



THE LINDE GROUP

*Linde*

Manufacturing.

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# Introduction.

The Engineering Division, with its technological focus on promising market segments such as processing plants for hydrogen, oxygen, olefin and natural gas, is successful throughout the world.

We have extensive process engineering know-how combined with broad experience in the planning, project development and construction of turnkey industrial plants. The wide spectrum of Linde's technologies is characterised by the scope of the temperatures applied, ranging from  $-271^{\circ}\text{C}$  in a refrigeration plant for superfluid helium to  $1,200^{\circ}\text{C}$  in the process for olefin production.



# Production facilities.

The production facilities in Pullach near Munich have an overall area of 52,000 m<sup>2</sup> of which 11,000 m<sup>2</sup> are shop floor space.

The main fabrication for plant components in Schalchen, located approx. 100 km east of Munich, Germany, comprises an overall area of 200,000 m<sup>2</sup>. There are 22 production shops with 63,000 m<sup>2</sup> covered shop floor space for the fabrication of cryogenic equipment.

For very large units satellite workshops are available at the North Sea coast (e.g. Bremen/Germany and Antwerp/Belgium).



Cold box assembly for the Snøhvit LNG plant in Norway at the satellite workshop port of Antwerp, Belgium



Schalchen plant, approx. 100 km east of Munich, Germany





### Aluminium plate-fin heat exchangers

These units are key components in many process plants. Each aluminium plate-fin heat exchanger is specially designed for the required thermal and hydraulic performance thus providing a tailor made and very economic process equipment.

← Plate-fin heat exchanger in the production hall



### Cold boxes

An economic alternative to separate installation on site is the assembly of various cryogenic plant components into a steel containment (cold box). Interconnecting piping, vessels, valves and instrumentation are included in this packaged unit to form, after filling with insulation material (perlite), a ready-to-operate unit.

← Cold box assembly



### Coil-wound heat exchangers

Coil-wound heat exchangers are compact and reliable with a broad temperature and pressure range and suitable for single phase as well as two phase streams. Multiple streams can be accommodated in one exchanger. They are known for their robustness particularly during start-up and shut-down or plant trip conditions.

← Tube bundle fabrication



## Storage tanks for cryogenic gases

Industrial gases such as oxygen, nitrogen and argon are delivered to customers in liquid form at cryogenic temperatures and are then stored by the customers in tanks before future use. The vacuum-insulated double wall tanks consist of two concentric vessels, an austenitic steel inner tank and an outer jacket in carbon steel with an anti-corrosion primer and a special environmentally friendly top coat.

[Various sizes of storage tanks →](#)



## Air-heated vaporisers

Linde air-heated vaporisers are heat exchangers for evaporating and superheating of cryogenic fluids, such as oxygen, nitrogen, argon, hydrogen and carbon dioxide. A new generation of all aluminium vaporisers ensures maximum air circulation due to optimized fin and vaporiser geometrics.

[Air-heated vaporisers →](#)



## Water-bath vaporisers

Water bath vaporisers are used for the vaporisation of all liquefied air gases, carbon dioxides and hydrocarbons in single or multistream operation, including on request the pressure build-up vaporiser.

The Linde water bath vaporiser consists of a water vessel in which a coil-wound tube bundle is submerged, optimized to withstand quick start-ups and temperature changes. The water bath is heated by direct steam injection or hot water circulation. Compared to the Linde air-heated vaporiser, this heat exchanger type is the efficient alternative for larger vaporisation demands.

[Fabrication of water-bath vaporiser →](#)





