

***IGEM/UP/19 with amendment January 2015
Communication 1777***

Design and application of interlock devices and associated systems used with gas appliance installations in commercial catering establishments



*Founded 1863
Royal Charter 1929
Patron: Her Majesty the Queen*

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© The Institution of Gas Engineers and Managers
IGEM House
High Street
Kegworth

Derbyshire, DE74 2DA

Tel: 0844 375 4436

Fax: 01509 678198

Email: general@igem.org.uk

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SECTION 1 : INTRODUCTION

- 1.1 The content of this Standard has been developed by the Institution of Gas Engineers and Managers (IGEM) in conjunction with Gas Safe Register and representatives from the catering industry. Gas Safe Register issued a Technical Bulletin TB 140, which replaced Health and Safety Executive (HSE) guidance note CAIS 23 for the catering sector regarding the necessary advice for gas installers and designers; CAIS 23 has been revised and reissued for caterers and this Standard replaces TB 140.
- 1.2 Catering establishments are generally defined as those preparing meals for the public other than in domestic situations, see clause 3.3.5. BS 6173, as currently written, is not intended to apply to dwellings or primarily domestic premises, such as those in Bed & Breakfast installations. For these latter installations, reference has in the past been made to standards such as BS 5440-2 and BS 6172, however many installations may border on commercial activities due to their high cooking loads. The aim of this Standard is to clarify some of the options and requirements for new and existing installations, both large and small.
- 1.3 It is possible that natural ventilation could achieve adequate air quality, in a kitchen environment but, for small spaces with a large cooker or large catering installations, the fitting of mechanical ventilation would normally be required. This may require extract canopies, but special care will be needed to ensure good air movement within the space to ensure a safe working environment.
- 1.4 The application of mechanical ventilation in the majority of cases will require the fitting of associated interlocks to ensure the safety of staff in respect of the air quality of their working environment.
- 1.5 This Standard is not intended to deal with mechanical ventilation systems in domestic applications although the principles of safety may be similar if increased ventilation is necessary to meet the desired air quality.
- 1.6 This Standard has been drafted by a Panel appointed by the Institution of Gas Engineers and Managers' (IGEM's) Gas Utilization Committee, subsequently approved by that Committee and published by the authority of the Council of IGEM.
- 1.7 This Standard makes use of the terms "must", "shall" and "should" notwithstanding Sub-Section 1.9,
- the term "must" identifies a requirement by law in Great Britain (GB) at the time of publication
 - the term "shall" prescribes a requirement which, it is intended, will be complied with in full and without deviation
 - the term "should" prescribes a requirement which, it is intended, will be complied with unless, after prior consideration, deviation is considered to be acceptable.
- Such terms may have different meanings when used in legislation, or HSE ACoPs or guidance, and reference needs to be made to such statutory legislation or official guidance for information on legal obligations.
- 1.8 The primary responsibility for compliance with legal duties rests with the employer. The fact that certain employees, for example "responsible engineers" (e.g. suitably Gas Safe registered) are allowed to exercise their professional judgement does not allow employers to abrogate their primary responsibilities.

Employers must:

- have done everything to ensure, so far as is reasonably practicable, that there are no better protective measures that can be taken other than relying on the exercise of professional judgement by “responsible engineers”
- have done everything to ensure, so far as is reasonably practicable that “responsible engineers” have the skills, training, experience and personal qualities necessary for the proper exercise of professional judgement
- have systems and procedures in place to ensure that the exercise of professional judgement by “responsible engineers” is subject to appropriate monitoring and review
- not require “responsible engineers” to undertake tasks which would necessitate the exercise of professional judgement that is 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.

1.9 Notwithstanding Sub-Section 1.7, this Standard does not make obligatory the use of any method or specification against the judgement of the “responsible engineer”. New and improved practices may be adopted prior to this Standard being updated. Amendments to this Standard will be issued when necessary and their publication will be announced in the Journal of IGEM and elsewhere as appropriate.

