



## Mobile Nitrogen Pumping Services

Purging.  
Displacing.  
Blanketing.  
Drying.  
Cooling.  
Heating.  
Pressure testing.  
Leak testing.

And more with  
99.9+% pure  
nitrogen gas.



### Linde Services puts nitrogen to work for you.

Dry, inert nitrogen is a very versatile industrial tool, and Linde Services' precisely controlled mobile nitrogen pumping service (NPS) puts it to work in a wide range of applications, including:

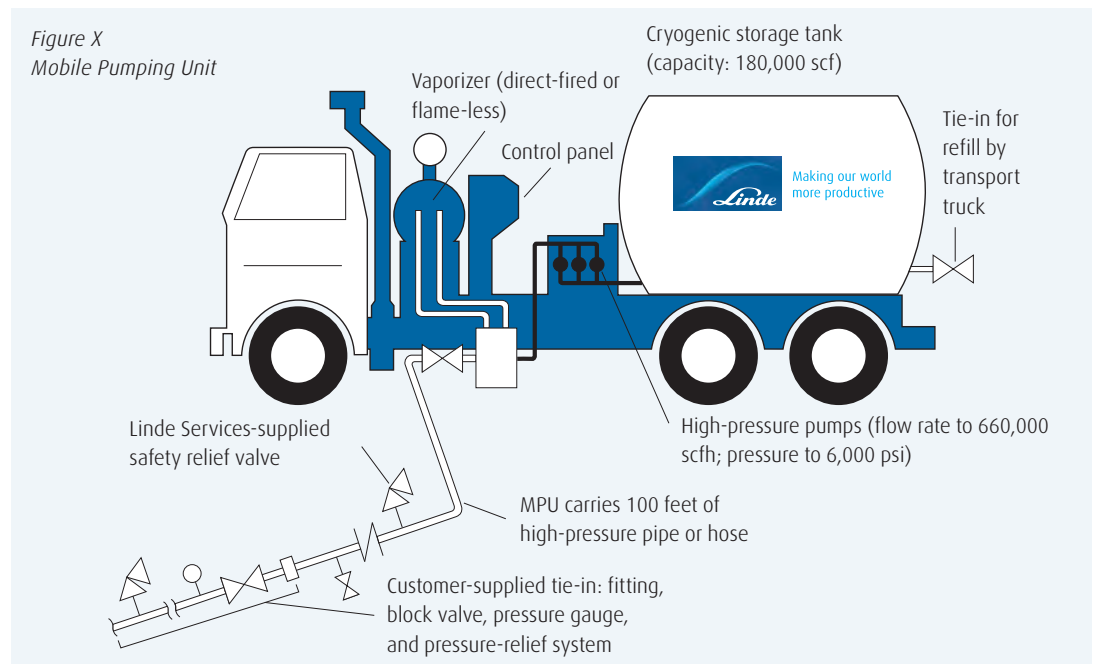
- Accelerated reactor cooling
- Catalyst handling support
- Purging and hot stripping
- Inerting and blanketing
- Unit and pipeline drying
- Product displacing
- Pressurizing/pressure testing
- Unit heating

Our diverse fleet of mobile pumping units delivers a continuous, dedicated supply of high-purity nitrogen at any combination of the following conditions:

- Flow rates to 860,000 scfh (single unit)
- Pressures to 6,000 psi
- Temperatures from -320° to 600°F
- Volumes: unlimited

With these capabilities, Linde Services' mobile NPS provides many advantages over stand tank, pipeline or other plant nitrogen supplies. For example:

- High-flow rates, pressure and heat combine to cut downtime dramatically for unit purging, product displacing, vessel drying, pressure testing, and reactor cooling
- Mobile nitrogen services can perform jobs typically beyond the scope of plant nitrogen supplies, such as accelerated reactor cooling, catalyst drying, leak testing at operating pressures, and blast furnace blowdowns
- Equipment mobility provides nitrogen on-site for work performed on pipeline right-of-ways, at remote valve stations / terminals and in other locations where nitrogen is typically unavailable



## Customer Applications

**Purging and Inerting.** During unit shutdowns, nitrogen is used to purge dangerous gases or liquids from vessels, towers and tanks, leaving an inert atmosphere for safer maintenance.

**Hot Stripping.** Hot nitrogen is used for fast, effective hydrocarbon stripping in fixed-bed reactors and molecular sieve units prior to catalyst inspection or changeout.

