

QUADRANT SR-Series Thermal Oxidizers in Chemical Manufacturing

Chemical processing facilities across the country are facing ever tightening restrictions for volatile organic compound (VOC) and hazardous air pollutant (HAP) emissions. These emissions can be generated from such points as process vents, storage tanks, fugitive releases, among others.... To achieve compliance with Clean Air Act Amendments, facilities may have to apply maximum achievable control technology (MACT) and demonstrate MACT compliance during normal operations and startup, shutdown, and malfunction conditions.

When considering various technologies capable of meeting MACT standards, the choices of equipment can be confusing. Available control devices can include; adsorption, biofiltration, condensation, thermal oxidation, uv light oxidation, wet scrubbing, and various combinations of the above. In many of today's chemical processing facilities, the choices are quickly narrowed down to thermal oxidation systems. Within this field of abatement devices there are yet a few more equipment choices; catalytic oxidation, regenerative thermal oxidation, thermal (recuperative) oxidation, and direct thermal oxidation.

One chemical processing facility worked with Catalytic Products International toward the design and installation of a system to exceed the MACT requirement while providing a highly reliable system, capable of working through the wide range of emission characteristics of their vent streams. The equipment choice was a Thermal (recuperative) Oxidizer with a specially engineered shell and tube primary heat exchanger.

A Thermal (recuperative) Oxidizer works by combining the harmful air pollutants with oxygen and heat. In this controlled environment, the VOC's are converted to CO₂ and water vapor. These harmless byproducts are released over the shell and tube heat exchanger for energy recovery. Controlling this reaction is complicated in many chemical processes. Consider that many emission points cycle on and off at various times or that reactions in the process yield changing emission loadings.

The application included an ever changing variety of solvent species such as; hydrocarbons, aldehydes, esters, and acids. Complicating the application was the plants desire to engineer a highly fuel efficient device. Since the solvent loading was ever changing (from low to high), the Thermal (recuperative) Oxidizer had to be designed with a special heat exchanger, capable of working through this wide range of emissions without compromising the uptime reliability of the process.

The system installed is rated for operation from 5 different reactor vents totaling 7,000 scfm. The temperature of these vents varied slightly from ambient to 130 F. The loading variations could range from about 1% LEL to over just over 25% LEL. The plant environmental permit called for a minimum destruction rate efficiency of 99%, however the plant demanded that this device obtain 99.9%.

The equipment choice was a QUADRANT SR-7,000 Thermal Oxidizer. This oxidizer is designed to effectively process the range in emissions and volumes without compromising the plants operation. The system includes the use of a FLOATING TUBE HEAT EXCHANGER engineered to lower the fuel consumption at all times. This heat exchanger is special because it offers a completely stress free design, beneficial in these demanding applications. The results of the system proved to meet the plants expectations in both compliance and operating costs. The unit has shown to be highly reliable by meeting the uptime goals demanded by chemical processors, with downtime only for normal preventive maintenance tasks.

The QUADRANT Family of oxidizers is available in four different configurations. These special systems are capable of treating emissions up to 50,000 scfm and solvent concentrations exceeding 100% LEL. Special systems are also available to treat halogenated air streams.



Photo is a QUADRANT SR-7,000 Thermal (recuperative) Oxidizer designed, manufactured and installed by Catalytic Products International, Inc.

For more information about this system or any of the VOC abatement systems designed and manufactured by Catalytic Products International, please contact them at:

Catalytic Products International
980 Ensell Road
Lake Zurich, Illinois 60047
tel: 847-438-0334
fax: 847-438-0944
e-mail: info@cpilink.com
website: www.cpilink.com