



Proof of concept.

One of our container glass customers reported the following operational benefits with COROX LowNO_x, based on a low up-front investment (EUR 140,000 – EUR 150,000) and annual operating expenses between EUR 70,000 and EUR 75,000.

Parameter	Standard air/fuel furnace	COROX® LowNO _x furnace
Fuel, natural gas	1000 Nm ³ /h	965 Nm ³ /h
Additional oxygen	–	100 Nm ³ /h
NO _x level	1200–1400 mg/m ³	600–700 Nm ³ /h
Pull rate	260 t/d	260 t/d

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→ COROX® LowNO_x technology for endport furnaces

THE LINDE GROUP

Linde

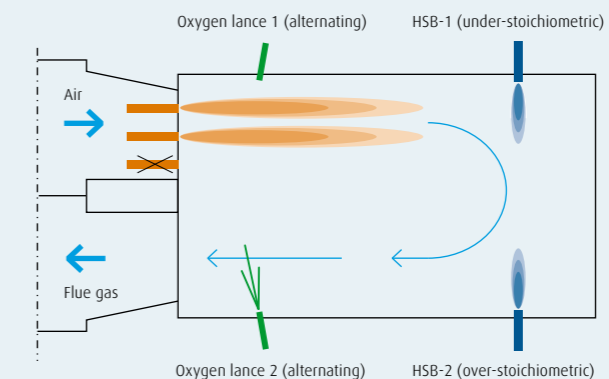
COROX® LowNO_x

Lowest NO_x at lowest energy consumption.

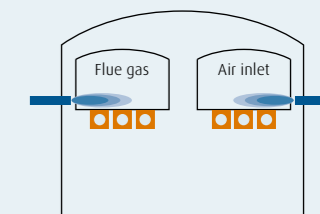




Top view



Front view



Growing pressure on glass manufacturers.

Time to act.

Increasingly strict EU legislation is placing growing pressure on glass furnace operators to limit emissions, with attention focusing on nitrogen oxides in particular. Nitrogen oxides (mainly NO and NO₂) – known as NO_x – react with oxygen in the air to produce ground-level ozone. The amount of NO_x present in furnace flue gases must be measured for the purposes of compliance. These values are reported in milligrams per normal cubic metre (mg/Nm³) in dry flue gas, based on 8% residual oxygen. In glass furnaces, NO_x is mainly caused by thermal NO_x and – to a lesser extent – fuel NO_x.

Because of the health and environmental risks associated with NO_x, new European legislation, for instance, limits NO_x emissions to 800 mg/Nm³ – which is a significant reduction compared with current emission levels in many furnaces. These new threshold values are due to come into effect at the end of 2013, which means that glass manufacturers need to take action now.

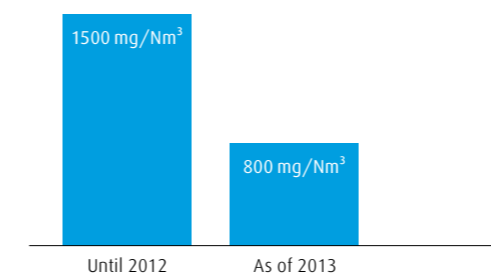
Our new COROX[®] LowNO_x solution can help you meet ever stricter compliance requirements, keeping your NO_x emissions within a 500–800 mg/Nm³ corridor.

Best fit for today's glass production challenges. Put our expertise to work for you.

COROX LowNO_x is a unique patent-pending fuel dilution and gas conditioning technology suited to both regenerative and recuperative endport glass furnaces. It employs special horizontal oxygen lances, which can be combined with oxyfuel burners, to create atmospheric conditions that result in substantially reduced NO_x emissions. It can be fitted to new furnaces or easily added to existing facilities with minimal space requirements.

We combine this innovative technology with the vast process know-how and experience we have gained serving glass customers over the years to analyse your individual requirements and engineer a package tailored to your specific furnace and productivity needs. Our offering extends from this initial consultation through installation of oxygen lance technology and oxyfuel burners to fine-tuning the control equipment.

NO_x limit
(EU Directive 2012/75/EU – BATC 03/2012)



So how does it work?

Additional oxygen is injected through high-pressure lances to create a more intense, directional flue gas recirculation effect within the furnace. As a result, the main air/gas burner system produces a diluted, staged combustion process. Fuel dilution leads to a more homogeneous flame and a reduced flame temperature. As the flame temperature has a direct impact on NO_x levels, this lowers emissions significantly. A lower flame temperature also reduces the concentration of hydrocarbon radicals in the furnace, thereby limiting NO_x formation. In addition, an improved heat transfer rate shortens the window during which NO_x can form.

You can combine oxygen lances with oxyfuel burners to reduce NO_x emissions even further or increase your melting capacity by 5–15% while still complying with upcoming EU legislation.

Highlights at a glance

- NO_x emissions down by as much as 65% to 500 mg/Nm³
- Energy consumption down by between 3 and 5%
- Consistently high glass quality (e.g. no shift in T-profile, stable CO concentration)
- Furnace capacity increase by 5–15%
- Low up-front investment and operating costs

