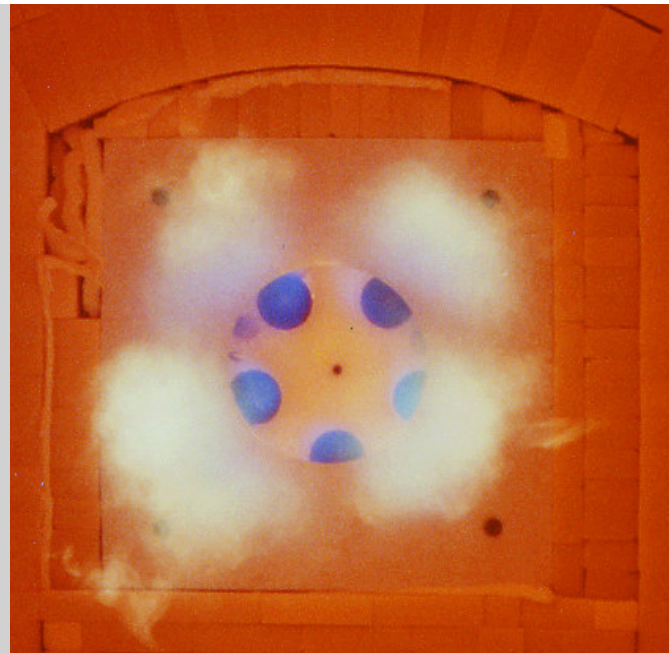
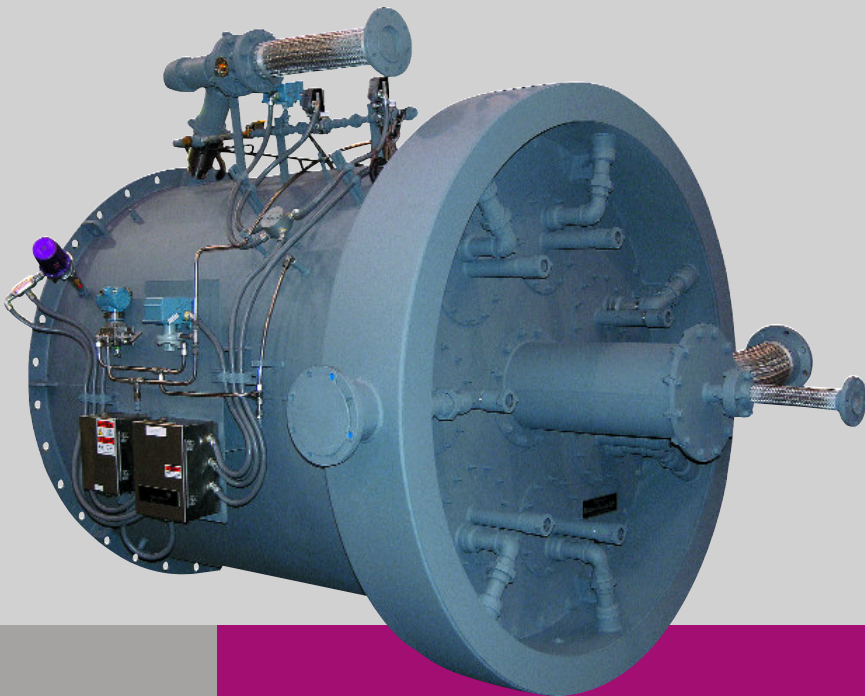




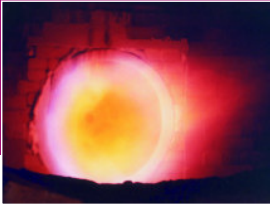
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## ***Magna-Flame™ LE***



Cutting emissions through cutting-edge technology

Implementing the LE burner into your thermal process will provide you with lower emissions, higher combustion efficiency, and better process control — all with proven reliability.



# Breakthrough technology for the ultimate in performance

## Applications

- Boilers
- Steel reheat furnaces
- Calcining furnaces
- Ore roasters
- Process heaters
- Incinerators
- Thermal fluid heaters

## Unique Patented Design

The Magna-Flame LE provides the ultimate in emission reductions of NO<sub>x</sub>, CO, and VOCs. The technology uses patented premix and dilute combustion designs to safely combust heat releases up to 250 million Btu/hr.

### PATENT NUMBERS

US 5,407,345  
 US 5,554,021  
 US 5,667,376  
 US 5,730,591  
 EP 0 804 647 B1  
 US 5,605,452

### LICENSED PATENTS

US 5,201,650

## Ultra low NO<sub>x</sub> without FGR

The Magna-Flame LE uses a lean premix primary flame and dilute secondary combustion to achieve less than 18 ppm (corrected to 3% O<sub>2</sub>) NO<sub>x</sub> without FGR in many applications. The LE's lean premix technology also provides low NO<sub>x</sub> with preheated air.

## Low NO<sub>x</sub> without sacrificing low CO and VOCs

In many low NO<sub>x</sub> burners, CO and VOC emissions increase as NO<sub>x</sub> emissions decrease. The Magna-Flame LE utilizes a lean premix reaction chamber that changes this relationship and minimizes NO<sub>x</sub>, CO, and VOCs simultaneously.

## Get even lower NO<sub>x</sub> with FGR

When FGR is utilized with the Magna-Flame LE, the NO<sub>x</sub> emissions can be taken to even lower levels; below 8 ppm (corrected to 3% O<sub>2</sub>), 0.01 lb NO<sub>x</sub> per MMBtu. (see FIG 1).

## Multi-fuel capability

The LE is capable of firing a wide range of gaseous fuels cleanly, from low Btu waste streams to conventional purchased gases to refinery gases. Additionally, the LE is capable of firing No. 2 oil providing back-up fuel options.

