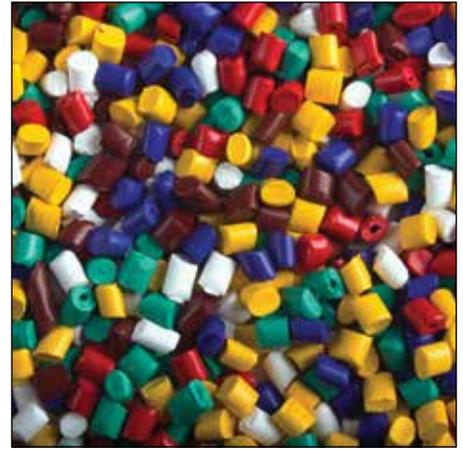


Injection Molding

Market Application Publication



Background:

Injection molding is a common process for producing parts from thermoplastic feed materials. Material is fed into a heated barrel, mixed, and forced into a mold cavity where it cools and hardens to the configuration and is then ejected from the mold. It is widely used for manufacturing a variety of plastic parts, from the smallest precision component to the largest, such as a car door panel.

Unfortunately, as popular as this process is, there are still some common problems that can cause significant product issues. Oxygen and moisture can cause significant problems with the final product, including defects and blemishes. Using nitrogen at some key points in this process can result in better product quality, lower scrap, decreased material usage and more uptime.



Features and Benefits:

- Price of our nitrogen is constant. Supplier Nitrogen is subject to pricing increases, rental agreements, hazmat fees, delivery surcharges, local & state taxes, etc. A nitrogen generator offers long term price stability.
 - Your cost increases relative to usage with bulk, dewar or cylinder nitrogen. Costs decrease as usage increases with a nitrogen generator.
 - Nitrogen has a very low boiling point, and is continuously evaporating when supplied as liquid in bulk or dewars. It can cost thousands of dollars if these gases are not recaptured.
 - A nitrogen generator eliminates the contracts required from bulk gas suppliers. No more automatic renewals, automatic increases or 1-year written notice for contract termination.
 - Ease of installation. Pipe in compressed air and pipe out Nitrogen.
- Contrast this with the installation requirements for a bulk tank, including a concrete pad, fence and significant square footage.
- Complete start up and testing procedure at the factory prior to delivery.
 - Very little maintenance or monitoring required once system is up and running. Simple and straightforward operation.
 - Proven technology with numerous references available. Over 10,000 successful generator installations.

Application:

Nitrogen is widely used in a variety of applications to improve the injection molding process.

Moisture in the material feed hopper can also cause bubbles in the melt and, in combination with oxygen, carbonization on the screw. The bubbles in the melt will result in poor final product quality and excess scrap. Carbonization on the screw can be such an issue that the operator must break down the setup regularly (daily, weekly, etc.) for cleaning. This carbonization on the screw can affect proper metering of material into the mold machine.

Nitrogen is dry with a very low dew-point (-58°F or -50°C), so a nitrogen purge in the feed hopper can be an effective method to provide dry material for molding. This nitrogen purge will also evacuate oxygen in the hopper,



practically eliminating any carbonization on the screw. A nitrogen purge will improve final product quality, minimize scrap and maximize uptime.

Another popular use of nitrogen is the gas assist injection molding process, where it is injected into a mold and pressurizes the melted (liquid) material to create hollow channels in the final product. Injecting nitrogen can yield a stronger product with reduced

wall thickness and ensure a consistent surface without flaws, blemishes or distortion. It allows operators to produce larger parts more efficiently with less feed material. Since the walls are significantly thinner and less polymer is required, curing and cooling times are significantly reduced. Nitrogen significantly improves efficiency, productivity and output in the gas-assist injection molding process.

Case Study:

Rexam Plastic Packaging Corporation is a manufacturer of precision injected molded caps, primarily for health care packaging. They historically used compressed air in the feed throat of the material hopper. The throat contains a screw feeder, and the (relatively) high concentration of oxygen in compressed air caused extensive carbonization on the screw. This carbonization caused significant performance issues, result-

ing in the need for Rexam to break the equipment down and clean the screw every 7-10 days. By using a Parker Balston nitrogen generator to minimize the oxygen concentration in the feed throat, carbonization on the screw has been nearly eliminated. Nitrogen has allowed Rexam to go from cleaning the screw every 7-10 days to once per year, significantly decreasing downtime and improving production.



Specifications and Ordering Information:



Standard Package Includes:

- Fully enclosed cabinet with casters
- High efficiency coalescing and sterile air filters
- Oxygen analyzer available
- High oxygen alarms and dry contacts available
- Stand by mode
- Purity easily adjusted between 95%-99.999% with flow control valve
- Outlet pressure regulator
- 60 gal. vertical nitrogen storage tank

