



**AIR**CLEAR

**GETTING YOUR  
PROJECT STARTED  
WITH AIR CLEAR**

# GETTING YOUR PROJECT STARTED WITH AIR CLEAR

Everything you need to know about how to get a quote on an Air Pollution Control Unit from one of the top leaders in the industry.

This guide aims to provide a general overview of air pollution control technologies available and help you make informed decisions about where/how to get a quote on emission abatement solutions.

## THE FIRST STEPS

If a regulatory agency has recently informed your company/business that you are out of compliance, or maybe your industry is facing a new set of state/federal regulations. Or maybe your neighbors complain about the opacity/odors from your facility, and you are unsure where to begin looking for help. If so, this guide will explain everything you need to know about meeting environmental requirements. Everything you will need to know, from how the process works, what process information you will need to collect, to how the correct equipment is selected for your particular application, and even why coming straight to a dependable turnkey operation, like Air Clear, is always a more cost-effective solution than going to an environmental consultant. Balancing the need to meet requirements with profitability can take time and effort. We will explain the various pollution control technologies and define commonly used terms.

## WHO IS AIR CLEAR?

Air Clear is one of the industry's most trusted environmental systems suppliers. Headquartered in Elkton, Maryland, USA, they maintain a global presence, internationally recognized as a top-tier Air Emission Abatement Solutions provider. A complete turnkey operation, Air Clear, can see a project from start to finish by supplying their expert engineering, in-house manufacturing, comprehensive installation, and aftermarket service. That is why the world's best and biggest environmental consultant groups look to Air Clear first for help with their client's projects. That guarantees they will have a reliable and consistent partner who can engineer and manufacture cutting-edge equipment on budget and on time. With over 30 years of experience in the environmental industry, Air Clear is fully committed to ensuring a more sustainable future by providing its clients with cleaner air at the lowest possible price.



**Air Clear's History of Air Pollution Control**

by Steven M. O'Connor  
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## **ONE SIZE DOESN'T FIT ALL.**

While some industries may have similar pollution control challenges and solutions, be aware of cookie-cutter approaches to air pollution control. At Air Clear, we use a combination of our experiences over the past 30 years, implementing tried and true engineering techniques and sophisticated proprietary computing software to help our clients choose the appropriate technology for their specific application. Every process is unique, so we customize units tailored to your process flow, temperature, process parameters, efficacy demands, and destruction requirements (DRE). While our competition may cut corners for profit, we do things right at Air Clear.

Our engineers will learn as much about your process as possible, study your project's parameters, and visit your facility firsthand. They also keep open lines of communication through the design process with your team so that your unit can be customized to your needs for convenience. Once all the information needed is collected, it is carefully analyzed and reviewed before being packaged in a formal proposal.

## **FREQUENTLY ASKED QUESTIONS:**

**Which technology should we choose?**

**How big will the unit be?**

**What is the lead time on a new piece of equipment?**

**Do you sell used units? Are rental units available?**

**What are Volatile Organic Compounds (VOCs)?**

**What are Hazardous Air Pollutants (HAPs)?**

**What is the difference between Actual Cubic Feet per Minute (ACFM) and Standard Cubic Feet per Minute (SCFM)? How are they calculated?**

**What is thermal oxidation, and how is it different from catalytic oxidation?**

**How much will the unit cost?**



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## 1. EQUIPMENT SELECTION IS BASED ON ESSENTIAL FACTORS THAT DEFINE YOUR PROCESS STREAM.

**FLOW** – The airflow (SCFM or Nm<sup>3</sup>/hr) is the most crucial piece of information you can provide

**TEMPERATURE** – The inlet temperature that your unit would see is an integral piece of information for determining the footprint of your potential unit.

**CONTAMINANTS** – (Volatile Organic Compounds (VOCs) in your process stream/airflow\*  
*\*IF YOU DO NOT KNOW WHAT EMISSIONS ARE IN YOUR EXHAUST, STACK TESTING WILL BE REQUIRED TO DETERMINE WHAT CONTAMINATES ARE PRESENT.*

**Lower Explosive Limit (LEL)** – The explosive limit is the lowest organic concentration in a stream that would yield a combustible mixture in the presence of an ignition source.

When you first contact Air Clear, you will be sent a document called an Application Analysis Form (AAF). It has a series of questions about the specifics of your process.\* You will need to fill it out to the best of your ability. The essential factors discussed above are the most important. Then a team of Air Clear's skilled engineers will review the AAF sheet, analyze your submitted data, and select the proper air pollution control technology.

