

THE LINDE GROUP

*Linde*

A man wearing a white hard hat and a red lab coat stands in the center of a large industrial facility. He is holding a small piece of paper and looking towards the left. The facility is filled with massive, spiral-welded aluminium pipes that curve and run parallel to each other, creating a sense of depth and scale. The lighting is bright and focused, highlighting the metallic surfaces of the pipes. The overall atmosphere is industrial and professional.

# Spiral-Welded Aluminium Pipes



# Introduction.

The spiral-welding of aluminium pipes is a special fabrication process to obtain leakage-free pipes in a wide range of diameters and wall thicknesses according to pressure vessel requirements.

This process has been set-up based on own Linde development in 1976 and has thus been improved continuously. Linde is today one of the leading producer of spiral-welded aluminium pipes with an annual capacity of approx. 90 kilometers.

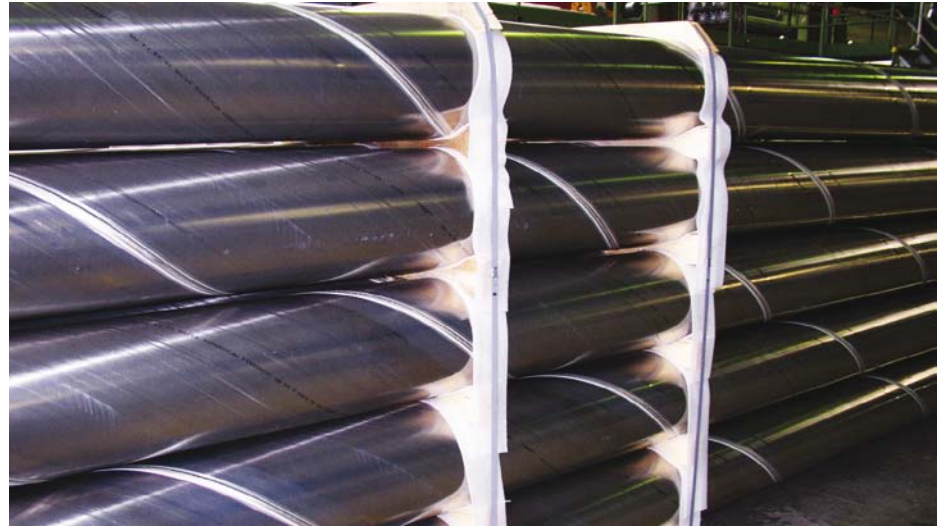
# Dimensions.

- Range of diameters: from 273 up to 1,200 mm
- Range of wall thicknesses: from 4 up to 10 mm
- Standard lengths: from 3 up to 19 m

Diameter (mm)	Wall thickness (mm)
273	4
324	4
406	4
406	8
508	4
508	10
610	5
711	6
813	6
914	6
914	8
1016	8
1118	8
1220	10

## Packing:

- Wooden saddles keep bundled pipes in position for land transport
- Pipes up to 11.6 m can be packed into 40 ft. - containers
- Pipes up to 19 m can be packed into steel racks



# Benefits.

The outstanding quality and the wide range of applications for Linde's aluminium spiral-welded pipes offers a lot of benefits for the user:

