

# Mine Inerting

## Market Application Publication



### Background:

Federal Mine Safety and Health Administration (MSHA) regulations require mine operators to test the atmosphere in sealed mine areas, and take necessary corrective actions to prevent explosions or fire. The need for testing and corrective action has been exacerbated by recent tragedies. These incidents have prompted MSHA to focus increased attention on mine ventilation, rock dusting, methane monitoring and mine examinations.



### Features and benefits:

- Continuous on-site production of dry, inert nitrogen to your purity specifications
- High flow capabilities in a compact, easily transportable container
- Avoids the transportation logistics and costs associated with cryogenic-based N2 supply
- Can process low pressure air from conventional lubricated or oil-free compressors
- Optional built-in membrane air dryer is available to process saturated feed air
- Simple process controls with N2 flow, purity and pressure read-outs and signal outputs
- Suitable for direct injection or as a carrier gas for foam to maintain an inert atmosphere
- Rapid set-up, start-up, and de-rigging on location within hours
- Low profile options available to locate generators in underground mines if needed



## Application:

The primary uses for nitrogen in the mining industry are extinguishing coal mine fires, or, more recently to inert abandoned areas of mines. Reducing oxygen content of the combustible gases below the lower limit of explosion (LEL) is an effective method to extinguish coal mine fires. One significant benefit of nitrogen, over liquids, foams or powders, is easy distribution to hard-to-reach places. Nitrogen gas injection to seal abandoned areas is often required to displace oxygen, carbon monoxide (CO), methane and other gases below LEL. A continuous injection of nitrogen, modifying oxygen concentration to below 10% and maintaining a tight seal to at least 50 psig is required by Federal Regulations. A Parker Hannifin Nitrogen Generator, which separates nitrogen and oxygen from a compressed air supply, can often be the most economical method to supply this nitrogen.

## Case Study:

A major Appalachian coal mine operator was ordered to shut down an active mine until the abandoned areas of the mine were properly sealed and inerted. The operator elected to inert the abandoned areas of the mine immediately via trailer-loads of cryogenic nitrogen, but this was inconvenient and expensive. Continuous nitrogen injection can be required for days, or even months in some instances, so on-site nitrogen generation is often the most cost effective and convenient solution. A membrane nitrogen generator system, providing continuous nitrogen injection at the surface of the mine, was soon purchased, as it was more economical for both current and future requirements. Another mine operator in Colorado, faced with similar mine closures, compared the cost of a rental N<sub>2</sub> system to ownership, and elected to purchase a containerized Parker Hannifin custom membrane system. These systems

can be mobilized quickly to inject nitrogen anywhere it is needed in the mining complex, and allows the mine to continue production while abandoned areas are inerted per industry recommendations.



Parker Hi-Fluxx Air separation membranes provide the highest productivities on the market, delivering high N<sub>2</sub> flow rates in a compact configuration.

## Parker Nitrogen Gas Generator System Designed Specifically for the Underground Mine “Long-wall” Low Profile, High Performance Packages

- Nitrogen Purity: 95% - 99.99%
- Standard Flows: 250 SCFM- 2500 SCFM
- Nitrogen Outlet Pressure: 75-175 PSIG

### Performance Charts

Low pressure models shown - pressures to 190 psig available

#### Parker HiFluxx<sup>®</sup> Containerized Membrane Systems

Model Number	Flow Rate (scfm)(1)(2)	Feed Pressure	Delivery Pressure	Dimensions (L x W x H, ft)	Weight (lbs)
FB-3 to 6 ST15020	300-750	100-115	75-100	20 x 8 x 8.5	10,000
FB-6 to 8 ST15020	750-1200	100-115	75-100	20 x 8 x 8	10,000
FB-12 to 15 ST15020	1500-2000	100-115	75-100	20 x 8 x 8	15,000
Consult factory	2000-3000+	100-115	75-100	(20-40) x 8 x 8	15,000-25,000

#### Parker Low Profile Underground Membrane Nitrogen Gas Generator Skids

Model Number	Flow Rate (scfm)(1)(2)	Feed Pressure	Delivery Pressure	Dimensions (L x W x H, ft)	Weight (lbs)
FB-ST16020-2-SK-LP	360	131	105	15 x 6 x 4	6,500
FB-ST16020-3-SK-LP	540	131	105	16 x 6 x 4	7,000
FB-ST16020-4-SK-LP	720	131	105	15 x 6 x 4	7,500
FB-ST16020-5-SK-LP	900	131	105	15 x 7 x 4	8,000
FB-ST16020-6-SK-LP	1080	131	105	15 x 7 x 4	8,500

#### Parker Low Profile Underground “PSA” Nitrogen Gas Generators

Model Number	Flow Rate (scfm)(1)(2)	Feed Pressure	Delivery Pressure	Dimensions (L x W x H, ft)	Weight (lbs)
DB-50-SK-LP	250	140	85	16 x 6 x 5	5,100
DB-72-SK-LP	350	140	85	18 x 6 x 5	5,800

#### Notes:

- 1 Performance based on actual feed air flow, pressure, temperature and required N<sub>2</sub> purity. Consult factory for higher N<sub>2</sub> purities, flow rates, or delivery pressures.
- 2 Custom flow rates and packaging options available; consult factory.
- 3 High efficiency Pressure Swing Adsorption (PSA) Models also available - 250 to 1000 scfm - consult factory.



Parker Low Profile Underground Membrane Nitrogen Gas Generator Skid

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