1.10 It is now widely accepted that the majority of accidents in industry are in some measure attributable to human as well as technical factors in the sense that people’s actions initiated or contributed to the accidents or people might have acted better to avert them.

It is therefore necessary to give proper consideration to the management of these human factors and to the control of risk. Further advice may be found in HSG65 and HSG48.

1.11 Requests for interpretation of this Standard in relation to matters within its scope, but not precisely covered by the current text, should be addressed in writing to Technical Services, IGEM, IGEM House, High Street, Kegworth, Derbyshire, DE74 2DA and will be submitted to the relevant Committee for consideration and advice, but in the context that the final responsibility is that of the engineer concerned. If any advice is given by or on behalf of IGEM, this does not relieve the responsible engineer of any of his or her obligations.

1.12 This Standard was published in February 2015.

1.13 Amendment is shown in document by ► ◄.

SECTION 2 : SCOPE

- 2.1 This Standard provides requirements for the design and application of various air flow and air quality interlock devices and associated systems used in conjunction with gas appliance installations in new commercial catering establishments, (see Glossary in Appendix 1).

Note 1: Catering establishments will normally fall within the definition of a 'Food Business' in The Food Safety (General Food Hygiene) Regulations.

Note 2: This Standard does not apply to mobile catering installations or transportable temporary event catering installations. See Nationwide Caterers Association (NACSS) guidance.

- 2.2 This Standard applies to replacement of, or extension to, existing installations. It is not retrospective, but it is recommended that existing installations be modified to meet this Standard, when appropriate.

Note: Standards rarely cover the retrospective issue of existing installations. They can, however, set a basis for consideration of performance upon which a risk assessment can be developed. Where appropriate, ventilation checks for CO₂ levels need to be performed.

It can be argued that any improvements in safety are better than none at all. It may be unreasonable to expect that an old installation is brought right up-to-date in all respects. Where a major refurbishment of the installation takes place, it would be reasonable to consider the installation as a new installation, as far as is reasonably practicable.

- 2.3 This standard provides the requirements for air quality testing of new and existing commercial catering establishments.

- 2.4 This Standard applies to installations of maximum operating pressure (MOP) not exceeding 100 mbar supplied with heavier and lighter than air flammable gases such as Towns (manufactured) gas, Natural Gas (NG), Liquefied Petroleum Gas (LPG), LPG/air and biogases.

- 2.5 Pressures quoted 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".

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. The devolution of power to the Scottish, Welsh and Northern Ireland Assemblies means that there may be variations to the legislation described below for each of them and consideration of their particular requirements must be made. 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 Approved Codes of Practice (ACoPs), official Guidance and referenced codes, standards, etc. shall be taken into account.

Note: Appendix 2 is relevant in this respect.

Health and safety legislation must be observed, especially those requirements which are concerned with the duties of employers, not only to their own employees, but also to members of the public who may be affected.

- 3.1.2 Unless otherwise stated, the current editions of legislation and standards apply.
- 3.1.3 In the absence of specific legislation, it is essential that installations are designed, constructed, installed, operated and maintained so as to be safe.
- 3.1.4 The legislation appropriate to any installation will depend largely upon its location. Advice will need to be sought from the relevant Authorities.
- 3.1.5 Where British Standards, etc. are quoted, equivalent national or international standards, etc. equally may be appropriate.

3.2 PRIMARY LEGISLATION

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

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

3.3 SECONDARY LEGISLATION

3.3.1 Control of Noise at Work Regulations

- 3.3.1.1 These Regulations require employers to make and review noise assessments and to keep relevant records. The risk of damage to the hearing of employees from exposure to noise has to be reduced. Noise is to be eliminated or reduced at source so far as is reasonably practicable and before the issue of hearing protection is considered. Guidance is provided in L108.
- 3.3.1.2 Hearing protectors are required to be worn by employees entering a hearing protection zone.
- 3.3.1.3 Employees likely to be exposed to a level of noise above the specified action level are required to be provided with adequate information.

