

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

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**IGEM/UP/19 Edition 2 Supplement 1**  
Communication 1876



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*Founded 1863  
Royal Charter 1929  
Patron: His Majesty the King*



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## CONTENTS

<b>SECTION</b>	<b>PAGE</b>
1 Introduction	1
2 Scope	2
3 Ventilation and interlocks	3
4 Air quality testing	5
5 Maintenance and inspection	11
6 Records	11
7 User instructions	12
 <b>FIGURES</b>	
1A Typical test locations and typical locations for carbon dioxide detectors	7
1B Typical test locations and typical locations for carbon dioxide detectors	8
2 Flowchart dealing with risk assessment protocol when dealing with `new` gas fired installations in commercial catering establishments	9
3 Flowchart dealing with risk assessment protocol when dealing with `existing` gas fired installations in commercial catering establishments	10
 <b>APPENDIX</b>	
1 Glossary	13
2 Supporting questions and advice for sample testing of commercial installations	14

## SECTION 1 : INTRODUCTION

- 1.1 This Guide supersedes IGEM/IG/2 Edition 1, Communication 1772, which is obsolete.
- 1.2 This Guide has been drafted by a Panel appointed by the Institution of Gas Engineers and Managers' (IGEM's) Gas Utilisation Committee, subsequently approved by that Committee, approved by the Technical Coordinating Committee and published by the authority of the Council of the Institution.
- 1.3 IGEM/UP/19 Edition 2 "Design and application of interlock devices and associated systems used with gas appliance installations in commercial catering establishments" was published in July 2022 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.*
- 1.4 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.
- 1.5 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 (NCASS) guidance).*
- 1.6 This Guide has been prepared in consultation with the commercial catering industry bodies CEDA (Catering Equipment Distributors Association Limited) and FEA (Food Service Equipment Association).
- 1.7 Requests for interpretation of this Standard in relation to matters within its scope, but not precisely covered by the current text, should be either:
- addressed to Technical Services, IGEM, IGEM House, 26 & 28 High Street, Kegworth, Derbyshire, DE74 2DA; or
  - emailed to [technical@igem.org.uk](mailto:technical@igem.org.uk).
- These 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 imply acceptance of liability for the consequences and does not relieve the responsible engineer of any of their obligations.
- 1.8 This Guide was published in August 2024.

## **SECTION 2 : SCOPE**

- 2.1 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.
- 2.2 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.
- 2.3 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 latest version of Gas Industry Unsafe Situations Procedure (IGEM/G/11) for commercial catering establishments.
- 2.4 This Guide is applicable to those installing, servicing or maintaining catering equipment.
- 2.5 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.*
- 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 "should", "shall" or "must".

## SECTION 3 : VENTILATION AND INTERLOCKS

- 3.1 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 Gas Safety (Installation and Use) Regulations (GS(I&U)R) requirements under Regulation 27(4) an interlock may be required to prevent the appliance operating if the draught fails, see Figure 2.
- 3.2 Interlocks for proving safe working conditions need to monitor at least one of the following:
- air flow
  - air pressure
  - fan current/power absorption.
- 3.2.1 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.
- 3.3 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 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).*
- 3.4 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.

## SECTION 4 : AIR QUALITY TESTING

- 4.1 Air quality testing procedures given in IGEM/UP/19 as stated 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 of this Guide for questions and advice for sample testing of commercial installations.
- 4.2 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.
- 4.3 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.
- 4.4 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.
- 4.5 **ASSESSING THE EFFECTIVENESS OF VENTILATION PROVISION OR SYSTEMS**
- 4.5.1 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 handheld devices.
- 4.5.2 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 :* 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 IGEM/UP/19).
- 4.6 **TEST EQUIPMENT FOR EVALUATING ENVIRONMENTAL CONDITIONS**
- 4.6.1 To carry out environmental testing, portable 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.



## 4.7 TESTING

4.7.1 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 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 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.*

4.7.2 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 with all baffles and filters in place.

4.7.3 Where VSS systems are installed, the tests need to be performed at the lowest setting. Where VSS 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.

*Note: Testing of VSS systems can be complex and it is recommended that a competent ventilation engineer confirm they are operating correctly in all modes and environmental sensor heads etc. are calibrated.*

4.7.4 The tests need to be performed with doors and serving hatch(es) closed.

*Note: Prior to testing, it is advisable to risk assess the area for fire alarm heat sensor and possible false fire alarm activation when undertaking CO<sub>2</sub> testing under maximum load, minimum ventilation conditions.*

4.7.5 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: 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).*

4.7.6 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 uncommissioned.

