

## GPAC 500.4 Gas Phase Air Cleaner **[Operating & Maintenance Instructions]**

### Device Description

The GPAC500 is a 500 litres/second airflow gas phase air cleaning device.

The GPAC500 removes body odours and odours of human occupancy from the air in occupied buildings in accordance with AS1668.2 (1991, 2002 or 2012 edition).

The minimum as tested efficiency of the GPAC500, when used as recommended, is 90%.

The technology has been tested at the Australian National University with ACT Government funding. The test methodology allows a minimum postulated efficiency to be confirmed/rejected but it does not yield an actual efficiency to be stated. The estimated actual efficiency of the unit (based on test results and other data) is expected to be in the 99-100% range. Due to the statistical/psychophysical nature of the testing methodology quoted efficiency figures are referenced to a 5% error probability as is standard in good psychophysical research and testing.

The efficiency is constant during the period of media (within unit) service life thereafter it declines slowly. The period of media service life is estimated as 4 years (8 hr/day normal commercial use e.g. office, lecture hall, court).

Service life of media will be reduced if the unit is used to clean excessively polluted air e.g. if building occupants are excessively odorous, if the building population load is excessive or if the building itself emits excessive amounts of pollutants - from building materials, surface finishes, processes undertaken in the building etc. In this case the unit will aid in preserving the health/amenity of building occupants by reducing pollution in the air they breathe.

GPAC500 users may refresh the media in the unit on a scheduled basis or they may elect to do so when there begins to be olfactory evidence of the need i.e. an increase in odour level.

### Use of the Device

Typically the GPAC is used to augment ventilation in its task of producing suitable breathing air in buildings.

About 2.5 l/s/person is the fresh air requirement in normal buildings for maintenance of a healthy breathing environment – this requirement incorporates a generous safety factor.

It is common for an AS1668.2 compliant building system to provide 7.5 -10 l/s/person as a measure to maintain odour levels in the building at an acceptable level – that producing about 80% visitor satisfaction and about 95% occupant satisfaction (visitors are fresh to a building, occupants have acclimatised to odour conditions in the building). This ventilation rate applies when suitable particulate filters are installed.

When a GPAC unit is used it may provide the fresh air equivalent that allows building occupants to experience an effective 7.5-10 l/s/ or a higher chosen value.

The point of using a GPAC is that:

- It reduces outdoor air intake in all seasons thus it reduces the annual cost of heating or cooling the building.
- It reduces outdoor air intake in all seasons, including periods of peak heating and cooling load, thus it reduces the size and cost of heating and cooling plant
- It potentially reduces peak load electricity (e.g. kVA) surcharges
- It allows for greater population in a particular occupancy without actual increase of outdoor air intake. Providing additional outdoor air may be impractical, inconvenient, expensive or effectively impossible in particular building refurbishment circumstances
- It allows the creation of particularly high air quality environments without undue capital expenditure or unduly high energy consumption

When the population in a building is relatively large (e.g. large lecture hall, theatre, stadia) the ventilation air heating/cooling requirement may be high and GPAC use will greatly reduce the required size of air-conditioning plant.

Additionally the unit may be used to remove general or particular pollutants from indoor or ventilation intake air (e.g. where there is pollution outdoors) - tailored unit media fill is available when the pollutant to be removed is unusual.

### Installation

The units are usually installed in a plantroom. They take in return air from the air conditioned occupied space. Cleaned air from the units is delivered back to the occupied space via system ductwork.

Units are typically floor mounted. System ductwork is connected to the units top air exit and side air intake.

An F5 filter is installed in the ductwork upstream and downstream of each unit. This is provided by the air-conditioning system installation contractor.

After installation the fill level of adsorptive in each machine is checked and topped up if necessary.

Each unit's control panel is fitted with differential pressure sensors to indicate the pressure drop across the two associated filters. For each filter indication one pressure pickup point is within the GPAC unit and the other is site-installed on the far side of the filter.

### Electrical and Control

Mains voltage supply to each GPAC unit goes directly to the electrically commutated plug centrifugal fan in it. This is the only mains voltage operated item in each unit.

The control panel on each unit is supplied with 24V supply from the fan motor in that unit.

Each control panel contains two filter differential pressure sensors and a 3 term (P+I+D) controller that controls the rotational speed of the direct driven EC plug centrifugal fan.

A 0-10 V signal from each filter differential pressure sensor is available, at the control panel, to the building BMS system to indicate the need for particulate filter media change.

Fan (i.e. unit) enable and fault indication interfaces are available, at the control panel, for BMS connection.

The PID controller in the control panel uses two air pressure measurements to calculate the airflow through the GPAC unit. Pressure is measured in the plenum below the fan air intake and at the fan intake cone.

At commissioning the fan 'K' factor ( $K=95$  in this instance) and the appropriate controller pressure input range are manually input at the controller interface.

The desired GPAC airflow rate (in this instance 500 litre/sec or 1800 cubic metres/Hr) is set at the controller and the controller automatically varies the fan speed to maintain this airflow.

### Maintenance

There is no scheduled maintenance requirement for the GPAC unit other than gas phase adsorptive media replacement at lengthy intervals.

The period of media service life is estimated as 4 years (8 hr/day normal commercial use e.g. office, lecture hall, court). High gaseous pollution load will reduce life.

The media in the unit may be replaced on a scheduled basis or when there begins to be olfactory evidence of the need i.e. an increase in odour level in the occupied space.

The media in the unit is proprietary. Spry Engineering Pty Ltd is the sole supplier.

Use of other media will void unit/installation compliance with AS1668.2 and render the installation in violation of building regulations.

For media replacement service contact Bioair – **info@bioair.com.au**