' instructions.

4.3.3 Where required by the consumer, risk assessments and method statements shall be provided.

4.3.4 Before commencing any work, a safe operating procedure shall be established. Precautions shall be taken to ensure the atmosphere is safe before entering any housing or enclosure. Every door, cover, etc. should be secured in the open position to maximise ventilation and minimise the risk of creating a hazardous situation.

Note: In extreme cases, forced ventilation may be necessary. There may be a need to have breathing apparatus, safety lines, etc. available for use in an emergency, especially where access is restricted.

4.3.5 Operation and maintenance should be designed to maximise the availability of the associated gas supply. Contractual arrangements for gas supply, with third parties, should be taken into account.

4.3.6 The risks and consequences of failure associated with operating and maintaining a meter installation shall be considered from design, installation, commissioning and operation.

Note: The modes of failure associated with an installation will be governed largely by the plant design and the operating method used. Using this knowledge, in addition to a good maintenance history, an effective maintenance strategy can be devised to reduce the risk of failure to an acceptable level.

Consequences to be considered shall include failure to supply gas and damage to the downstream system by over-pressurisation, flow surges, etc.

Note: For new plant, or in the absence of any operational or maintenance history, it may be desirable to use manufacturers' recommendations as the initial basis for all maintenance activities. Normally, plant history will be gained, over time, from operational/maintenance data or may be gained from experience of similar equipment/installations.

4.3.7 Any organisation carrying out maintenance of a meter installation shall have the requisite knowledge, skills, experience and resources to ensure that maintenance is undertaken competently and safely.

This may be satisfied by allocating responsibilities and work activities to managers, responsible engineers and other personnel within the organisation and by the proper use of contracted personnel. All personnel shall be trained and competent in the appropriate skills and procedures necessary to carry out their duties and be an "approved class of persons" where required (see clause 3.10.2 and the CoMCoP).

4.3.8 The frequency of inspection/calibration should be based on the required system accuracy, the meter performance and any changes to the process parameters, for example gas composition or load changes.

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4.4 MAINTENANCE PHILOSOPHIES

4.4.1 Introduction

4.4.1.1 It is recognised that a number of different maintenance philosophies are available. A structured decision-making process should be used to identify the optimum maintenance regime.

It should be recognised that the optimum maintenance requirements are dependent on a number of factors, including the operating conditions, duty and consequences of failure.

Note: For example, an active regulator in the working stream of a twin stream installation, located in an enclosure, may have different maintenance requirements to that of a similar regulator serving as the monitor in a standby stream located in a harsh external environment.

4.4.2 Selection of maintenance philosophy

4.4.2.1 The maintenance regime should follow an approach which utilises any one or a combination of philosophies, such as:

- maintenance at regular intervals
- breakdown maintenance
- condition-based maintenance.

Note 1: An approach may be applied to:
- *all installations or all installations of a certain type*
- *individual installations*
- *certain equipment types of installations etc.*

Note 2: An overall philosophy may be adopted for maintenance but, within that philosophy, there may be different approaches for different parts of the installation or equipment types, for example:
- *installation as a whole – regular interval maintenance programme*
- *slam-shut valves (SSVs), regulators and relief valves – major scheduled maintenance, for example annually*
- *valves – scheduled lubrication but, otherwise, breakdown maintenance*
- *filters elements/baskets – condition monitoring, for example filter differential pressure with alarms*
- *maintenance as required by manufacturers' instructions for valves, regulators, meters etc.*

Some advantages and disadvantages of these philosophies are shown in Table 1.

4.4.2.2 When selecting the overall maintenance philosophy, the following list details typical factors that shall be taken into consideration:

Note: This list is not exhaustive and other items not listed may be important to specific installations.

- duty of equipment and consequences of failure e.g. continuity of supply, pressure control and overpressure protection
- inspection and maintenance of equipment certified for use in a hazardous area has to be carried out in accordance with the certification requirements and take account of manufacturers' instructions and any relevant standards.

Documentation and records need to be kept to allow such equipment to be maintained in accordance with its type of protection.

- inspection-frequency for installations where the hazardous area classification is determined in accordance with BS EN 60079, IGEM/SR/25 or IGEM/GM/7B
- regular inspection and confirmation of the operation of any data transmission chain has to be undertaken in accordance with IGEM/GM/7A
- any manufacturers' requirement for regular maintenance, for example the checking of oil level on RD meters

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- validation, calibration or recertification of any instrumentation associated with the meter installation, which may include such instruments as:
  - the meter
  - differential pressure transmitters

    Note: Zero checks may need to be made more frequently.

  - pressure transmitters
  - temperature measuring instruments
  - density measuring instruments

    Note: Density transducers have to be calibrated by the manufacturer or by an approved laboratory and at frequencies as given in IGE/GM/4.

  - flow computers or conversion systems
  - gas chromatographs.

Additional information is given in IGE/GM/4 and IGEM/GM/5.

Note: The frequency of maintenance of the instruments depends upon the accuracy of measurement required, instrument type and any special contractual arrangement.

4.4.3 Maintenance at regular intervals

If maintenance at regular intervals is selected, the following procedures apply.

4.4.3.1 The installation should be visited at pre-set intervals. All components should be functionally checked, cleaned, repaired or replaced as required.

Note: The period between overhaul and inspection may be varied according to the requirements of the system, experience gained locally and manufacturers' specific recommendations (particularly with reference to elastomeric components). Dust burden, gas humidity and abnormal chemical constituents, and chemical additives used in the treatment of Network pipelines are factors that may adversely affect sealing materials and elastomeric components. All these factors have a direct bearing on the frequency of maintenance.

4.4.3.2 Records of an installation's performance, as indicated by data loggers, gauges, switching of duty streams or operation of monitor devices etc., should be examined to identify any malfunction or deterioration in performance.

Note: Inspection covers may need to be removed to look for the accumulation of dust and fine matter.

4.4.3.3 Where scheduled replacement of regulator components is undertaken, the working and standby components should be replaced at staggered intervals to minimise the likelihood of coincidental failure of components.

4.4.4 Breakdown maintenance

This philosophy should be adopted only after consideration of the consequences of failure of the whole installation or individual components.

4.4.5 Condition-based maintenance

The condition of the whole installation or individual components should be assessed, in order to determine the optimum time to replace/repair components. Operational parameters should be monitored regularly by local inspection, or remotely by telemetry, for signs of deterioration.