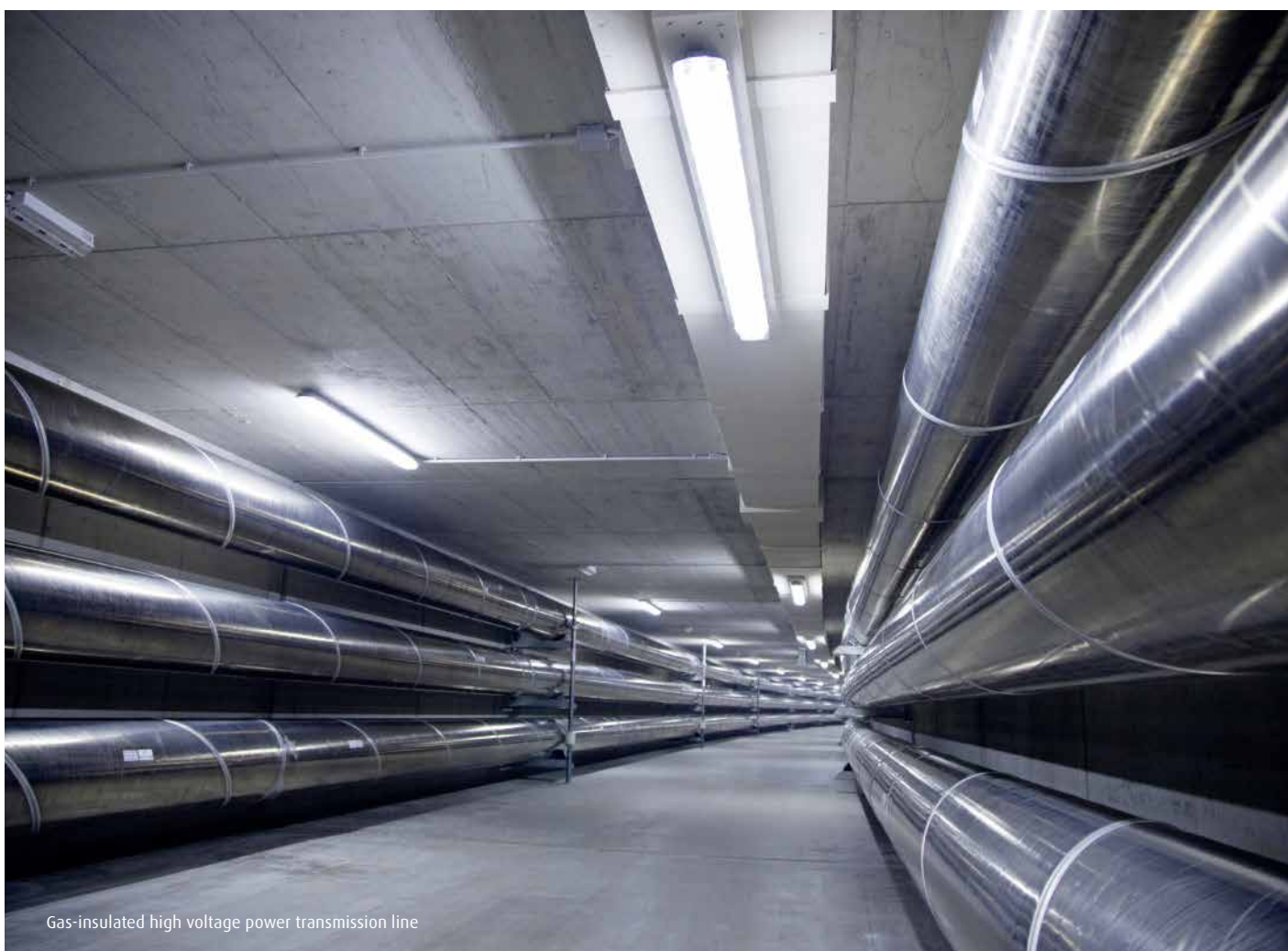
### Spiral-welded aluminium pipes

This special type of aluminium pipe is mainly used for the following applications:

- Gas-insulated high voltage switch gears and power transmission lines (GIS/GIL)
- Cryogenic process plants (for example gas treatment plants and air separation units)

The spiral-welding of aluminium pipes is a special continuous fabrication process to obtain leakage free pipes in a wide range of diameters ( $\varnothing$  280 – 1200 mm) and wall thickness (4 – 10 mm) which are in accordance with pressure vessel requirements.

← Spiral-welded aluminium pipes



Gas-insulated high voltage power transmission line



# Collaborate. Innovate. Deliver.

Linde's Engineering Division is a leading player in the international plant engineering business. Across the globe, we have delivered more than 4,000 plants and cover every step in the design, project management and construction of turnkey industrial facilities. Our proven process and technology know-how plays an indispensable role in the success of our customers across multiple industries – from crude oil, natural gas extraction and refining to chemical and metal processing.

At Linde, we value trusted, lasting business relationships with our customers. We listen carefully and collaborate closely with you to meet your needs. This connection inspires us to develop innovative process technologies and equipment at our high-tech R&D centres, labs and pilot plants – designed in close collaboration with our strategic partners and delivered with passion by our employees working in more than 100 countries worldwide.

From the desert to the Arctic, from small- to world-scale, from standardised to customised builds, our specialists develop plant solutions that operate reliably and cost-effectively under all conditions.

You can always rely on us to deliver the solutions and services that best fit your needs – anywhere in the world.

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

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## Core competencies at a glance

### Plant engineering

- Air separation plants
- LNG and natural gas processing plants
- Petrochemical plants
- Hydrogen and synthesis gas plants
- Adsorption and membrane plants
- Cryogenic plants
- Carbon capture and utilisation plants
- Furnaces, fired heaters, incinerators

### Component manufacturing

- Coldboxes and modules
- Coil-wound heat exchangers
- Plate-fin heat exchangers
- Cryogenic columns
- Cryogenic storage tanks
- Liquefied helium tanks and containers
- Air-heated vaporisers
- Water bath vaporisers
- Spiral-welded aluminium pipes

### Services

- Revamps and plant modifications
- Plant relocations
- Spare parts
- Operational support, troubleshooting and immediate repairs
- Long-term service contracts
- Expert reviews for plants, operations and spare part inventory
- Operator training