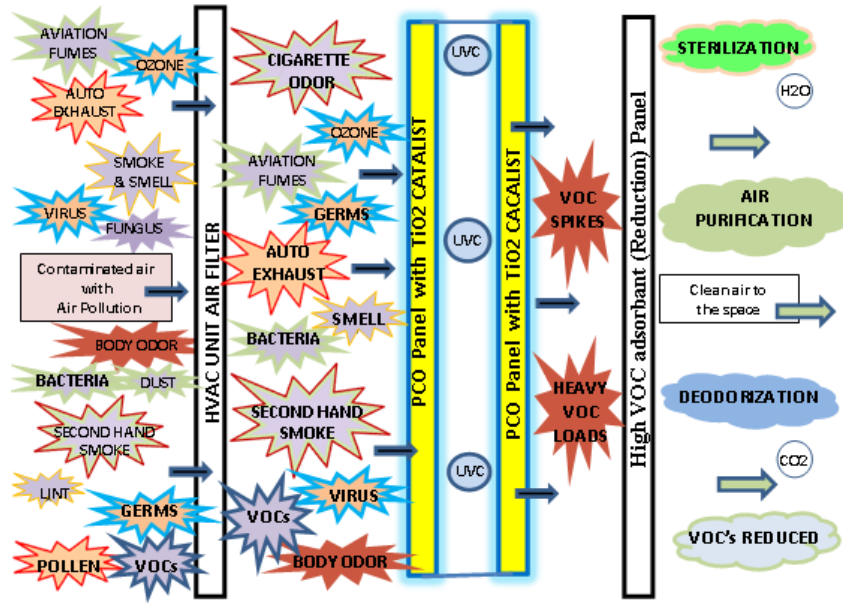


Improving your Casino and Hotel Indoor Air Quality: PCO Technology (Photo Catalytic Oxidation)



FIVE STAGE AIR CLEANING & PURIFICATION (PCO) SYSTEM

Properties currently using PCO to improve indoor air quality



1) Who is using PCO technology in the hotel and casino industry to improve their indoor air quality? From a 400 sq. ft hotel smoking room at the Peppermill Resort Spa Casino to the 310,000 sq. ft. Barona Resort & Casino in Lakeside, CA, PCO technology is reducing contaminants and improving indoor air quality in the gaming industry. See two satisfied customers below.



Testimonial: “The number one complaint (from guests) is smoke. These things (air purifiers) made a night and day improvement in air quality so quickly,” **Dave Fuller, Hotel Director Peppermill Resort Spa Casino.**



Testimonial: After looking at a variety of systems, it became clear to us that UVDI’s V-PAC™ system is the most advanced on the market. And, the results of the Western Environmental Services’ study further demonstrated the V-PAC™ system will provide Barona with the cleanest air in the casino industry.” **Rick Salinas, General Manager of Barona Resort & Casino**

2) What's the difference between "point of use" and "point of entry" PCO applications?

For areas under 4,000 sq. ft, the "point of use" Catalytic PURE AIR (PCO) purifier, is a powerful stand alone air unit with a small 8" x 24" foot print that is a self contained air purifier that delivers excellent air exchange and plugs into any 110V outlet . It's perfect for smoking hotel rooms, slot areas, public areas, etc. that need to improve indoor air quality immediately. Each air purifier unit covers 300 – 500 sq. ft. and can be grouped in an area as **seen below**.



