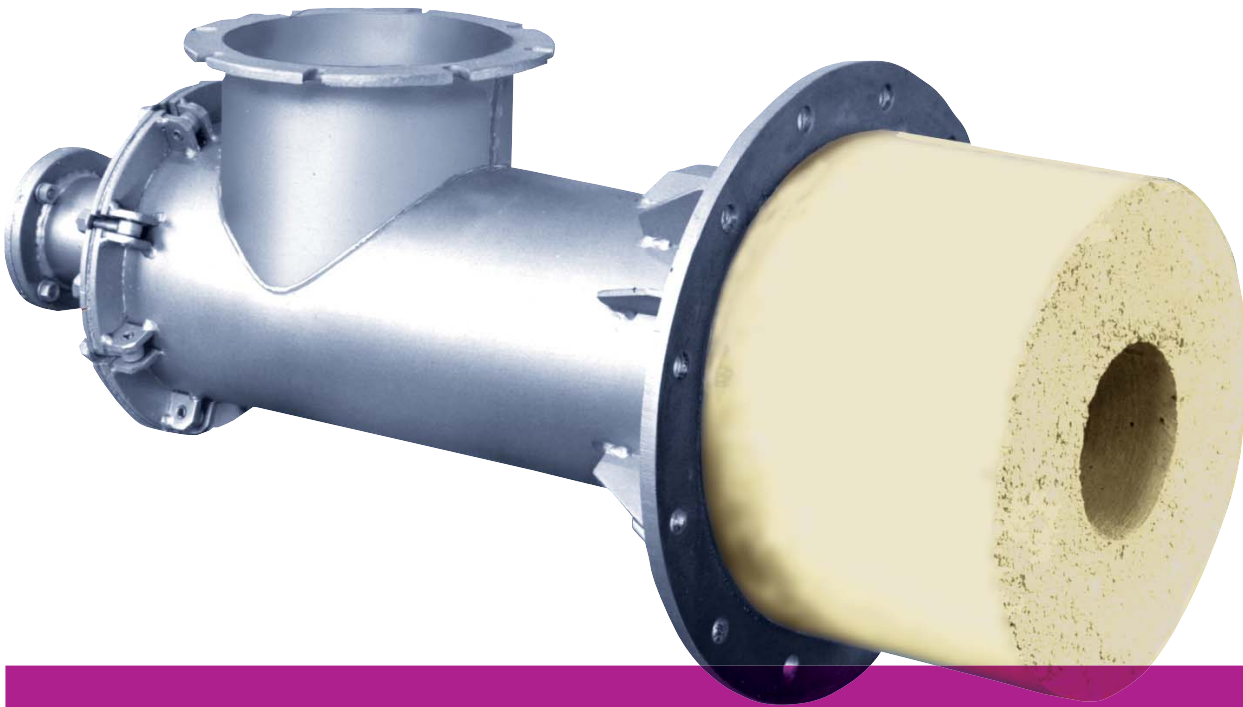


# North American HIRAM<sup>®</sup>

High Velocity, RAM Effect, Low NO<sub>x</sub> Burners



Exceptional performance for aluminum melting, heat treat furnaces, drying, air heating, forging, incineration, ladle and tundish heating, rotary dryers, calciners, roasters.

North American HiRam Heating Benefits:

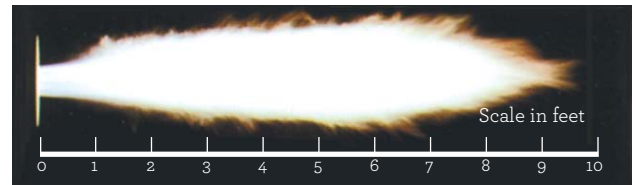
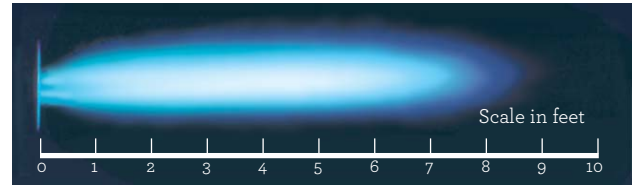
- Reduced fuel consumption
- Shortened cycle times
- Uniform heating from churning furnace atmosphere
- High turndown
- Reduced tile discharge opening protects internals from furnace radiant heat and splash in melting furnaces

# North American HiRAM<sup>®</sup>

## How North American HiRAM Works

North American HiRAM improves heat transfer by reaching parts of the load that radiation cannot "see" and standard low velocity burners do not penetrate. True high velocity results from HiRAM's exceptionally high Btu/hr input rates relative to its reduced tile discharge area.

North American HiRAM burners combine large capacity with high velocity. Flames shown are natural gas (top right) and #2 fuel oil (bottom right) firing with 10% excess air at a rate of 15 million Btu/hr.

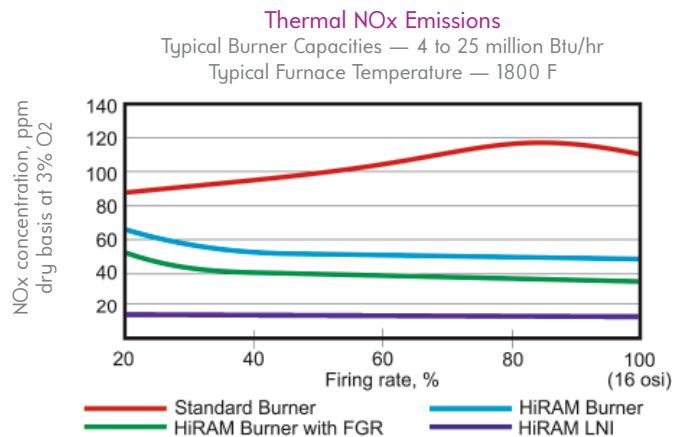


## Low NOx

High velocity burners were developed by North American in the early 1960's and dramatically improved many industrial heating processes. High discharge velocity circulates furnace gases creating uniform furnace temperatures and reducing pollutants known as NOx.

North American HiRAM reduces NOx by drawing furnace gases into the flame, which has much the same effect as vitiated combustion air. For such a large burner, North American HiRAM produces surprisingly low NOx numbers without the complexities of FGR (furnace gas recirculation) or staged air combustion. However FGR can be used on the North American HiRAM to reduce NOx levels even further. In applications requiring ultra low NOx emissions, the North American HiRAM LNI SYSTEM should be considered. The low NOx injection (LNI) of the fuel and air into the furnace chamber provides high efficiency and ultra low NOx. The LNI system takes advantage of the largest source of "free" FGR available — the furnace itself. The graph at the right shows comparative emissions.

NOx can change with furnace temperature, fuel type, combustion air temperature, burner firing rate, and other factors. Contact your North American field engineer for an examination of your process for North American HiRAM heating.



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