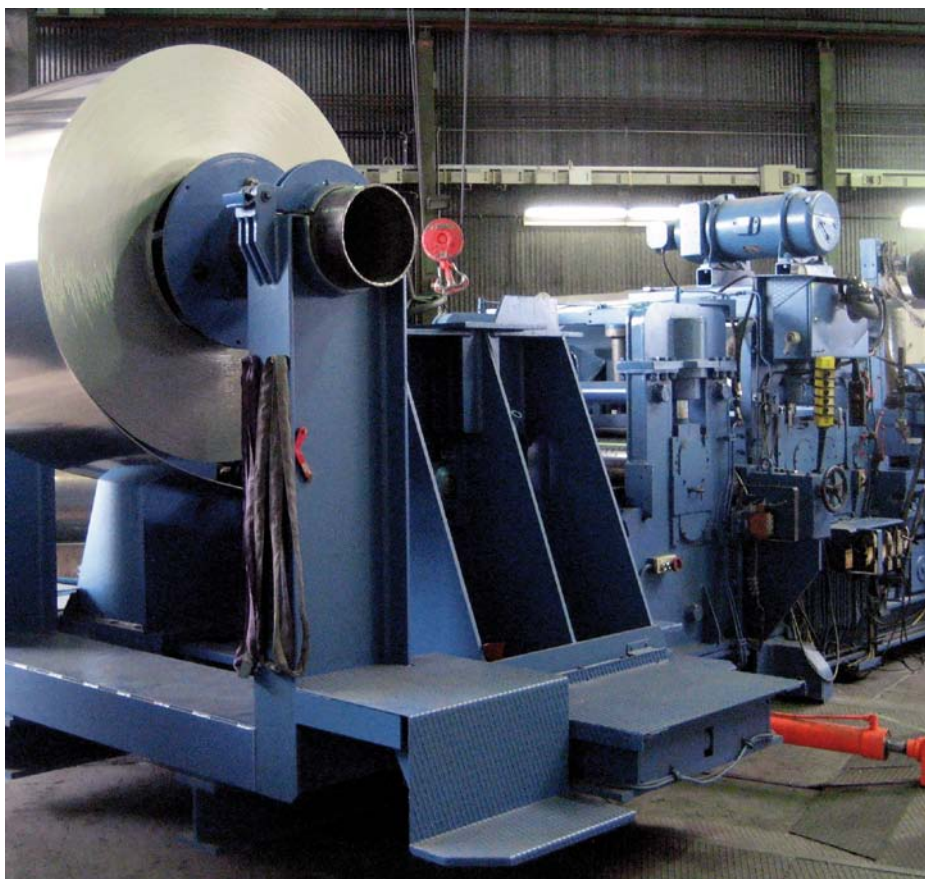
- Standard sizes in EN-AW 5083 can be delivered with short delivery times and in small quantities
- Standard pipes are 100 % ultrasonic tested
- If required, additional testing is possible:
  - Hydrostatic pressure test acc. to pressure vessel requirements
  - Radiography
  - Third party approval
- Individual production of any required dimension from 273 mm up to 1,200 mm in diameter and up to 10 mm in wall thickness (inch-sizes are also available)
- Max. fabrication length of ~ 19 m
- Separate cutting lengths during the production
- Time saving fabrication with automatic ultrasonic testing and marking assures a continuously high quality
- Tolerances of  $\pm 1$  mm for OD < 400 mm and  $+2/-1$  mm for OD > 400 mm are Linde standard requirements
- Pipes allow for an installation in leakage free systems with high operation pressure



## Fabrication.

Welding is performed using a plasma arc welding process which guarantees a joint efficiency of  $V = 1.0$ .

The surface is clean and free of oil and grease, suitable for oxygen use.



## Material.

The range of materials includes:

- EN AW 5754-O (AlMg3)
  - EN AW 5083-O (AlMg4,5)
- (other weldable alloys upon request)

Material tests are in accordance with code requirements and customer specifications on each individual batch.

Pipes will come with material certificates in line with the respective pressure vessel code.



# Applications.

Piping for a air separation unit ▶

Linde spiral-welded aluminium pipes can be used for a wide range of applications in the industry.

The main applications are for example:

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

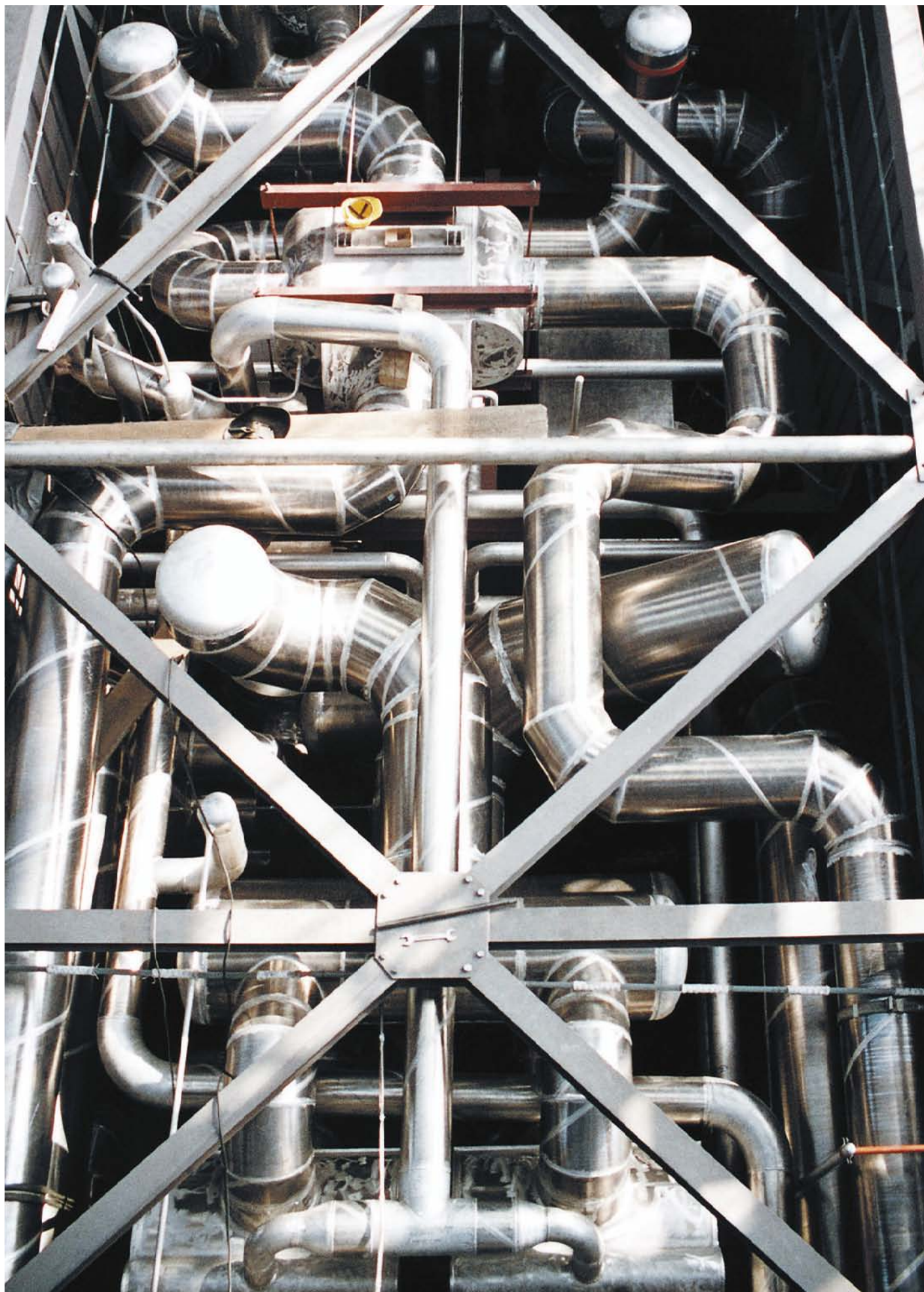
Gas-insulated high voltage switch gear.  
Reference: Siemens Erlangen. 300 KV, 3000 A transmission line GIL (Gas Insulated Line) located in Switzerland at the Palexpo exhibition area, Geneva. ▾



