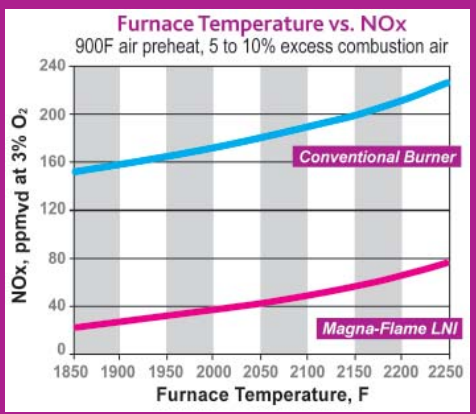
# *Magna-Flame™ LNI™*

## The Premier Low NOx Hot Air Burner

Breaking the low NOx barriers without the use of FGR.

- Steel Reheat Furnaces
- Aluminum Melters
- Forge Furnaces
- High Temp Furnaces




### Operating Features

- Combustion air temperatures up to 1200F
- Capacities ranging from less than 1 million Btu/hr to over 20 million Btu/hr
- Excellent temperature distribution
- Easy to retrofit on existing installations
- Stable, clean combustion without excess air

### LNI Benefits

- Ultra low NOx with preheated combustion air
- Designed for low excess air operation
- Low CO and VOC emissions
- No FGR required
- Cost effective, compact design

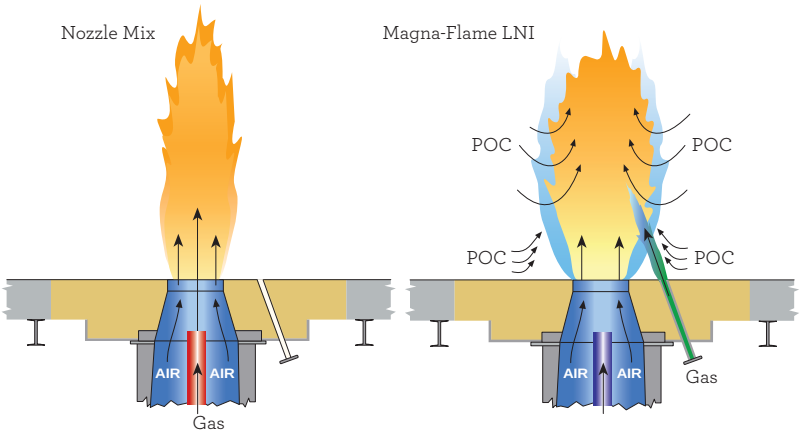
# Magna-Flame™ LNI™

## How LNI Works

All direct NOx reduction strategies revolve around three basic principles: control of peak flame temperature, reduced in-flame oxygen concentration, and reduced in-flame residence time. The **LNI** system takes advantage of all three techniques resulting in extremely low NOx emissions, even for high temperature, high air preheat applications.

The Magna-Flame operates as a conventional nozzle mix burner when the furnace temperature is below 1400F. Above that temperature, fuel is switched to strategically positioned nozzles adjacent to the burner tile port. The fuel and air jets entrain large volumes of products of combustion, greatly reducing the local oxygen concentration. In the flame envelope, these entrained gases limit the maximum combustion temperatures, leveling out temperature spikes that generate high NOx emissions. All combustion takes place within the furnace volume, not the restricted tile port, providing short high temperature residence times further inhibiting the NOx production. After combustion, the gases lose their heat through radiation and convective heat transfer to the work. These cooled gases travel throughout the furnace and are again entrained by the burner air and fuel jets, sustaining the NOx inhibiting process.

**Low NOx Injection (LNI)** of the fuel and air into the furnace chamber provides the highest potential efficiency. The **LNI** system takes advantage of the largest source of "free" FGR, the furnace itself, to produce uniquely low NOx emissions from high temperature systems.




## No External FGR or Efficiency Loss

In many high temperature combustion systems flue gas recirculation is used to reduce NOx emissions from burners. FGR systems require piping runs and a blower that supply the furnace exhaust gas to the combustion air.

If FGR is added to combustion air after the recuperator, or if the system does not have a recuperator, the thermal efficiency can be reduced by as much as 15%. If FGR is added prior to the recuperator, system efficiency can be maintained, but a larger recuperator may be required to accept the additional volume. In either case, combustion air piping and burner size may increase due to oxidant volume.

**LNI** is an "in-furnace" direct NOx control method that maintains the highest possible efficiency without requiring larger size combustion equipment. While other combustion systems may use up to 50% FGR, **LNI** offers lower NOx emissions without any decrease in system efficiency or added equipment costs.

## No Complex Refractory (as with staged combustion air)

A very practical advantage of **LNI** low NOx technology is the simplicity of construction of the burner and tile. Burners that use air staging to reduce NOx emissions require complex refractory construction that can be prone to failure. The reduced port tile and in-furnace combustion of an **LNI** system further protect burner internals as radiation received by burner internals is reduced.

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