

Silicone Converter Succeeds with Custom Air Pollution Control Equipment

Many industries utilize silicone as an ingredient in their manufactured product. Silicone enhances the attributes of the product or helps to improve production characteristics. Whatever the reason may be, users of solvent borne silicone's all face very troubling issues when it comes to the selection of the right air pollution control system.

Among the air pollution control choices available to consider; Catalytic Oxidation, Thermal (recuperative) Oxidation, and Regenerative Thermal Oxidation, all are susceptible to operational problems of one kind or another. The basis for these problems stems from the oxidation process itself. During operation of the production source, silicones are driven off along with the VOC's. Since the air pollution control equipment is installed to destroy the VOC's, any system has to be designed to also process the silicone vapors. During the oxidation process, silicone will convert to silicon dioxide (SiO_2). This (SiO_2) is the culprit for failing and/or under-performing air pollution control equipment. The SiO_2 is a talcum-powder like substance that clings to metal surfaces; robbing any system of efficiency and putting at risk the system's ability to effectively destroy VOC's.

Catalytic Oxidizer's are highly discouraged due to the fact that silicones poison catalyst. Regenerative Thermal Oxidizer's are at risk to ceramic media loading and valve seat degradation. Some Thermal (recuperative) Oxidizer's are susceptible to frequent cleanings and quickly diminished thermal efficiency.

One silicone coater worked extensively with Catalytic Products International to design a highly reliable Thermal (recuperative) Oxidizer, capable of working efficiently through the varying ranges of operations, with a unique approach to dealing with the problems of SiO_2 . 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 carbon dioxide and water vapor. These harmless byproducts are released over the shell and tube heat exchanger for energy recovery.

The application called for a pollution control system to destroy VOC's such as; Ketones, Alcohol's, Acetates, Glycol's, among other such organic vapor emissions. Depending on the line speed and the products width, these solvents could range from 10% LEL to over 25% LEL. The majority of the time, the coating line is operating at 15-17% LEL. When designing the thermal rate efficiency of the oxidizer system it is important to rate the maximum efficiency of the primary heat exchanger to the solvent load thought to be encountered near 80% of the time. This allows the oxidizer to use very little natural gas during normal operations. It is important also to design a system that will be capable of working through the higher solvent loading conditions. A hot-gas bypass is a standard recommendation on all Thermal Oxidizer's. The hot-gas bypass becomes the safety valve for the system and allows higher LEL's to be safely and effectively managed, without any need for operator involvement.

In this application, the customer expects that 2-5 lbs/hr of silicone products such as; Silicone Dioxide (an inorganic), Hexamethylcyclotetrasiloxane, and/or Octamethyl-cyclotetrasiloxane (both organic) could be found in the exhaust stream. For this reason, the system has been engineered to withstand the rigors of a considerable amount of particulate buildup.

The recommendation was to use a QUADRANT SR-Silicone Series Thermal Oxidizer. QUADRANT SR-Silicone Series Thermal Oxidizer's offer a variety of features that help to keep users compliant and profitable for years to follow:

- **Round – Modular Design:** Eliminates stress and strain associated with integral – square box systems
- **CPI's FLOATING TUBE HEAT EXCHANGER:** Engineered without any expansion joints, the system is completely stress free and allows fast startups, frequent cycling, and ultra-high thermal efficiencies.
- **Silicone Transitions:** Specially designed transitions force SiO_2 for drop-out and to aid in fast cleanouts.
- **Efficient Cleaning:** The system forces the SiO_2 through the inside of the tubes. This affords fast and thoroughly efficient cleaning. Through the use of a special cleaning device, the system is fully restored to its original thermal efficiency.
- **Monitoring:** The system automatically tracks the thermal rate efficiency of the system and warns you when cleaning should be scheduled. This avoids un-necessary shutdowns for cleaning when not cost justified.
- **Among Other Special Features.....**You can learn more about this system be calling CPI at 847-438-0334, or a special look inside these systems can be viewed at our website: www.cpilink.com



Photo is a QUADRANT SR-15,000 Silicone Series Thermal (recuperative) Oxidizer designed, manufactured and installed by Catalytic Products International, Inc.

This QUADRANT SR-15,000 Silicone Series Thermal Oxidizer was especially designed for users with very heavy SiO_2 loading levels. The special vertical orientation allows a majority of the SiO_2 to fall to the ground level clean-out transition. This special feature drastically lengthens the time between cleanings. Ridding the tubes of all SiO_2 build-up is accommodated from the top-down. Special platforms allows for easy access with worker safety in mind.

This system replaced two older style, square box designed thermal oxidizers that incorporated antiquated expansion joints and poorly planned clean-out access. Beyond the short life of the primary heat exchangers (due to the frequent cycling) these systems could not be effectively cleaned of the SiO₂. Overtime, the original thermal efficiency diminished so much and the excessive costs for cleaning became burdensome to the operations that new equipment was eagerly installed.

Overall, the system exceeded the local Clean Air Act requirements by providing 99.9% destruction of all VOC's. The system incorporates a hot gas bypass that automatically de-rates the 75% thermally efficient heat exchanger when higher solvent loads are processed. The FLOATING TUBE HEAT EXCHANGER accommodates single shift operations, allowing for daily startup and shutdown without any chance for damage.

Catalytic Products International is a worldwide leader in the design and manufacture of custom air pollution control systems. Other products include; Regenerative Thermal Oxidizer's, Catalytic Oxidizer's, Concentrator's, Particulate Control, Energy Conservation System's, and special services to meet your every need.

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.

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