MESSER
Gases for Life

OXYBOOST™ Oxygen Injector.

Oxygen enrichment optimization.

Many oxidation processes in refineries and petrochemical plants (such as Claus, FCC) and in base chemical production (intermediates, end products, such as sulfuric acid regeneration) use ambient air as an oxidant. Oxygen enrichment of these processes 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, have to be avoided as these may lead to localized high temperatures. These hot spots can cause runaway reactions or damage to piping or reactors. Therefore, uneven oxygen distribution in the air flow has to be avoided.

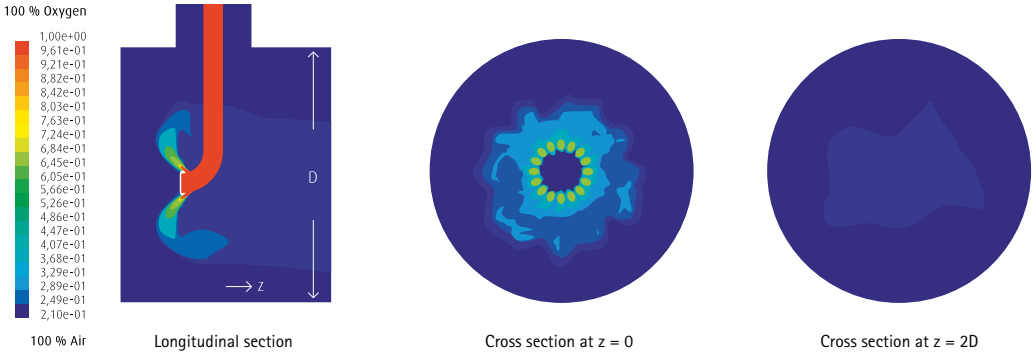
Description

The design of the OXYBOOST™ oxygen injector, including nozzles and equipment, is based on Messer's oxygen expertise and validated using CFD (computational fluid dynamics) simulations. The OXYBOOST oxygen injector is installed in the process air pipe and oxygen is injected against the air flow at a specific angle through an array of nozzles.

The OXYBOOST oxygen injector 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.

Why choose the OXYBOOST solution?

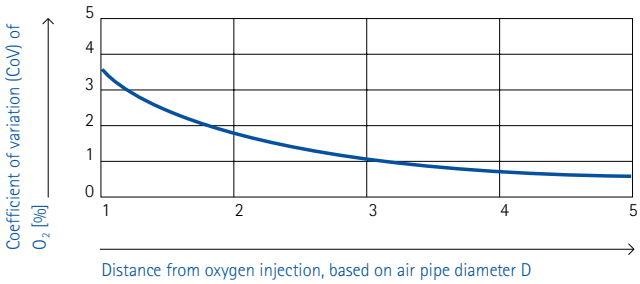
- Complete mixing within a short mixing distance
- Simultaneous injection and mixing
- Compact dimensions
- Easy installation via flange
- Low installation costs
- Maintenance-free since no moving parts
- Improvement in operating safety



Example of CFD simulation of an OXYBOOST oxygen injector
Oxygen distribution in longitudinal and cross sections
Operating data: air velocity 16.4 f/s, oxygen enrichment 24 vol.-%

An oxygen coefficient of variation (CoV) < 2% describes a complete mixing of air and oxygen. CoV is defined as the standard deviation of the oxygen distribution divided by the mean value. For the designed operating conditions more clearly relate to figure on page 2, the OXYBOOST oxygen injector reaches an excellent mixing quality within a short mixing distance:
CoV < 2% at distance 2D = Air pipe diameter
CoV < 1% at 4D

- Low pressure drop ΔP in the air pipe



Examples of ΔP for different air velocities and injector head diameters:
ΔP < 0.03 psig at 32.8 f/s and injector head diameter 33% of D
ΔP < 0.06 psig at 98.4 f/s and injector head diameter 22% of D

Material

The OXYBOOST oxygen injector is made of stainless steel (grade 316 Ti or equivalent), which is recommended for pure oxygen applications. It is cleaned for oxygen service using Messer Standards, which meet or exceed CGA cleaning procedures. Other materials are available on request.

Installation

The OXYBOOST oxygen injector can be installed easily into the air pipe through a flange during a short plant shutdown. Due to the compactness of the OXYBOOST injector, little space is required for the installation and installation costs are low. The OXYBOOST injector is checked by a ball valve, does not contain moving parts and is maintenance-free.

References

The performance of the OXYBOOST oxygen injector was proven in installations for oxygen enrichment under various operational conditions.

Service and know-how

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

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