

TECHNICAL BULLETIN

ODOUR REDUCTION FROM CATERING ESTABLISHMENTS

Odour reduction from catering establishments has been successful at many sites around the country, and is often now a requirement of both Planning and Environmental Health Departments.

As more restaurants are being established in Listed Buildings, and Residential Areas, the planning authorities appear to be compromising on the design of such systems, rather than allowing an "in-keeping" modification to the building

The compromise of the design functions causes the whole system to be ineffective, and the design principals must be taken as a total solution.

There are four facets to the reduction of odours:

- Activated Carbon Filters will reduce the odours in an air stream, but they only operate with an air temperature below 40 Deg. C and or a humidity level below 80%R.H. Particulates within the airstream will reduce the efficiency and life of the filters.
- Removal of the grease and fats from the airstream, as this can cause fires in the ductwork and will effectively block any other filter in the system if it is not removed.
- The majority of large particles and any particles of grease and fats not collected by the Grease Filters are removed by Bag Filters.
- Removal of fine smoke particles which can be a nuisance in themselves and will also cause the Activated Carbon filter life to be reduced, this is performed by a High Efficiency Particulate Arrestor Filter.

In Detail

The grease removal commences with the Hood over the cooking equipment whether that is ovens, grilles, hot plates or ranges. Air from the cooking with these appliances needs to be captured and drawn through the hood via Grease Filters. The Trade Association, Heating and Ventilating Contractors' Association, has produced a Standard for Kitchen Ventilation Systems, Reference DW/171, which should be conformed with. If a large amount of steam is produced during cooking, such as large steamers, or washing up machines, it is preferable not to treat this within the system, as both the temperature and humidity are in excess of the allowed design parameters, and little odour is produced.

Final removal of grease contaminants and the larger particulates is achieved by the use of a General Purpose Bag Filter, we recommend a grade of F5 to EN779, which will afford good protection for the Activated Carbon Filter.

If the cooking involves heating oils to extreme or such other cooking techniques as Char grilling, the capture and elimination of smoke particles will be required. These will ordinarily pass through the Bag filters and the Carbon filters, and

particles which are not entrained in the Carbon will reduce its capacity to adsorb. For this application the use of High Efficiency Particulate Arrestor Filters is required, having a minimum efficiency of H10 to EN779, or for the more onerous requirements an efficiency of H14 to EN1822.

The Activated Carbon filter can only adsorb certain gases, but the majority of cooking odours are captured successfully by them. The lighter cooking odours associated with English cuisine are adsorbed adequately with a contact time of 0.1 seconds, i.e. as the air passes through the bed of carbon it is in contact with the carbon for 0.1 seconds. Heavier odours associated with Indian cuisine require an increase in this contact time to 0.3 seconds.

Activated Carbon Life is measured by the comparison of its own weight to the weight of gas adsorbed, so by definition, the life of the filter is dependent upon the mass/weight of carbon in the cell originally. We would recommend a coconut based Activated Carbon having a minimum retentivity against Carbon Tetrachloride of 40% for this application.

The essential design points are:

- Hood and Grease Filters designed in accordance with DW/171
- Air temperatures controlled to be below 40 Degrees Centigrade.
- Air Humidity to be controlled to have a maximum 80% Relative Humidity.
- Particulate Filtration to a minimum of F5 to EN 779
- Smoke Filtration to Grade H14 of EN1822-1
- Activated Carbon Filters, using coconut based carbon having a minimum retentivity of 40%.
 - Contact time of 0.1 seconds for light odours (English and Chinese Cuisines)
 - Contact time of 0.3 seconds for heavy odours (Indian and Thai Cuisines)
 - Impregnated Carbons for intensive use of Garlic and some other spices.
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In addition to the nuisance caused by the odours from cooking establishments consideration should be given to the noise nuisance, and the fans should be fitted with attenuators to provide acceptable noise levels in proportion to the amenity at the outlet. Often sound attenuators are installed to protect the restaurant/kitchen from their Health and Safety responsibilities in preference to the nuisance caused to the amenity in which they are situated.

Any cooking establishment is prone to fire, and the necessary equipment should not be overlooked. The use of a bifurcated fan where high temperatures may be encountered, and the use of fire rated ductwork where applicable in accordance with BS5588 Pt 9.

Maintenance

The on going maintenance of the filtration system installed is necessary; to ensure continued compliance with the design principal. We would recommend the Guide to Good Practice - Cleanliness of Ventilation Systems, as published by the Heating and Ventilating Contractors' Association. Document Ref: TR/17.

This will include:

- daily cleaning of the Grease filters, and their replacement as necessary.
- The Bag and HEPA filters can be monitored for their life by their resistance to airflow, i.e. pressure drop, and that pressure will be detailed by the designer/installer of the equipment.
- The life of the Activated Carbon Filters cannot be deduced, from design in practical terms.
However the manufacturer will detail the retentivity of the carbon, e.g. a 40% of their own weight, and by the analysis of a test cell or sample of carbon taken from the installation after a specific period; say one month, the remaining life can be estimated, and the filters changed at the end of that period.