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PHILOSOPHY	ADVANTAGES	DISADVANTAGES
Maintenance at regular intervals	Ease of planning and management of resources, for example personnel and spares. Manufacturers' recommendations are usually available to immediately set up a maintenance regime. Opportunity to build up an operational history of plant and equipment fairly quickly.	Difficult to establish optimum interval between maintenance/overhaul – needs considerable operational data and experience. Potentially wasteful – parts replaced without reference to their actual condition. May not take into account nature of duty, variations in loading of plant and equipment – may fail before next scheduled maintenance under arduous duty. Potentially greater risk of failure because plant and equipment are regularly "disturbed".
Breakdown maintenance	Less unnecessary disturbance of plant and equipment. Potential savings in spares replacement costs.	Requires very careful assessment of consequences of breakdown. Potentially higher risk of loss to supply unless high reliability of standby plant and equipment. Difficult to manage resources due to unpredictability and location of failures.
Condition-based maintenance	Components only replaced when needed i.e. life is maximised. Number of failures can be minimised. Time is gained to organise personnel and materials to carry out maintenance. Repairs can be planned to ensure minimum disruption to the gas supply. Potential to monitor for wear and early failures.	Changes in parameters need to be present and detectable. The rate of deterioration needs to be sufficiently slow to allow detection before failure. Failure characteristics of equipment are required. Extensive historical data on failures is required.

TABLE 1 - MAINTENANCE PHILOSOPHIES – SOME ADVANTAGES AND DISADVANTAGES

4.5 MAINTENANCE REVIEW

4.5.1 The maintenance programme should be reviewed periodically to ensure the maintenance philosophy is effective. Plant history will form a major part of the data required to inform decision making and justify changes to existing maintenance practices.

The review should be carried out at an interval not exceeding 3 years or upon a major change of circumstances if sooner.

4.6 SITE MANUAL

Where a site manual has been provided this should be complied with and kept up-to-date (see IGEM/GM/8 Part 3 for the required contents of such a manual).

4.7 COMMUNICATIONS

Arrangements shall be made for good communication between maintenance personnel, consumers, and control centres, at all levels, in order to deal with routine, non-routine and emergency operations.

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4.8 EMERGENCY ARRANGEMENTS IN THE EVENT OF A GAS ESCAPE OR A DANGEROUS SITUATION

Emergency arrangements must be in place to:

- ensure the safety of the public and personnel
- prevent damage to the installation and other property
- minimise the extent and effects of the emergency
- contact the ESP.

Reference shall be made to Appendix 3 and the Gas Industry Unsafe Situations Procedure (GIUSP) IGEM/G/11.

4.9 EMERGENCY ARRANGEMENTS IN THE EVENT OF A FAILURE OF GAS SUPPLY OR A MAJOR FAULT

4.9.1 Suitable emergency arrangements should be prepared and kept updated for the guidance of all personnel connected with the operation and maintenance of a meter installation in the event of the urgent need to respond to a failure of gas supply or a major fault.

The arrangements should cover the reasonably foreseeable emergency situations arising from the supply of gas to or from the installation, or resulting from leakage. They should detail the arrangements for alerting other persons who may be affected by an emergency situation.

4.9.2 The organisation of routine work and the provision of communications should be such that sufficient relevant additional personnel can be alerted and immediately dispatched to the installation(s) concerned, in the event of a situation arising.

4.9.3 Arrangements should be in place to cover situations arising outside normal working hours and should include procedures for calling out personnel.

4.9.4 Periodic tests or exercises should be carried out to confirm the effectiveness of the arrangements.

4.9.5 Arrangements should be reviewed, and amended as necessary, as a result of testing and of any practical experience gained during real situations.

In the event of an upstream gas supply failure, arrangements should be clear as to how to contact the ESP.

4.10 SYSTEMS OF WORK

4.10.1 An operation and maintenance regime shall be in place.

4.10.2 Installations shall be categorised according to the risk presented.

Note: Elements typically contributing to higher risk systems include:

- *MOP_u exceeding 2 bar*
- *large capacity (Q_{imax})*
- *design not complying with IGEM/GM/8 Part 1*
- *unsteady flow conditions*
- *large difference in the installation inlet and outlet system pressures*
- *installations supplying large industrial, or otherwise sensitive, end users, without an alternative fuel supply*
- *complex installations, for example where flow computers, telemetry etc. are included.*

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Elements typically contributing to low risk systems include:

- *small capacity (Q_{imax})*
- *steady flow conditions*
- *design complying with IGEM/GM/8 Part 1*
- *small difference in the installation inlet and outlet pressures*
- *simple installations of MOP not exceeding 2 bar.*

4.10.3 Any risk created by any undertaking and/or work practices should be assessed to identify the measures that may be needed to eliminate them or to reduce them to as low as reasonably practicable as well as to comply with duties under health and safety law. The following steps should be incorporated in any risk assessment:

- identify the hazard
- decide who may be affected by work activities
- evaluate the risks and decide on whether existing measures are adequate or if additional measures are required to reduce the risks
- record the findings and implement them
- review the assessment from time to time and revise as necessary.

Note: Further guidance may be found in INDG163 and IGEM/G/7.

A record of the risk assessment should be retained.

4.10.4 Job instructions should be used to control all work activities with suitably referenced Permits to Work when required (see IGEM/GL/6 for advice on Permits to Work).

Routine work should be carried out by maintenance personnel or others without the necessity for on-site supervision or additional instructions.

Note: Examples of this kind of work include:

- *functionally checking the equipment*
- *changing or cleaning filter elements*
- *changing set points*
- *changing over working and standby regulator streams*
- *de-commissioning and maintaining equipment*
- *testing and re-commissioning equipment after maintenance.*

The instructions should clearly define the task to be undertaken and make necessary reference to relevant maintenance procedures and instructions.

The system of work should have provision for reporting the results of findings of work activities and for reporting the completion of a task.

A formal procedure should be established for the issue and control of job instructions.

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4.11 ARRIVAL ON SITE AND BEFORE STARTING WORK

4.11.1 On arrival on site, the following actions shall be carried out in a safe and professional manner:

- report to the appropriate consumer, or their representative and notify them of presence on site, purpose of the visit, duration of the work and implications on the gas supply
- undertake any site safety induction required and, while on site, comply with any site-specific safety requirements advised by the consumer and/or MAM
- identify the location of the correct meter installation and obtain any key(s) required to gain access
- park any vehicle in a safe area, with consideration to other road/site users
- in the event of a smell of gas, take appropriate action (see Appendix 3)
- gain familiarity with the installation location and its surroundings and identify the means of access/egress. Note any local instructions and specific hazards which need to be taken into consideration during the site visit, for example low overhead cables.

4.11.2 Appropriate personal protective equipment must be worn at all times when undertaking work on site.

4.11.3 Before starting work, the following steps shall be taken, where applicable:

- carry out a site-specific risk assessment
- take all necessary precautions as identified in the Operations Procedure, for example by not taking equipment that may be a potential ignition source into a hazardous area
- open all meter housing doors/compound gates and ensure they are held securely in the open position and that they are clear, so allowing safe access/egress in an emergency
- check that ventilation is adequate – where it is inadequate (see IGE/GM/8 Part 2) notify the owner in writing
- enter the date and time of the visit in the site log book and notify appropriate parties of your presence on site, for example where instrumentation outputs and/or alarms are telemetered
- undertake the following:
  - check that any by-pass valve is closed and appropriately sealed
  - check that any official meteorological meter seal is intact
  - check that regulator and associated safety device seals are intact.
  - reading from the meter and any converter
  - inspect the meter and associated installation for evidence of tampering
  - inspect the meter and associated installation for any evidence that the meter has not continuously been in position for the purpose of registering the quantity of gas supplied
  - inspect the meter for any evidence of deterioration that might affect its function or safety

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SECTION 5 : OPERATIONAL CHECKS

5.1 GENERAL

5.1.1 Undertaking functional checks on pressure regulating equipment requires the breaking of AMI seals and as such can only be undertaken by the GT or a person authorised by the GT i.e. the party undertaking the work are required to have a valid GT authorisation in place see GDN/PM/GT2.

