

LOW NOx THERMAL OXIDIZERS



CLEAN, COMPLIANT, ULTRA LOW NOx CONTROL WITH LOW NOx THERMAL OXIDIZERS

Meeting a strict NOx limit with a conventional thermal oxidizer usually means adding a selective catalytic reduction system downstream, bringing catalyst cost, ammonia handling, and another maintenance-intensive component onto the skid.

CRA's Low NOx Thermal Oxidizer (LNOx TO) combines multi-stage burners with flue gas recirculation and precision controls to limit thermal NOx formation at the source. Multi-stage burners introduce fuel and combustion air in controlled zones, limiting peak flame temperature and the thermal NOx that forms at hot spots, while cooled exhaust gas recirculates into the combustion zone, lowering oxygen partial pressure and further suppressing NOx formation. The combustion chamber holds sufficient residence time at 760-980°C for complete VOC oxidation, independent of the NOx control strategy, so the unit reaches greater than 99.9% VOC/HAP destruction without a post-combustion catalyst.

CRA has engineered low NOx thermal oxidizers for chemical, petrochemical, and oil and gas duty for over 30 years, designed and tested to meet EPA, EU, and regional NOx limits, under the same ISO 9001 quality system that governs every CRA skid.



CRA ADVANTAGE

+ Ultra Low NOx Emissions (Achieves low NOx using staged combustion and flue gas recirculation, no SCR required)	+ Optimal Design & Performance + Accomodate Special Requirements
+ High Destruction Efficiency (Consistently delivers >99.9% VOC and HAP destruction, meeting the toughest air-quality standards)	+ On-Time Delivery + Responsive & Organized Team
+ Reduced Operating Costs (Eliminates catalyst purchase/handling and minimizes reagent use, driving down lifecycle expenses)	+ Stringent Quality Management + Fast Turnaround
+ Regulatory Assurance (Designed and tested to meet EPA, EU, and regional NOx limits without complex add-ons)	+ Cost Effective Maintenance Packages + Long-Term CRA Support

APPLICATIONS

Supplied for VOC and HAP destruction under strict NOx limits across chemical, petrochemical, and oil and gas duty

- + Odorous Emissions
- + Acid Gas
- + Tail Gas
- + Halogenated Hydrocarbons
- + Particulate-Laden Streams
- + Inert And Nitrogen-Blanketed Streams

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WORKING & PERFORMANCE



STAGED BURNERS AND FLUE GAS RECIRCULATION REPLACE SCR

WORKING

- + Multi-stage burners introduce fuel and combustion air in controlled zones, limiting peak flame temperature and the thermal NOx that forms at hot spots
- + Cooled exhaust gas recirculates into the combustion zone, lowering oxygen partial pressure and further suppressing NOx formation
- + The combustion chamber holds sufficient residence time at 760-980°C for complete VOC oxidation, independent of the NOx control strategy
- + Precision combustion controls hold peak flame temperature and excess O2 within the band that keeps both NOx and VOC destruction on target

WHY LOW NOx

- + VOC/HAP Destruction: >99.9%
- + NOx Control: Staged Combustion + Flue Gas Recirculation
- + SCR: Not Required
- + Operating Temp: 760-980°C
- + Achievable NOx: Roughly 20-50 Ppm @ 3% O2 With FGR^L

Staged combustion and flue gas recirculation typically cut thermal NOx 50-60% or more versus an uncontrolled burner, without the catalyst cost, ammonia handling, or reactor footprint an SCR system adds.^L

TYPICAL DESIGN & PERFORMANCE PARAMETERS

VOC/HAP destruction	>99.9%
NOx control method	Staged combustion + flue gas recirculation + precision controls
SCR requirement	Not required
Operating temperature	760-980°C (1,400-1,800°F)
Achievable NOx range	Approximately 20-50 ppm @ 3% O2 with FGR-equipped low-NOx burners, application-dependent ^L
Typical FGR-driven NOx reduction	50-60% or more versus an uncontrolled burner ^L
Regulatory basis	Designed to meet EPA and EU NOx limits
Applicable standard	NFPA 86, burner management ^L

Figures per CRA published product data; items marked with a superscript L are drawn from published industry literature.

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