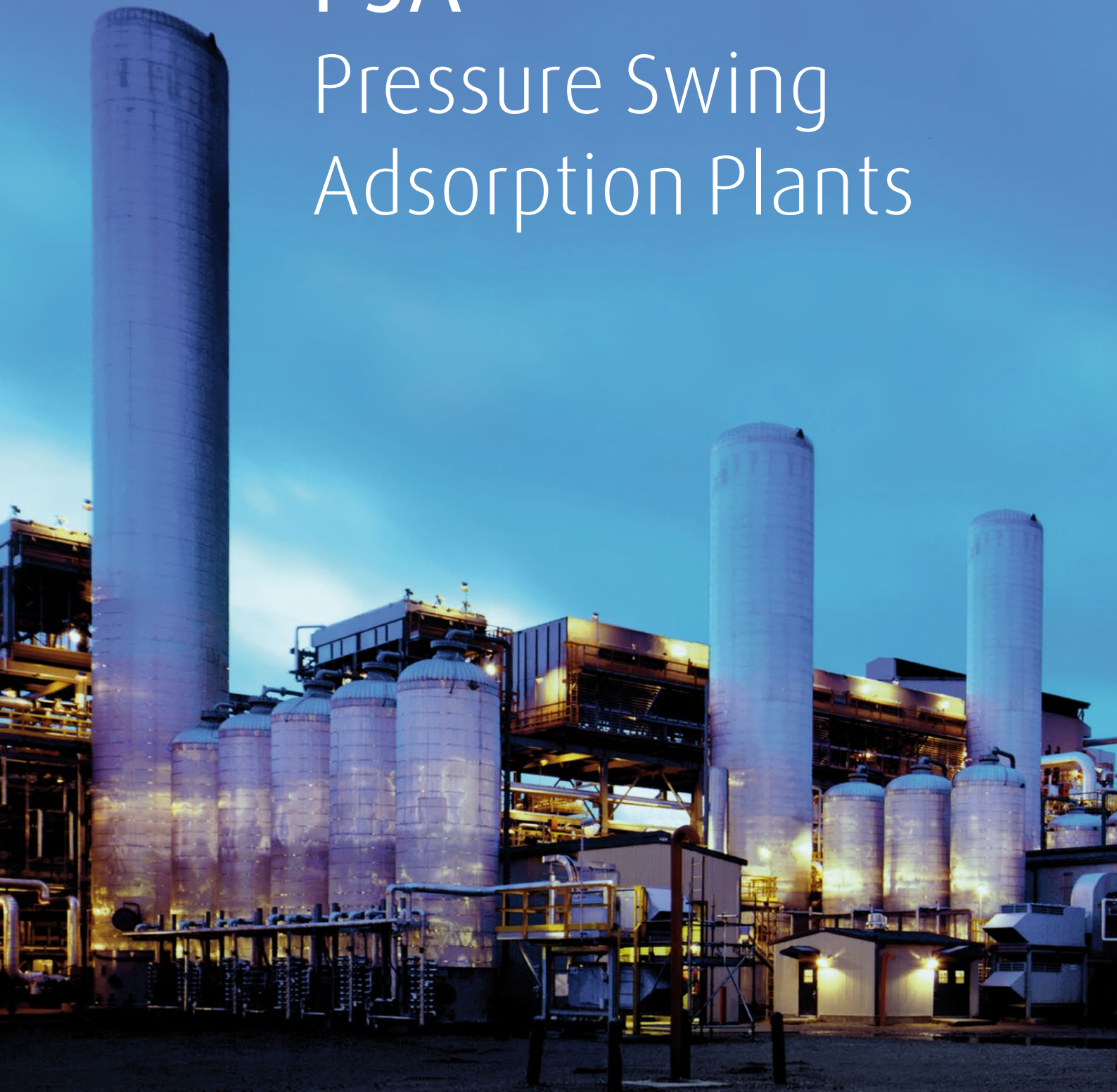


THE LINDE GROUP

Linde

PSA Pressure Swing Adsorption Plants



PSA - Pressure Swing Adsorption Plants.

With over 30 years of experience in this field, Linde Engineering has continued with innovative improvements of the Pressure Swing Adsorption (PSA) process and strengthened its position as world leader in this field of technology. Over 500 PSA plants - including the world's largest units - have already been designed and supplied by Linde. The well proven Linde High Performance PSA systems provide an economic and reliable separation and purification technology for a wide range of process gases. Capacities range from small plant sizes of a few hundred Nm³/h to large scale plants of over 400,000 Nm³/h feed gas flow. These PSA systems are suitable for a vast number of different applications in the refining, petrochemical, iron/steel-making, and mining industry.

Hydrogen Recovery and Purification

The main application for Linde PSA plants is the recovery and purification of hydrogen from raw gases, such as synthesis gases from steam reforming, partial oxidation or gasification processes, as well as refinery off-gases, ethylene off-gases, coke oven gases, methanol and ammonia purge-gases. The hydrogen product meets every purity requirement up to 99.9999 mol-% and is achieved at highest recovery rates.

Carbon Dioxide Recovery and Removal

Linde Pressure Swing Adsorption (PSA) and Vacuum Pressure Swing Adsorption (VPSA) systems are successfully employed for the bulk removal of carbon dioxide in direct reduction plants of the iron-making industry. Linde PSA/VPSA plants are also used for the recovery and purification of carbon dioxide from various raw gases in order to make them suitable for liquefaction or other consumers.

Oxygen VPSA plant in Chile





PSA units for H₂ and CO₂ recovery in a refinery in Germany

Oxygen Generation

The production of gaseous oxygen with purities between 90 % and 94 % and capacities of up to 6,000 Nm³/h can be most effectively achieved by the Linde VPSA process (Vacuum Pressure Swing Adsorption).

The advantages of this process are low specific energy consumption and simplicity of operation with regard to start-up and turn-down operation.

Nitrogen Generation

Linde also supplies PSA units for the generation of nitrogen for capacities of up to 5,000 Nm³/h and purities of 98 % to 99.9 % (and even higher).

These plants can be engineered and fabricated fully tailored to the requirements and specifications of our clients, among which are well-known companies in the oil and gas business.

Other applications

Furthermore, Linde PSA plants have proven their capability in the recovery of helium and in the upgrading of natural gas to pure methane.

Features

Particular features of Linde's PSA technology are high product recovery rates, low operating costs and operational simplicity. Highest reliability and on-stream availability of the PSA plants is achieved by special design features and the application of proven high-quality plant components. The modular skid design of the PSA plants reduces erection time and costs on site. The fully prefabricated skids are thoroughly tested before they leave the workshop. Commissioning and start-up of the plants as well as operator training and customer service are performed by experienced specialists.

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

Get in touch with our adsorption plant team:

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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 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