North American HiRAM® LNI™

Ultra low NOx... air, oxygen, or both

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

Operating Features

— Oxidant can be cold or preheated air, oxygen, or a combination
— Self-cooling design can eliminate cooling water
— Capable of firing on-ratio or with high excess air
— Accommodates high temperature load heating or dry out and cure cycles for any refractory
— Low pressure combustion air means lower horsepower required

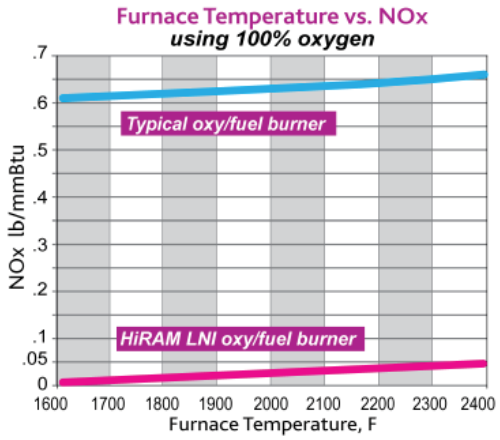
How LNI Works

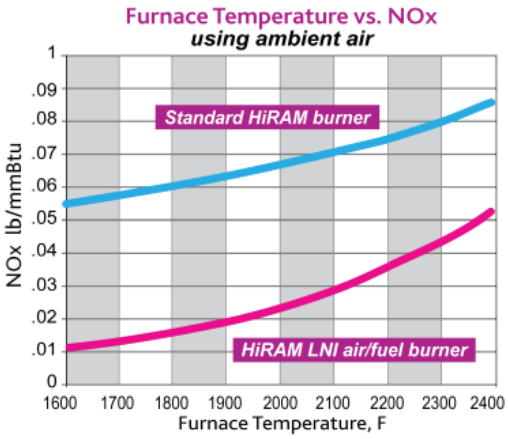
Low NOx Injection (LNI) of the fuel and air into the furnace chamber provides the highest potential efficiency and lowest NOx. The LNI system takes advantage of the largest source of "free" flue gas recirculation (FGR), the furnace itself, to produce uniquely low NOx emissions from high temperature systems.

All 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 HiRAM LNI operates as a low NOx nozzle mix burner when the furnace temperature is below 1400 F. Above 1400 F, 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 maximum combustion temperatures to level out temperature spikes that generate high NOx emissions.

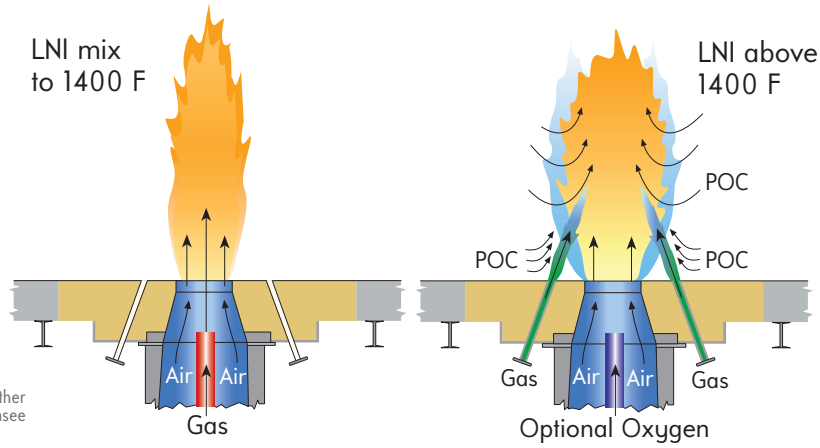
All combustion takes place within the furnace, not inside the tile port, providing short high temperature residence times that inhibit NOx production. After combustion, the gases lose their heat through radiation and convective heat transfer to the work. These cooled gases travel throughout the furnace and are again entrained by the burner air and fuel jets, sustaining the NOx inhibiting process.





HiRam LNI Benefits

- Ultra-low NOx, even with 100% oxygen
- Major fuel savings potential
- Evenly dispersed hot gas radiation improves heating
- High-velocity discharge for enhanced convection heating
- Low emission are enhanced by proprietary control systems



LNI uses low NOx technology patented by Tokyo Gas Co. Ltd. of Japan and further developed by Fives North American Combustion, Inc., the exclusive world-wide licensee for use of this technology. U.S. Patent No. 4,945,841.

fives ultimate machines ultimate factory

CONTACT US:
Fives North American Combustion, Inc.
4455 East 71st Street - Cleveland, OH 44105 - USA
Tel: +1 216 271 6000 - Fax: +1 216 373 4237
Email: fna.sales@fivesgroup.com

www.fivesgroup.com