Linde Gas

LINDARC® oxyfuel in vessel preheating.
25% shorter heating cycle and 55% less fuel with flameless oxyfuel.

Flameless oxyfuel in vessel preheating allows for shorter tap-to-tap cycles and lowers costs.

Summary

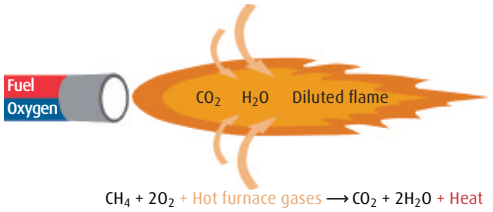
- Compared to airfuel, oxyfuel allows for fuel savings of up to 55%
- 25% shorter heating cycle
- Compact, simple and powerful oxyfuel installation, easy to fit on any vessel
- Flameless oxyfuel promotes more uniform heating to further reduce the number of vessels in circulation and effectively lowers NO_x emissions

Vessel preheating

Steel producers constantly emphasise the importance of increasing productivity and achieving full utilisation of investments. Shortening the tap-to-tap time implies higher output from the Electric Arc Furnace (EAF) but producers also need to constantly cut fuel consumption and minimise the risk of unplanned stops and maintenance. Lately, the issue of lowering emissions of gases, such as CO_2 and NO_x, is not only an environmental concern but also an economic aspect of modern steel production. The application of oxyfuel combustion in preheating of various vessels, (such as ladles, AOD converters, tundishes, etc) has since long proven its worth as an efficient method to cut heating times, lower the EAF tapping temperature which saves energy, on electrodes and vessel refractory. Low-calorific gases, for example blast furnace top gas, can be put to use without any additional energy. When combusting such gases with oxygen, it is possible to reach the necessary temperatures for an efficient heating of the vessel.

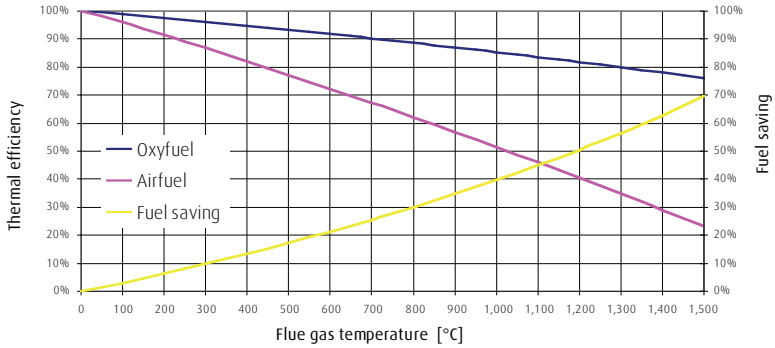
Flameless oxyfuel

Flameless oxyfuel combustion technology is uniquely designed for the challenges that exist within the steel industry in order to boost capacity, reduce fuel consumption, avoid overheating and lower emissions. The combustion occurs under a diluted oxygen concentration as flue gases are mixed into the combustion zone. This slows down the oxyfuel combustion reactions and results in lower flame temperatures, comparable to those of airfuel technology, which are below the point at which thermal NO_x is created. The mixing of flue gases into the flame also disperses the energy throughout the entire furnace for a faster and more uniform heating. The dispersed flame contains the same amount of energy but with a much more effective distribution. The overall result is more homogenous heating, but also reduced formation of dross and NO_x emissions.



$CH_4 + 2O_2$ + Hot furnace gases $\longrightarrow CO_2 + 2H_2O$ + Heat

In flameless oxyfuel, the flame is diluted with the furnace gases. This lowers the flame temperature and promotes an effective heat distribution.



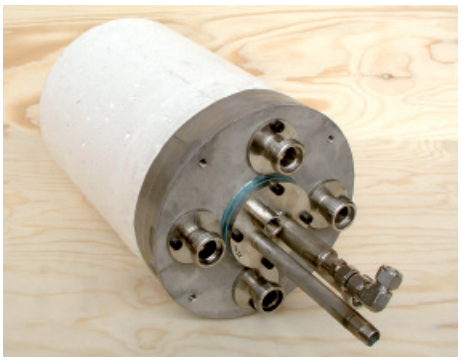
Features

- Compact, rugged and modular oxyfuel burner. Self-cooled (ceramic) or water cooled type. With integrated ignition and UV cell.
- Separate flow trains for fuel and oxygen
- Process control system
- New or modernised vessel lid
- Oxyfuel can be used to dry the refractory

Customer benefits

- Up to 55% reduction of fuel consumption and CO_2 emissions
- 25% shorter heating cycle
- Flameless oxyfuel promotes more uniform heating to further reduce the number of vessels in circulation and effectively lowers NO_x emissions
- Compact, simple and powerful oxyfuel installation, easy to fit on any vessel
- Hotter ladle allows for lower EAF tapping temperature which saves energy, electrodes and refractory lining
- Hotter and uniformly heated vessel for improved cast product quality or longer treatment times in degassing and ladle furnace refining. Minimized return rate.
- Reduction of flue gas volumes by 70–80%
- Possible to combust low-calorific gases with oxygen to reach typical vessel preheating temperatures

Linde offers complete installation: revamp, burners, flow trains and control system.



The self-cooled (pictured) and the water cooled flameless oxyfuel burners are compact, powerful, rugged and of modular design.

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