- 4.7.7 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 :* 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 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.

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

- 4.7.9 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, IGEM/G/11 is to be implemented.

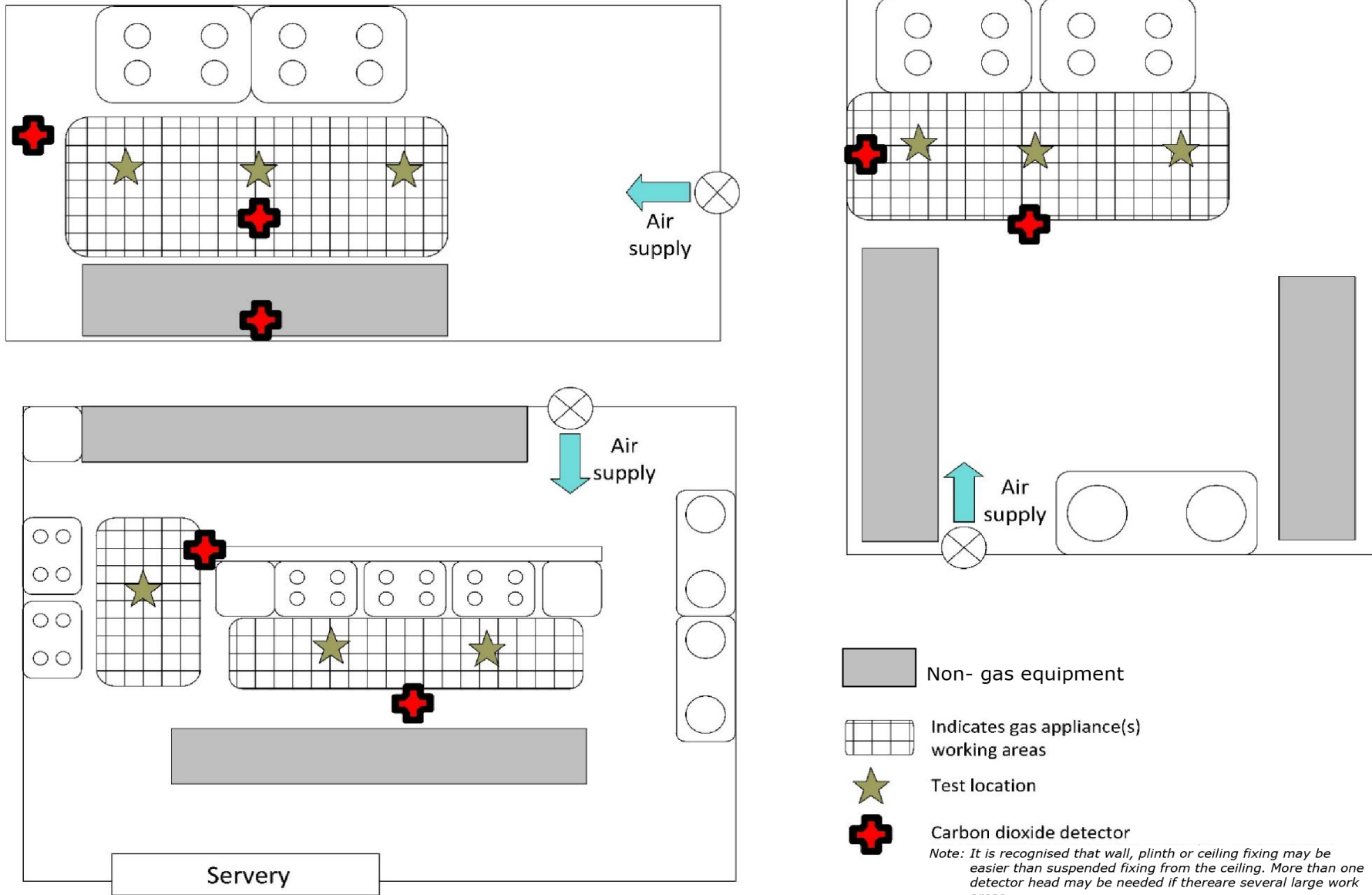
- 4.7.10 For existing installations, where it is found that the concentration of CO<sub>2</sub> exceeds 5000 ppm, the person performing the test needs to immediately agree with the responsible person a course of action that makes safe the installation, for example turn off gas appliances and evacuate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

*Note :* 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).