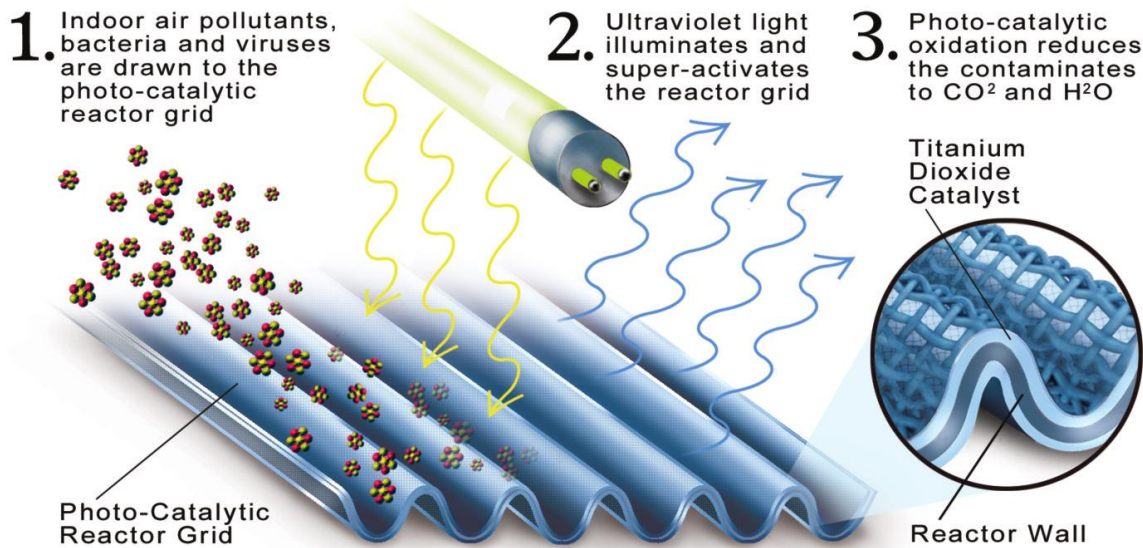
The "point of entry" V-PAC (PCO) systems install in the air handling unit (10 ton and above) of the HVAC system for your property. A simple to install system essentially consisting of an array of germicidal UV lamps (V-MAX GRID™ system) in close proximity to one or more arrays of PCO panels. An optional carbon filter bank is available downstream of the PCO filter bank as needed. It is available in a variety of configurations depending on concentration levels, percentages of outside air, and desired results. A design team will assist in tailoring your system for the specific end-use application.

"The V-PAC™ system has taken our clean air and energy efficiency initiatives to entirely new levels," said **Jeff Young, Lucky Eagle Director of Facilities**. "Our guests and team members noticed the difference almost immediately following installation. See picture below.



More FAQ's about PCO (Photo Catalytic Oxidation):

3) How does the PCO technology work? PCO systems utilize a UV lamp and a titanium dioxide photo catalyst to create oxidants that destroy gaseous contaminants. When the photo catalyst is irradiated with UV light of a certain wavelength (254-365 nm), a photochemical reaction takes place and this reaction, called photo catalytic oxidation (PCO), converts organic pollutants into carbon dioxide and water. Pollutants, particularly VOCs, are preferentially adsorbed on a catalyst surface and oxidized in this process. The process is diagramed below.



4) What will it cost me for my casino? For a PCO system, whether it is a “point of use” or “point of entry” application, a good estimate is \$1 - \$2 per sq. ft. We offer a range for budgeting purposes as many factors will affect the price such as activity and occupancy, contaminants, height of the ceiling and amount of ventilation.

