

## OXYMIX™. Oxygen injector for oxygen enrichment.

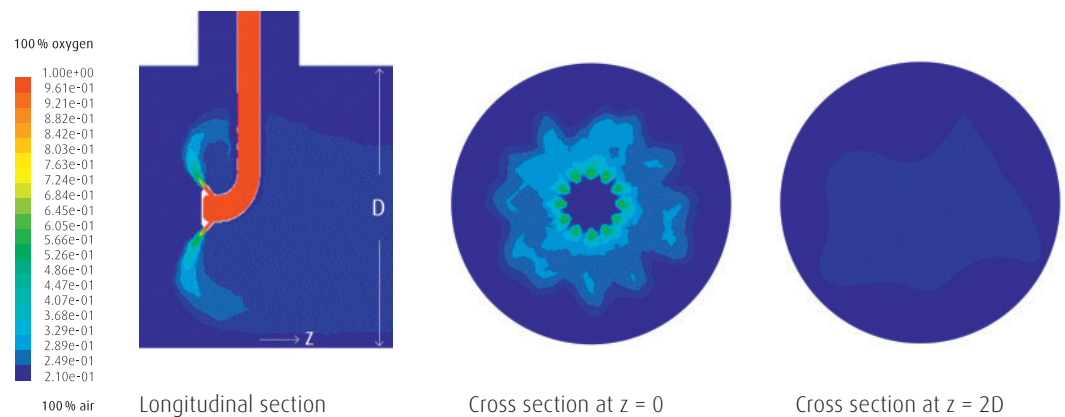


**Task** Many oxidation processes in refineries (Claus, FCC) or in base chemistry (intermediates, end products) use ambient air as an oxidant. Oxygen enrichment can increase plant capacity. Yield and selectivity can often be improved as well.

The additional oxygen and the air have to be mixed completely within a short mixing distance to obtain a reliable oxygen analysis and a smooth oxidation in the reactor downstream. In the reactor, areas of high oxygen concentrations, which may lead to high temperatures locally, have to be prevented. These hot spots can cause a runaway of the reaction. Explosion risks can also be increased by an uneven oxygen distribution in the air flow.

**Description** The design of the OXYMIX™ oxygen injector is based on CFD (computational fluid dynamics) simulations. The oxygen is injected into the air flow at a certain angle through a circle of nozzles.

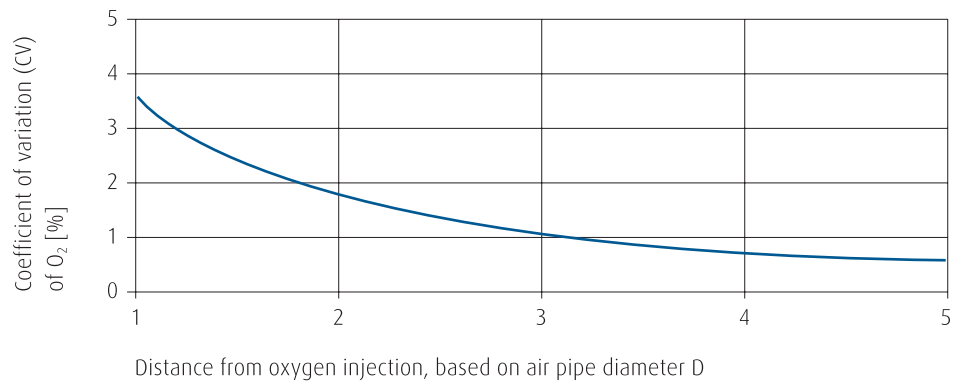
The OXYMIX™ provides a thorough mixing within a short mixing distance. High oxygen concentrations near the pipeline wall are prevented and operational risks of oxygen enrichment are reduced.



Example of CFD simulation of an OXYMIX™  
Oxygen distribution in longitudinal and cross sections  
Operating data: air velocity 5 m/s, oxygen enrichment 24 vol.-%

OXYMIX™ is a trademark of the Linde Group. Patent pending.

**Benefits** · Complete mixing within a short mixing distance



An oxygen coefficient of variation (CV) < 2 % describes a complete mixing of air and oxygen. CV is defined as the standard deviation of the oxygen distribution divided by the mean value. For the operating conditions mentioned before, the OXYMIX™ reaches an excellent mixing quality within a short mixing distance:

CV < 2 % at 2D, D = Air pipe diameter  
CV < 1 % at 4D

- Low pressure drop  $\Delta p$  in the air pipe  
Examples of  $\Delta p$  for different air velocities and injector head diameters  
 $\Delta p < 2$  mbar at 10 m/s and injector head diameter 33 % of D  
 $\Delta p < 4$  mbar at 30 m/s and injector head diameter 22 % of D
- Simultaneous injection and mixing
- Compact dimensions
- Easy installation via flange
- Low installation costs
- Maintenance-free since no moving parts
- Improvement of operating safety

**Material** The OXYMIX™ is made of 1.4571 stainless steel, which is suitable for pure oxygen applications. Other materials are available on request.

**Installation** The OXYMIX™ can be installed easily into the air pipe through a flange during a regular plant shut-down. Due to the compactness of the OXYMIX™, only little space is required for the installation. Installation costs are low. The OXYMIX™ does not contain any moving parts and is maintenance-free.

**References** The performance of the OXYMIX™ was proven for oxygen enrichment under various operational conditions in several Claus and FCC plants and other oxidation processes worldwide.

**Service and know-how**

- Customized design and manufacturing of the OXYMIX™ and its integration into the air pipeline
- Delivery and installation of oxygen supply equipment including measurement and control device FLOWTRAIN™
- Start-up assistance
- Oxygen enrichment tests for the customer's process
- Performance and profitability calculations
- Reliable oxygen supply

**Subject to change** 43491456 1005 – 1.1 ku

FLOWTRAIN™ is a trademark of the Linde Group.



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