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

3.3.2.1 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. The regulations also require the identification of pipelines and containers containing hazardous substances.

3.3.2.2 The following publications contain details of the regulations and their application:

- INDG370
- L138.

3.3.2.3 All gas systems except those in domestic parts of buildings fall within the scope of DSEAR. This requires that a risk assessment be completed for each premise to determine if any hazardous area exists and its extent. Normally, systems of MOP not exceeding 500 mbar do not require the use of certified electrical components if correctly installed, tested and maintained.

3.3.3 **Electrical Equipment (Safety) Regulations**

3.3.3.1 These Regulations apply to the supply of electrical equipment (including any electrical apparatus or device) designed or adapted for use with voltage (in the case of alternating current) of not less than 50 volts nor more than 1,000 volts or (in the case of direct current) of not less than 75 volts nor more than 1,500 volts.

3.3.3.2 Electrical equipment is required to be:

- safe
- constructed in accordance with principles generally accepted within the member States as constituting good engineering practice in relation to safety matters and in particular shall be designed and constructed to ensure that it is safe when connected to the electricity supply system by providing a level of protection against electric shock which relies on a combination of insulation and the protective earthing conductor contained within the electricity supply system or which achieves that level of protection by other means; and
- in conformity with the principal elements of the safety objectives for electrical equipment set out in Schedule 3 to these Regulations (see Appendix 4).

3.3.4 **Electricity at Work Regulations (EWR)**

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

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

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

Note: HSR25 provides guidance on the Regulations.

3.3.5 **The Food Safety (General Food Hygiene) Regulations**

3.3.5.1 These Regulations apply to the proprietor of a food business for food safety or wholesomeness, and covers the nature of the food, the manner in which it is handled and packed, any process to which the food is subjected before supply to the consumer, and the conditions under which it is displayed or stored.

3.3.5.2 “Food business” means any undertaking, whether carried on for profit or not and whether public or private, carrying out any or all of the following operations, namely, preparation, processing, manufacturing, packaging, storing, transportation, distribution, handling or offering for sale or supply, of food;

3.3.5.3 “Hygiene” means all measures necessary to ensure the safety and wholesomeness of food during preparation, processing, manufacturing, packaging, storing, transportation, distribution, handling and offering for sale or supply to the consumer, and “hygienic” is to be construed accordingly.



FIGURE 1 - AN EXAMPLE OF A FOOD HYGIENE RATING LABEL

Note: The display of this label indicates that the premises fall within The Food Safety (General Food Hygiene) Regulations

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

3.3.6.1 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 1: Information on the interpretation of GS(I&U)R is available in L56.

Note 2: Reg 27(4) Flues are only associated with Type B flued appliances. It also includes an extract duct acting as a flue. However this Standard considers the appliance supply and extract systems for both Type A and Type B appliances.

Note 3: GS(I&U)R does not apply to certain premises (see L56 Guidance Notes 28 and 29). However, where they do not apply, the principles of GS(I&U)R need to be applied, notwithstanding that the requirement for Gas Safe registration need not be applied.

3.3.6.2 GS(I&U)R addresses both NG and LPG.

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

3.3.6.4 GS(I&U)R defines the type of work that requires persons carrying out such work, or their employers, to be an “approved class of person”. In the UK this means registration under the Gas Safe Register scheme.

3.3.6.5 The gas engineering operative is required to check the safety of any appliance, flue, pipework and other fittings they install or work on and take appropriate action where they find faults. Reference is to be made to the requirements

contained in the Gas Industry Unsafe Situations Procedures (details are available through Gas Safe Register).

Note: Operatives working for an Emergency Service Provider (ESP) may have limited responsibilities in this area.

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

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

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

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

Note: More information on PUWER can be found in L22. Free leaflets include INDG291 and INDG229.