5.1.2 Functional checks on the filter, slam-shut and creep relief cannot be undertaken without isolating the regulator stream. On all but the smallest of metering installations steps shall be taken to ensure that the consumer's system can be maintained at a positive pressure.

For example, on single stream installations this can be achieved through the use of bottled gas or a temporary by-pass.

Any temporary by-pass, that by-passes the main stream regulator(s) or safety system(s) shall have similar regulating and safety systems as the main stream to protect the downstream system.

5.1.3 Pipework should be checked to ensure it carries no electrical voltage, for example by using a "volt stick" or similar device. Where a voltage is detected, a full inspection shall be undertaken by a qualified electrical engineer.

5.1.4 Before performing any work, a sight, sound and, if odorised gas is used, smell check, shall be carried out for any signs of gas escape or evidence of tampering with the meter installation, the service (pipe), the meter and other installation seals. If there is any evidence of signs of tampering or any damage to any of the seals, reference should be made to Sub-Section 4.6.

Note: Meters approved and badged in the UK will have official Gas and Oil Measurement Branch (GOMB), Measuring Instruments Directive (MID), OFGAS or Ofgem meter seals and such seals can only be replaced by a Meter Examiner. The continued use of a meter with damaged/missing seals is illegal for flow rates not exceeding 1600 $m^3 h^{-1}$ std and the meter may have to be replaced.

5.1.5 Valve movement shall be checked prior to commencement of work, for example, if safe to do so, by partially opening or partially closing.

5.1.6 Where there is no permanent continuity bond or insulated joint, a temporary continuity bond shall be fitted prior to disconnection of any component or pipework.

The cable used shall have a minimum cross section of 10 mm^2 and be insulated.

A gas free check shall be undertaken and the vicinity made safe before any temporary bond is made. The temporary bond shall be left in place until the pipework or component is replaced and reconnected.

5.1.7 Where filters, separators or pipework are fitted with drainage valves or systems, any liquids present shall be removed.

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5.1.8 Checks should include:

- visual checks of the general condition and security of the installation
- flow rates and operating pressures to check that the installation, including secondary instrumentation, is operating within the design constraints

  Note: Excessive pressure variations downstream of the meter, in response to a load change, indicate that this type or size of meter and/or regulator may not be appropriate for the load.

  This includes checking the differential pressures across filters.

- the correct functioning of any data transmission chain for which the meter installation operator is responsible
- checking the metering pressure to ensure it has not drifted outside the limits given in Table 2 or Table 3, as appropriate. If it has, the regulator should be re-set to give the correct metering pressure.

  Note: An excessive drift in metering pressure indicates that the regulator requires maintenance.

METER INLET PRESSURE	CONTROL ACCURACY
≥ 21 mbar ≤ 100 mbar	± 7.5% (gauge) preferred ± 10.0% (gauge) limit*[2]
> 100 mbar ≤ 38 bar	± 1% (absolute)

Note 1: The flow range is from 5% Q_{imax} to 100% Q_{max}.

*Note *2: When the 10% gauge limit is applied, due regard needs to be paid to ensuring minimum required delivery pressure to downstream appliances.*

TABLE 2 - CONTROL ACCURACY OF METER INLET PRESSURE (WITH FIXED FACTOR CONVERSION)

METER INLET PRESSURE	CONTROL ACCURACY
≥ 21 mbar ≤ 100 mbar	± 7.5% (gauge) preferred ± 10% (gauge) limit*[2]
> 100 mbar ≤ 350 mbar	± 5% (gauge)
> 350 mbar ≤ 38 bar	± 2.5% (gauge)

Note 1: The flow range is from to 5% Q_{imax} to 100% Q_{imax} .

*Note *2: When the regulator set pressure not exceeding 75 mbar and when the 10% gauge limit is applied, due regard needs to be paid to ensuring minimum required delivery pressure to downstream appliances.*

TABLE 3 - CONTROL ACCURACY OF METER INLET PRESSURE (WITH AUTOMATIC VOLUME CONVERSION)

5.2 MAXIMUM PRESSURE LOSS AGAINST A CLEAN FILTER/STRAINER

5.2.1 Problems with excessive pressure drop are often caused by obstructed filters/strainers and the following procedure shall be used to check their performance, when necessary.

5.2.2 The differential pressure loss across any filter or strainer shall be checked, at a measured flow rate.

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5.2.3 In general, the condition of a filter can be determined by measuring the differential pressure (ΔP). Where ΔP is found to be excessive when compared with the allowable ΔP for the installation, the filter element or strainer should be removed from the line, cleaned or replaced, and reinstated.

Note: It is important, when removing the strainer or filter element, that any collected debris does not fall into, and remain in, the pipe.

In general, ΔP across a clean extraction system will have been designed to not exceed the values given in Table 3 of IGEM/GM/8 Part 1. However, the allowable ΔP for an installation will take into account a number of operating factors and should be determined by the installation designer/MAM.

When the installation is not passing Q_{imax}, the following formula can be used to determine the maximum allowable ΔP for that flow rate.

ΔP_m is not greater than $\Delta P_{Qimax} \left[\frac{C_{max}}{Q_{imax}} \right]^2$ mbar.

For MOP not exceeding 75 mbar, ΔP at Q_{imax} for a dirty filter normally would not be expected to exceed 0.9 mbar. For higher MOP, the MAM/manufacturer should be consulted.

5.3 FUNCTIONAL TESTS FOR REGULATORS AND SAFETY DEVICES

5.3.1 The purpose of a functional test is to provide evidence that equipment is in working order. For example, SSVs, monitor regulators, relief valves and duplicate streams should respond at their set point (SP) pressure. One method of carrying this out is to use a portable test rig to raise the sensing pressure to the set point.

5.3.2 Functional tests should be carried out on any installation safety devices.

Note: They may be carried out on other equipment, dependent upon the maintenance strategy.

5.3.3 If functional tests are to be performed to ensure continuity of supply and/or to prevent system overpressurisation, Table 4 should be applied.

