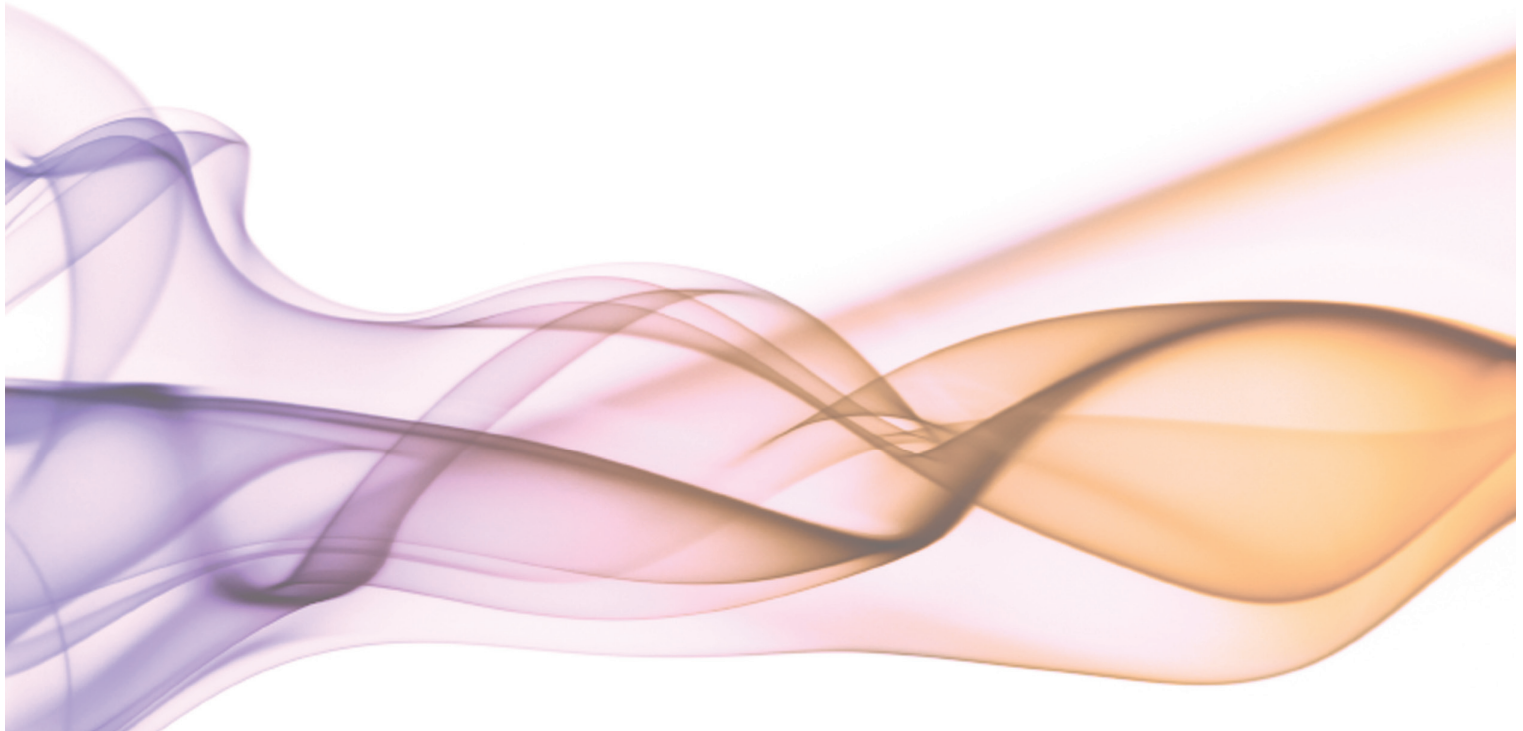


***Guidance for gas engineers to the application of  
relevant sections of IGEM/UP/19 in  
catering establishments***



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## SECTION 1 : INTRODUCTION

IGEM/UP/19 “Design and application of interlock devices and associated systems used with gas appliance installations in commercial catering establishments” was published in October 2014 and supports the requirements for interlocking mechanical ventilation systems required by BS 6173.

*Note: 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.*

The aim of this Guide is to clarify some of the options and requirements for new and existing installations in catering establishments, both large and small.

Catering establishments are generally defined as those preparing meals for the public other than in domestic situations. However, the Standard IGEM/UP/19 and this guide covers all catering establishments that fall within The Food Safety (General Food Hygiene) Regulations.

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

This guide has been prepared in consultation with the commercial catering industry bodies CEDA and CESA.

## SECTION 2 : SCOPE

This Guide may be used to clarify some of the options and requirements for ventilation systems for new and existing gas installations in catering establishments that are required by IGEM/UP/19.

