

# Ventilation of kitchens in catering establishments

## HSE information sheet

### Catering Information Sheet No 10 (rev1)

#### Introduction

This guidance provides information on ventilation requirements for kitchens. The guidance will assist caterers in assessing whether existing ventilation is adequate. It will also be useful for planning the ventilation specification for new or refurbished kitchens. The guidance advises on management as well as design and performance issues that are specific to catering.

#### The importance of kitchen ventilation

Kitchen ventilation is required to create a safe and comfortable working environment. Catering and cooking can produce significant quantities of fumes and vapours as well as large amounts of heat. Ventilation is necessary to remove these and discharge them to a safe external location. This is usually achieved by mechanical extraction via a canopy hood installed over the cooking appliances. The ventilation system should also provide general ventilation throughout the kitchen.

It is particularly important to provide adequate make-up air for gas-fired appliances. The lack of an adequate supply of air, and/or incorrect flueing arrangements can lead to incomplete combustion and the accumulation of combustion products such as carbon monoxide. However, most aspects of this guidance also apply to other energy sources.

#### Adequate ventilation

The objectives of an adequate ventilation system are to:

- remove cooking fumes at the source, ie at the appliance;
- remove excess hot air and introduce incoming cool clean air so that a comfortable working environment is achieved. Inadequate ventilation can cause stress, contributing to unsafe systems of work and high staff turnover;
- ensure that the air movement in the kitchen does not cause discomfort, eg from strong draughts;
- provide sufficient air for complete combustion at

fired appliances, and prevent the risk of carbon monoxide accumulating;

- be easy to clean, avoiding the build-up of fat residues and blocked air inlets which lead to loss of efficiency and increase risk of fire;
- be quiet and vibration free.

The ventilation system needs to be designed to take account of:

- cooking load;
- amount of cooking equipment used;
- layout and shape of the kitchen;
- numbers of staff;
- the need for easy cleaning and maintenance.

#### Gas Safety (Installation and Use) Regulations 1998

These Regulations will apply to gas appliances found in most catering premises. Some gas appliances will be a type (known as type B) that requires a flue to comply with the Regulations. Where extraction is provided to serve that purpose it will be considered to be a flue and will require an appropriate interlocking system connecting the airflow to the gas supply.

Further details can be found in Catering Information Sheet 23,<sup>1</sup> Catering Information Sheet 3<sup>2</sup> and in the guidance accompanying the Regulations.<sup>3</sup>

#### Features of an effective kitchen ventilation system

Detailed specifications on design features, dimensions of canopies and criteria on canopy performance can be found in the industry guidance *Specification for kitchen ventilation systems* DW172<sup>4</sup> – published by the Heating and Ventilating Contractors Association.

The following general points below indicate the design features that have been found to be suitable and effective in the past. Existing systems should be assessed and new systems planned to meet these ventilation objectives.

## **Canopies**

### **Design**

The canopy hood needs to be designed and operated to ensure the effective removal of cooking fumes. It will need to be of suitable size and have sufficient extraction to minimise fume spillage into the kitchen.

There should be sufficient canopy hoods for all appliances and other sources generating fumes and heat.

The canopy hood(s) should be located as close as possible to the source but obviously need to take into account the work requirements.

The airflow into the canopy should be uniform and constant, and meet the appropriate design flow required for the appliances and room ventilation rate.

Canopies and ductwork need to be constructed from non-combustible material and fabricated so as to discourage accumulations of dirt or grease, and condensation.

There should be suitable access to the ductwork to allow for regular cleaning to prevent accumulation of fat etc.

Grease filters need to be readily removable for cleaning/replacement.

### **Performance**

The extraction rate is best calculated from the information supplied with the appliances within the kitchen. It should also take account of air change rates required for kitchens.

Where canopies are not used, eg where extraction occurs through ventilated ceilings, consult a competent heating and ventilation engineer to calculate the appropriate ventilation rates.

The design should avoid draughts where the kitchen is subdivided (eg wash-ups, vegetable preparations).

## **Replacement air**

The ventilation system design should take into account the need to replace extracted air. Make-up air can be provided by mechanical and/or natural means.

In smaller kitchens, sufficient replacement air may be drawn in naturally via ventilation grilles in walls, doors or windows.

Where air is drawn in naturally, some means of control over pest entry is usually required. A fine mesh grille will restrict the ventilation, and a larger grille area can compensate. However, for larger installations, a mechanical system using a fan and filter is more suitable.

The 'clean air' should not be taken from 'dirty' areas eg waste storage, smoking areas etc. The make-up air should not impair the performance of flues serving gas appliances.

## **Cooling air**

The effective balancing of incoming cool air and extracted hot air should help prevent the kitchen becoming too hot. For mechanical make-up air systems, the cooler air can be directed towards hot work positions. Otherwise, you may need to consider air conditioning or fixed fans that do not affect the efficiency of fumes extraction.

