



*Argon or argon-blend shielding gases for welding are suitable for microbulk delivery. Cylinders in multiple-use points can be consolidated into one central area with pipe drops to each use point, and flow restrictors can be installed for greater control.*

## Microbulk Gas Delivery

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**M**icrobulk gas delivery is a method for supply of argon, nitrogen, and oxygen in the liquid cryogenic state, an approach that is significantly more efficient than handling multiple high-pressure and liquid cylinders. Storage tanks range in size from 230 to 1500 liters, and are equipped with internal vaporizers and pressure-build regulators, enabling gas delivery at pressures up to 450 psig (3100 kPa). Each storage tank is capable of delivering product in either gaseous or liquid phase. Each tank has a flat base, which al-

lows more flexible installation options than typical large bulk storage tanks. Only rarely do circumstances require a special foundation. Further, it is possible to install microbulk tanks inside buildings, whereby deliveries are made through a uniquely designed wall box on the building exterior.

A centralized microbulk storage tank replaces cylinders at multiple-use points throughout a facility. Low-cost, flexible piping options for inert gas applications include Kitec, a unique composite pipe with an aluminum core that is bonded to interior and exterior layers of polyethylene. It is flexible and lightweight, with threaded connections that allow simple yet durable installations.

When piping is not an option, portable 230-liter tanks can be placed

at multiple-use points. When the tanks need to be replenished, they can be moved to a suitable access point for the microbulk tank truck to fill on-site. Full tanks are then returned to the use point. This approach still offers many of the benefits of microbulk supply, including improved quality control and elimination of wasted residual gas.

This article discusses custom gas blending, lists the benefits of microbulk gas delivery, and shows applications for welding, lasers, brazing, and heat treating.

### **Microbulk benefits**

The microbulk tank truck allows fast on-site filling and automatic delivery shutdown. The vehicle is much smaller than traditional bulk delivery trucks. Its small size allows

## Cost comparison of cylinders vs. microbulk\*

Costs	Cylinders	Microbulk
Gas, delivery and rental (\$/mo)	\$195	\$142
Residual gas lost	\$30	\$0
Total hard cost per month	\$225	\$142
Cylinder handling	\$50	\$0
Total cost per month	\$275	\$142

\* Table assumes that a typical customer who requires 10 nitrogen cylinders per month, with 20 minutes labor to changeout cylinders and 20% residual product in empty cylinder, converts to a 230-liter microbulk tank.

access to delivery sites with limited space, which are common to users with low-volume applications. A typical payload range for a microbulk delivery vehicle is 2000 to 3000 gallons, compared with 6000 to 8000 gallons for a traditional bulk delivery vehicle.

Metals processors should consider microbulk delivery as an alternative to cylinder gas supply for a number of reasons, which may include reduced costs through efficiency improvements, enhanced safety performance, and improved quality control.

- **Efficiency improvements and reduced costs:** When an "empty" cylinder is exchanged for a full one, it is common to see as much as 20% residual gas remaining in the cylinder. This is gas that the processor has paid for but is unable to use. Microbulk delivery eliminates residual gas returned to the supplier. Customers are billed only for gas metered off the truck each time a delivery is made. For ongoing deliveries, the amount should always be less than the full capacity of the storage tank.

Microbulk also eliminates the need for cylinder change-outs. In some cases, this may reduce labor costs directly. Labor also can be redeployed to more value-added tasks. An ongoing, centralized gas supply instead of multiple cylinders in multiple use points can reduce the number of purchasing and inventory transactions, simplifying the purchasing process.

- **Enhanced safety:** Consolidating to a centralized microbulk gas supply system eliminates the need to handle cylinders, thereby reducing the risk of injury. It also reduces the number of deliveries that are required. Having the gas supplier on-site less frequently reduces congestion.

- **Improved quality control:** With traditional cylinder supply, a new source of potential contamination is

introduced with every cylinder delivered. With microbulk and its dedicated on-site storage container, this potential source of contamination can be eliminated. You have the same tank connected to your process, day after day, year after year.

Cylinder users often stockpile product to ensure that they do not run out. A centralized microbulk supply system is much easier to manage than multiple supply sources. An automated tank telemetry system can further streamline gas inventory management and enhance reliability of supply. Finally, constant on-stream gas supply and reduced risk of surprise runouts should improve operating efficiencies.

### Custom gas blending

For applications that require mixed gases, processors traditionally have relied on delivery of pre-blended cylinders on a full-for-empty basis. With microbulk, gases can be mixed on-site, where storage tanks for two or more gases are connected to a blending system. Variable ratio-controlled blending systems let the processor change the gas mixture as needed for different applications and to test new blends. This eliminates the cost of multiple cylinders containing individual mixtures.

### Microbulk applications

Processors who require as few as ten high-pressure cylinders per month, or any liquid cylinder volume, can benefit by converting to microbulk supply, thanks to the range and flexibility of the microbulk tanks available today.

The example shown in the table illustrates the cost benefits for small-volume users. The results are more attractive when gas volumes increase for metals processing.

Microbulk offers advantages over traditional small bulk systems in applications that require a 1500-

gallon storage tank or smaller.

The greatest advantage is flexibility. A traditional bulk storage tank is mounted on legs, making a robust concrete foundation necessary for installation. In contrast, a microbulk tank has a flat bottom and can be installed on most level, firm surfaces—for example, a loading dock or parking lot—without expensive site preparation.

Some examples of microbulk for metals process applications include:

- **Argon or argon blend shielding gas for welding:** Cylinders in multiple use points can be consolidated into one central supply storage area with pipe drops to each use point. Flow restrictors can be installed at each for greater control.

- **Nitrogen for laser assist gas:** Replacing multiple liquid cylinders and consolidating to a central microbulk supply eliminates cylinder change-out. Tanks are available at pressures up to 450 psi, which eliminates the need for the additional equipment typically required for small bulk tanks.

- **Argon or nitrogen for gas back-flushing in the vacuum furnace and protective atmospheres in metals treatment processes.** Microbulk can replace cylinders for smaller shops with variable production cycles requiring volumes below traditional bulk supply.

- **Nitrogen for brazing, sintering and annealing:** As in the application above, microbulk can be an attractive alternative to cylinders for smaller shops with variable production cycles requiring volumes below traditional bulk supply.

Finally, metals processors who require small gas volumes now have options that can deliver the benefits associated with much higher volumes. Small tanks and small trucks benefit the small-volume user. Sizes, pressures, and configurations are available to meet processors' needs while providing a cost-effective, reliable alternative to cylinders for nitrogen, oxygen and argon supply. ■

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320-05-001-US