



**DESIGNED FOR LOW NO<sub>x</sub> EMISSIONS**

## **Advanced Burner Technology**



# Callidus Low NO<sub>x</sub> Staged Gas (CSGL) Burners

**The Callidus (CSGL) is rapidly becoming the preferred staged gas low NO<sub>x</sub> process burner.**

An innovative design has been employed which increases the burner's stability and allows for optimal performance on typical refinery fuel gases and 100% natural gas. The new design also increases the tile exit velocity which enhances the fuel/flue gas/air mixing, providing a shorter, "stiffer" flame as compared to other next generation Ultra-low NO<sub>x</sub> burner designs.

Using our extensive engineering experience and ground breaking innovation, Callidus designed the CSGL to meet our customers' challenges.

**With specific requests and developmental mandates from the industry's leading companies, the CSGL was created with these distinct advantages:**

## **No special operating needs**

- The CSGL does not require start-up lances or special procedures
- Operations are no different than a conventional burner

## **Able to fit in virtually any application**

- Natural draft or forced draft
- Flat flame or round flame
- 2 MM Btu/hr to 26 MM Btu/hr with higher levels possible
- Round flame tile has the smallest diameter of any comparable duty, ultra-low NO<sub>x</sub> burner available, allowing for retrofits without floor modifications
- Fires — vertical (up or down) or horizontally
- Operates with a wide range of fuels
- Perfect for retrofit of older heaters originally designed for conventional raw gas and premix burners

## **Extremely Stable**

- The CSGL is stable and can achieve 10 to 1 turndowns

## **Shorter Flame Lengths**

- Typical flame length of (1.56 m/MW)

## **Better NO<sub>x</sub> Reduction**

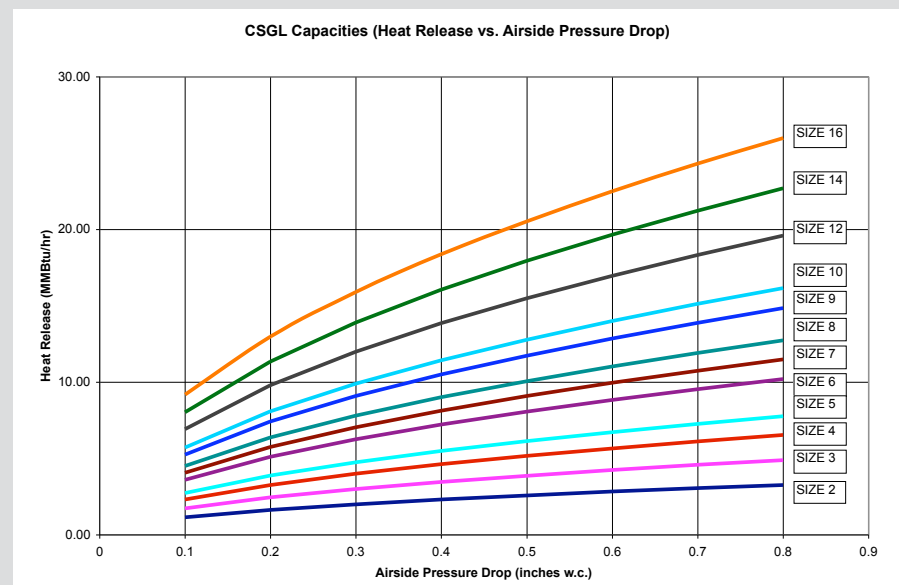
- 40-50 ppmv are typical without any additional technologies (steam, external flue gas, etc.)
- The CSGL is a staged, gas, internal flue gas recirculation burner

## **Reduced Maintenance**

- No metallic flame holders to burn up
- Primary tips are well away from the combustion and cooled by air stream
- Staged tips are shielded by refractory

## CSGL Capacities

Heat Release vs. Airside Pressure Drop





Callidus headquarters - Tulsa, Oklahoma. USA

### Global Coverage

Callidus reaches the global market through our headquarters located in Tulsa, Oklahoma, USA, regional direct sales offices in China, Belgium, India and Brazil and with independent sales representation around the world. Meeting our customers' expectations and setting the standards for the combustion industry have always been our company goals. Each burner system we design and manufacture is built with those goals in mind.

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### Computational Fluid Dynamic Modeling

Our in-house Computational Fluid Dynamic Modeling (CFD) capabilities combined with Fluent® software creates 3-D models of fired equipment. These CFD models are combined with real world experience and years of Callidus proven R&D, to predict field performance of entire systems to avoid potential performance problems prior to fabrication.

### Advanced Manufacturing and Fabrication Capabilities

Upgrading our manufacturing and fabrication facilities is an ongoing process at Callidus. Our fabrication facilities employ the latest manufacturing practices and equipment. As a global leader in the combustion technology market, much of our fabrication occurs in strategic locations around the world. This approach makes good economic sense, and provides our customers the best value for their combustion system.

### Quality In Everything We Do

Our manufacturing facility demonstrates the highest quality standards in the industry. In some cases, many of our internal quality assurance programs require higher performance standards than some industry certifications. Callidus fabrication and manufacturing are certified ISO 9001:2008 in USA and China.

### ISO 9001:2008 Certification



USA Certification



China Certification

At Callidus, quality assurance is everyone's job. Every step of the project is consistently reviewed to ensure that we live up to the expectations of the customer.

### R&D Test Facility

The Callidus, 290 acre, R&D facility is in continual use for combustion technology research and development as well as customer witnessed demonstrations. Our array of test systems allows us to closely match actual field operating conditions, providing results which will more accurately predict actual measured performance.



Callidus 82,000 sq. ft. manufacturing and fabrication facility in USA

