

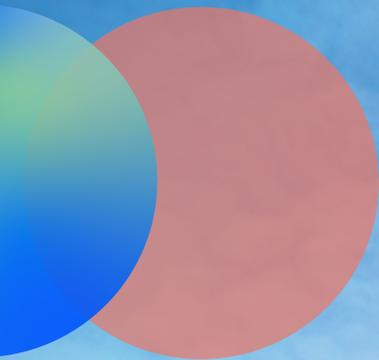
Where energies make tomorrow ●

Large Scale Vortex Burner

Our high-quality, low-nox combustion solution



TECHNIP
ENERGIES



Technip Energies' burner technology

Developing combustion solutions for tomorrow

Clients and regulators today are placing greater expectations and demands on burners than at any time in the past. While plant owners want larger capacity, greater reliability and lower costs, regulations are driving demand for higher efficiency and tighter emission limits on pollutants like carbon monoxide (CO) and nitrogen oxide (NOx).

In response to changing market conditions, Technip Energies's experts in fired heaters are developing innovative solutions, including our Large Scale Vortex (LSV®) burner technology.

The LSV was developed by Air Products, a company with substantial experience in fired heater operation. For more than 15 years, the burner has been in service in its steam reformer installations.

Features	Benefits
Unique nozzle to rapidly dilute fuel	Flameless combustion Low NOx
Very flexible fluidic flame stabilizer	Ultra-lean and cool primary flame
Robust design	Reliable
Multi-fuel flexibility	Burner can be used for a wide range of processes
Shielded fuel lances	No coking or plugging Clean tips
Adjustable and uniform flame heat release profile	Heat release matching process requirements Lower radiant tube wall temperature High firebox efficiency
Manufactured by Technip Energies	Quality control Latest developments in burner design applied

The burner also can be used to avoid higher capital intensive DeNOx systems based on selective catalytic reduction (SCR) in certain applications and regions.

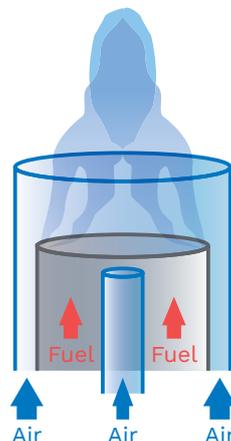
Why choose the LSV burner?



The burner is a cost-effective, low-NOx combustion solution representing Technip Energies' successful track record in design. It can be applied to different process heating applications and combustion air supply modes (natural draft, induced draft or forced draft). The combustion air may be at ambient temperature or preheated. The burner also is suitable for a wide range of fuel gas compositions and firing configurations. It can be placed on the roof (top firing) or on the floor (bottom firing) of a firebox.

Field results confirm our best-in-class burner technology:

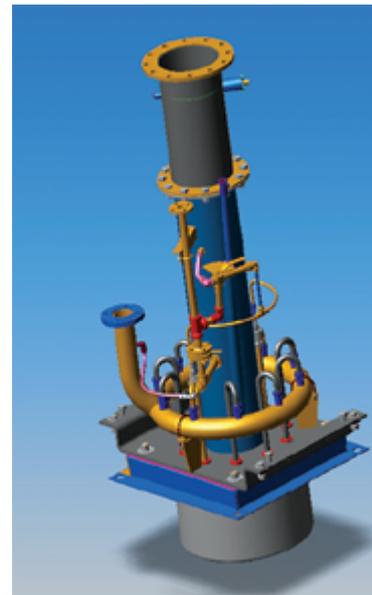
- Ultra-low NOx emissions
- Uniform flame heat release profile
- Compact flame for longer lasting radiant tubes
- Trouble-free plant operations
- Selective catalytic reduction avoidance in certain applications
- Smooth burner light-off



The burners also can be applied to retrofit projects. Replacement of existing burners with LSV technology can result in greater capacity and run length.

The high quality of the LSV burner arises from its:

- Simple, single burner block design
- High-grade, standard tip materials
- Robust design
- Ability to avoid overheating and tip-fouling
- Versatility for revamp projects
- Supply chain management by Technip Energies





Research and development

Technip Energies continuously researches the performance of the LSV burner in a radiant firebox environment such as an ethylene furnace or a steam reformer. We apply our proprietary CFD-NOx simulator (computational fluid dynamics study of NOx emissions) to correctly predict flame shape, flue gas temperature and flow profiles and radiant coil heat flux profiles.

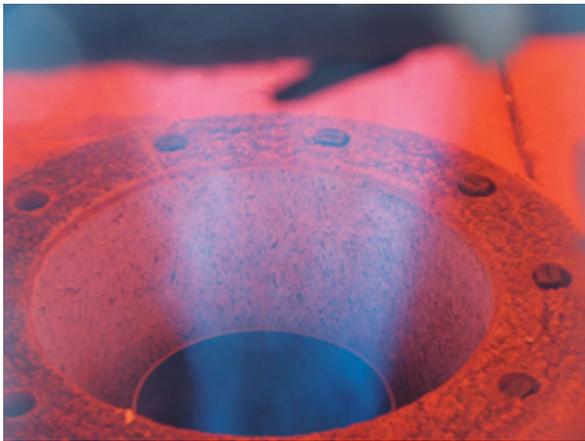
The Clean Energy Lab at Air Products' U.S. headquarters continues to fine-tune the burner to achieve even lower emissions.