3.3.8.2 The term 'work equipment' includes all fixed plant and machinery as well as portable tools for use at work. This includes gas/plant/cable detection equipment, digging tools, ladders, lifting equipment and hand tools.

3.3.9 **Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)**

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

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

- death or major injury arising out of the distribution, filling, import or supply of NG or LPG should be reported by the conveyor for NG and the filler, importer or supplier for LPG
- dangerous gas fittings (as defined in RIDDOR) are required to be reported by a "member of a class of persons".

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

- for fatal and major injuries only, telephone on 0845 300 9923 (opening hours Monday to Friday 8.30 am to 5 pm) and complete appropriate on-line form
- all other reports at HSE website www.hse.gov.uk

Complete the appropriate online report form listed below.

- report of an injury
- report of a dangerous occurrence
- report of an injury offshore
- report of a dangerous occurrence offshore
- report of a case of disease
- report of flammable gas incident
- report of a dangerous gas fitting.

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

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

3.3.9.4 INDG 453 (rev 1) contains detailed guidance on RIDDOR, including a full list of injuries etc. that need reporting.

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

3.3.10 **Workplace (Health, Safety and Welfare) Regulations**

3.3.10.1 These Regulations apply to workplaces that are defined as any premises or part of any premises that are not domestic premises and are made available to any person as a place of work.

They require maintenance of the workplace, equipment, devices and systems to ensure that they remain in an efficient state, in efficient working order and in good repair, including mechanical ventilation systems.

This includes the provision of effective and suitable ventilation of every enclosed space by a sufficient quantity of fresh or purified air.

3.3.10.2 Ventilation systems are required to include an effective device to give visible or audible warning of any failure of the system where necessary for health and safety.

3.3.10.3 In addition, the temperature of the indoor workplaces during normal working hours, are required to be reasonable.

SECTION 4 : THE DESIGN AND CONSTRUCTION OF EQUIPMENT USED WITHIN INTERLOCK SYSTEMS

4.1 GENERAL

- 4.1.1 The integrity of the interlock system, as described below shall be such as to ensure adequate air quality conditions should an air extraction or supply component fail.

The fundamentals of interlock system design are that they shall:

- be reliable and suitable for their intended duty and take into account the maintenance and testing requirements of the devices, where applicable
- be independent of other functions, unless their safety function cannot be affected by such other functions
- be compatible with other components, equipment and functions
- provide suitable and reliable protection, that is, fail safe modes, redundancy, diversity, and self diagnosis
- be able to monitor the correct air provision/and or quality conditions as required and cause a shut down condition of the system, requiring reset upon a failure condition occurring
- not incorporate a manual override.

- 4.1.2 For the purpose of this Standard, the types of interlock systems are described as:

- Air flow monitoring
The simplest interlock system is that of sensing the correct operation of fans by the use of an air flow switch
- Air pressure monitoring
This interlock system senses the correct operation of fans by the use of either a pressure switch/transducer, or a differential pressure switch/transducer. This differential pressure switch/transducer is normally fitted across either the inlet and outlet of the fan, a length of ducting or a venturi.
- Fan power monitoring
Systems are available that measure the electrical power consumption of the fan(s). They can discriminate between normal power consumption, higher power consumption if the flow is low due to high resistances, say in the grease filters or lower consumption, for example if the impellor has broken. They may not always be appropriate for belt drive fans unless it can be guaranteed that they will detect failure under all conditions.
- Carbon dioxide (CO₂) monitoring
The intention is to ensure a safe working environment in applications where combustion products are emitted into that environment.

It is considered that environmental monitoring is an indication of the fan performance and of the resulting ventilation rates.

For new installations, CO₂ monitoring would normally be used in conjunction with either a fan flow/pressure switch or fan power monitoring (see above and Sub-Section 5.2), but may be used alone with Type A appliances.

For Type A appliances, environmental monitoring measuring CO₂ may be used in conjunction with other air quality sensors such as temperature or humidity to provide information to be included in an interlock system. It may also be used as part of demand control ventilation system.