



## Precise, Reproducible, Traceable Atmospheres



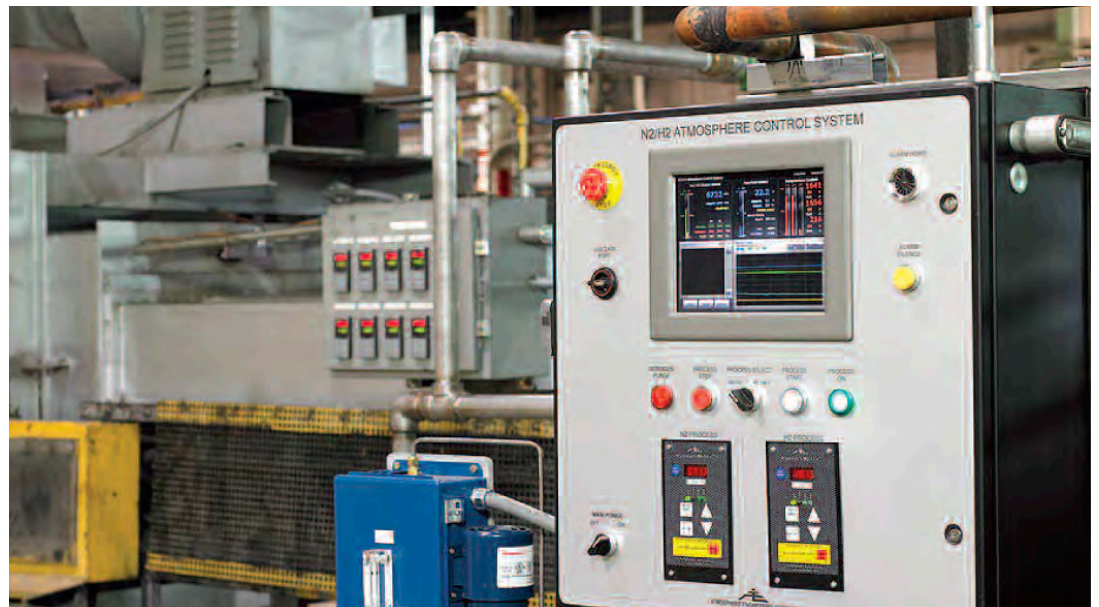
Linde is a leading supplier of hydrogen, nitrogen, helium and argon atmospheres and has proven gas-control technology for a variety of furnace operations to help you ensure consistent product quality. For businesses large and small, our field support, troubleshooting and atmosphere diagnostic resources are always available.

### Atmospheres for a Host of Applications

Linde's protective atmosphere systems offer measurable benefits over conventional, generated atmospheres. As reliable, safe and cost-effective alternatives to conventional endo-, exo-, and dissociated ammonia generators, these atmospheres can provide practical solutions for:



- Ferrous and Non-Ferrous Annealing
- Vacuum carburizing
- Quenching, back fill
- Carburizing, Neutral Hardening
- Inerting, Purging
- Carbonitriding
- Autoclave Operations
- Sintering
- Powder Production
- Brazing
- Hot Isostatic Pressing
- Ceramic Metallizing
- Metal Injection Molding
- Glass-to-Metal Sealing



### Versatile Gas Supply Options

Linde production facilities strategically located across North America support supply reliability. We offer a full range of industrial gas supply options and can help you determine which is most appropriate and cost-effective for you:

- Bulk liquid deliveries of hydrogen, nitrogen, argon and helium come via truck or railcar and are stored in a tank located at your site.
- Chemical acetylene is available in bulk and cluster packs
- Cylinders and microbulk for small volume users are available in a variety of sizes from authorized Linde distributors across North America.
- With more than 400 systems installed to date, Linde onsite nitrogen systems are often the most cost-effective choice for your operation. From non-cryogenic nitrogen membrane systems to high-purity nitrogen plants that produce 10,000 cubic feet per hour, typical cost savings can be 20 percent lower than traditional liquid supply.
- Linde maintains the largest liquid hydrogen supply network in North America. Strategically located to promote reliable supply, Linde operates four liquid hydrogen plants, 17 truck filling stations and 11 pipeline networks. Plus, Linde now offers an on-site hydrogen generating system for large volume users.

