



Total Spectrum™ Air Purification System

Total Spectrum Air Purification (patent pending) uses a new technology that augments conventional, media-based air filtration. The result is a powerful chemical destruction system for any polluted indoor air. The Total's design concept is flexible enough to be effective in industrial environments, such as refineries, mines, mills, and wastewater plants as well as offices, bars, restaurants, casinos, hotels, and homes. Total Spectrum is capable of removing environmental tobacco smoke (ETS) and other pollutants down to levels of outside air or better. This permits HVAC systems to use more recirculated air scrubbed by Total Spectrum and less energy-consuming outside air.

Advantages in Air Purification with Total Spectrum

- Reduces all odorous and hazardous air pollutants to outside air or better levels
- Maintains high removal efficiency of gases to keep air at cleanest level
- Provides very high single-pass efficiency of gas removal
- Destroys health threats such as molds, viruses, bacteria, allergens and other bacteria
- Removes particulates down to desired levels
- Incorporates patented technology that efficiently regenerates the media bed daily
- Scales up or down to meet any airflow demand and can be retrofitted to existing systems
- Includes controls to ensure safe operation
- Does not produce harmful emissions

Advantages in Energy and Cost Savings with Total Spectrum

- Lowers energy costs by recycling more indoor air and reducing the amount of outside air required; for example, savings of \$1/cfm per year with heat recovery and \$4/cfm per year without heat recovery
- Reduces capital costs in new construction with smaller HVAC requirements, such as the need for heat recovery systems
- Lowers operating and maintenance costs with ease of use, ease of service, and long-lasting replacement parts
- Meets or exceeds Green Building standards for clean indoor air

System Description

Total Spectrum Air Purification has a unique sequencing of filters, UV lights, and dynamic chemistry that captures and destroys airborne contaminants. Conventional media filters remove particulates. A series of 4-inch deep prefilters are included up to the desired efficiency level, usually MERV 14. A proprietary photo-catalytic oxidation (PCO) section removes gaseous pollutants, generates powerful oxidation and reduction chemistry, and regenerates a bed of activated carbon or other suitable media. This stops any chemistry that could pass through the PCO section. The carbon is contained in patented PMA 25 media modules that minimize pressure drop and maximize residence time.

A second media bed, filled with alumina-based media (PG300) in PMA25 modules, removes any remaining chemistry. Air quality sensing monitors are installed before the final catalytic filter. This filter ensures that no dynamic chemistry passes downstream and back into occupied space. A control box on the outside of the housing engages the UV lights and sensors, turns UV lights off when entrance doors are opened, and performs other necessary safety and operating functions. The control box also houses pressure gauges across prefilters, giving an easy visual indication of when filters need to be changed.

Dynamic Chemistry Purifies Air and Regenerates Media

Total Spectrum has the unique ability to dynamically produce powerful chemistry within the purification system. This chemistry reacts with airborne pollutants, instantly destroying them. When pollutant levels are low, the chemistry is available to clean the first stage filter media, renewing it for the next surge of pollutants. This self-cleaning capability significantly reduces operating costs by extending media life indefinitely. ProMark's design uses special UV light to generate strong oxidizers, such as O_3 , OH^- , H_2O_2 , O^{++} , and others, by the decomposition of hydroperoxides (ROOH) via the reaction of excited atomic oxygen with water. This is the very same process at work each day in the troposphere, where the hydroxyl radical, OH^- , acts as the "detergent", reacting with many pollutants and acting as the first step in their removal.