TYPE OF REGULATOR INSTALLATION	FUNCTIONAL TESTING (check operation of)	
	CONTINUITY OF SUPPLY	OVERPRESSURISATION
Active and SSV	• standby stream and working stream creep relief valve • working and standby stream protection • stream discrimination device (where fitted).	• working stream relief valve • working stream SSV • standby stream relief valve • standby stream SSV.
Monitor/active and SSV	• standby stream and working stream creep relief valve • working stream and standby stream protection (where fitted) • stream discrimination device (where fitted).	• working stream monitor regulator • working stream relief valve • working stream SSV • standby stream monitor regulator • standby stream relief valve • standby stream SSV.

TABLE 4 - FUNCTIONAL TESTS

5.3.4 Wherever possible, tests should be carried out in such a way as to simulate (in a safe and controlled manner) a component malfunction. For example, the operation of a standby stream should be proved by lowering the SP of the working stream until the standby stream takes control.

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5.3.5 If as a result of other checks being carried out, zero flow is achieved the lock up and let by of the active regulator should be checked (e.g. for installations where MOP_u not exceeding 75 mbar).

5.4 METERS

5.4.1 General (Diaphragm/RD/Turbine)

5.4.1.1 Meters shall be examined for signs of faulty operation such as excessive noise, or irregular index movement, and for evidence of corrosion or other damage.

5.4.1.2 Any meter that requires periodic oiling, or oil level checks/changes, should be lubricated in accordance with manufacturers' recommendations.

5.4.1.3 If the operation of a meter is suspect, ΔP should be compared with that of the meter as new for the same flow rate.

Note 1: A significant increase in ΔP across the meter indicates the existence of a mechanical fault or an obstruction.

Note 2: Wide pressure variations occurring downstream of an RD meter in response to a load change, indicate that the type or size of meter and/or regulator may not be appropriate for the load.

5.4.1.4 When the operation of a meter is suspect, it should be removed from the line for inspection.

Note 1: The removal of a meter requires the installation to be left in a safe condition which may involve one of the following:

- *if a by-pass is provided, the installation may be left operating on by-pass (but refer to IGEM/GM/8 Part 1 for design requirements for the by-pass)*
- *the meter may be replaced by a spool piece*
- *the meter may be replaced by a substitute meter*
- *the installation may be turned off and made safe (with or without provision being made for maintaining a positive pressure in the downstream system)*

The option chosen may be dictated by local site conditions and may need to be discussed with the gas supplier.

Note 2: Where a turbine meter is fitted with a high frequency (HF) pulse output that utilises blade sensors, the output may be used to verify the condition of the turbine wheel.

5.5 MULTI-PATH USMs

5.5.1 Inspections of any USM should be undertaken on a regular basis, the frequency of which will be dependent on local conditions.

5.5.2 An inspection should consist of checks of the electronics, in particular the accuracy of timing, undertaking diagnostic checks using the manufacturers' software, verifying the S-N ratios etc.

Note 1: Multi-path USMs embody ongoing self diagnostics. Therefore, USMs need not necessarily be removed from the line for routine inspection or after a flow disturbance, but can be examined in-situ with either the meter run vented down and purged or under live conditions with the meter pressurised and with gas flowing.

Note 2: Several main diagnostic methods are used. Principally, these are manufacturer supplied software packages that interrogate the meter electronics, looking for unexpected changes in automatic gain levels, transducer performance and deviations in the velocity of sound footprint. The detection and recording of these parameters can form the basis of an on-line validation programme which can determine the time scale of any meter revalidation at a flow-testing laboratory.

Note 3: As part of such an on-line validation programme, the alarm status of many parameters can be monitored by either the stream flow computer or associated data-gathering supervisory system.

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5.5.3 Where a meter shows evidence of accumulated contamination, the cause should be investigated and if necessary more frequent inspections than would normally be the case should be carried out.

5.5.4 Where an inspection indicates that a USM no longer complies with the accuracy requirements, and remedial action cannot redeem the situation, it should be removed from the tube. It should then be recertified or taken out of service permanently.

5.6 THERMAL MASS AND SMALL USMs

5.7 VALVES

The means of operation of any valve should be checked, for example for corrosion or distortion of the spindle. If considered necessary, the valve shall be checked to ensure it will operate by turning by a small amount, then re-opening i.e. without reducing the flow. If the valve will not operate, remedial action shall be taken.

Where a valve is closed for the purpose of completing a functional check, it shall be checked for let-by.

Where required, routine lubrication of valves should be carried out in accordance with the manufacturer's instructions.

Where a meter by-pass valve (MBV) is fitted, a visual check shall be made to ensure the valve is sealed in the closed position and that the seal is undamaged.

5.8 STREAM DISCRIMINATION SYSTEM

Any stream discrimination system should be tested for operation.

5.9 SECONDARY INSTRUMENTS

5.9.1 General

Any pressure or temperature gauges should be checked for general condition and operation.

5.9.2 Volume conversion systems

The maintenance of any electronic conversion system, including pressure and temperature transmitters, shall be in accordance with IGEM/GM/5.

5.9.3 Flow computers

Reference should be made to IGEM/GM/4.

Prior to the start of tests, the constants entered in any flow computer should be recorded and checked.

Checks should be carried out on the following:

- analogue to digital conversion
- frequency inputs
- RTD temperature input
- digital to analogue conversion

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- calculation of density from live input
- calculation of relative density from live input
- calculation of density, relative density and calorific value from the gas composition
- calculation of flow rate
- calculation of flow totals
- deployment of fixed factors
- active selected determination methods
- unit conversion
- DP switchover
- action upon instrument failure
- alarm generation
- communication including HART, Modbus, Ethernet.

Note 1: It may be possible to undertake a test which checks a number of these parameters at the same time.

Note 2: Although primarily for volume conversion devices, some useful further guidance is available in IGEM/GM/5.

Following the completion of tests upon a flow computer, the operator should:

- reinstate and confirm that all fixed values entered to undertake the tests have been removed
- cross check the configuration with the master record
- capture and electronically save the configuration for traceability and backup purposes.

5.9.4 Density transducers

Any vibrating element density meter should be isolated from the main pipework by means of isolation valves in the sample lines and tested in-situ. The meter should be calibrated at its anticipated operating conditions i.e. simultaneously at temperature and pressure, using one or more transfer fluids, the density of which has been determined across the required temperature and pressure range. The time period of the density transducer output signal should be measured by a certified timer counter. The measured time period should agree, within limits, with the value stated on the manufacturers' calibration certificate. The condition of any thermal lagging/insulation should be checked and replaced if necessary.

Note: For practical applications, it may be difficult to carry out this test to achieve the required uncertainty in the field. The meter may be removed from site (for calibration on a manufacturers factory or at independent test rig) and replacing it with a pre-calibrated unit.

5.9.5 Gas chromatographs

Any gas chromatograph should automatically perform a daily calibration or verification, using a calibration gas prepared gravimetrically or a standard gas similar to the process gas which is traceable to national standards. Reference should be made to IGEM/GM/4.

Other devices should be maintained in accordance with manufacturers' instructions.