Local freestanding fans are not recommended. They may spread microorganisms or set up air currents or turbulence affecting the efficiency of fumes extraction. They also introduce other hazards such as tripping and electric shock hazards from the trailing cable.

## **Discharge**

High-level discharge of extracted air is often needed to prevent nuisance to neighbouring properties. 'Chinaman's hats' on discharge stacks are not recommended as they encourage down draught and re-entry of fumes into the building. Fumes discharge should also be away from wet cooling towers.

## **New ventilation systems**

### **The caterer**

Changes in catering processes will probably require ventilation changes or new systems.

The caterer will need to provide detailed information for the competent advisor, designer and installer, including the following information:

- maximum demands likely to be placed on the ventilation (eg to cope with peaks of activity);
- amount and type of kitchen equipment;
- menu;
- number of meals; and
- number of staff.

Advisors, suppliers and installers should have knowledge of the best industry practice and relevant health and safety guidance and legislation.

The caterer should consult with the safety or employee representatives in good time about any significant changes.

The caterer must keep records of design criteria, commissioning performance, maintenance requirements, and of tests and inspections. These enable maintenance, modification, and testing against the original specification.

### **The building owner or controller**

The owner or controller of the building may provide facilities such as equipment and ventilation. In such cases the owner or controller should follow the above advice on adequate ventilation. The provision of adequate ventilation will require the owner to obtain information on the probable kitchen usage from the caterer.

### **The designer/design team**

The 'design team' means the various parties (owner, caterer, designer, supplier, installer). These parties need to discuss their respective information needs and what information each should supply.

The ventilation design engineer will need to take into account:

- kitchen usage information from the caterer;
- equipment information from the caterer or supplier, eg cleaning requirements, the amount of air required for complete combustion, and the performance of the existing installation;
- the requirements or specifications for air cleaning systems, eg for grease removal at the canopy and also before final discharge to outside atmosphere;
- the limitations of the building, eg the available room may influence the sites and routes for air inlets or discharges;
- food hygiene requirements, eg identify a suitable source for clean make-up air, prevent pest entry, avoid grease accumulations and ensure easy cleaning of the system;
- heat control and waste energy recovery to maximise energy efficiency.

The risk assessment of the installation should include the need for interlocking the ventilation power supply to the gas supply, depending upon the type of gas appliances and their manner of use.

Designers would then normally refer to industry technical guidance, eg The Chartered Institution of Building Services Engineers (CIBSE), The Heating and

Ventilation Contractors' Association (HCVA) guidance DW172 *Specification for kitchen ventilation systems* and BS 6173: 2001.<sup>5</sup>

### **The equipment installer**

The equipment installer will need to know the design performance and capacity of the ventilation system so they can ensure adequate ventilation.

For existing installations where data is absent or unavailable, the installer should recommission the system of extraction and make-up air, and produce a report detailing its performance. A competent heating and ventilation specialist can provide this information.

Before installing a gas-fired appliance, the gas installer will need to know the specific air inlet requirements. The manufacturer of new catering appliances has to provide this under the Gas Appliances Directive. The gas installer can then check that these requirements are met by the ventilation system provided, taking into account the other existing appliances.

Information on the ventilation requirements of the existing appliances could be obtained from the caterer's records or from the manufacturers concerned.

Further information on ventilation issues relating to gas appliances can be found in Catering Information Sheet No 23 *Gas safety in catering and hospitality*.

### **References**

- 1 *Gas safety in catering and hospitality* Catering Information Sheet CAIS23(rev1) HSE Books 2007 Web version: [www.hse.gov.uk/pubns/cais23.pdf](http://www.hse.gov.uk/pubns/cais23.pdf)
- 2 *Precautions at manually ignited gas-fired catering equipment* Catering Information Sheet CAIS3 HSE Books 1995 Web version: [www.hse.gov.uk/pubns/cais3.pdf](http://www.hse.gov.uk/pubns/cais3.pdf)
- 3 *Safety in the installation and use of gas systems and appliances. Gas Safety (Installation and Use) Regulations 1998. Approved Code of Practice and guidance* L56 (Second edition) HSE Books 1998 ISBN 0 7176 1635 5
- 4 *Standard for kitchen ventilation systems* DW172 Heating and Ventilating Contractors' Association. Available from HVCA Publications, Old Mansion House, Eamont Bridge, Penrith CA10 2BX Tel: 01768 860405 e-mail: [hvcapublications@welplan.co.uk](mailto:hvcapublications@welplan.co.uk)
- 5 BS 6173: 2001 *Specification for installation of gas-fired catering appliances for use in all types of catering establishments* British Standards Institution

## Further information

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