This Guide is not intended for use in isolation, it is to provide support to the competent gas engineer working in catering establishments, and includes extracts from the IGEM publication IGEM/UP/19.

This Guide includes the risk assessment protocols for new and existing catering installations along with the air quality testing procedure, acceptance criteria and sign posting to the Gas Industry Unsafe Situations Procedure (GIUSP) for commercial catering establishments.

This Guide is applicable to those installing, servicing or maintaining catering equipment.

This Guide includes supporting questions and advice for sample testing and it also covers maintenance, inspection, records and user instructions.

*Note: Notes have been added either directly from IGEM/UP/19 or by the Catering Equipment Industry Technical Representatives in each section and sub-section where applicable.*

## SECTION 3 : VENTILATION AND INTERLOCKS

### New Systems

Gas appliances may be fitted in a room/space that is naturally or mechanically ventilated. If it is mechanically ventilated then in order to satisfy GS(I&U)R requirements under Regulation 27(4) an interlock is required to prevent the appliance operating if the draught fails.

Type A flueless appliances are not required to be connected to a flue, but if the environment that they are installed in requires mechanical supply/extract ventilation then this requires to be interlocked with the appliances. The interlocks for proving safe working conditions need to monitor at least one of the following:

- air flow
- air pressure
- power absorption
- air quality, for instance carbon dioxide (CO<sub>2</sub>) (this may be in association with variable speed drive (VSD) systems).

The interlock may operate on any of the following:

- a single automatic gas supply valve
- individual automatic gas supply valves to each appliance or
- power isolation to all fully automatic appliances.

Type B flued catering appliances are required to be connected to a flue system such as an extract canopy.

For Type B flued appliances, the interlocks for proving safe working conditions need to monitor at least one of the following:

- air flow
- air pressure
- power absorption.

The interlock may operate on any of the following:

- a single automatic gas supply valve
- individual automatic gas supply valves to each appliance or
- power isolation to all fully automatic appliances.

### Existing Systems

In accordance with BS 6173 over-rides to interlocks and interlock systems are not permitted and, as appropriate the responsible person is to be advised accordingly including within any written report (see Risk assessment protocol given in Figure 2).

*Note 1 by the Catering Industry: Unless the engineer is competent to carry out work on interlock systems they are not to attempt it and are to refer the customer to the original supplier (see IGEM/UP/19).*

For domestic type installations (see BS 5440-2) that are used infrequently and only for short periods it is permitted to have opening windows or a domestic type wall extract fan. In such instances interlocks are not always essential with domestic Type A appliances, but safe systems of work need to be in place and suitable signage used to specify the ventilation procedures.

In all cases, correct air quality conditions are to be achievable with windows open or extract fans operating. If safety cannot be demonstrated with open windows and extract fans operating, supply air fans need to be fitted.

*Note 1: Notices typically would be expected to say 'When cooking, ensure adequate ventilation by opening windows or operating extractor fans' (see IGEM/UP/19).*

*Note 2 by the Catering Industry: If an installation including Type A appliances predates 2001 and does not have an interlock fitted, the engineer is to recommend the fitting of an interlock as a safety upgrade. If the upgrade is not to be carried out but the installation is well managed with trained staff operating in safe conditions they are to classify the installation under the current GIUSP.*

The ventilation system and interlocks need to be reviewed when there are changes to the cooking equipment or catering environment to ensure that it continues to deliver the required air quality.

Where an atmosphere sampling test identifies that continued use of the catering establishment would be considered unsafe, the current Gas Industry Unsafe Situations Procedure (GIUSP) needs to be implemented.

## SECTION 4 : AIR QUALITY TESTING

Air quality testing procedures given in BS 6173 need to be followed, the results recorded in a file and kept on site for new and refurbished installations. A written record needs to be left on site containing the details of the person carrying out the test, the results of the test, the details of any remedial action required or taken and advice that this record is kept safe for future reference. See Appendix 2 for questions and advice for sample testing of commercial installations.

Consideration is to be taken for personal safety on site whilst undertaking air quality testing. The use of an analyser or a personal carbon monoxide (CO) alarm to ensure that potentially dangerous levels of CO are not present on the premises in which they are working is recommended to the engineer.

During commissioning, checks need to be made for the CO<sub>2</sub> levels in the atmosphere and if the CO<sub>2</sub> level exceeds 2800 ppm, commissioning of the system is not to continue until appropriate remedial actions have been completed. In accordance with Reg 33 (2) of GS(I&U)R the appliance/installation needs to be disconnected from the gas supply and a label attached to any appliances, which have not been fully commissioned, indicating this to be the case. Once remedial work has been undertaken, the commissioning can be completed and the installation put into service.