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5.9.6 **Pre-heat systems**

A schedule of inspection, functional checks and maintenance shall be established, dependant on the criticality of the system, for all elements of any pre-heating system, this should include where appropriate and for example:

- water bath heaters, shell and tube heat exchangers and electric heaters
- gas boiler systems
- heater control systems
- safety systems, cut-offs, bursting discs and other protective devices
- emission control systems and combustion gas analysis
- corrosion inhibitors and anti-freeze additives
- water levels
- power supplies.

5.10 PIPEWORK AND COMPONENTS/FRAMEWORK ETC.

A visual check of the paintwork and protective coating for all pipework, components, framework, support structures, etc. shall be made. If the paintwork/coating is damaged but the gas carrying components/framework/ support structure is unaffected, the protection should be re-applied in an appropriate manner. Where the components etc. are affected by gouging, denting, pitting or flaking corrosion, expert advice should be sought to determine the remedial action necessary.

5.11 DUCTS AND PIPEWORK

5.11.1 Ducts and pipework shall be periodically checked for signs of damage or corrosion, with particular attention being paid to areas of contact between pipework and supports, and penetration points of ductwork and ducting in channels.

5.11.2 Backfill in ductwork should be checked to ensure satisfactory coverage.

5.11.3 Inspection panels in ductwork should be checked for ease of removal and any debris removed.

5.11.4 Ductwork carrying plastic pipe or wiring should be checked for any signs of vermin damage or infestation.

5.11.5 Any pipework insulation or lagging shall be checked for integrity and damage, in particular with regards to potentially increased noise levels and internal corrosion.

5.11.6 Action shall be taken to rectify any deficiency from the above as soon as practicable.

5.12 CATHODIC PROTECTION (CP) SYSTEMS

5.12.1 The continued effectiveness of a CP system is dependent on a satisfactory level of monitoring and maintenance and should form part of an installation's management system.

5.12.2 Due regard should be taken of the possible ageing effects on the pipework coating system and on locations where the integrity of the CP system could become increasingly vulnerable.

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The frequency of monitoring the continuing suitability of the representative test locations should be reviewed periodically and altered as required.

Note: Suitable procedures are given in BS EN 13636. The following routine might be considered appropriate. However, it is recognised that some smaller installations need not be subject to such a rigorous routine:

- *for sacrificial anode systems, pipe and soil potentials, check 6 monthly at representative points and points of low level protection*
- *for impressed current systems, a monthly status check to establish that the CP system power source(s) is/are functioning within limits previously shown to give the required degree of protection throughout the system. Checks may also be made on the integrity and accessibility of the means of isolation*
- *measuring pipe to soil potentials and examining surface components to such a schedule that, in general, all points considered to be critical to the effectiveness of the system are checked annually*
- *after the commissioning period, and where practicable, carry out a close interval polarised potential survey over the total length of buried pipework within the installation and thereafter at intervals not exceeding 10 years.*

5.13 SITE FENCING, COMPOUNDS AND HOUSINGS

5.13.1 Periodic checks shall be made of the following general conditions. Where these checks reveal a deficiency, action shall be taken to either rectify the deficiency as soon as practicable or to report the deficiency to the responsible party, for example the MAM or consumer, as appropriate.

The checks shall include:

- that site security has not been compromised. Any evidence of unauthorised access shall be reported
- that access and exit doors, gates and panels operate satisfactorily and are not obstructed. Any required lubrication of locks, hinges, rollers, runners, etc. shall be in accordance with the manufacturer's instructions
- that fencing is in a safe condition, and that its material has not suffered excessive damage or corrosion
- that surrounding foliage and trees do not encroach into hazardous areas and are unlikely to damage pipework components or support structures
- that areas within any compound/housing are clear of weeds etc. and rubbish
- that the general condition of any housing remains acceptable, including any damage/defacement caused by vandalism
- that there has been no intrusion into any compound/housing by recent civil works or overhead cables, for example cables encroaching into the hazardous area surrounding vent stacks
- that any air ventilation systems are clear and unobstructed.

5.13.2 Periodic checks shall be made of the following specific aspects of a meter installation. Where these checks reveal a deficiency, action shall be taken to rectify as detailed:

- that all required notices and labels (see IGEM/GM/8 Part 5) are in place, legible and not obscured. Any information on these notices and labels that becomes inaccurate as a result of a maintenance visit, or which is apparent following work on a previous visit, shall be updated and missing/obstructed/ illegible notices and labels shall be provided/unobstructed/made legible as required
- that any walkway can be used safely. Any significant damage shall be repaired before using the walkway
- that any pest control measures remain effective. If necessary, the measures shall be renewed
- that any leak detection and fire fighting equipment, for example a fire extinguisher, is undamaged and within certificated expiry dates.

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- that any ventilation grille or duct is cleared of any debris or other construction
- that any earthing pit/rod is undamaged
- that any lighting functions correctly and is in a good general condition
- that any explosion relief is unobstructed. A visual check of the restraining mechanism shall be made. Any recommended lubrication shall be applied
- that any other equipment associated with the meter installation is visually checked for general condition and any damage which could give rise to doubt about its continued satisfactory operation, for example solar panels
- that all necessary signs, operating handles and keys intended to be in the housing/compound are in place.

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SECTION 6 : RECORDS

6.1 Detailed technical, operational and maintenance records shall be maintained.

6.2 Any change or modification to a meter installation shall be recorded and, where appropriate, reference shall be made to IGEM/GL/5.

6.3 All maintenance work, diagnostic checks and functional tests, together with any replacement parts fitted to individual items of equipment, shall be recorded.

6.4 A record of all inspections and work programmes should be maintained and filed. In addition, whenever a meter by-pass valve has been opened or closed, the relevant meter and volume conversion system readings shall be recorded and submitted to the gas supplier.

6.5 Data arising from maintenance visits, breakdowns or other fault conditions should be recorded and processed to allow statistical assessment of the defect rate of the system or items of equipment.

Note: The results of such analysis may be valuable in determining the maintenance periods, levels of maintenance and in improving the specification and application of equipment.

6.6 Data may be stored and retrieved using a variety of forms, such as paper systems or electronically. The most appropriate system shall be selected.

Note: Computer-aided records are recommended as they can be used readily to provide information analysis and facilities such as:

- *work and material schedules*
- *automated job sheets*
- *tighter spares stock control*
- *identification of repetitive fault conditions and other trends.*

A suitable back-up system should be provided for records of critical aspects of maintenance.

6.7 Operational settings of adjustable equipment should be recorded centrally and, where reasonably practicable, should also be displayed at each installation. Such settings include:

- current set points for pressure or flow and the date when set
- for remotely-controlled installations, the range of the pressure or flow parameters
- SP of SSVs and relief valves and the date when last proved
- alarm settings (where telemetry is installed).

Note: With the exception of a stream changeover the set points have to reflect those on the GT authorisation, any change to set points will require a new GT authorisation to be obtained.

6.8 Procedures for updating both technical and operational records should be in place, including central records supplied for reference to technical and operational personnel.

