

ZEECO® TRICLEAN™

Vapor Combustion Unit

Ultra-low-VOC, NO_x, & CO Emissions



BURNERS | FLARES | THERMAL OXIDIZERS | VAPOR CONTROL | RENTALS | AFTERMARKET

The TriClean Triple Threat

Zeeco's TriClean Vapor Combustor Unit (VCU) delivers:

- Volatile Organic Compound (VOC) destruction and removal efficiencies (DRE) of up to 99.99%
- Ultra-low-NO_x emissions of **≤ 0.018 lbs./MMBTU** corrected to 3% oxygen
- Ultra-low-CO emissions of **≤ 0.01 lbs./MMBTU** corrected to 3% oxygen

How?

The TriClean VCU utilizes a proprietary premix combustion design that enables it to achieve some extraordinary results. Diluting the flame with excess air reduces peak flame temperatures, significantly decreasing NO_x formation to ≤ 0.018 lbs./MMBTU. Thorough mixing of the vapor and air streams generates a homogeneous mixture that ensures the proper ratio of oxygen to hydrocarbons over the entire surface of the burner, increasing VOC destruction efficiency up to 99.99%. The abundance of oxygen in the system coupled with the thorough mixing results in a high conversion rate of carbon monoxide to carbon dioxide. This conversion rate enables the TriClean VCU to guarantee CO emissions of ≤ 0.01 lbs./MMBTU.

Advantages of Zeeco's TriClean VCU:

- **Lowers three key emissions** - Lowers VOC, NO_x, and CO emissions without additional equipment.
- **Thorough mixing** - Premix combustion thoroughly mixes the vapors with the combustion air stream to eliminate non-diluted flame zones that generate higher levels of NO_x and can form localized hot spots on the stack.
- **Even distribution** - Even combustion across the entire face of the burner ensures the allowable heat density of the burner face is not exceeded, which extends the life of the burner and ensures emissions levels are achieved.

- **Lower assist gas consumption** - When the vapors are lean (≤200 BTU/scf) stable combustion can still be maintained inside the unit with much lower assist gas than traditional VCU designs.
- **Control during transitions** - When the vapors are rich (≥ 200 BTU/scf), premix combustion utilizes the flow of combustion air to control the temperature in the stack. The ability to quickly change the speed of the fan is vital. TriClean VCUs are a compact design and have relatively small fans which enables quick responses to changing process conditions.



When do you need an ultra-low-emission VCU?

Ground-level ozone is formed when VOC and NO_x emissions chemically react in the presence of sunlight. Ozone in the stratosphere protects the earth from the harmful effects of ultraviolet radiation. But at ground level, ozone is a carcinogen. Therefore the U.S. Environmental Protection Agency (EPA) has set the National Ambient Air Quality Standard for the presence of ground-level ozone at 0.070 ppm.

VOC laden vapor streams can be generated by several fixed sources, such as:

- Loading a truck, railcar, or vessel with petroleum products
- Anaerobic digesters
- Petrochemical facilities
- Biogas from landfills
- Three-phase separators at upstream oil gathering facilities
- Biogas purification systems

In most areas, a standard VCU is an environmentally friendly and economical way to destroy these vapors at the present time. Facilities who want to be ahead of the curve of regulatory requirements or facilities in one of the EPA's **8-Hour Ozone Nonattainment Areas** may need the power of TriClean VCU to meet the more stringent requirements.

Emission Guarantees*

VOC DRE	up to 99.99%
NO _x Emissions	≤ 0.018 lbs./MMBTU
CO Emissions	≤ 0.01 lbs./MMBTU

*Based on a vapor stream of natural gas corrected to 3% oxygen

Work with the World Leader

Founded in 1979, Zeeco has steadily become the world leader in the design and manufacture of advanced combustion and environmental solutions. Headquartered in Broken Arrow, Oklahoma, USA, Zeeco is a privately held business with more than 1,000 employees and 25+ global locations on virtually every continent. The company has executed 50,000+ projects, including ultra-low-NO_x industrial burners, flares, hazardous waste incinerators, vapor control, and ancillary products for the refining, production, petrochemical, LNG, power, pharmaceutical,

biogas, and other industries. ZEECO® products are designed to reduce emissions, optimize processing industries, and maximize operating efficiency while meeting all global environmental compliance requirements. Zeeco also provides comprehensive aftermarket parts, service, and engineered solutions, as well as rental equipment. Zeeco's worldwide headquarters is located on a 250-acre campus, which includes a 100,000 ft² (9,290 m²) manufacturing facility and the world's largest industrial-scale research and test facilities.

Model	Minimum Heat Release	Equivalent Fill Rate of Gasoline*	Maximum Heat Release	Equivalent Fill Rate of Gasoline*
TriClean™ VCU-A	0.17 MMBTU/hr.	16 gpm	1.7 MMBTU/hr.	158 gpm
TriClean VCU-B	0.34 MMBTU/hr.	32 gpm	3.4 MMBTU/hr.	316 gpm
TriClean VCU-C1	1.2 MMBTU/hr.	112 gpm	12 MMBTU/hr.	1,116 gpm
TriClean VCU-C2	1.7 MMBTU/hr.	156 gpm	17 MMBTU/hr.	1,568 gpm
TriClean VCU-D	3 MMBTU/hr.	276 gpm	30 MMBTU/hr.	2,767 gpm

*Vapor from gasoline loading assuming 40% vapor concentration

The Zeeco Difference



By concentrating on what we do best, Zeeco has grown into a worldwide leader in combustion and environmental solutions. We are a privately held company whose ownership stays highly involved in daily operations, with upper management composed of the world's leading combustion experts.

When you call Zeeco, we answer. When you make a request, you get a quick, efficient response. We are lean and efficient, able to make decisions quickly, without bureaucracy and red tape. Our sales, engineering, and purchasing groups work hand-in-hand to deliver highly competitive quotes and heroic turnaround times. We stand ready and willing to travel anywhere in the world to discuss upcoming projects firsthand, and to ensure that every existing project runs seamlessly.

Zeeco Headquarters
22151 East 91st Street
Broken Arrow, OK 74014

Learn more at zeeco.com

✉ sales@zeeco.com

☎ +1 (918) 258 8551

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