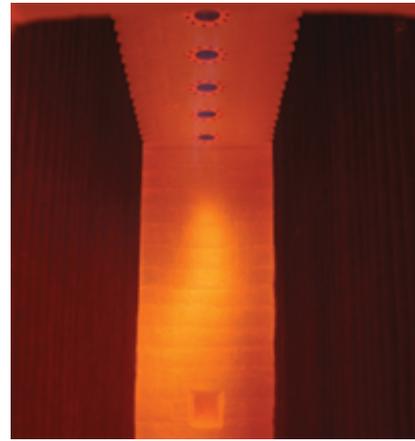
Test furnace, Air Products

Customer satisfaction

LSV technology has been applied successfully over the past 15 years in cracking furnace and hydrogen reformer installations. The burners have been installed in new and revamp projects on both induced draft and balanced draft furnaces. They operate efficiently and reliably with limited maintenance. The burners consistently earn high marks from customers around the world.

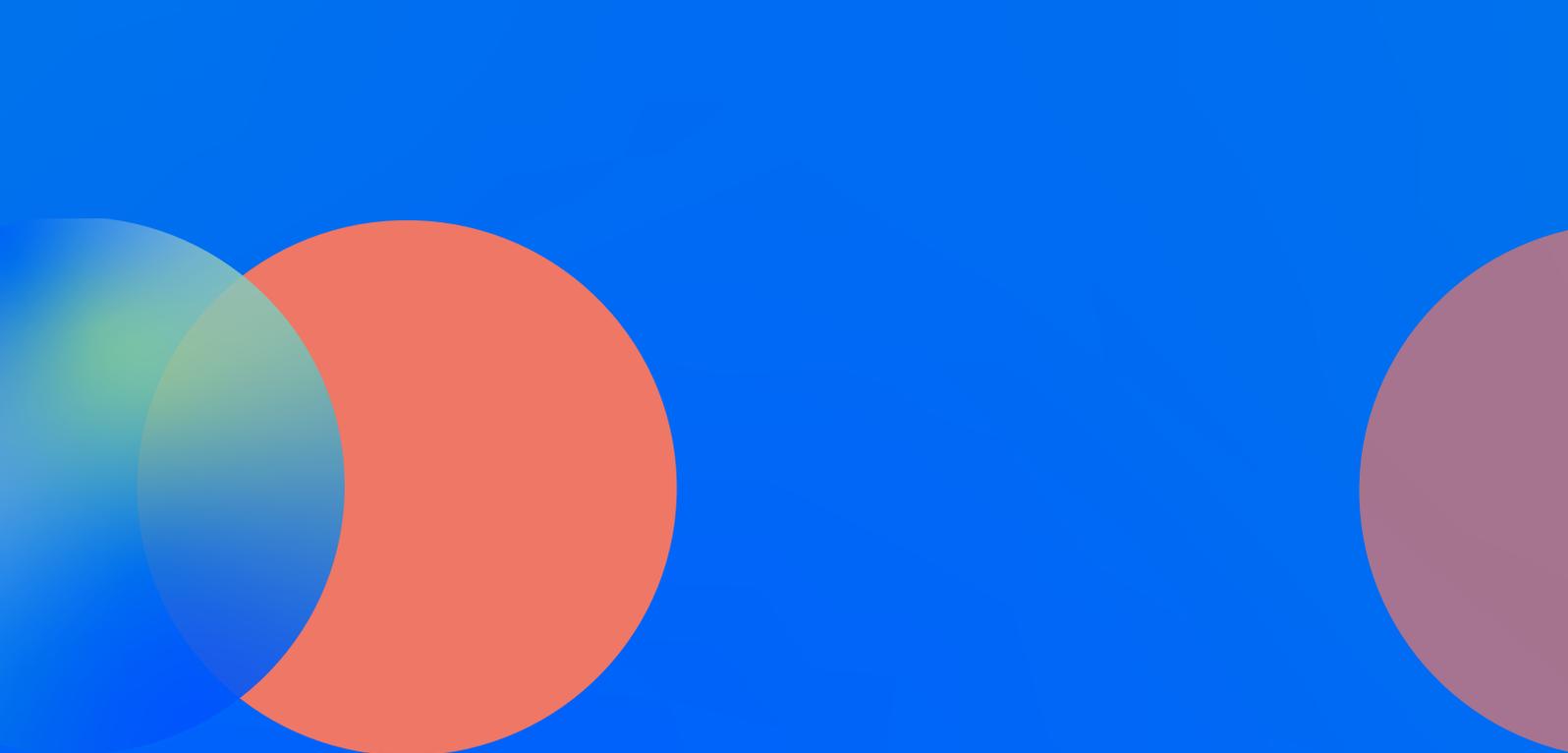


Bottom-mounted LSV burner in operation



Top-mounted LSV burner in operation





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