Note: Statutory records may be required for the following:

- *breathing apparatus*
- *fire fighting equipment*
- *lifting gear*
- *electrical equipment*
- *air cylinders.*

6.9 Any deficiency or omissions from the above shall be reported to the MAM for appropriate action.

6.10 Where applicable, under PSSR, a WSoE shall be maintained (see clause 4.2.2).

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SECTION 7 : REPLACEMENT/UPDATING AND REMOVAL OF METERS/ METER INSTALLATIONS

This Section has been written to cover the situation where a MAM has identified the need to replace or upgrade part or all of one of their meter installations. Where a replacement is being undertaken as a result of a change of ownership, the requirements of the REC CoMCoP to replace the whole meter installation have to be complied with.

7.1 Before commencing replacement or updating work, the installation should be surveyed for compliance with current standards, to enable updating work to be determined and incorporated into planned work.

7.2 Where the installation does not meet this Standard but meets the requirements of previous Standards, consideration shall be given to updating to IGEM/GM/8 Part 3 or making improvements as far as reasonably practicable.

7.3 For installations complying with this Standard, component parts should be replaced with like for like components to ensure the overall performance of the installation is not compromised. Where a like for like exchange is not possible, the design and performance of the new components shall be assessed to ensure that the modified installation is capable of achieving the required performance.

7.4 If the load has changed significantly, the suitability of the installation with regard to accuracy and pressure control should be assessed. Where regulator or meter sizes are to be changed, the installation should be redesigned to ensure compliance with this Standard.

Note: If redesigning the installation the appropriate authorisations and accreditation will be required.

7.5 Prior to commencing any work, appropriate safety checks shall be undertaken to ensure a safe working environment.

7.6 Pipework should be checked for the presence of stray electrical voltage, for example by using a "Voltstick" or similar device. Where a voltage is detected, the consumer should be informed, and a full inspection shall be undertaken by a qualified electrical engineer.

7.7 A check for gas presence shall be undertaken and the vicinity made safe before any temporary bond is made.

A temporary continuity bond shall be fitted prior to disconnection of any component or pipework and left in place until either the pipework or component is replaced and reconnected or a permanent continuity bond is fitted.

Any cable used shall have a minimum cross section of 10 mm^2 and be insulated.

Where insulating joints are deliberately incorporated anywhere in the installation, for example Protective Multiple Earthing (PME) insulators or CP insulators, temporary bonding shall not produce a bond around any such joint.

Note: Many flange adapters have elastomeric sealing rings and, therefore, they may not provide electrical continuity.

7.8 Appropriate end closures shall be fitted to the remaining pipework, including any decommissioned pipework.

7.9 A check shall be made that the required ECV is present and that it operates correctly. If an ECV is not present, or if it does not operate correctly, work shall not be started. The GT shall be notified so that an ECV may be installed, replaced or repaired as appropriate.

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7.10 If the consumers pipework is to be depressurised, before commencing work, a tightness test shall be carried out and the result recorded in accordance with IGE/UP/1, IGE/UP/1A, IGEM/UP/1B or IGEM/UP/1C, as appropriate.

7.11 If the test fails, remedial action should be agreed with the consumer.

7.12 Before commencing work, the meter installation shall be isolated from the upstream Network supply pipeline and purged in accordance with IGE/UP/1, IGE/UP/1A, IGEM/UP/1B or IGEM/UP/1C, as appropriate.

7.13 Whenever possible, pipes should be disconnected and removed to a safe place before being flame cut or welded.

The dismantled installation/removed meter/component shall be left in a safe condition and all remaining pipework capped at all open ends. The ECV and the inlet to any remaining installation pipework shall also be capped. Arrangements shall be made for redundant installation pipework to be de-commissioned.

For installations where:

a) the consumer's pipework was already disconnected from the meter installation, and
b) a continuity bond had not been fitted from the ECV/meter installation to the consumer's pipework, and
c) the consumer's pipework is within 2 m of the ECV/service pipe.

Any exposed metal on either the service pipe and ECV or the consumers outlet pipe shall be encapsulated in an insulating material.

The insulation shall be fitted such that it encompasses all of the metallic sections of one of the pipes thereby eliminating any risk of the metallic parts of the ECV/service pipe and the consumer's pipework being touched simultaneously.

7.14 When handling and transporting removed equipment the following shall apply:

- rotary and turbine meters to be drained of oil as applicable
- suitable precautions to be taken with meter indexes that contain mercury
- all meters to be capped and suitably sealed
- all removed pipework and components to be fully purged before disposal
- removed components such as meters, regulators to be clearly marked and identified as to the reason for removal/replacement i.e. faulty, policy etc. (see examples in Figure 1)
- all new and removed meter details and reads to be recorded and reported to the gas supplier in accordance with industry requirements
- if the meter installation has been replaced by a new MAM, then all the original MAM's property to be made available to them in accordance with industry requirement
- for materials to be returned to the original MAM, labels detailing the name of the original MAM, Meter Point Reference Number (MPRN), date and site name need to be securely attached to the meter and the rest of the consignment.

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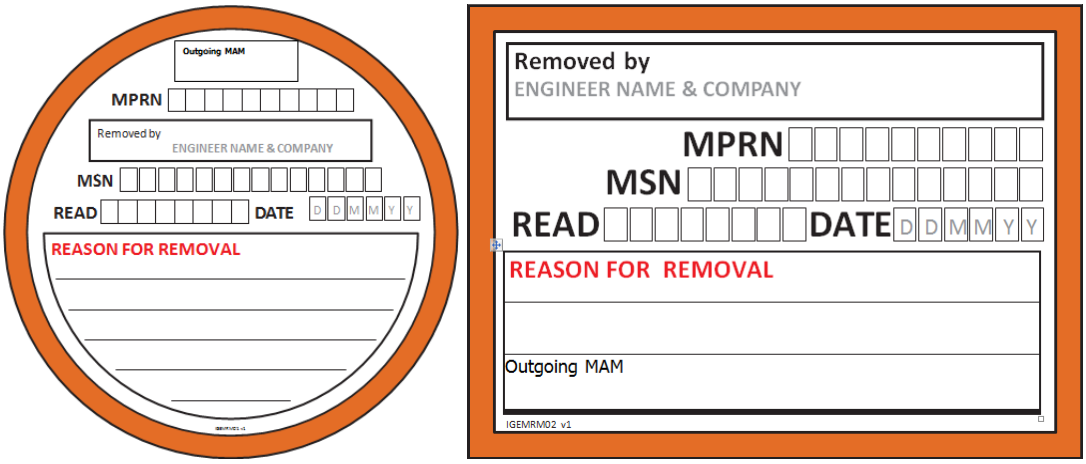

FIGURE 1 – TYPICAL LABELS FOR IDENTIFYING REMOVED METERING EQUIPMENT

7.15 All replacement equipment shall be designed and installed in accordance with IGEM/GM/8, also refer to Sub-Section 1.5.

