



THERMATRIX®. ES flameless thermal oxidizer.

High destruction efficiency,
low NO_x, electrically
operated

The patented Thermatrix® ES Flameless Thermal Oxidizer (FTO) reliably and cost-effectively treats Volatile Organic Compounds (VOCs) in fume streams and repeatedly demonstrates 99.9999% destruction efficiency. Thermal oxidation is accomplished at ~1600°F to avoid production of thermal NO_x and to minimize operating costs.

How the ES works

The largest unit in the ES family, the ES-100, consists of a 36" diameter carbon steel, refractory-lined oxidation vessel. The ES vessel contains three silicone-carbide spiral-wound electric resistance heater elements in 6"-diameter 310 SS protection tubes surrounded by a bed of randomly packed inert ceramic pieces. The system is fully automatic and there are no moving parts in the oxidizer. In chlorinated or sulfonated service, alternate materials of construction and a small exhaust gas scrubber can be provided. The ES requires 480V 3 phase 100 amp, 120V 1 phase 20 amp, and 5 scfm of instrument air at 80 psig.

Fume entering the ES is distributed evenly across the ceramic bed by the fume distributor. As the hot ceramic pieces radiate their stored heat to the flowing fume, oxidation begins and the heat of oxidation is added to the ceramic bed. An array of thermocouples in a single thermowell located within the ceramic bed monitors the bed temperature and allows the integrated control system to increase or decrease the electrical power to maintain the oxidation zone at ~1600°F at all times. Electrical energy is only required as a supplement to the heat content of the fume and to preheat the ceramic bed during start-up. The oxidation products flow upward through the hot ceramic matrix where ample residence time, temperature, and excess oxygen complete the oxidation process.

Flameless, stable operation

Although the VOCs fully react with oxygen to form oxidation products, the ES operates well below the Lower Flammable Limit (LFL) and there is never a flame in the oxidizer. The fume oxidizes as it passes through the oxidation zone, releasing heat, which is transferred back and forth to the surrounding ceramic matrix in a "thermal flywheel". This large thermal mass provides excellent stability in operation. The excess oxygen, long residence time and excellent mixing result in outstanding performance. The relatively mild oxidation conditions (~1600°F compared to ~3000-3500°F for flame-based oxidizers) ensure extremely high destruction and ultra-low thermal NO_x emissions, while minimizing power consumption.

Low cost versatility

The ES is offered as a complete, pre-assembled and compact skid-mounted unit. As an example, the skid footprint for the ES-100 is 5' by 6' with the stack exhausting ~15' above the oxidizer. The ES meets Class I, Div 2, Group D requirements and can be easily adapted to meet Zone I Class IIB T3 requirements. Simplicity and portability make it a versatile piece of equipment for operation at remote locations near the fume source. The Thermatrix ES is a standardized well-proven design that requires little customization and is therefore conservative on capital cost. Finally, the ES is relatively easy to permit and requires minimal time to install and place into operation. Models include the ES-5, ES-10 and ES-100, treating from 5 to 90 scfm of fume having 0 to 20 BTU/scf heat content or up to 140 scfm of fume having 20 to 40 BTU/scf heat content. Multiple ES units can be configured in parallel.

Applications

- Pilot plant venting
- Tank breathing
- Pump seals
- Direct process vents
- Demonstrations

Selas Linde North America's FTO technology has repeatedly demonstrated organic waste destruction efficiency of 99.99% +, virtually undetectable NO_x and CO emissions, and dioxin and furan emissions less than 0.1 ng/m³ TEQ. This unique performance assures regulatory compliance with a high degree of reliability.

Selas Linde North America
A division of Linde Engineering North America Inc.
Five Sentry Parkway East, Suite 300, Blue Bell, PA, 19422, USA
Phone +01.610.834-0300, sales@leamericas.com, www.leamericas.com