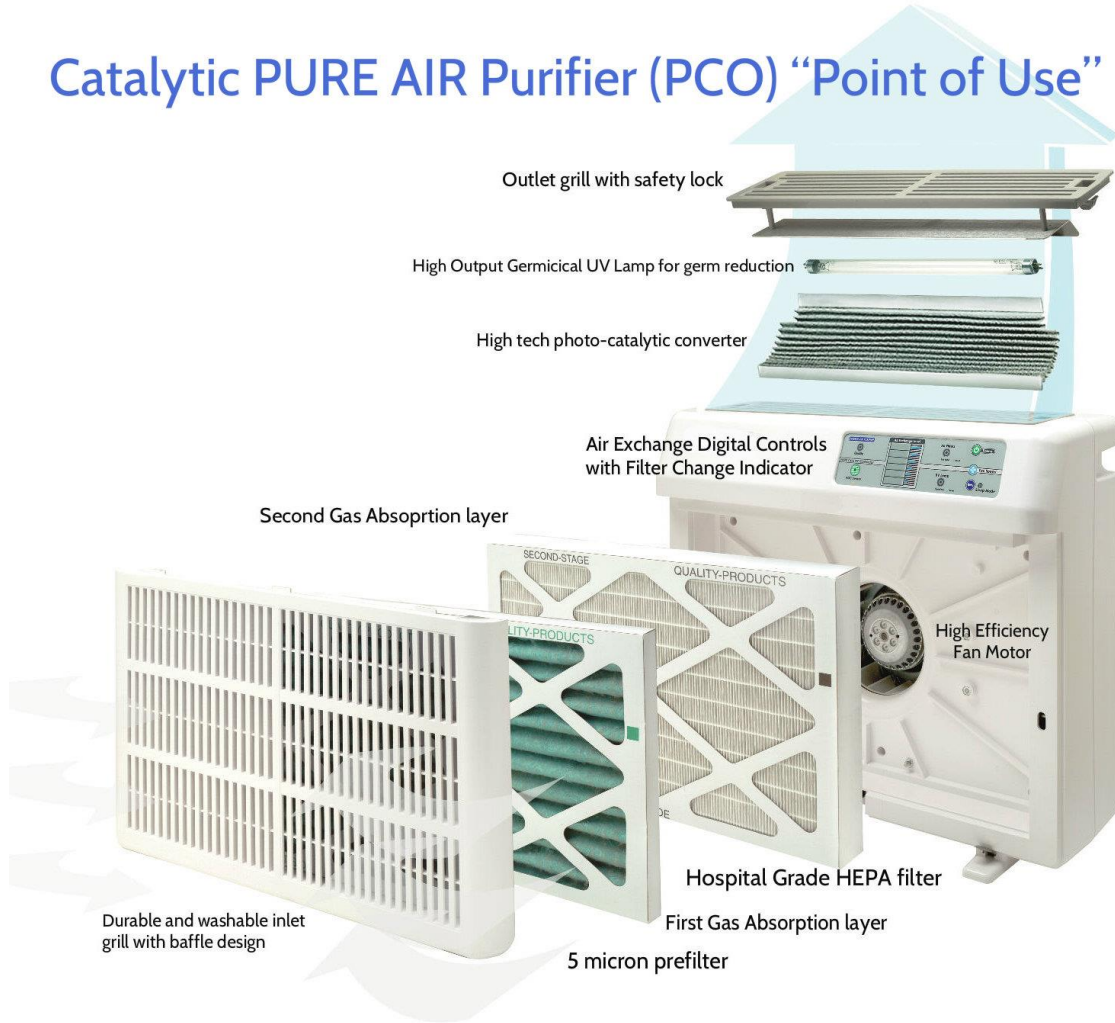
5) What is the next step I take? Ask us about our Free Trial program with one of our “Point of Use” Catalytic PURE AIR purifiers. This gives you, your staff and your guests a chance to experience and appreciate PCO air quality. During your trial, we can look at your property and figure out the most cost effective way to use PCO to get the indoor air quality results you need.

6) How do I get more referrals and test results? Contact us and we will be glad to send you more case studies and referrals to help you towards improving your indoor air quality. Below are some preferred properties currently using PCO technology to improve their indoor air quality.



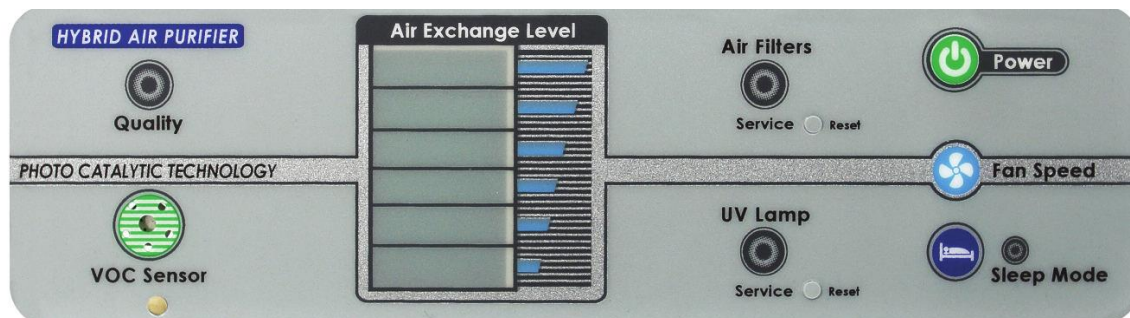
Need more technical information? Below follows technical information on the Catalytic PURE AIR purifier and V-PAC system with PCO technology.

Catalytic PURE AIR Purifier (PCO) “Point of Use”



Air Exchange Control:

The other important concept to getting healthier indoor air quality is Air Exchange. You need to change the air in a room to clean it preferably 4-6 times per hour. On the front of your Catalytic PURE AIR purifier you will see the Air Exchange Level monitor on the Display Panel **pictured below**. The higher the air exchange level, the better indoor air quality you will have.



Let's now go into detail of each stage of the Catalytic PURE AIR purifier so your can understand why it is the preferred air purifier of so many casinos and hotels to improve indoor air quality.