Fig. 1

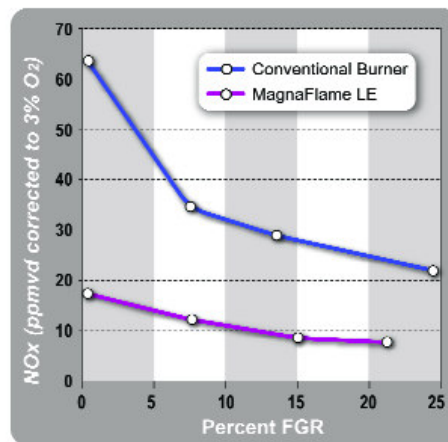
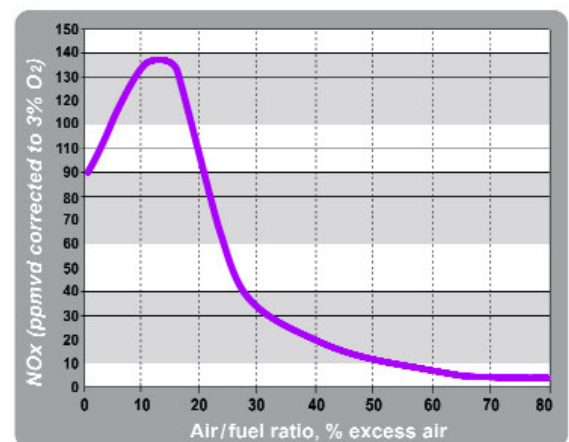


Fig. 2



## How it works

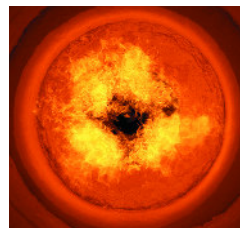
The unique patented design of the Magna-Flame LE uses a method of lean premix combustion with a controlled reaction zone and dilute secondary combustion in the furnace to achieve ultra low burner NO<sub>x</sub>, CO, and VOC emissions.

Fig. 2 illustrates how the NO<sub>x</sub> emissions from a premix flame decrease as the amount of excess air is increased. The Magna-Flame LE uses this method to operate at single digit NO<sub>x</sub> emissions in the reaction chamber.

Fig. 3 illustrates how the LE establishes a lean premix and then combusts the mixture in the primary reaction zone. The fuel and air are introduced separately into the burner, where they are intimately mixed

within the integrated mixers. This mixture is then directed into the reaction zone where the lean combustion takes place.

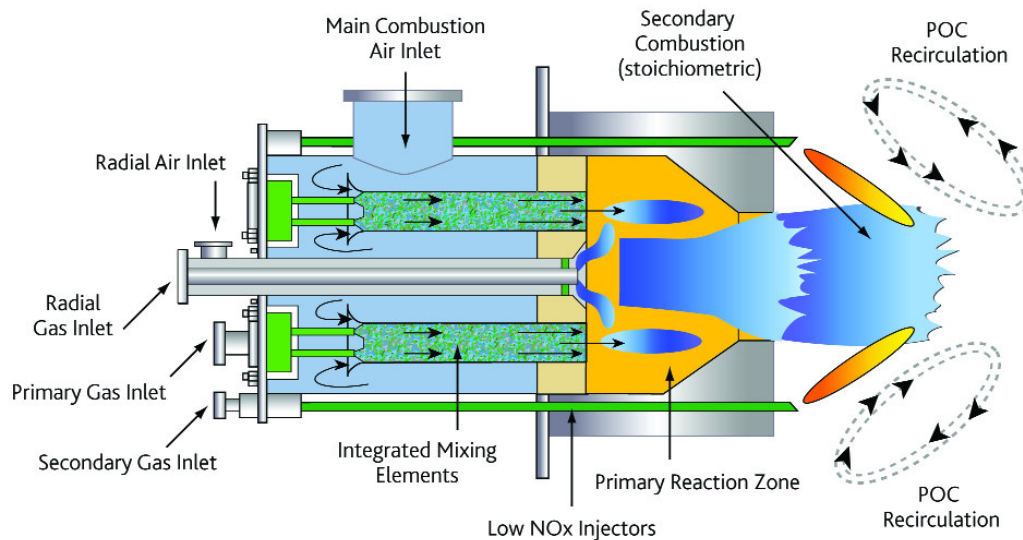
Secondary gas is injected into the furnace where it mixes with furnace gases and the



products of combustion from the primary reaction zone. The secondary fuel flow provides near stoichiometric

overall ratio for the burner. The entrained oxygen deficient furnace gases are vital to creating a minimal amount of NO<sub>x</sub> with the secondary jets.

Fig. 3 LE - CROSS SECTION



## LE Features

- < 8 ppm, 0.01 lb NO<sub>x</sub> per MMBtu with FGR
- < 20 ppm NO<sub>x</sub> without FGR
- Low CO and VOC emissions
- High intensity, compact flame
- Sizes from 1.0 to 250 million Btu/hr
- Turndown up to 20:1
- Available from windbox inserts through packaged systems
- Patented technology
- Robust design
- Rugged and reliable
- No moving parts



## The Fives North American Commitment

We continuously provide our customers with innovative solutions for all their combustion needs. Our creative energy and engineering expertise come together to provide the latest in combustion technology—supplying breakthrough new products and solutions that improve your facility's performance—and your bottom line.

We provide our customers with full-service support. End-to-end, we ensure every customer is completely satisfied. From initial consultations through field installation and service, Fives North American provides complete customer support throughout the entire process.



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