### Strategic Alliances Benefit Our Customers

Linde's alliance with UPC-Marathon allows our heat treating customers to have easy access to complete and precise furnace control. The offering incorporates Linde's gases, applications technologies and supply systems with process controllers, atmosphere sensor technology, data acquisition software, and precise furnace control panel systems from UPC-Marathon. The combined capabilities of Linde and UPC-Marathon cover a broad spectrum of batch and continuous heat-treating processes such as carburizing, carbonitriding, neutral hardening, annealing, gas quench-ing and heat treating under vacuum.

### Welding and Coatings Increase Quality and Reduce Costs

Linde offers a full portfolio of products for cutting and welding operations, including shielding gases, equipment, consumables and accessories. Linde's proven application experience helps increase productivity, improve product quality, and reduce welding costs. In addition, the Linde Surface Technologies group offers a number of wear-resistant coatings and surface technologies to help parts last longer and resist corrosion. For metal processors, these surface coatings offer solutions to the wear-related problems of furnace and flattening rolls.

## Atmosphere Alternatives for Annealing Selected Metals

	Nitrogen	Hydrogen	Nitrogen – Hydrogen	Nitrogen – Hydrocarbon*
Aluminum	●			
Copper-Based	●		●	
High Carbon	●			●
Low Carbon Steel	●	●	●	●
Stainless Steel		●	●	
Tool Steel			●	●

\*Commonly used hydrocarbons include methane, propane and propylene.

### Fully Automated Process Controls Panels

The nitrogen based atmosphere control panel is a fully automated gas mixing system for heat treating furnace atmosphere production. The panel utilizes the latest in precision differential pressure flow measurement and touch screen controller design. The system is the first with built-in flow rate calculation to automatically set the nitrogen and hydrogen flow rates based on a desired percentage hydrogen concentration. The panel comes completely pre-piped, wired, and tested to perform to the exact furnace requirements you program.

- Automatic Flow Setpoint Calculation automatically calculates and controls the precise volume of gasses to maintain the desired percentage hydrogen in the furnace atmosphere.
- Automatic Atmosphere Recover provides additional atmosphere automatically when introducing a new load into the furnace
- Integrated Dew Point Control will automatically modify the mixture to maintain a desired dew point within the furnace atmosphere while only using as much gas as is required.
- Full-Color Touch Screen Interface with Integrated Paperless Chart Recorder will track flow rates, furnace temperature, dew point, and other variables as necessary.
- Integrated Ethernet Communications (Modbus RTU)
- Designed for use with single and multi-zone furnaces
- Integrated Nitrogen Purge to meet NFPA 86 Guidelines

Courtesy of Atmosphere Engineering, Inc.

### Total Customer Service

Customer service and support is a cornerstone of Linde's philosophy. When you choose a Linde protective atmosphere system, you get much more than gas and equipment. You have access to a full range of customer services at your fingertips to assist you with your solution, including hydrocarbon additives, equipment and system design.

### Reliable Supply With The Linde Supply Management Program

Customers participating in the Linde Supply Management program benefit from our highly sophisticated distribution network of gas transportation vehicles and strategically located plants for fast, reliable response throughout North America. Linde also has advanced remote telemetry technology that automatically monitors your tank levels and automatically schedules the next delivery with the Linde National Logistics Center in Tonawanda, N.Y.

**We're Here  
for You**

Linde's commitment to customer satisfaction includes:

- Complete supply system design, installation and maintenance
- Qualified field support for process start-ups and fine-tuning
- Continuing in-depth technical assistance from application specialists
- On-going research and development
- Analytical and diagnostic resources, including specialty gases

**Why Linde Protective  
Atmospheres**

- Improved product quality
- Low processing costs
- Low capital costs
- Operating flexibility and ease of operation
- Easier and less costly installation and maintenance
- Clean and reliable performance
- Flexibility in atmosphere composition
- Immediate start-up
- Shutdown capability without extensive production loss
- Effective parts protection
- Automatic nitrogen purging to reduce combustible atmosphere hazards
- Consistent, reproducible atmospheres
- Precise and efficient regulation and flow-rate adjustment to match requirements
- Easily expandable
- Added versatility for other in-plant industrial gas applications

**Experience  
Counts**

As one of the oldest and largest industrial gas companies in the world, Linde has decades of experience in the metals and materials processing industry. Whether you need help converting generator produced atmosphere systems to design, installation, and maintenance of cost-effective protective atmosphere supply systems, Linde is your partner in success. For total capabilities from a single source, dedicated to helping you increase your output and improve your bottom line, call Linde.