When testing previously commissioned installations, if the CO<sub>2</sub> level exceeds 2800 ppm, the system needs to be made safe by isolation of individual appliances, increasing ventilation or isolation of the gas supply. In such cases, it is recommended that the provision of ventilation is reviewed in order to achieve CO<sub>2</sub> levels not exceeding 2800 ppm.

### ASSESSING THE EFFECTIVENESS OF VENTILATION PROVISION OR SYSTEMS

Carbon dioxide can be reliably sensed at concentrations well below harmful levels and therefore can give accurate assessment of natural ventilation/supply/extract effectiveness. The current prescribed evaluation of extract and supply air quality, in this context, advocates measuring CO<sub>2</sub> levels with hand held devices.

The test to measure the levels of CO<sub>2</sub> in the atmosphere is to be taken at 2 m above floor level at three points within the cooking work area(s) and an average taken, see Figures 1A and 1B. Sampling is not to be adjacent to air supply grills.

*Note 1: Any individual readings of concentrations of CO<sub>2</sub> above 2800 ppm need to be dealt with as required (see clause about Testing below and IGEN/UP/19).*

### TEST EQUIPMENT FOR EVALUATING ENVIRONMENTAL CONDITIONS

To carry out environmental testing, direct reading CO<sub>2</sub> analysers that meet the minimum requirements of the product standard BS EN 50543 (or the older standard BS 8494) are to be used.

### TESTING

Testing is to be carried out when commissioning a new gas installation and or ventilation system and:

- a) when working on gas equipment for the very first time in any commercial catering establishment
- b) when carrying out maintenance (as opposed to repair) of gas or ventilation equipment
- c) after installing any additional or replacement gas appliance or part of a gas fired item
- d) when replacing or fitting new fan motors or other ventilation equipment
- e) in any commercial catering establishment where it is suspected that the extraction/make up air system is not working satisfactorily, for example very hot working environment, high levels of condensation, catering staff complaining about the working environment.

*Note 1 by the Catering Industry: The reference c) to part of a gas fired item only refers to parts that may affect gas safety and does not refer to items such as control knobs etc.*

Tests on new or partially new installations or existing installations need to be performed with appliances and burners operating under maximum cooking load conditions and without any utensils. Ventilation systems need to be operating normally.

Where VSD systems are installed, the tests need to be performed at the lowest setting. Where VSD interlock systems are installed in conjunction with environmental sensors the test needs to be carried out in all operating modes. It needs to be verified that the air quality is maintained throughout the range of conditions.

Where domestic equipment is installed the tests need to be performed with doors, and serving hatch(es) closed.

After the environment has settled (not less than 10 minutes) the concentrations of CO<sub>2</sub> at the sample positions are not to exceed 2800 ppm.

*Note 1: It is expected that the CO<sub>2</sub> levels in the environment will take at least 10 minutes to settle for small installations and increased time is to be allowed for large installations. Settling of CO<sub>2</sub> levels occurs when there is no significant increase to the measured level after a period of 5 minutes from the previous reading. It can't be predicted by the size of the installation (see IGEM/UP/19).*

For new installations, where it is found that the concentration of CO<sub>2</sub> exceeds that given above, the system needs to be disconnected until remedial actions have been completed. This includes labelling the installation/appliance(s) as un-commissioned.

For existing installations, where it is found that the concentration of CO<sub>2</sub> exceeds 2800 ppm and is less than 5000 ppm, the person performing the test needs to immediately agree with the responsible person steps to be taken, e.g. increasing ventilation or the temporary disconnection of non-essential gas appliances.

*Note 2: This is to ensure that the connected gas load can be used safely and CO<sub>2</sub> levels will not exceed 2800 ppm while remedial action is taken (see IGEM/UP/19).*

*Note 2 by the Catering Industry: Increasing ventilation temporarily whilst investigation of the causes of poor air quality can include opening doors and windows which may assist in determining the corrective action required.*

After remedial work has been completed including reconnection of appliances, the test needs to be undertaken again so as to ensure safe operation.

Where it is not possible to reach agreement on a course of action that will ensure the installation can be continued to be used safely, the Gas Industry Unsafe Situations Procedure is to be implemented.

For existing installations, where it is found that the concentration of CO<sub>2</sub> exceeds 5000 ppm the person performing the test needs to immediately agree with the responsible person a course of action that makes safe the installation, for example turn off gas appliances and evacuate personnel and ventilate the affected area until levels fall below 2800 ppm.