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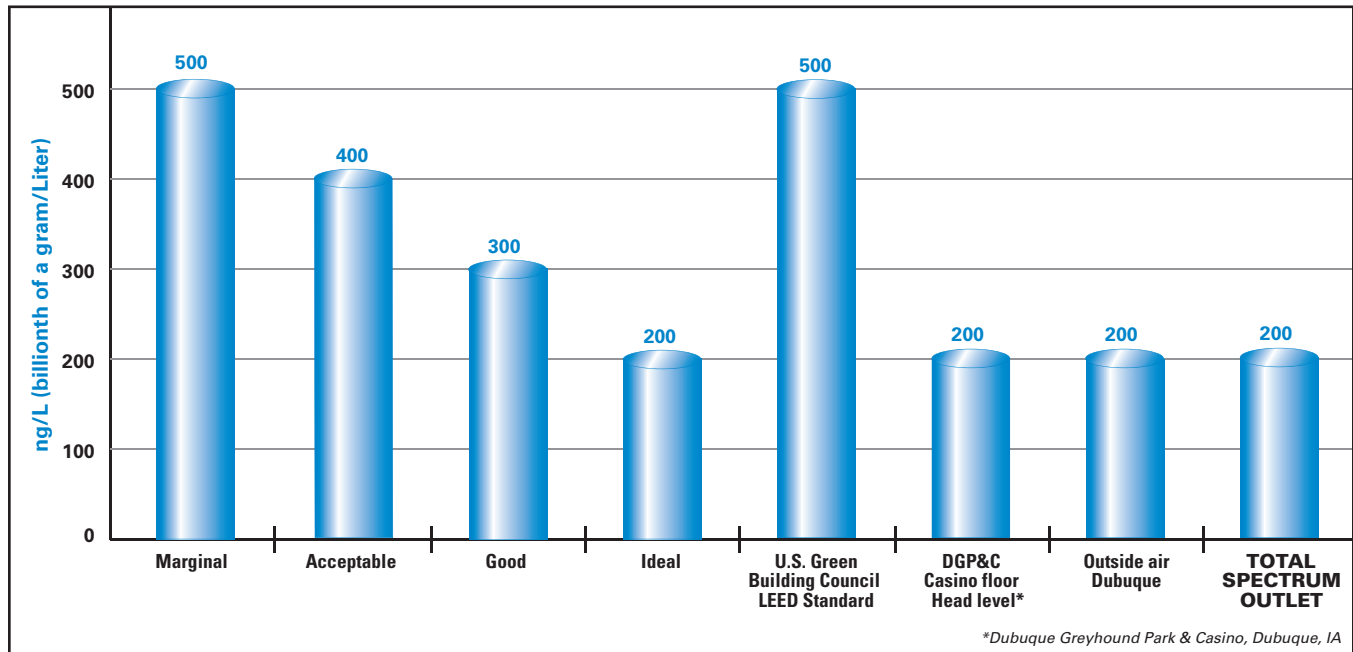
Engineering Pure Air

toll free **800.809.8300**

www.promarkassociates.com

Total Spectrum™ Air Purification System

Case Study Test Results Air Purified to 200 Billionths of a Gram of Pollutant*



Total Spectrum Options

- Real-time air quality monitoring via internet
- HEPA final filters
- Heating and/or cooling in stand alone systems
- "On demand" operation for light duty applications
- Regular system service by ProMark technicians
- Periodic air quality sampling, testing, reporting

Awards

- AHR Expo 2006 Innovation Award for Indoor Air Quality
- ASHRAE (American Society for Heating, Refrigeration, and Air-Conditioning Engineers) 2006 Excellence in Engineering Illinois chapter
- American Gaming Association Vision Award for Environmental Design

ProMark is a global provider of innovative indoor air purification design, equipment, and services for the industrial, commercial and residential markets.

Compliance With ASHRAE Design Standards

Total Spectrum Air Purification can solve multiple indoor air quality (IAQ) problems while complying with ASHRAE Standard 62.1-2004 "Ventilation for Acceptable Indoor Air Quality". Section 6.2.9 requires air cleaning or increased ventilation for smoking areas. Section 6.3 Indoor Air Quality Procedures covers contaminant sources, concentrations, and design approaches for non-smoking areas. These two sections of the standard allow for air filtration to reduce pollutant levels in enclosed spaces as an alternative to increased ventilation with outside air. Some facilities deal with indoor pollutants by ventilating with 100% outside air, an expensive and often incomplete solution, especially when the outside air is not that clean. In the case of environmental tobacco smoke (ETS), the common solution is 100% outside air.

In casinos and bars that use Total Spectrum to eliminate ETS, indoor air quality goals can be met with only 20-30% levels of outside air. When ETS is not present, the Total Spectrum system can be reduced in size for "On Demand" scrubbing of air. Using air quality sensors, Total Spectrum will only operate when needed, purifying a side stream of 10-20% of the total air flow, and still fully comply with Section 6.3.1.4. The result: outside air use can stay at minimum levels while maintaining the highest level of indoor air quality and complying with ASHRAE Std. 62.1-2004.