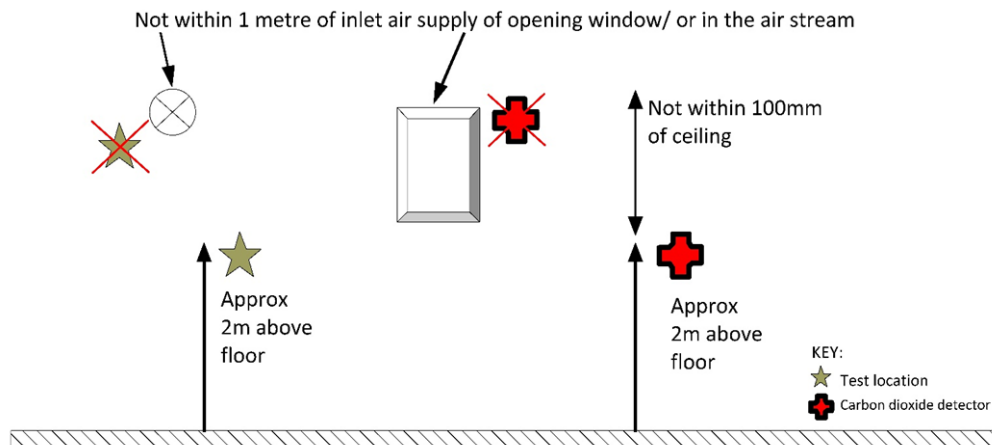
- 4.7.11 After remedial work has been completed, including reconnection of appliances, the test needs to be undertaken again so as to ensure safe operation.

- 4.7.12 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 IGEM/G/11 is to be implemented.

*Note by the Catering Industry:* Under IGEM/G/11, an installation with CO<sub>2</sub> levels between 2800 ppm 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**

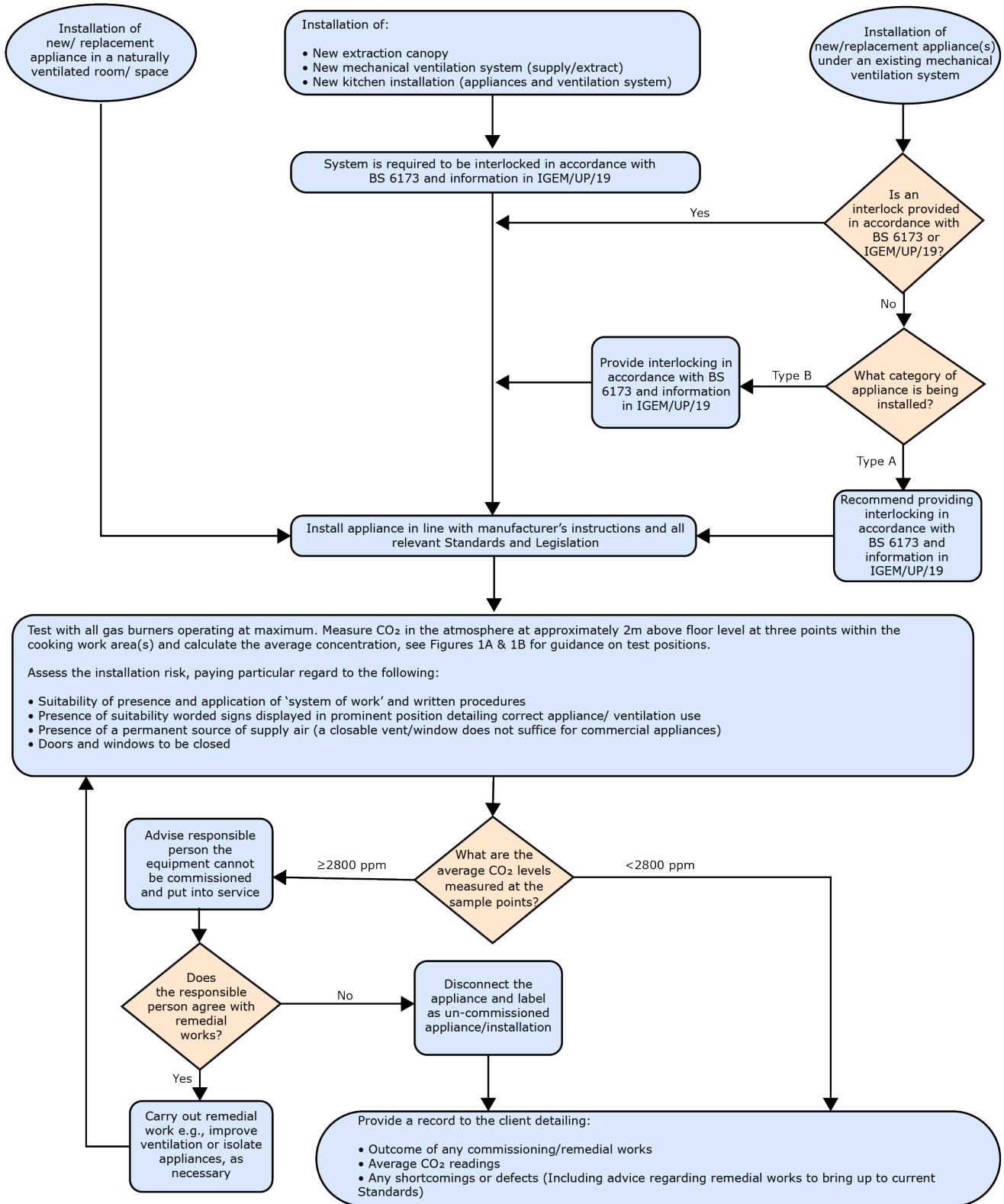
4.7.13 Where an atmosphere sampling test identifies that continued use of the catering establishment would be considered unsafe, the current IGEM/G/11 is to be implemented (see Figure 2 - Flowchart dealing with risk assessment protocol when dealing with `new` gas fired installations in commercial catering 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 1: 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).*