*Note 3: This is to ensure that the connected gas load can be used safely and CO<sub>2</sub> levels will not exceed 2800 ppm while remedial action is taken (see IGEM/UP/19).*

After remedial work has been completed including reconnection of appliances, the test needs to be undertaken again so as to ensure safe operation.

Where it is not possible to reach agreement on an immediate course of action that will ensure the installation can be continued to be used safely, the Gas Industry Unsafe Situations Procedure is to be implemented.

*Note 3 by the Catering Industry: Under GIUSP, an installation with CO<sub>2</sub> levels between 2800 and 5000 ppm is to be classified as "At Risk" and if the level is above 5000 ppm it is to be classified as "Immediately Dangerous" (see Figure 3).*



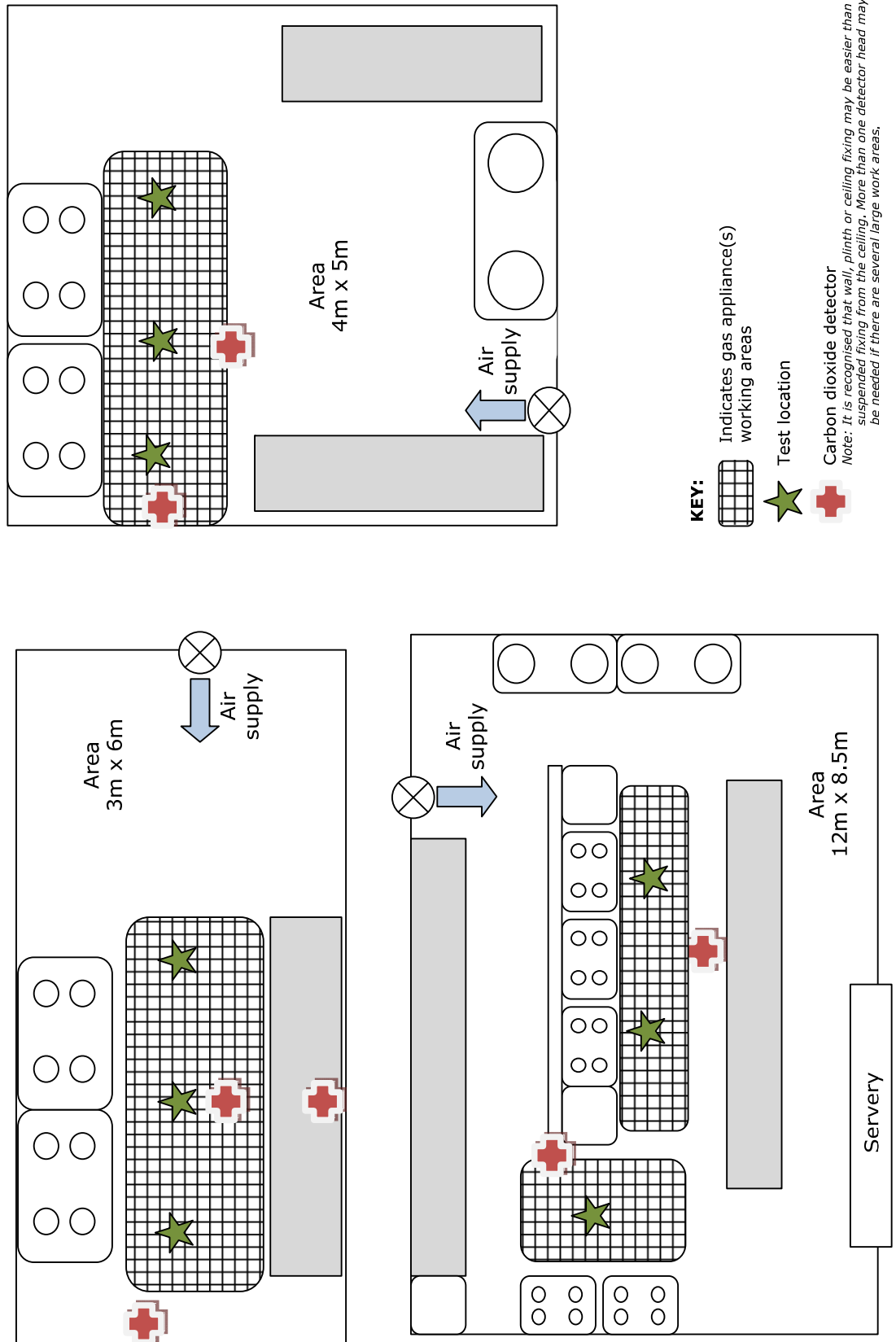
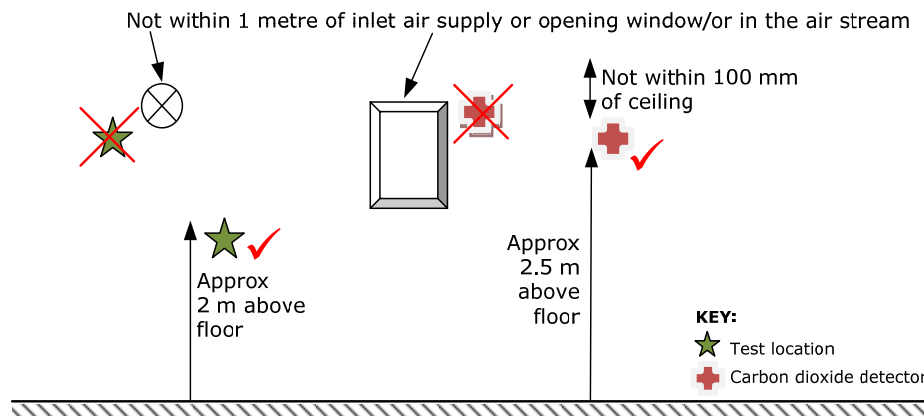