Stage 1: 5 micron prefilter: A 5 (five) micron prefilter removes all particles from the air larger than (5) microns, extending the life of the HEPA filter and protects the gas adsorbing media from dust coating and fouling. Dust, dirt animal hair, pollen etc.

Stage 2: 1st Gas Absorption Layer (Black) on the back side of the filter is especially formulated gas adsorption media adsorbs automobile exhaust fumes, organic hydrocarbons, formaldehyde form particle board used in home construction, paint solvents, chlorine, cleaning chemicals and other fumes until the photo-catalytic converter destroys the pollutants. toxic chemicals and gases reduces odors.

Stage 3: Hospital Grade HEPA Filter (White) removes allergens so small (down to 0.3 microns) that they can only be seen with a microscope. Pollen, mold, fungal spores, dust mites, cockroach dust, tobacco smoke and bacteria are but a few examples.

Stage 4: A 2nd Gas Absorption Layer (Black) on the back side of the HEPA filter is especially formulated gas adsorption media adsorbs automobile exhaust fumes, organic hydrocarbons, formaldehyde form particle board used in home construction, paint solvents, chlorine, cleaning chemicals and other fumes until the photo-catalytic converter destroys the pollutants. toxic chemicals and gases reduces odors.

Stage 5: A high output germicidal lamp UV lamp to reduce germs and bacteria. Ultraviolet light 10,000 times the intensity of sun light kills viruses and bacteria too small to be filtered out by a HEPA filter. Ultraviolet technology combined with photo-catalytic oxidation is the most important feature in air purification since germs are easily spread from one person to another by central heating and air-conditioning systems.

Stage 6: The Photo Catalytic Converter. The key to Photo-Catalytic Oxidation is the photo catalyst, a chemical compound that becomes highly reactive when exposed to various wavelengths of ultraviolet light.

Specifications for CATALYTIC PURE AIR purifier Model No. CPA-QA-20:

Carbon Filter: 5.0 micron rating
1.24 lbs. (0.58 kgs.) of pulverized coconut
4.9 sq. ft. (0.46 sq. meters) of material surface area
HEPA Filter: 0.3 micron rating
26 sq. ft (2.42 sq. meters) of material surface area
Zeolite Media: 1.0 lbs. (0.45 kgs.) of media
1.4 sq. ft. (0.13 sq. meters) of surface area
Catalytic Converter: 23 sq. in. of material. Radial screen for more contact with air flow.

Dimensions (inches)21.5 wide x 18.0 high x 8.0 deep
Weight23 pounds
Maximum Air Volume265 CFM Loaded / 400 CFM
Unloaded
UV Lamp254 nanometers (germicidal)
Line Voltage120V, 60 Hz / 230V-50Hz
Maximum Watts110 watts
Maximum Amperes0.89 amperes
BlowerForward-curved motorized impellor



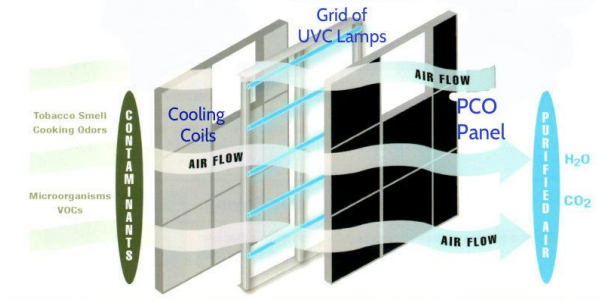
**Catalytic PURE AIR Purifier
Model No.: QA-20**

V-PAC System Application Guidelines

1 Stage System for Coil and Drain Pan Cleaning:

- System consists of 1 grid of UVC lamps between the cooling coil and 1 PCO panel
- Use when coil and drain pan cleaning is most the important and air stream VOC removal is not the main concern
- The PCO system works best in the air flow recirculation to the space mode
- Installation will be in the air stream down stream of the cooling coil

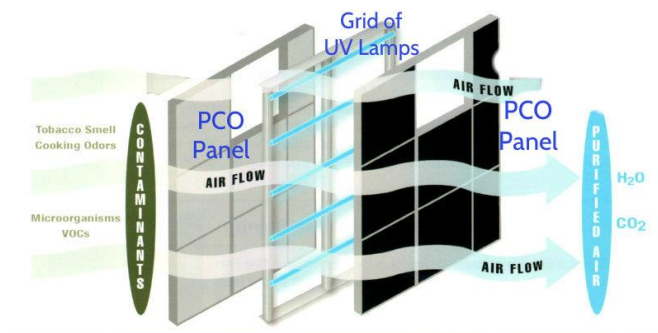
1 Stage System for Coil and Drain Pan Cleaning