**Accelerated Cooldown.** Once catalyst units are free of hydrocarbons, cold, high-flow rate nitrogen accelerates cooling of catalyst beds and reactor walls.

**Linde offers two accelerated cooldown procedures:** once-through cooldown and *NiCool*<sup>®</sup> reactor cooldown.

- Once-through cooldowns – Low temperature (usually 50° F) nitrogen gas is run through the reactor system at high-flow rates, reducing cooldown time from days to hours for typical reactors.
- *NiCool* reactor cooldown – More efficient and typically faster than once-through cooling, *NiCool* uses liquid nitrogen (-320° F) at high-flow rates using the existing recycle system. The cooling capacity of liquid nitrogen lowers the temperature of the recycle gas stream, resulting in more efficient cooling and lower nitrogen consumption. *NiCool* cools most catalysts to less than 100° F in about one quarter the time required for conventional methods, while at the same time using less nitrogen.

**Catalyst Handling (Inert Entry) Support.** Nitrogen is also used to support catalyst removal after the reactor has cooled. A small, continuous stream of nitrogen keeps oxygen away from pyrophoric catalysts and residual hydrocarbons, preventing heatups and explosions. This purge gas also dissipates residual heat, making catalyst removal easier and faster.

**Drying.** Nitrogen is pumped through systems and pipelines prior to startup to remove air and residual moisture to prevent product contamination, corrosion and risk of explosions.

**Pipeline Displacement.** Praxair nitrogen-assisted pipeline displacement is a one step displacement, drying, and inerting process. If pigging is necessary, pressurized nitrogen gas is used as a propellant. A clean, dry, inert atmosphere of nitrogen remains following product removal. Natural gas, crude oil, gasoline, diesel fuel, liquid petroleum gas, and other hydrocarbons are quickly and safely displaced, in addition to non-hydrocarbon liquids and gases.



Figure Y  
Nitrogen Tube Trailer

### Mobile Nitrogen Units

Linde Services uses a wide variety of mobile nitrogen equipment. We match the type of equipment to each application for optimum economy and performance. Any of these units can be refilled on site without interrupting the nitrogen supply.

- Versatile pumping units (Figure X) deliver nitrogen at a wide range of pumping pressures, temperatures, and flow rates. Our pumping units have advanced monitoring capabilities for the most sophisticated pumping applications.
- For jobs requiring high pressures or low volumes over extended periods, tube trailers (Figure Y) are positioned at your site. Delivery pressure can be regulated on-site according to your needs.
- Portable vaporizers (Figure Z) are used for applications requiring low-pressure flow over long periods. These fully automated units are equipped with steam and atmospheric vaporizers. Trailer-mounted vaporizing units are set up by Linde Services' technicians, left at your site, and operated by you as needed.

### Full-Service Drying

Linde Services' dry-air service is a complete problem-solving package for drying process systems during large unit turnarounds. Using a combination of nitrogen and dry-air phases, we can:

- Reduce overall downtime for a system through efficient drying, which can result in significant cost savings
- Reduce demand on in-plant nitrogen systems, especially during periods of heavy usage
- Provide equipment that is mobilized, set up and maintained by highly trained Linde Services personnel, reducing the involvement of customer site personnel
- Provide a technical representative to assist in planning the most economical method to complete the drying operation



Figure Z  
Portable Vaporizer

Linde Services' dry-air service complements our NPS and offers an attractive alternative for drying large process systems. The dry-air service provides:

- Oil-free air at dewpoints as low as -90° F
- Flow rates of 75,000 standard cubic feet an hour per air compressor
- Single multi-unit dryer capable of drying 600,000 scfh
- Single-compressor multi-bed desiccant dryers, if required
- Each unit delivering pressures up to 125 psig to promote moisture removal
- Safer conditions for maintenance personnel in the drying area
- Dry-air header which provides easy access points and reduced tripping hazards

Our full-service portfolio of core services includes:

- *Helitec*® helium leak detection for piping
- *NiCool*® reactor cooldown service
- *Sandjet*® furnace tube and pipeline cleaning
- *Seeper Trace*™ and *Tracer Tight*® leak detection for pipeline and piping networks

For more information on these and other services, contact us at: Linde Services Inc.

**1.844.44LINDE** or [www.lindeus.com/industrialservices](http://www.lindeus.com/industrialservices)