FIGURE 1A – TYPICAL TEST LOCATIONS AND TYPICAL LOCATIONS FOR CARBON DIOXIDE DETECTORS



**FIGURE 1B – TYPICAL TEST LOCATIONS AND TYPICAL LOCATIONS FOR CARBON DIOXIDE DETECTORS**

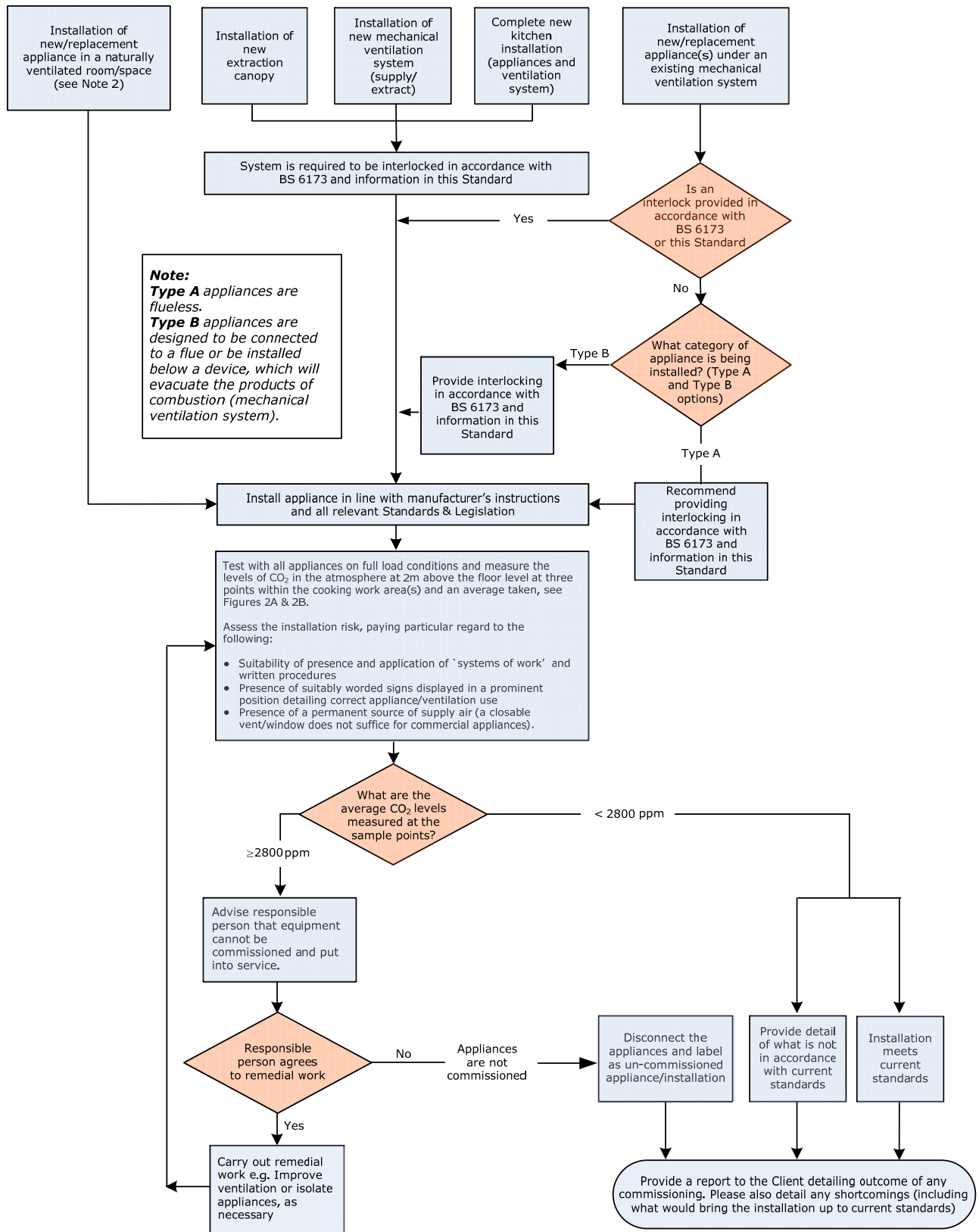
Where an atmosphere sampling test identifies that continued use of the catering establishment would be considered unsafe, the current Gas Industry Unsafe Situations Procedure (GIUSP) is to be implemented (see Figure 2 - Flowchart dealing with risk assessment protocol when dealing with 'new' gas fired installations in commercial catering establishments or Figure 3 - Flowchart dealing with risk assessment protocol when dealing with 'existing' gas fired installations in commercial catering establishments) and the necessary actions taken to make the installation safe.

