HAMILTON THORNE

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ZANDAIR PCOC™3

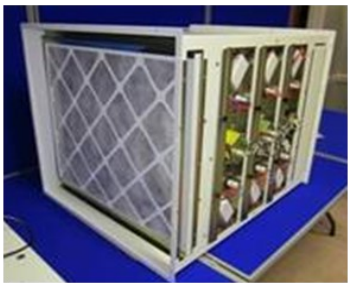
PHOTOCATALYTIC OXIDATION CHAMBER

The **ZANDAIR PCOC™3** model is an encased unit to be fitted into the HVAC/AHU unit or the air ducting to provide an airtight flow of the airstream through the unit and has the option for a removable MERV-13 and Potassium Permanganate Filter. This model consists of three photocatalytic grids to provide additional dwelling time for maximum breakup of the molecular structure of the VOCs passing in the airstream. The photo-catalytic action removes an oxygen atom ion from the molecular structure of the VOCs and renders them harmless.

PHOTOCATALYTIC OXIDIZING (PCO) technology converts and neutralizes Volatile Organic Compounds (VOC), odors, fumes, and toxic chemicals to benign water and carbon dioxide by-products. The process is called heterogeneous photocatalysis or photocatalytic oxidation. In chemistry, photocatalysis is the acceleration of a photoreaction in the presence of a catalyst. In photo-generated catalysis the photocatalytic activity depends on the ability of the catalyst to create electron–hole pairs, which generate free radicals (hydroxyl radicals: •OH) able to undergo secondary reactions. Its comprehension has been made possible since the discovery of water electrolysis by means of titanium dioxide – TiO_2. TiO_2 is a semiconductor photocatalyst with a band gap energy of 3.2 eV. When this TiO_2 is irradiated with the photons of less than 385 nm, the band gap energy is exceeded and an electron is promoted from the valance band to the conduction band. The resultant electron-hole pair has a lifetime in the space-charge region that enables its participation in chemical reaction. The most widely postulated reactions are **$\bullet OH^- + h^+ \rightarrow \bullet OH$ (hydroxyl radical) and $O_2 + e^- \rightarrow O_2^-$** (super-oxide ion). Hydroxyl radicals and super-oxide ions are highly reactive species that will oxidize volatile organic compounds adsorbed on the catalyst surface. Commercial application of the process is called Advanced Oxidation Process (AOP). There are several methods of achieving AOPs that can, but do not necessarily involve TiO_2 or even the use of UVC irradiation. Generally the defining factor is the production and use of the hydroxyl ion. *(in part from Wikipedia).*

The **ZANDAIR PCOC™3** model uses a patented process to affix TiO_2 nanoparticles to a solid substrate, for this TiO_2 to interact with

GERMICIDAL ULTRAVIOLET LIGHT UVC (UVGI) radiation at 253.7 nm which has the advantage that this wave length does not get absorbed by the oxygen molecules, thus does not create any ozone – O_3 (trioxygen). Naturally occurring ozone in the ambient atmosphere is converted by the TiO_2 / UVC interaction into normal dioxygen (O_2) or attached to other ambient gases which then get converted to benign matter, including diatomic oxygen (O_2) which forms 20.9% of our ambient atmosphere.



While the photocatalytic process is very fast, the number of individual photocatalytic actions occurring in the PCO chamber are multiple, sequential, and very complex. The efficiency of this process in our equipment is therefore increased by placing three such PCO chambers sequentially in a single frame, thus increasing the 'dwelling time' of the airstream through the **ZANDAIR PCOC™3** equipment.

Our **ZANDAIR PCOC™3** model carries an additional slot for an **Potassium Permanganate Filter (PPF)** to adsorb any aldehydes remaining in the airflow. This optional PPF filter with 1.5 kg of Activated Charcoal is specially formulated to adsorb any ambient formaldehyde/ aldehydes. This ACF filter can be ordered on demand for this feature.

Using a high proportion of return air as part of the airstream (between 85% to 95%) is thus helping in this cleaning process, as the recirculating return air already passed before through this photo-catalytic oxidation process. Recirculation of the airstream is also a very important concept for saving energy as already conditioned for the required room temperature.

A single **ZANDAIR PCOC™3** handles up to 2000 CFM airflow. Area to be covered is a function of that volume of air for the intended ACH (Air Changes Per Hour). 6 to 15 ACH recommended. Do not remove any existing HEPA filter. The **ZANDAIR PCOC™3** is to be used in conjunction with existing HEPA filter(s). HEPA filtration is still needed for fine particle removal.

The **ZANDAIR PCOC™3** model is equipment to be permanently installed by professional contractors familiar with air heating and cooling systems. Must be professionally installed to meet all local regulations.

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STATIC PRESSURE

With No Filters		
CFM		
2000	0.06 IN. WG	15 PA
1600	0.03 IN. WG	7 PA
1200	0.01 IN. WG	2 PA
With 1" Potassium Permanganate Filter (PPF) Only		
CFM		
2000	0.35 IN. WG	87 PA
1600	0.25 IN. WG	62 PA
1200	0.16 IN. WG	39 PA
With MERV 13 Filter Only		
CFM		
2000	0.40 IN. WG	100 PA
1600	0.30 IN. WG	75 PA
1200	0.25 IN. WG	62 PA
With 1" PPF *and* MERV 13 Filter		
CFM		
2000	1.20 IN. WG	298 PA
1600	1.10 IN. WG	274 PA
1200	1.00 IN. WG	249 PA

SPECIFICATIONS

POWER:	110V/60Hz / 1.8 Amps 150watts 220V/50Hz / 0.9 Amps 150watts
APPLICATION:	2000 CUBIC FT 57 M^3
MAX FORCE VELOCITY:	625 FPM 190 m / min
MAX AIR FLOW:	2000 CFM 56.6 m3 / min
SERVICE:	U.V Lamps Replace Every 12 months Replace Only with LTO 19 UV lamps Filters—Replace Every 6 months or sooner
UVC RANGE:	253.7 NM
CATALYST:	TiO2 210 sq ft 19.5 m^2

FRAME DIMENSIONS

Frame body between flanges
W 625 mm x L 785mm x H 559 mm
W 24 ⅝" x L 30 ⅞" x H 22"

Outside dimensions of flanges at both ends
W 658 mm x L 785mm x H 585 mm
W 25 ⅞" x L 30 ⅞" x H 23 ⅞"

Flange height
12 mm all around
½" all around

Cover for Electronics
W 470 mm x H 510 mm x D 72 mm
W 18 ½" x H 20 ⅛" x D 2 7/8"

Cover for MERV-13 filter
W 84 mm x H 484 mm x D 12 mm
W 3 5/16 " x H 19" x D 1/2 "

Cover for Activated Charcoal filter
W 38 mm x H 484 mm x D 12 mm
W 1 ½" x H 19" x D 1/2 "

2 electric connectors
(protruding from electronics cover)
DIA: 38 mm x 25 mm
DIA : 1 ½" x 1"

Weight: 42 kgs - 92 lbs
(including MERV-13 and Potassium Permanganate filters)