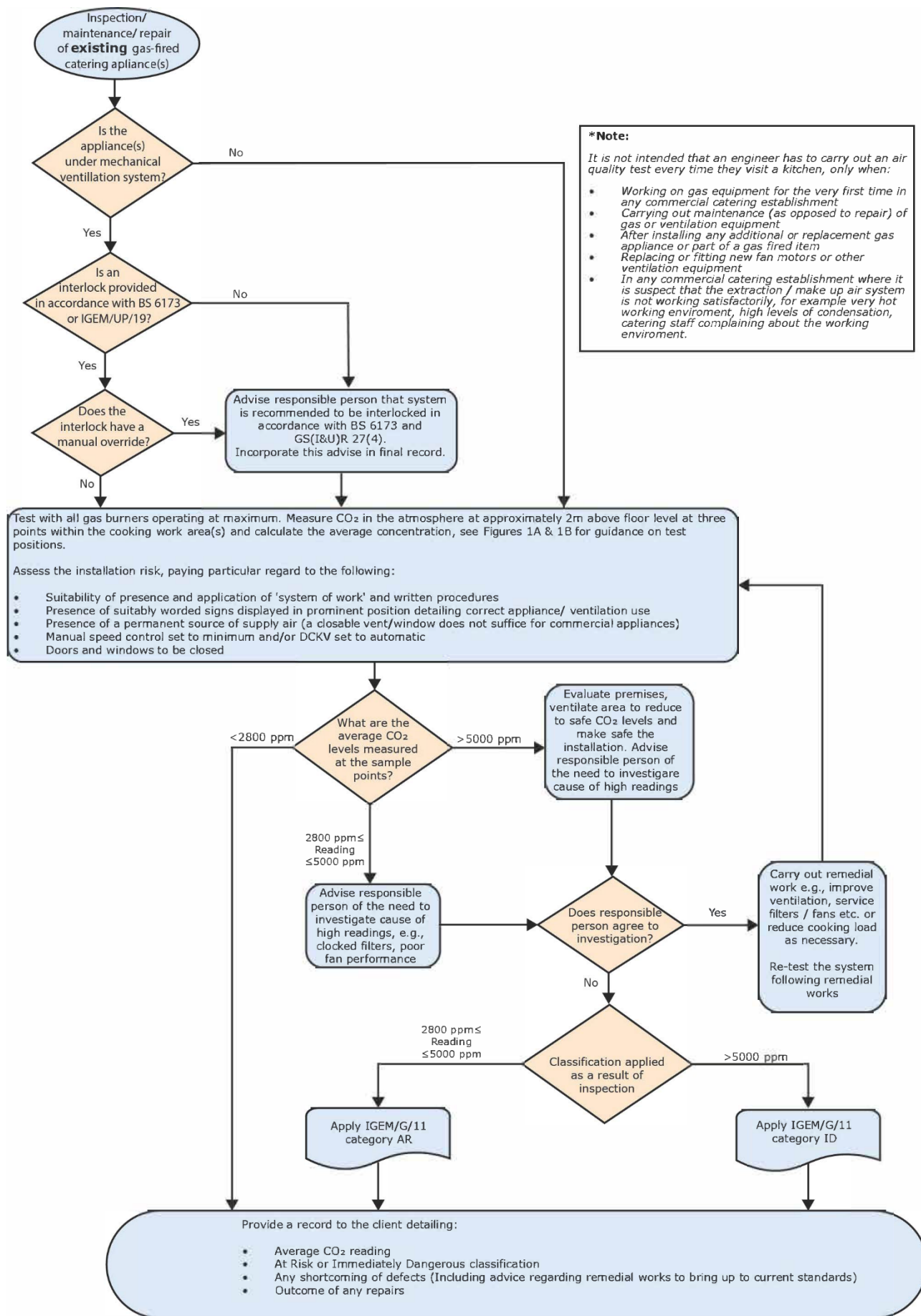
*Note 2: There is no requirement in the Standard to test for environmental levels of CO and levels up to 10 ppm are not considered to be a cause for concern. The air flow rates for catering kitchens necessary to achieve CO<sub>2</sub> levels below 2800 ppm are such as to ensure the CO levels remain extremely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