*Note 4: This decision can only be made following close liaison with the responsible person for the catering establishment and may involve the isolation of some appliances to achieve safe environmental conditions rather than shutting down the kitchen (see IGEM/UP/19).*

*Note 5: There is no requirement in the Standard to test for environmental levels of carbon monoxide and levels up to 10 ppm are not considered to be a cause for concern. The air flow rates for catering kitchens necessary to achieve CO<sub>2</sub> levels below 2800 ppm are such as to ensure the CO levels remain extremely low. However, any indication of poor burner performance (flame picture) needs to be investigated and remedied (see IGEM/UP/19).*

The designer/installer of new catering ventilation systems is to provide technical details about the system, procedures for commissioning and testing and what checks need to be undertaken during servicing. These tests and checks provide a means to ensure that the interlocks work and fail to a safe condition.

If during commissioning or testing the ventilation system does not perform as required or the interlock(s) either fails to operate or do not fail to a safe condition the owner or competent person needs to be informed in order that the designer and/or installer of the system can be consulted to remedy the fault(s).

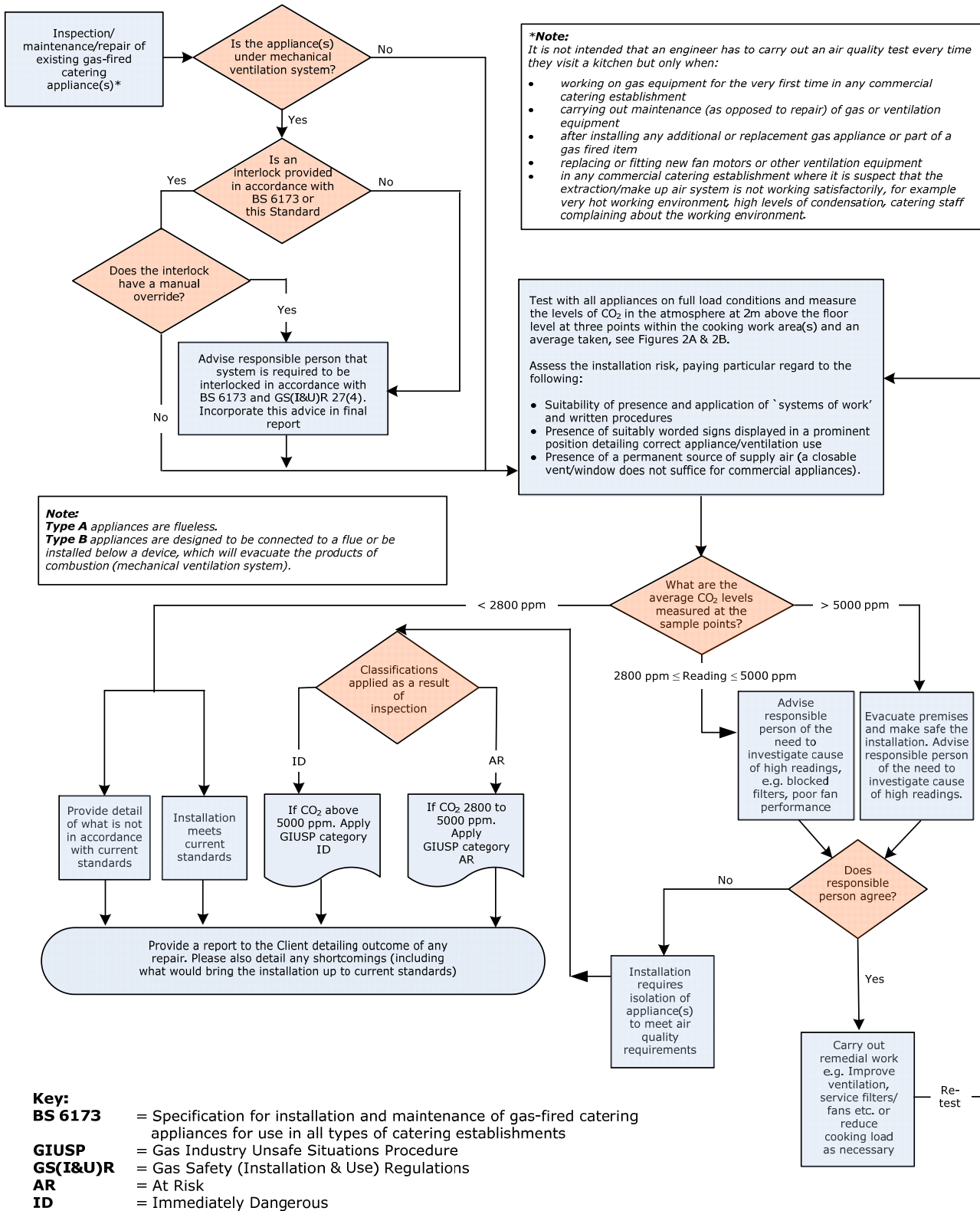


Note 1: For Type A and Type B appliances, see definitions in Appendix 1.

Note 2: Appropriate consideration needs to be taken dependant upon whether the appliance is Type A or Type B and whether there are other appliances in the room/space.

- Key:**  
**BS 6173** = Specification for installation and maintenance of gas-fired catering appliances for use in all types of catering establishments  
**GIUSP** = Gas Industry Unsafe Situations Procedure  
**GS(I&U)R** = Gas Safety (Installation & Use) Regulations

**FIGURE 2 – FLOWCHART DEALING WITH RISK ASSESSMENT PROTOCOL WHEN DEALING WITH 'NEW' GAS FIRED INSTALLATIONS IN COMMERCIAL CATERING ESTABLISHMENTS**



**FIGURE 3 – FLOWCHART DEALING WITH RISK ASSESSMENT PROTOCOL WHEN DEALING WITH 'EXISTING' GAS FIRED INSTALLATIONS IN COMMERCIAL CATERING ESTABLISHMENTS**

## SECTION 5 : MAINTENANCE AND INSPECTION

In Great Britain, the (GS(I&U)R) Reg 35 is the primary legislation concerning the maintenance of gas systems and appliances in domestic and commercial installations. Together with duties under the Health and Safety at Work Act etc. and Provision and Use of Work Equipment Regulations (PUWER), this requires employers/self employed persons and users to ensure that gas appliances, flues, pipework and safety devices are maintained in a safe condition to prevent the risk of injury to any person, (see Notes).