*\*PRIVACY IS ALWAYS PARAMOUNT. WE HAVE NDAs AVAILABLE TO USE/SIGN UPON REQUEST.*

## 2. HOW IS THE SIZE OF THE UNIT DETERMINED?

The size of an oxidizer manufactured for use in industrial air pollution control gets determined by several factors, including the type of air pollutants that need to be treated, the flow rate of the exhaust stream, the desired level of removal efficiency, and the specific process conditions and requirements of the facility where someone will install the oxidizer. Engineers and designers typically perform a series of calculations and simulations based on the above factors to determine the appropriate size of an oxidizer for a given application. They will typically analyze the composition of the exhaust gas stream and the desired destruction efficiency to determine the amount of heat that needs to be generated in the oxidizer.



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From there, they will consider the air flow rate, pressure drop, and other parameters to select the appropriate type of oxidizer, such as a thermal oxidizer, regenerative thermal oxidizer, or catalytic oxidizer. The oxidizer chosen must generate sufficient heat to combust the pollutants at the desired efficiency while meeting the application's flow rate and other requirements. Once the type of oxidizer has been selected, engineers will then calculate the oxidizer's physical size, considering factors such as the volume of the exhaust stream, residence time, and the required heat transfer surface area. A combination of these factors will determine the final size of the oxidizer. It will typically be tailored to meet the specific needs and requirements of the facility where it will be installed.

## "THE THREE Ts OF OXIDIZER DESIGN"

*You may hear this term, and understanding what it means may be helpful.*

Several key factors, including temperature, residence time, and turbulence, heavily influence the design of oxidizers. Temperature plays a crucial role in the process, as different air-polluting compounds in waste gases ignite at varying temperatures. To ensure the Combustion Chamber can accommodate all compounds, the temperature must be kept from exceeding 1500 - 1600° F (816 - 870 °C). Thermocouples monitor this temperature while controls modulate gas burners to maintain the desired level of heat. High temperatures are required to ensure that volatile organic compounds (VOCs) are destroyed at a high level. The type and concentration of VOCs can impact the operating temperature, as higher temperatures lead to higher levels of destruction and removal efficiency (DRE) of the compounds being oxidized. Each substance has a specific autoignition temperature, in thermal oxidation must be exceeded to achieve the desired DRE.

Residence time is also critical in oxidizer design, referring to how long waste gases remain in the combustion chamber. The required level of destruction for various VOCs must be achieved within the residence time, which typically ranges from 0.5 to 1 second. The balance between capital and operating cost must be considered when determining chamber temperature, as longer residence times can allow for lower temperatures but may result in decreased DRE.

To increase the efficiency of the thermal oxidizer and ensure that all VOCs are oxidized, turbulence is necessary. Chaotic fluid flow increases mixing and mass distribution, preventing gases from collecting in dead regions. Many designs of thermal oxidizers incorporate combustion chambers with specific geometries intended to generate turbulence. With a residence time of no more than one second and chamber temperatures ranging from 1650 to 2190 °F (900–1200 °C), typical VOC destruction efficiencies are around 99.9%.



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### 3. WHAT IS THE LEAD TIME ON A NEW PIECE OF EQUIPMENT?

The lead time for projects can be crucial, especially if you have waited to move forward. Air Clear's lead time for a new piece of equipment can vary depending on factors such as the type and size of the equipment and the number of projects already in the queue. Typically, custom-made equipment like large Oxidizers or FiberBed Filter units can require longer lead times than standard or smaller equipment and the availability of third-party parts such as fans or burners.

That being said, Air Clear is a turnkey operation that engineers and manufactures in-house. Typically, lead time ranges from 20 to 36 weeks from receiving a purchase order. However, it's best to contact Air Clear directly to get a more accurate estimate based on your specific equipment needs.

### 4. DO YOU SELL USED UNITS? ARE RENTALS UNIT AVAILABLE?

Yes, we sell used equipment upon request. On occasion, we buy back our old equipment if a company no longer has a need for it or they are going out of business. We also do have good relationships with various contacts in the APC aftermarket. In 2023, the availability of equipment is minimal, not to mention the fact that previously owned/operated units can be unreliable due to their history/previous upkeep. Finding the correct type of equipment that is appropriately sized can be very challenging. We can call around looking for your potential APC unit, but it is never a sure thing.

Rentals are also hard to keep in stock, but sometimes clients get lucky and inquire when a unit is back in our possession. We also take older units that are no longer working and refurbish them in our shop. It is always a good idea to inquire about all our available equipment, used and rentals.