Principal Specifications - Models DB5, DB-10, DB-15, DB-20

Model Number	DB-5	DB-10	DB-15	DB-20
Feed Air Pressure (minimum)	110 psig	110 psig	110 psig	110 psig
Air Quality	Clean air without contaminants			
Temperature	80°F	80°F	80°F	80°F
Electrical Requirements	120 VAC /lph / 60Hz			
Maximum Pressure	140 PSIG	140 PSIG	140 PSIG	140 PSIG
Temperature Range	60°F - 105°F	60°F - 105°F	60°F - 105°F	60°F - 105°F
Nitrogen Dewpoint	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Commercially Sterile	Yes	Yes	Yes	Yes
Filtration Efficiency	99.99% @ 0.01u	99.99% @ 0.01u	99.99% @ 0.01u	99.99% @ 0.01u
Suspended Liquids	None	None	None	None
Ambient Pressure	Atmospheric	Atmospheric	Atmospheric	Atmospheric
Dimensions	28.5"L x 32.25"D x 78"H	28.5"L x 32.25"D x 78"H	28.5"L x 51.5"D x 78"H	28.5"L x 51.5"D x 78"H
Weight (with tank)	625 lbs	835 lbs	1245 lbs	1455 lbs
Inlet	1/2" NPT	1/2" NPT	1" NPT	1" NPT
Outlet	1/2" NPT	1/2" NPT	3/4" NPT	3/4" NPT

N2 Flow Rates (SCFH)

% N2	DB-5	DB-10	DB-15	DB-20
99.99	194	388	583	777
99.95	314	629	943	1258
99.9	365	730	1095	1460
99.5	512	1024	1536	2048
99	618	1235	1853	2470
98	770	1541	2311	3081
97	892	1783	2675	3566

Ordering Information - Models DB5, DB-10, DB-15, DB-20

	DBO-5	DBO-10	DBO-15	DBO-20
Dual Bed N2 Generator with O2 Analyzer	DBO-5	DBO-10	DBO-15	DBO-20
Dual Bed N2 Generator w/o O2 Analyzer	DB-5	DB-10	DB-15	DB-20
Maint. Kit for N2 Generator with O2 Analyzer	MKDBO-5	MKDBO-5	MKDBO-15	MKDBO-15
Maint. Kit for N2 Generator w/o O2 Analyzer	MKDB5	MKDB5	MKDB15	MKDB15
Oxygen Sensor	72695	72695	72695	72695

Specifications and Ordering Information:

HFX Series Flow Rates and Pressure Correction

Flow Rates (SCFH) @ 100 psig @ 68°F

Model	95	96	97	98	99
HFX-1	40	33	26	16	11
HFX-3	148	120	95	70	42
HFX-5	279	229	176	131	76
HFX-7	452	360	283	209	120
HFX-9	752	600	452	330	201
HFX-11	1201	992	780	572	248

Pressure Correction Factors (at Indicated Operating Pressure (PSIG))

	58	73	87	101	116	130	145
HFX-1	.52	.65	.86	1	1.15	1.35	1.44
HFX-3	.54	.68	.85	1	1.14	1.3	1.43
HFX-5	.52	.65	.85	1	1.14	1.34	1.43
HFX-7	.53	.66	.86	1	1.14	1.32	1.43
HFX-9	.44	.65	.85	1	1.1	1.3	1.4
HFX-11	.44	.65	.85	1	1.2	1.4	1.6



Principal Specifications - HFX Series Membrane Nitrogen Generators

Model Number	HFX-2	HFX-3, HFX0-3	HFX-5, HFX0-5	HFX-7, HFX0-7, HFX-9, HFX0-9, HFX-11, HFX0-11
Atmospheric Dewpoint	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)	-58°F (-50°C)
Commercially Sterile	Yes	Yes	Yes	Yes
Particles > 0.01 micron	None	None	None	None
Suspended Liquids	None	None	None	None
Min/Max Operating Press.(1)	60 psig/145 psig (4 barg/10 barg) (1)	60 psig/145 psig (4 barg/10 barg) (1)	60 psig/145 psig (4 barg/10 barg) (1)	60 psig/145 psig (4 barg/10 barg) (1)
Max. Press. Drop (at 95% N ₂ , 125 psig)	10 psig (0.7 barg)	10 psig (0.7 barg)	10 psig (0.7 barg)	HFX-7, HFX0-7: 10 psig (0.7 barg) HFX-9, HFX0-9: 15 psig (1.03 barg) HFX-11, HFX0-11: 20 psig (1.4 barg)
Recommended Ambient Operating Temperature	77°F (25°C)	77°F (25°C)	77°F (25°C)	77°F (25°C)
Min/Max Inlet Air Temp.	40°F/110°F (4°C/43°C)	40°F/122°F (4°C/50°C)	40°F/122°F (4°C/50°C)	40°F/122°F (4°C/50°C)
Recommended Inlet Air Temperature	77°F (25°C)	77°F (25°C)	77°F (25°C)	77°F (25°C)
Inlet/Outlet Port Sizes	1/4" NPT	1/4" NPT	1/4" NPT	1/2" NPT
Electrical Requirements (2)	None (2)	None (2)	None (2)	None (2)
Dimensions	10.7" w x 13.4" d x 16.1" h (27.2cm x 34cm x 40.9cm)	16" w x 16" d x 50" h (41cm x 25cm x 91cm)	16" w x 16" d x 50" h (41cm x 25cm x 91cm)	24" w x 20" d x 69" h (61cm x 51cm x 175cm)
Shipping Wt.	42.5 lbs. (19 kg)	75 lbs. (34 kg)	106 lbs. (114 kg)	250 lbs. (114 kg)

Notes:

1 Maximum operating pressure in Europe is 8 barg.

2 No electrical power required unless used with an electrical accessory, e.g., an oxygen analyzer.

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