How the Equipment Works

Electrostatic Precipitation and its use for the separation of sub-micron particles has been around since the late nineteenth century. The principle of operation is to impart a negative or positive electrical charge (Ionisation) to a particle. The particle is then passed between finely spaced parallel metal plates (average spacing 5-10mm) which are held at opposite electrical potentials. One plate will be charged to the same polarity as the ionised particle whilst the other will be earthed (opposite with respect to the positive/negative).

As the charged particle travels between the two metal plates it is forced away from the plate held at the identical polarity and drawn towards the earthed plate. During the path of travel the Parallel Effect takes place resulting in the charged particle becoming attached to the earthed plate due to the electrostatic difference, once attached the particle will either run off and be held in the sump or in the case of dry particulate remain suspended on the plate until cleaned off during maintenance.
The Electrostatic Precipitator is ideal for use in kitchen exhaust systems to separate the small grease and smoke particles that penetrate the main grease filters in the canopy.

Efficiency

The Electrostatic Precipitator is a very efficient means for separating the particulate phase; operating efficiency when clean can be as high as 98% at particle sizes down to 0.01 micron. However, as the plates and ioniser become laden with particles during the use the efficiency will reduce due to the insulating effect of the dirt.

Pressure Loss

The Electrostatic Precipitator does not present a high-pressure loss (10mm—15mm Water Gauge). This gives a specific advantage in that most standard Kitchen extractor fans will have the capability of overcoming this small differential.
This is particularly advantageous when it is considered that if the pressure loss were high larger noisier fans would probably be necessary resulting in potential noise pollution.

Maintenance

There are no replacement filters; all that is required is regular removal of the filters, ioniser and collector cells, which can be cleaned with chemicals and warm water. If the maintenance schedule is ignored or overruns there is no significant damage to the Electrostatic Precipitator. However, there is potential for electrical or electronic component failure for systems that are not maintained as required.

Mixed Media Filters

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 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.

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 a 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 0.08μm our process increased separation efficiency from 0.3×10^{-2} to 0.3×10^{-5}.

ON 100 Odour Neutraliser (Gaseous Phase Odour Control)

The patented system combines physics and chemistry. A venturi spigot is connected to the duct; this is connected to the O.N. 100 via a non-conductive flexible hose. Ambient air is drawn into the O.N. 100 where it is mixed with the neutralising chemical to form a vapour or gas, the vapour is then ionised to 15,000 V negative and discharged into the duct. The duct is earthed through the electrostatic circuit thus making the contents of the duct at an opposite electrical potential to the ionised chemical. The electrostatic difference forces the chemical to combine physically with the contaminant after which a chemical reaction takes place to neutralise the cooking odour.

Terms and Conditions

This quotation has been prepared taking into account our standard terms and conditions and is subject to these terms and conditions which are attached.

Unless otherwise agreed in writing the terms and conditions of this agreement shall apply to any order placed by the customer. In the event of any inconsistency between these terms and those passing between the parties these terms shall prevail. No variation of the terms and conditions shall be allowed unless expressly accepted in writing.

1 **Interpretation**

1.1 In these conditions:-
"Purchaser" means the person who offers to purchase the goods and whose name and address appear on the order constituting such offer.
"Company" means Purified Air Limited (registered in England under Company No. 1827831)
"Goods" means the goods (including any instalment of the goods or any parts for them) which the Company is to supply in accordance with these conditions.
"Conditions" means the standard terms and condition of sale set out in this document. "Contract" means the Contract for the purchase and sale of the Goods.
"Writing" includes cable, facsimile transmission, **e-mail** and comparable means of communication. Dealer installer or maintenance company means a person or company appointed by Purified Air Limited.

1.2 These conditions are deemed as those in force between the Company and the Purchaser and no other terms or conditions will replace these conditions unless authorised and specifically agreed in writing by the company.

2 **Basis of the Sale**

2.1 An invoice will be deemed to be accepted if not queried in writing within 7 days of the invoice date.

2.2 In entering into the Contract the Purchaser Acknowledges that it does not rely on and waives any claim for breach of any representations concerning the goods unless such representations are confirmed in writing by or on behalf of his company.

2.3 The Purchaser further acknowledges that prior to submitting an offer or order for the Goods it has received a copy of these Conditions and makes its offer to purchase in full knowledge and acceptance thereof, unless agreed specifically in writing by the Company and the Purchaser.

2.4 No quotation or estimate given by the Company shall constitute an offer for sale and no contract shall exist until an offer or order has been accepted in writing by the Company whereupon these conditions shall be binding to the exclusion of any other items or conditions.

3 **Orders and Specifications**

3.1 The Purchaser shall be responsible to the Company for ensuring the accuracy of the terms of any order (including any applicable specification) submitted by the Purchaser and for giving the Company any necessary information relating to the Goods within a reasonable time to enable the Company to perform the Contract in accordance with its terms.

3.2 The quantity, quality and description of any specification for the Goods shall be those set out in the Purchaser's order which shall be in accordance with the Company's quotation unless agreed otherwise by the Company in its written acceptance of the Purchaser offer

3.3 The Company reserves the right to make any changes in the specification of the Goods which are required to conform with any applicable safety or other statutory requirements which do not materially affect their quality or performance.

3.4 No order which has been accepted by the Company may be cancelled by the Purchaser except with the agreement in writing of the Company.

3.5 In the event of unauthorised cancellation and/or return of **standard** goods the Purchaser shall be responsible to the Company for a charge equivalent to 25% of the value of the contract cancelled including the value of goods and services including labour costs as quoted. In the event of unauthorised cancellation and/or return of specially made goods or systems the Purchaser shall be responsible to the Company for a charge equivalent to 100% of the value of the contract cancelled.