

How to Specify an Oxidizer

By Charles M. Martinson, Wolverine (Massachusetts) Corp.

To design an oxidizer that meets your company's air pollution control needs, the proper information must be supplied.

As the full effects of the Federal Clean Air Act (CAA) amendments continue to impact today's industry, many companies are finding it necessary to install new or additional air pollution control equipment. Catalytic and thermal oxidation has become a popular method for controlling volatile organic compound (VOC) and hazardous air pollutant (HAP) emissions.



Oxidizers convert the harmful VOCs and air toxic pollutants contained in process exhaust fumes to carbon dioxide and water at elevated temperatures. The methods used (catalytic or thermal oxidation) ensure complete VOC and HAP destruction. Many of today's energy-efficient oxidizer designs utilize a high efficiency, air-to-air heat exchanger to preheat incoming exhaust fumes, further reducing operating costs.

Available in sizes from 500 to 40,000 scfm, oxidizers can be retrofit to existing processes.

Once the decision has been made to purchase an oxidizer, you should select several experienced vendors and provide them with specific design specifications and details that can be used to prepare formal proposals. What kind of information should be provided? Here are 12 tips to help you solicit a complete, accurate proposal.

- 1. Describe the production process emitting the VOC or HAP to be controlled.** If possible, include a sketch of the floor plan, showing the location of all pertinent production equipment.
- 2. Provide the geographical location (and elevation level, if known) where the oxidizer will be installed.** Both the outdoor climate (which impacts selection of surface finishes, types of dampers, etc.) and the elevation (which will determine fan sizing) can affect oxidizer design.
- 3. Estimate the number of hours per day the oxidizer will be operated.** Heat exchanger efficiency, catalyst chamber design and other design criteria can change depending upon the operation hours required.
- 4. List the total number of emission points (exhaust stacks) to be controlled.** A process controller bypass T-damper may be required at each emission point. The oxidizer's electrical control design also will change depending upon the number of dampers to be controlled.
- 5. Specify the exhaust rates and temperatures for each emission point.** The exhaust rates are important for sizing the unit but also are used to size the ductwork and dampers. The temperature is used to calculate estimated operating costs and determine whether ductwork insulation is necessary.
- 6. Describe the heat source used for any dryers or ovens to be controlled.** If the heat source for the process dryers or ovens are gas-fired burners, National Fire Protection Association (NFPA) regulations will dictate the method of purging and damper control required. If the heat source is steam or hot oil, process control and bypass T-dampers may not be required at each stack.
- 7. List the solvent types and quantity being used.** In addition to affecting the choice of catalyst used in catalytic units, solvent type and quantity also will affect VOC destruction efficiencies, heat exchanger efficiency, selection of the internal materials of construction and estimated operating costs.

8. Provide the type, cost and line pressure of supplemental fuel available. The fuel type available (natural gas, propane, etc.) and line pressure are used to determine the burner and fuel train design. The fuel cost is used to calculate the estimated operating costs.

9. Provide the electrical voltage and available power cost. The voltage available determines the type of electronics used. The power cost is used to calculate the estimated operating costs.

10. Describe the physical location of the oxidizer installation. The actual oxidizer location determines whether a concrete equipment pad or steel support structure is required. Also, if possible, provide specific site installation plans such as duct run length, exhaust stack height and gas piping length required.



11. Indicate the percent of VOC/HAP destruction efficiency required. The destruction efficiency percentage required will determine the amount of catalyst needed (in catalytic models) as well as the operating temperature.

When specifying a catalytic oxidizer, list any catalyst masking or poisoning agents that may be present in the airstream.

12. List any catalyst masking or poisoning agents that may be present in the airstream. Compounds such as silicones, phosphorus, heavy metals, halogen, sulfur and any particulates could be of concern and should be identified. A catalytic oxidizer can be designed to handle various levels of most compounds if they can be quantified by the user.

It can be difficult to understand the significant differences between one oxidizer manufacturer's offerings and another's. When evaluating an oxidizer for purchase, effective product testing cannot be done, so purchasing decisions typically are made by relying on the vendor's credibility and on the assembled design data. The more thorough and precise you can be when providing operating and design criteria, the more likely it is your project will culminate in an oxidizer system that will meet your individual needs and provide many years of trouble-free service.