

Making our world more productive



# Oxygen safety in air separation plants

From planning to operation



# Oxygen safety through active product responsibility

Here at Linde, we are committed to helping our clients to understand and mitigate the risk of oxygen fires. We place a strong focus on safety already in the sales phase and maintain this during project execution, construction and commissioning. Our after-sales service continues to prioritise safety every step of the way.

Linde is one of the largest and most experienced suppliers of air separation plants in the world. We have already delivered over 3,000 cryogenic air separation plants around the globe and operate more than 400 air separation plants ourselves. Furthermore, we design and manufacture all key cryogenic components at our own fabrication workshops. This experience gives us deep insights into the safe handling of oxygen equipment and our clients' needs in this area.



Assembly of cleaned parts for manufacturing of brazed aluminium plate-fin heat exchangers at Linde's own workshop

# Ensuring zero incidents when working with oxygen

## **Sales**

- Consider all global oxygen safety requirements and performance assurance requirements for construction work already in the sales phase
- Offer awareness training for client employees handling oxygen equipment

## **Engineering**

- Transfer oxygen requirements into process and equipment design
- Define oxygen-compatible materials
- Issue purchase specifications that include all oxygen safety requirements

## **Procurement**

- Perform oxygen audits at critical vendors/manufacturers
- Purchase from approved vendors/manufacturers

## **Quality control**

- Carry out cleanliness inspections
- Provide technical documentation, reports & conformity certificates
- Review vendor documentation

## **Construction**

- Consider oxygen requirements for warehouse management
- Conduct awareness training for construction companies
- Execute construction according to performance assurance requirements:
  - supervision for EPC contracts
  - construction consultant services for EP contracts
- Perform oxygen-related safety reviews

## **Commissioning**

- Adhere to oxygen safety instructions during pre-commissioning and commissioning

## **After-sales service**

- Deliver oxygen safety-relevant spare parts services including oxygen awareness training under the umbrella of our LINDE PLANTSERV® offering

# Linde oxygen safety expertise

## Under one roof

Integrated lifecycle management through operation of own plants

Internal oxygen safety regulations stricter than international regulations

Qualified and dedicated inspectors for oxygen equipment & valves

Oxygen steering group to maintain sustainable oxygen awareness across Linde

In-house manufacturing of key components guarantees adherence to all safety-relevant standards

In-house labs for analyses and data generation

Short response timelines due to globally standardised oxygen processes

Internal safety standards ensure a consistent product approach in all Linde hubs

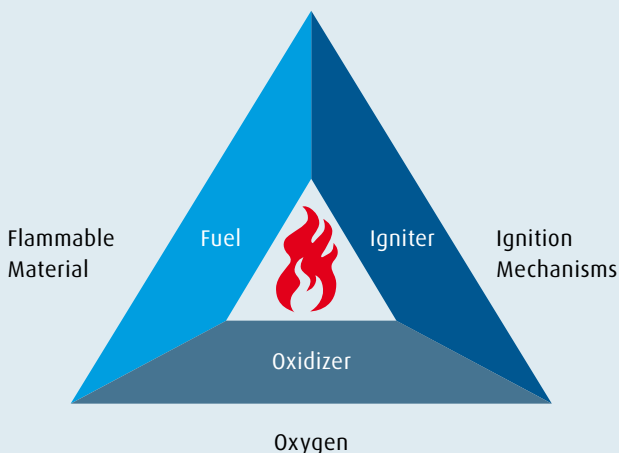
# The hazards in focus

Any industrial process that generates or uses oxygen is exposed to an elevated risk of fire. This applies in particular to air separation plants, where pure oxygen is in contact with different types of equipment. Mechanisms such as friction, mechanical impact and contact with organic materials not compatible with oxygen can quickly spark a fire inside valves, for instance. The resulting explosion-like reaction is a substantial risk to people working nearby.

In the presence of oxygen, any flammable material – once ignited – will readily burn. Depending on operational conditions, even metals may become ignited.

## The fire triangle

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Three elements required for a fire to occur.

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# Linde oxygen safety in action



Wipe test of an oxygen valve

Discover how we can contribute to your success at  
[www.linde-engineering.com](http://www.linde-engineering.com)

Get in touch with our oxygen steering group:  
inquiry: [www.linde-engineering.com/contact](http://www.linde-engineering.com/contact)  
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