7.16 Upon completion of work, the meter installation and if applicable the consumer's installation shall be tested and purged in accordance with IGE/UP/1, IGE/UP/1A, IGEM/UP/1B or IGEM/UP/1C, as appropriate. Results shall be recorded on a test record/purging form with a copy being provided to the consumer/responsible person.

Following satisfactory testing and purging, the meter installation shall be commissioned in accordance with IGEM/GM/8 Part 3, ensuring appropriate records are updated in accordance with Section 18 and 19.

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

A1.1 GLOSSARY

All definitions are provided in IGEM/G/4, which is freely available by downloading a printable version from IGEM's website www.igem.org.uk.

Recommended Standard and legacy gas metering terms are given in IGEM/G/1, which is also freely available to download and print from website www.igem.org.uk.

A1.2 ACRONYMS AND ABBREVIATIONS

ACoP	Approved Code of Practice
ACS	Nationally Accredited Certification Scheme for Individual Gas Fitting Operatives
AMI	Approved Meter Installer
CE	European Community
CO	carbon monoxide
CoP	Code of Practice
COSHH	Control of Substances Hazardous to Health Regulations
CP	cathodic protection
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations
ECV	emergency control valve
ESP	emergency service provider
GB	Great Britain
GIUSP	Gas Industry Unsafe Situations Procedures
GOMB	Gas and Oil Measurement Branch (Department of Energy)
CoMCoP	Consolidated Metering Code of Practice
GS(I&U)R	Gas Safety (Installation and Use) Regulations
GS(M)R	Gas Safety (Management) Regulations
GSM	global system for mobile communications
GT	gas transporter
HF	high frequency
HSE	Health and Safety Executive
HSWA	Health and Safety at Work etc. Act
IGEM	Institution of Gas Engineers and Managers
LPG	Liquefied Petroleum Gas
MAM	meter asset manager
MAMCoP	Meter Asset Managers Code of Practice
MBV	meter by-pass valve
MHSWR	Management of Health and Safety at Work Regulations
MID	measuring instruments directive
MIP	maximum incidental pressure
MOP	maximum operating pressure
MPRN	meter point reference number
NG	Natural Gas
Ofgem	Office of Gas and Electricity Markets
OP	operating pressure
PE(S)R	Pressure Equipment (Safety) Regulations
PME	Protective Multiple Earthing
PRI	pressure regulating installation
PSR	Pipelines Safety Regulations
PSSR	Pressure Systems Safety Regulations
PUWER	Provision and Use of Work Equipment Regulations
Q	flow rate
RD	rotary displacement
REC	Retail Energy Code company

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RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
SP	set point
SPAA	Supply Point Administration Agreement
SSV	slam-shut valve
STP	strength test pressure
TOP	temporary operating pressure
UK	United Kingdom
UKAS	United Kingdom Accreditation Service
USM	ultrasonic meter
WSoE	Written Scheme of Examination.

A1.3 SYMBOLS

±	plus or minus
>	greater than
<	less than
≤	less than or equal to
≥	greather than or equal to
∆P	differential pressure
%	percentage.

A1.4 UNITS

barg	bar gauge
$m^3 h^{-1}$	cubic metre per hour
mbar	millibar
mm	millimetre
mm^2	square millimetre
m^2	square metre
^oC	degree Celsius.

A1.5 SUBSCRIPTS

u	refers to the upstream Network. For example, MIP_u is the MIP that the Network may apply to the meter installation as a result of a fault on the upstream district pressure regulation station.
max	maximum (component)
imax	maximum (installation)
m	metering.

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APPENDIX 2 : REFERENCES

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 will be necessary. The following list is not exhaustive.

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

Care is to be taken to ensure that the latest editions of the relevant documents are used.

A2.1 LEGISLATION

This sub-appendix lists legislation referred to in this Standard as well as legislation not referenced but which may be applicable.

- Health and Safety at Work etc. Act 1974, as amended
- Gas Act 1986 (as amended by the Gas Act 1995 and incorporating stand-alone provisions of the Utilities Act 2000)
- Confined Spaces Regulations 1997
- Control of Asbestos Regulations 2012
- Control of Substances Hazardous to Health Regulations 2002, as amended
- Dangerous Substances and Explosive Atmospheres Regulations 2002
- Electricity at Work Regulations 1989, as amended
- Gas (Calculation of Thermal Energy Regulations 1996, as amended
- Gas (Meter) Regulations 1983, as amended
- Gas Safety (Installation and Use) Regulations 1984; 1994, 1998, as amended
- Gas Safety (Management) Regulations 1996, as amended
- Management of Health and Safety at Work (Amendment) Regulations 2006
- Measuring Instruments (EEC Requirements) (Gas Volume Meters) Regulations 1979, as amended
- Pipelines Safety Regulations 1996
- Pressure Equipment (Safety) Regulations 2016
- Pressure Systems Safety Regulations 2000
- Provision and Use of Work Equipment Regulations 1992; 1998
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013.

A2.2 HSE ACoPs

- HSG48 Reducing error and influencing behaviour. Guidance
- HSG227 A comprehensive guide to managing asbestos in premises
- L22 Safe Use of Work Equipment. ACoP and Guidance
- L73 Reporting of Injuries, Diseases and Dangerous Occurrences Regulations. Guidance
- L82 A guide to the Pipeline Safety Regulations 1996. Guidance
- L138 Dangerous Substances and Explosive Atmospheres Regulations 2002. ACoP and Guidance
- L143 Managing and Working with Asbestos

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- HSR25 Electricity at Work Regulations. Guidance
- INDG 370 Fire and explosion; How safe is your workplace? A short guide to the Dangerous Substances and Explosive Atmospheres Regulations 2002
- INDG 163 L 5 steps to risk assessment
- INDG 178 Written Schemes of Examination
- INDG 229 Using Work Equipment Safely
- INDG 261 Pressure Systems – a brief guide to safety
- INDG 291 Providing and using work equipment safely A brief guide to the Provision and Use of Work Equipment Regulations
- INDG 453 Reporting accidents and incidents at work

A2.3 **RETAIL ENERGY CODE COMPANY**

- CoMCoP Consolidated metering Code of Practice for meter asset managers and meter installers.

A2.4 **BRITISH STANDARDS INSTITUTION (abbreviated titles)**

- BS 13636 Plastics. Film and sheeting. Non-oriented poly(ethylene terephthalate) (PET) sheets
- BS 6400-1 Domestic-sized meter installations – low pressure Natural Gas
- BS 6400-2 Domestic-sized meter installations – medium pressure Natural Gas
- BS 7361 Cathodic protection
- BS EN 437 Test gases
- BS EN 60079-17 Electrical apparatus for explosive gas atmospheres. Inspection and maintenance.