*Note 1: Similar requirements apply in other geographical areas covered by Gas Safe Register. For details of current gas safety legislation, building legislation and industry standards for the geographical areas covered by Gas Safe Register, see the Legislative, Normative & informative document list at: <https://engineers.gassaferegister.co.uk>. – login and visit the Technical Information area (see IGEM/UP/19).*

Where practicable, users need to be advised that the frequency of servicing and testing of ventilation systems is to be based upon the manufacturer's instructions and the use of the catering equipment, but otherwise at least yearly will be a reasonable minimum frequency (this also applies to the gas installation).

*Note 2: It is the responsibility of the employers/self employed persons to ensure that all safety interlocks and environmental detectors (CO<sub>2</sub> detector heads) and safety controls are maintained and checked for calibration as specified by the manufacturer. Failure to perform such tests may result in undetected failure and thus unsafe conditions (see IGEM/UP/19).*

*Note 3: Air supply and extract air systems and associated interlocks need to be routinely serviced to ensure their continued safe operation. This needs to be done by competent personnel such as appropriately qualified service engineers (see IGEM/UP/19).*

*Note 4: There are also implications under PUWER for the occupier or employer to ensure that safety systems are working correctly. The manufacturer of safety and interlock systems will provide information on the maintenance instructions and procedures for the items of equipment being supplied. It is important to ensure that such maintenance is performed by competent persons and that any remedial works following maintenance are actioned with due diligence (see IGEM/UP/19).*

## SECTION 6 : RECORDS

The owner or responsible person needs to be advised that information on all work undertaken on the gas and ventilation systems is to be retained on site by the site occupier and that:

- these records are to include details of all controls systems, maintenance records, risk assessments and faults/remedial work requirements
- there is a record of all as commissioned settings of interlocks (both high and low) and of controls, such as flows, pressures, current, power, gas concentrations etc.
- where the GIUSP procedures have been applied, details of the faults and recommendations need to be retained in the records.