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## 5. WHAT ARE VOCs

Volatile Organic Compounds (VOCs) are organic compounds that contain carbon and hydrogen and occur naturally in living things. However, the majority of the organic compounds we use are man-made. Some organic compounds are stable and require additional processes like heating or cooling to create a vapor. In contrast, others are volatile, meaning they vaporize at room temperature and atmospheric pressure. Some volatile organic compounds can be dangerous to humans when inhaled in large quantities or over a long period. Additionally, some volatile organic compounds can contribute to the formation of ozone and smog. Ozone is a dangerous compound that, when mixed with other compounds in the air, becomes the main component of smog, causing respiratory ailments, heart conditions, and environmental damage. Eliminating harmful VOCs from being released is the best way to prevent an increase in ozone and smog, and Air Clear's oxidation technologies are designed to do just that.

## 6. WHAT ARE HAPs

Hazardous Air Pollutants (HAPs) are VOCs with additional harmful properties that can cause severe health effects. According to the U.S. Environmental Protection Agency, HAPs cause thousands of cancer deaths each year in the U.S. Therefore, controlling HAPs is critical to protecting public health and the environment.

## 7. WHAT IS THE DIFFERENCE BETWEEN ACFM & SCFM, AND HOW ARE THEY CALCULATED?

To determine the volume of air being treated by air pollution control equipment, you need to understand two different units of measurement, Actual Cubic Feet per Minute (ACFM) and Standard Cubic Feet per Minute (SCFM). ACFM is the volume of air flowing through the system under actual temperature, humidity, and pressure conditions at the site. In contrast, SCFM is the volume of air flowing through the system under standard temperature and pressure conditions, typically defined as 70°F and 1 atmosphere. To convert ACFM to SCFM or vice versa, you use the Ideal Gas Law, which relates the pressure, volume, and temperature of a gas. It is crucial to measure the airflow rate accurately and determine the actual conditions at the site to ensure proper system design and compliance with environmental regulations.



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To calculate ACFM, you need to measure the actual flow rate of gas in cubic feet per minute (CFM) and adjust it for the actual temperature and pressure of the gas. To calculate SCFM, you need to adjust the ACFM for the standard temperature and pressure conditions, typically 68 °F (20 °C) and 14.7 pounds per square inch (psi), respectively. The calculation involves multiplying the ACFM by the ratio of the standard temperature and pressure to the actual temperature and pressure. It is important to calculate both ACFM and SCFM to accurately measure and monitor gas flow rates in a system, especially in industrial settings where precise control of air or gas flow is crucial for process optimization and air pollution control.

## 8. KEY DIFFERENCES BETWEEN THERMAL OXIDIZERS & CATALYTIC OXIDIZERS

Thermal oxidizers (TOXs) work by heating the waste gas stream to a high temperature, ~1,500 to 1,800 °F (816 to 980 °C), in a combustion chamber. This high temperature causes the VOCs to break down into simpler compounds (carbon dioxide and water vapor) that are less harmful to the environment. Thermal oxidizers do not use a catalyst to enhance the reaction rate of the VOCs and instead rely on high temperatures to initiate and sustain the oxidation process.

Catalytic oxidizers (CATOXs), on the other hand, use a catalyst to increase the reaction rate of the VOCs for a given temperature. This allows for lower operating temperatures, typically between 392 to 932 °F (200–500 °C), to achieve a similar removal efficiency as TOXs. The catalyst in a CATOX unit typically consists of a porous material with a large surface area that promotes the adsorption and reaction of the VOCs. The catalyst bed allows for a more efficient and complete breakdown of the VOCs, which results in less energy consumption and a lower overall operating cost. Catalytic Oxidizers use a catalyst to increase the reaction rate of VOCs at lower temperatures, while Thermal Oxidizers rely on high temperatures to initiate and sustain the oxidation process.





## 9. WHAT WILL THE UNIT COST?

The cost of a typical industrial air pollution control unit from Air Clear can vary widely depending on the specific type of equipment, its application, size, and destruction requirements of the unit. Air Clear designs and manufactures custom air pollution control systems, so the cost of each unit is unique to the project.

To get a more accurate estimate of your project's scope, it is best to contact Air Clear directly with your specific project requirements predetermined. Air Clear has a team of experts who can work with you to provide a detailed quote based on your specific needs and over 30 years of experience bringing projects in on time and within budget.

**In conclusion, understanding air pollution control technologies and the process of going about requesting a formal quote from Air Clear is easier than you might have thought. Our experts are here to walk you through every step of the way and explain anything you may need help understanding, such as associated terminology. That is because the more information you have, the more informed your decisions regarding emissions control are. At Air Clear, we are dedicated to applying our expertise in air pollution control solutions to help you select the best technology for your specific application. Clean Air is Air Clear's top priority; let us help you stay compliant by surpassing your company's ESG objectives and exceeding environmental regulatory standards. Find out why Air Clear is the top choice for dependable air pollution control. Reach out to a representative to discuss your unique requirements and find out how we can help you through the process.**



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