A2.5 **IGEM**

- IGEM/G/1 Defining the end of the network, a meter installation and Edition 2 installation pipework
- IGEM/G/5 Edition 3) Gas in flats and other multi-dwelling buildings
- IGEM/GM/4 Edition 3 Flow metering practices. Inlet pressure exceeding 38 bar and not exceeding 100 bar
- IGEM/GM/5 Edition 4 Selection, installation and use of electronic gas meter volume conversion systems
- IGEM/GM/6 Edition 3 Standard non-domestic meter installations. Flow rate exceeding 6 $m^3 h^{-1}$ and inlet pressure not exceeding 100 mbar
- IGEM/GM/7A Edition 2 Electrical connections for metering equipment
- IGEM/GM/7B Edition 2 Hazardous area classification for metering installations
- IGEM/GM/8 Part 1 Non-domestic meter installations. Flow rate exceeding 6 $m^3 h^{-1}$ and inlet pressure not exceeding 38 bar. Design

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• IGEM/GM/8 Part 2 Ed 3	Non-domestic meter installations. Flow rate exceeding 6 $m^3 h^{-1}$ and inlet pressure not exceeding 38 bar. Locations, housings and compounds
• IGEM/GM/8 Part 3 Ed 3	Non-domestic meter installation. Flow rate exceeding 6 $m^3 h^{-1}$ and inlet pressure not exceeding 38 bar. Fabrication, installation, testing and commissioning
• IGEM/GM/8 Part 5 Ed 3	Non-domestic meter installation. Flow rate exceeding 6 $m^3 h^{-1}$ and inlet pressure not exceeding 38 bar. Notices and labels
• IGEM/TD/1 Edition 6	Steel pipelines for high pressure gas transmission
• IGEM/TD/2 Edition 2	Assessing the risks from high pressure Natural Gas pipelines
• IGEM/TD/3 Edition 5	Steel and PE pipelines for gas distribution
• IGE/TD/4 Edition 5	Gas services
• IGEM/TD/13 Edition 3	Pressure regulating installations for transmission and distribution systems
• IGEM/SR/29 Edition 2	Dealing with reported gas escapes
• IGEM/G/7	Risk assessment techniques
• IGEM/G/11 Edition 2	Gas industry unsafe situations procedure
• IGEM/SR/25 Edition 2	Hazardous area classification of Natural Gas installations
• IGEM/GL/5 Edition 3	Procedure for managing new works, modifications and repairs
• IGEM/GL/6 Edition 3	Permitry for the safe flow of gas
• IGEM/GL/8 Edition 4	Reporting and investigation of gas related incidents
• IGE/UP/1 Edition 2 RWA	Strength and tightness testing and direct purging of industrial and commercial gas installations
• IGE/UP/1A Edition 2 RWA	Strength and tightness testing and direct purging of small low pressure industrial and commercial Natural Gas installations.

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APPENDIX 3 : EMERGENCY GUIDELINES

GENERAL RULES

The following are general rules that need to be followed when any person attending a premises discovers a gas escape or dangerous situation, and cannot immediately resolve the problem:

- extinguish all sources of ignition (e.g. no smoking, no naked flames, or use of mobile phones in the vicinity of the leak etc.)
- do not operate any electrical switches or appliances
- if the gas escape may be within a building, open doors and windows to ventilate the building
- advise all personnel in the affected area of the gas escape and advise them of all of the actions covered above
- evacuate when:
  - occupant safety is at risk, or
  - persons are overcome by gas vapours or products of combustion.
- make every effort to inform the responsible person e.g. the site manager, site supervisor or appropriate person in authority, of the gas escape or dangerous situation
- advise the responsible person:
  - of the severity of the leak
  - the risks that it presents, and
  - recommend that they turn off the gas supply at the meter.
- the responsible person should take the decision to turn off the gas supply, however, if in the absence of a person in authority and if in your judgement, an IMMEDIATE danger exists you should turn off the gas supply

  Note 1: Consideration needs to be given to the process and the risk that may result in isolating the supply, in the circumstances where no responsible person is available. Further guidance can be found in the GIUSP and OAMI Codes of Practice.

  Note 2: Where the ECV is sited in a basement, the advice given by the National Gas Emergency Service is not to enter the basement, due to the potential risk of asphyxiation.

- reiterate the advice given in the first three bullets above
- report the gas emergency immediately and personally on 0800 111 999, informing the user this has been done.

  Note 1: When reporting the gas escape or dangerous situation and its location within the premise, give full details of the nature of the escape or dangerous situation and its location within the premise; including the name and contact information of the responsible person.

  Note 2: In the event of a suspected or actual theft of gas, where it is safe to do so the emergency service needs to be notified at the time that the escape is called in.

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APPENDIX 4 : THE GAS ACT 1986 AS AMENDED SCHEDULE 2B – THE GAS CODE

METERS TO BE KEPT IN PROPER ORDER

There are a number of metering obligations within the Gas Act on GTs, gas suppliers and consumers.

Schedule 2B covers "Meters to be kept in proper order" and states:

3) Every consumer shall at all times, at his own expense, keep all meters -

(a) which belong to him, or which are lent or hired to him and are owned otherwise than by the gas transporter or a relevant gas supplier; and

(b) by which the quantity of gas supplied is registered, in proper order for correctly registering the quantity of gas.

(2) In default of the consumer's doing so -

(a) the gas transporter may disconnect his premises; and

(b) any relevant gas supplier may cut off the supply of gas to his premises.

(3) In the case of any consumer, the GT or any relevant gas supplier shall at all times, without charge to the consumer, keep any meter which is owned by him and is lent or hired to the consumer in proper order for correctly registering the quantity of gas supplied.

(4) Sub-paragraph (3) above is without prejudice to any remedy the transporter or supplier may have against the consumer for failure to take proper care of the meter.

(5) In the case of any consumer, the GT, any relevant gas supplier and any relevant gas shipper -

(a) shall have power to remove, inspect and re-install any meter by which the quantity of gas supplied is registered; and

(b) shall, while any such meter is removed, fix a substitute meter on the premises;

and, subject to sub-paragraph (6) below, the cost of removing, inspecting and re-installing a meter and of fixing a substitute meter shall be defrayed by the transporter, supplier or shipper.

(6) Where such a meter is removed for the purpose of being examined by a meter examiner in accordance with Section 17 of this Act, the expenses incurred in removing, examining and re-installing the meter and fixing a substitute meter shall be defrayed as follows -

(a) if the examination is carried out at the request of any person and the meter is found in proper order, by that person;

(b) if the meter is not so found, by the person required by sub-paragraph (1) or (3) above to keep the meter in proper order.

(7) A meter is found in proper order for the purposes of sub-paragraph (6) above if it is found to register correctly or to register erroneously to a degree exceeding the degree permitted by Regulations under Section 17 of this Act.

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(8) Nothing in this paragraph shall apply in relation to any meter which, in pursuance of an agreement falling within Section 17(14) of this Act, is used for ascertaining the quantity of gas supplied to a consumer if either -

(a) the agreement was entered into before the appointed day; or

(b) the GT and each relevant gas shipper have agreed that the meter should be kept in proper order by a person other than the consumer.

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