## Technical data.

### Tolerances

Outside diameter, calculated from circumference	DN < 400: +/- 1 mm	DN > 400: + 2 mm / - 1 mm
Out of roundness	max. 1 % of outside diameter	
Ordered length	- 1.5 mm / + 1.5 mm	
Diameter 273 mm up to 360 mm Diameter 360 mm up to 1200 mm	4 - 6 mm wall thickness 4 - 10 mm wall thickness	
Wall thickness	< 7 mm: +/- 0.3 mm	> 7 mm: +/- 0.5 mm
Height of welding bead inside / wall thickness	< 7 mm: max. 0.8 mm	> 7 mm: 0.8 mm - 1 mm
Outside	2 mm	
Length	up to 18.3 meters	
EN AW 5754-0 EN AW 5083-0	equivalent to SB 209 5754-0 equivalent to SB 209 5083-0	
	Other weldable alloys on request. Kindly ask us.	
Non destructive examination	Ultrasonic testing of spiral weld, 100 % Visual examination, dimensional checks, 100 %	
	Certificate according to EN 10204/3.1 B	



# Designing Processes – Constructing Plants.

Linde's Engineering Division continuously develops extensive process engineering know-how in the planning, project management and construction of turnkey industrial plants.

The range of products comprises:

- Petrochemical plants
- LNG and natural gas processing plants
- Synthesis gas plants
- Hydrogen plants
- Gas processing plants
- Adsorption plants
- Air separation plants
- Cryogenic plants
- Biotechnological plants
- Furnaces for petrochemical plants and refineries

More than 3,800 plants worldwide document the leading position of the Engineering Division in international plant construction.

## Production facilities.

We at the Linde Schalchen Plant are located 90 km east of Munich, Germany and cover a total site area of approx. 200,000 m<sup>2</sup>. Our 750 engineers and skilled workers design and manufacture components and complete modules for the application in process plants.

Backed up by more than 100 years of production know-how, highly developed plant modules are manufactured. Our innovative technologies and our competitiveness open the door to participation in prestigious plant projects world-wide.

We provide complete services on field installation and operation. A specialized service crew is available for immediate and professional repair services.

For further informations please contact:

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## Product range.

- Aluminium plate-fin heat exchangers as single units or as manifolded assemblies
- Coldboxes with aluminium plate-fin heat exchangers, columns and vessels
- Coil-wound heat exchangers and isothermal reactors for chemical and petrochemical plants
- Columns and pressure vessels in aluminium for cryogenic plants
- Spiral-welded pipes in aluminium
- Storage tanks for liquefied gases
- Steam-heated waterbath vaporizers as well as air-heated vaporisers for liquefied gases