2 Stage System for Air Stream Reduction of VOC's:

- System consists of 1 grid of UVC lamps between 2 PCO panels.
- Normal application and is for air stream reduction of VOC's
- Outside air should be limited to 50% of the system flow
- Installation can be upstream or downstream of the cooling coil

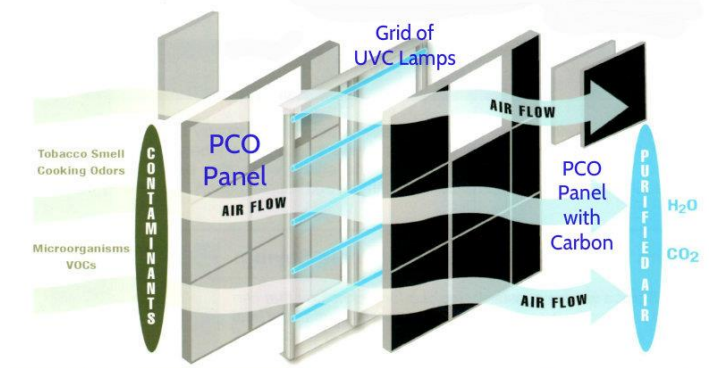
2 Stage System for Air Stream Reduction of VOC's



3 Stage System for Heavy VOC Spiking (Casino & Airports):

- System consists of 1 grid of UVC lamps between 2 PCO panels + 1 High VOC Adsorbent Carbon Panel (HVAP)
- For areas with VOC spikes and air recirculation will be less than 50%
- Effective for VOC spikes from casino cigarette smoke and aviation fuels

3 Stage System for Heavy VOC Spiking (Casinos & Airports)



V-PAC System Features:

- Modular configuration allows for easy integration into new and existing heating, ventilation, and air conditioning (HVAC) systems
- Scalable design to fit any plenum size
- Photo catalytic panels (PCO) and High VOC Adsorbent Panels (HVAP) are designed for installation in standard filter tracks
- Negligible pressure drop / Up to 95% non-condensing
- Complete system will fit in an airflow length that is as little as 9"
- Virus, bacteria, VOC and odor reduction
- The PCO filter panels are made of aluminum honeycomb construction impregnated with a proprietary coating of titanium dioxide catalyst
- The activated carbon filter is preferably a 1" thick BPS Lite™ filter which housed in the same filter holding frame as the PCO (photo catalytic panels)
- Ambient temperature operation / Rated for temperature 30F to 150 F (4C to 57C)
- Energy savings through the reduction of outside air / Chemical free / No residual ozone
- Low power consumption / Long catalyst life/ Minimal maintenance requirements

System Requirements:

- One V-PAC System per air handling unit (minimum 10 ton recommended)
- V-PAC Systems available to 1, 2 or 3 Stages. (See V-PAC Application Guidelines above)
- One 20 amp circuit per V-PAC system
- 9" of airflow length to accommodate the V-PAC system
- Recommended 4-6 air exchanges per hour

V-PAC System Sizes:

- 12 x 12 x 1
- 12 x 24 x 1
- 24 x 24 x 1
- Custom sizes also available

V-PAC System is available in a variety of configurations depending on concentration levels, percentages of outside air, and desired results. Our design team will assist in tailoring your system for the specific end-use application. Standard modular sizes available for configuring into any size duct cavity or AHU.

UVC Grid Sizes:

21" V MAX GRID Lamp Module: 120 VAC .45 A 240 VAC .20 A
33" V MAX GRID Lamp Module: 120 VAC .75 A 240 VAC .40 A
61" V MAX GRID Lamp Module: 120 VAC 1.30 A 240 VAC .60 A

Regulatory approvals:

ETL listed to UL/Canadian standards:
UL 1598/CSA 22.2 250 UL
1995/CSA 22.2 236 UL
153/CSA 22.2 12 for category ABQK
(Air Duct Mounted Accessories)



V-PAC Installation
Barona Resort Casino
San Diego's Leading
Casino Resort

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