SECTION 5 MIXED MEDIA ELECTROSTATIC FILTER FOR CONTROL OF GASEOUS PHASE CONTAMINANTS

Odour control filters are not a new concept, however, it is widely known that certain mediums are unable to adsorb particular gases or are inefficient at doing so. There are many volatile gases present in a cooking exhaust which, due to the natural cooling process, are changing state during the path of travel from their release at the cooking process to their ultimate discharge in the atmosphere. Many of these volatile gases can be detected by the human olfactory receptor at levels of parts per billion.

In order to provide a high efficiency odour filter we must provide a medium which is capable of acting as a high quality molecular sieve. It is important that the medium is effective at a high separation efficiency with the broad spectrum of gases present in the kitchen exhaust. In the Mixed Media Filter we use three mediums to adsorb the volatile gases. All of the media is micro porous in structure and it is therefore important that the majority of the particulate phase is eliminated prior to the odour control stage, it is not sufficient to use normal canopy filters as this will result in too much carry over of grease, a high quality filtration process is required combining a number of stages of technology. Various different primary stage particulate filters are manufactured by Purified Air, details available on request.

Set out below are the three mediums used in the Purified Air System:

Activated Carbon grade 207C - This is one of the highest grade Coconut Carbons which provides a surface area of 1200 square metres per gram. Activated Carbon is well known for odour control finding applications in many processes. Whilst Activated Carbon covers a broad spectrum of gases it has limitations with some of the volatile gases found in a standard cooking exhaust. As previously mentioned some of these volatile gases can be detected by the olfactory receptor at parts per billion it is therefore insufficient to remove these gases at levels of fifty percent or less.

Zeolites - These are crystalline aluminosilicates in which atoms form an extensive three dimensional framework with uniform surface pores and channels. Their shape selective structure allows them to be designed and manufactured to adapt and act as a molecular sieve and a catalyst to specific molecules. Through design the Zeolite can adsorb, at high efficiency, the molecules with which Activated Carbon is inefficient. The available surface area will depend on the design and application, however, for typical cooking our Zeolite bed will have a surface area between 700 - 900 square metres per gram.

Rare Earth's - These components are well known to improve the performance of filters and magnetic devices, they are produced as ultra fine metal powders which are incorporated in minute quantities into both the Activated Carbon and Zeolite beds via ion exchange or impregnation.

These mixed media filters are highly effective against the gases produced from the cooking process. The filter cartridges are tightly packed and are either made from a loose fill pelletised mix or constructed by bonding the granules together, permanent suspension, using a patented bonding process with conductive material to form an homogenous biscuit. Standard sizes are manufactured to suit repeat applications.

Turn key projects can also be accommodated using our known design process and with reference to the specialist manufacturers of the raw material. As far as cooking applications are concerned we have a library of formulae to cover all types of cooking. Most variations allow for increased dwell time combined with different percentage mixes of the raw material.

Ionising of Effects / Electrostatic Enhancement of Filtration Performance

The filters as described above can be enhanced by the use of ionisation. Purified Air Limited are the owners of a filtration enhancement process, protected by world-wide patents.

The process provides for sub micron particles and gases to be ionised before entering the filter medium thus imparting a negative charge in the region of 10,000 - 15,000 volts negative. Once charged the components seek to discharge on a positively charged or grounded surface. Our mixed bed filter is constructed from highly conductive materials which are laid on a perforated metal bed in a metal frame.

The filter is grounded on the opposite side of the High Tension circuit thus making it positively charged with respect to the negatively charged pollutant. As the negatively charged pollutant is drawn into the positively charged filter the natural adsorption process is magnified by the electrostatic difference thus ensuring a much greater degree of separation.

It is known that activated carbon normally has an adsorption capacity of one percent by weight, when used in our process the adsorption capacity is increased to as much as ninety percent by weight. In addition to the increased adsorption capacity the filtration performance is also greatly improved, tests carried out by the ministry of defence in France have shown that when tested for separation of florescent gases with a measured value of 0.08_{u}m our process increased separation efficiency from 0.3×10^{-2} to 0.3×10^{-5} .

LYON HOUSE LYON ROAD ROMFORD ESSEX RM1 2BG ENGLAND
Tel: 01708 755414 Fax: 01708 721488 Email: enq@purifiedair.co.uk