4.7.14 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.

4.7.15 If during commissioning or testing the ventilation system does not perform as required or the interlock(s) either fails to operate or does 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).



**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 ASSESSEMENT PROTOCOL WHEN DEALING WITH `EXISTING` GAS FIRED INSTALLATIONS IN COMMERCIAL CATERING ESTABLISHMENTS**

## SECTION 5 : MAINTENANCE AND INSPECTION

- 5.1 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. and Provision and Use of Work Equipment Regulations (PUWER), etc. 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 :* 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).

- 5.2 Where practicable, users need to be advised that the frequency of servicing and testing of ventilation systems and associated interlocks 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 1:* 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 2:* 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 3:* 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

- 6.1 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 IGEM/G/11 have been applied, details of the faults and recommendations need to be retained in the records.

## **SECTION 7 : USER INSTRUCTIONS**

- 7.1 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 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.
- 7.2 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.
- 7.3 Emergency notices are to be displayed in appropriate and prominent positions.
- 7.4 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 IGEM/G/11)
CEDA	Catering Equipment Distributors Association Limited
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
DCKV	Demand Control Kitchen Ventilation
FEA	Food Service Equipment Association
GS(I&U)R	Gas Safety (Installation and Use) Regulations
ID	Immediately dangerous (see IGEM/G/11)
IGEM	Institution of Gas Engineers and Managers
PUWER	Provision and Use of Work Equipment Regulations
VSS	variable speed system
m	metre
ppm	parts per million
IGEM/G/11 Edition 2	Gas Industry Unsafe Situations Procedure
IGEM/UP/19 Edition 2	Design and application of interlock devices and associated systems used with gas appliance installations in commercial catering establishments
BS 5440-2	Flueing and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd and 3rd family gases). Specification for the installation and maintenance of ventilation provision for gas appliances
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 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.

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

### A2.1 NOTES TO SECTION 3

A2.1.1 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?

A2.2.2 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 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)*

A2.2.3 Other issues you could ask about include any possible damage, e.g. heat stress/corrosion, maintenance history, potential for misuse and any operating difficulties.

A2.2.4 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 by the Catering Industry: This is to be done only by engineers who are appropriately trained and competent.*



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**Institution of Gas Engineers & Managers  
(IGEM)**

IGEM House, 26 & 28 High Street  
Kegworth, Derbyshire DE74 2DA

**t:** +44 (0)1509 678 150  
**e:** [technical@igem.org.uk](mailto:technical@igem.org.uk)  
**[www.igem.org.uk](http://www.igem.org.uk)**