





### Proven Low NOx Performance.

When demanding applications call for low NOx combustion, companies around the world count on the VARIFLAME, the most reliable burner on the market. Its rugged, simplified design with "no moving" parts delivers high-efficiency performance with *NOx emissions as low as 25 ppm at three percent O<sub>2</sub>*.

The VARIFLAME burner installed on a packaged boiler is the preferred choice of most rental companies with the need to get online quickly with reliable operation. Start-up time is only two-thirds of the industry's average.

Optimum and repeatable performance thanks to no moving parts to adjust, in combination with TODD's air flow modeling, creates balanced air flow around VARIFLAME burner circumference resulting in predictable and reliable combustion performance.

Designed specifically to avoid flame impingement for narrow furnaces, TODD™ carefully engineers each VARIFLAME application to ensure peak performance levels.

- NOx emissions as low as 25 ppm
- Low VOC, CO and particulate emissions
- Capacity range 30 to 400 million BTUs/hr/burner
- High-combustion efficiency
- High turndown ratios: 8:1 on oil and 10:1 on gas
- Low draft losses
- Flame geometry to suit narrow furnace
- Stable flame with no flame impingement
- Simultaneous gas/oil firing
- Capable of firing any gaseous fuels including: refinery gas, hydrogen, LFG, NCG, propane and butane
- Capable of firing liquid fuels including oil #2/#6, orimulsion and residual oil, kerosene, jet fuel and waste fuel
- Reliable automatic operation
- Lowest atomizing steam usage of any burner
- Low maintenance, less downtime and reduced operating costs
- Longer refractory life
- Low emission advanced oil tip design



# All The Components Of A Great System.

## Venturi Register.

Venturi register eliminates operator adjustments and guesswork by providing an even, turbulence-free axial air flow—with no moving parts. The venturi shape also minimizes pressure loss through the burner and maximizes velocity. This not only allows the use of existing forced-draft fans, but also reduces fan horsepower requirements.

## Tertiary Air Register.

Tertiary air is delivered through a secondary register to provide air staging within the flame envelope and to provide flame shaping to suit furnace geometry.

## Swirler.

Primary air exits the venturi register through the VARIFLAME swirler which provides the rotational vortex necessary for flame stability and thorough mixing. The swirler creates a tightly controlled, substoichiometric primary combustion zone with a fixed ignition point that never varies—regardless of load. The low-pressure zone formed by the swirler also recirculates hot gases within the flame pattern. This “internal FGR” is another key reason behind VARIFLAME’s impressive NO<sub>x</sub> reductions.

Secondary air exits the venturi register around the swirler. The remaining air flow exits through a tertiary air register, completing combustion downstream.



## Piezometer (optional feature).

A piezometer ring in the venturi facilitates measurements of combustion air flow over a wide range of operation. When fitted with an electronic differential pressure transmitter, an amplified and accurate air flow signal is provided for the combustion control system, even at very low loads.

## Throat.

To provide an aerodynamically stabilized flame, the throat exit shape is precisely matched with the register and swirler design. The burner throat is made of refractory material.

## Gas Burner.

The VARIFLAME burner effectively controls NO<sub>x</sub> by staging fuel and air. The multi-poker injector-type gas burner is supplied from an expansion reservoir located outside the burner front plate. Each of the pokers terminates in a stainless steel injector, machined to suit the gas flow required for the particular burner application. The injectors are oriented so that the gas enters the primary and secondary air flow stream and produces a suspended flame ahead of the swirler. Unique injector orientation provides fuel staging within the flame envelope, reducing thermal NO<sub>x</sub> formation. A coaxial center-fire gas injector is also available for dual gas firing applications.

## Oil Burner.

The shape of the atomizer spray and its position at the hub of the swirler creates suspended flame combustion. Flame stability is maintained over the full operating range which can be as high as 8:1. The atomizer sprayer plate is machined to produce a fine, atomized oil spray with economical use of atomizing steam. Steam consumption at maximum burner capacity can be as low as 0.05 pounds per pound of oil burned. The atomizer eliminates the need for a more complex, constant differential system, and operates at a constant pressure of 100 psig.

The advanced sprayer plate designs achieve a precisely controlled flame geometry that creates substantial NO<sub>x</sub> reductions over conventional oil-fired burners.



Developing Clean Air  
Solutions for Planet Earth

**IN THE USA**

TODD Combustion Group  
John Zink Company, LLC  
2 Armstrong Road, Third Floor  
Shelton, Connecticut 06484  
UNITED STATES OF AMERICA  
800-225-0085 or 203-925-0380  
Fax: 203-925-0384  
www.toddcombustion.com

John Zink Company, LLC  
International Headquarters  
11920 East Apache  
Tulsa, Oklahoma 74116  
UNITED STATES OF AMERICA  
800-421-9242 or 918-234-1800  
Fax: 918-234-2700  
www.johnzink.com

**IN EUROPE**

John Zink International Luxembourg S.a.r.l.  
Zone Industrielle B, No.1  
L-3401 Dudelange  
Grand Duchy of Luxembourg  
LUXEMBOURG  
+352-518991  
Fax: +352-518611

**IN ASIA-PACIFIC**

John Zink Asia-Pacific, a division  
of Koch Asia-Pacific, Inc.  
7th Floor, KSS Gotanda Bldg.  
21-8 Nishi-Gotanda 1-chome, Shinagawa-ku  
Tokyo, 141-85381  
JAPAN  
+81-3-5435-8551  
Fax: +81-3-3491-3584

**OTHER LOCATIONS**

Houston  
Los Angeles  
Calgary  
London  
The Netherlands  
Rotterdam  
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Madrid  
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