## SECTION 7 : USER INSTRUCTIONS

The gas engineering operative and/or equipment installer is to ensure that User Instructions provided with the equipment are handed to the responsible person. These are, as appropriate to advise the user on the actions to take in the event of a failed interlock proving system:

- a failed ventilation system
- a failed pressure test with a valve proving system
- a CO<sub>2</sub> monitor and alarm system indicating ventilation failure
- power failure
- gas pressure failure
- gas detection alarm
- fire alarm.

Where practicable, the gas engineering operative and/or the equipment installer is to ensure that the responsible persons are trained on the use of the ventilation and interlock systems together with the required responses to alarm conditions.

Emergency notices are to be displayed in appropriate and prominent positions.

The owner or responsible person is to be advised that information on some relevant aspects of safety in the use and maintenance of gas fired equipment used for catering can be found in Catering information sheet (CAIS) 23 available from HSE at [www.hse.gov.uk](http://www.hse.gov.uk).

## APPENDIX 1 : GLOSSARY

There are gas industry terms used in this document, which are further explained here.

AR	At Risk (see GIUSP)
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
GIUSP	Gas Industry Unsafe Situations Procedure
GS(I&U)R	Gas Safety (Installation and Use) Regulations
ID	Immediately dangerous (see GIUSP)
IGEM	Institution of Gas Engineers and Managers
PUWER	Provision and Use of Work Equipment Regulations
VSD	variable speed drive
BS 6172	Specification for installation, servicing and maintenance of domestic gas cooking appliances (2nd and 3rd family gases)
BS 6173	Specification for installation and maintenance of gas-fired catering appliances for use in all types of catering establishments (2nd and 3rd family gases)
BS 5440-2	Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases). Specification for the installation and maintenance of ventilation provision for gas appliances
BS 8494	Electronic portable and transportable apparatus designed to detect and measure carbon dioxide in indoor ambient air. Requirements and test methods
BS EN 50543	Electronic portable and transportable apparatus designed to detect and measure carbon dioxide and/or carbon monoxide in indoor ambient air. Requirements and test methods
Type A appliance	An appliance not intended for connection to a flue or to a device for evacuating the products of combustion to the outside of the room in which the appliance is installed (from PD CEN TR 1749-2)
Type B appliance	An appliance intended to be connected to a flue that evacuates the products of combustion to the outside of the room containing the appliance. The combustion air is drawn directly from the room (from PD CEN TR 1749-2)

## APPENDIX 2 : SUPPORTING QUESTIONS AND ADVICE FOR SAMPLE TESTING OF COMMERCIAL INSTALLATIONS

### NOTES TO SECTION 3

Some establishments may have a manager responsible for health and safety. A discussion with the responsible person might include the following questions:

- (a) Does the problem only happen when appliances, including mobile/portable appliances, are or have been in use? Are there any safety warning notices/labels attached to the Installation/appliances?
- (b) Do workers feel unwell in the premises and recover when outside or away from the workplace? What are their symptoms?
- (c) Is there a pattern to the occurrences, e.g. observed once, more than once or many times? Does it occur during particular weather conditions or certain activities, or from the use of a chemical or substance, or in a particular area?

If other fuel burning appliances, such as charcoal or tandoori ovens are present and in operation, where practical check them for production of CO and spillage. If these appliances are thought to be the cause of the problem, recommend the responsible person to seek expert advice.

*For oil appliances, contact the Oil Firing Technical Association*

*Tel: 0845 658 5080 Web site: [www.oftec.co.uk](http://www.oftec.co.uk)*

*For solid fuel appliances, contact the Solid Fuel Association*

*Tel: 0845 601 4406 Web site: [www.solidfuel.co.uk](http://www.solidfuel.co.uk)*

*Note 1 by the Catering Industry: CEDA has issued guidance for engineers working in kitchens with solid fuel fired equipment (Technical Guidance document 6). Tel: 01386 793911 Website: [www.ceda.co.uk](http://www.ceda.co.uk)*

Other issues you could ask about include any possible damage, e.g. heat stress/corrosion, maintenance history, potential for misuse and any operating difficulties.

Check that electrical power is being supplied to the mechanical ventilation fan, the fan is securely attached to the drive motor shaft, the fan blades are present and undamaged, the fan rotates in the correct direction, air filters are not blocked and any trip system is working correctly.

*Note 2 by the Catering Industry: This is to be done only by engineers who are appropriately trained and competent.*







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