N_2Revolution, Inc.

Setup and Operation Manual
NITROFLATOR™ SERIES

MODEL #_____ SERIAL #_____

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IMPORTANT SAFETY STATEMENT

NEVER allow unauthorized persons to operate the Nitroflator™.
NEVER use this product for anything other than its intended use.
ALL operators of this equipment must be trained and be knowledgeable on this equipment.
NEVER allow unauthorized persons to enter the work area where this equipment is being used.
ALWAYS follow safety precautions as stated on labels and signs.

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SAFETY INSTRUCTIONS

THIS EQUIPMENT MAY ONLY BE INSTALLED AND OPERATED BY INDIVIDUALS WHO HAVE READ AND ARE FAMILIAR WITH THIS SETUP AND OPERATION MANUAL.

PURIGEN98TM IS DE-OXYGENATED AIR AND SHOULD NOT BE INHALED, CONSUMED OR USED FOR ANY OTHER PURPOSE THAN INFLATION OF TIRES.

THE NITROFLATOR OPERATES ON PRESSURIZED COMPRESSED AIR, AND SHOULD HAVE A MANUAL DISCONNECT SHOULD ONE OF THE COMPRESSED AIR HOSES FITTING AND OR PARTS FAIL.

THE NITROFLATOR MUST BE CONNECTED TO A COMPRESSED AIR LINE WITH A MINIMUM PRESSURE SUPPLY OF 125psi.

OPERATORS OF THE NITROFLATOR MUST FOLLOW STANDARD SAFETY PROCEDURES WHEN FILLING TIRES.

OPERATORS OF THE NITROFLATOR MUST HEED ALL WARNINGS AND LABELS POSTED ON THE EQUIPMENT.

USE OF THIS PRODUCT IS ONLY PERMITTED IN PLACES FREE FROM EXPLOSION OR FIRE HAZARD.

DO NOT USE THE NITROFLATOR IF IT IS VISBLY WORN, DISTORTED OR DAMAGED.

THIS MACHINE MAY ONLY BE OPERATED IN A WELL VENTILATED SERVICE AREA.

THE NITROFLATOR MUST BE SERVICED BY TRAINED AND OR DESIGNATED SERVICE PERSONS. THE NITROFLATOR CONTAINS PRESSURIZED PARTS, ELECTRICAL PARTS AND HEATED PARTS. THE UNIT MUST BE DISCONNECTED FROM ALL COMPRESSED AIR INLETS, ALL ELECTRICAL CONNECTIONS AND THE STORAGE TANK MUST BE DEPRESSURIZED BEFORE THE UNIT IS SERVICED.

ONLY PERSONS TRAINED IN RMA/TIA TIRE SAFETY PROTOCOLS SHOULD SERVICE TIRES.

PurigeN98™ INFLATION IS NOT TO BE USED TO SEAT BEADS.

PurigeN98™ REINLFATION IS TO BE PERFORMED ONLY ON PROPERLY BEAD SEATED/NON-DAMAGED TIRES.

General Safety Instructions

Prior to installing and operating a Nitroflator™ system personnel must be aware of all hazards associated with and correct operating procedures for producing nitrogen through membrane air separation. The following section gives some details of these potential hazards and must be read prior to installation.

Introduction

The operation of industrial gas production equipment is accompanied by certain hazards, the seriousness of which depends upon the operation of rotating machinery and the more unpredictable conditions which can arise with the production of explosive or volatile products.
In addition to the normal hazards encountered in gas producing plants, such as those which stem from confined pressurized gases, there are other hazards associated with the operation of the air

separation requiring special safety precautions. These arise mainly from the presence of gaseous oxygen and from the possibility of oxygen deficient atmospheres.

Oxygen
Oxygen is the constituent of air which allows fuel or other combustible matter to burn. The presence of oxygen in air in excess of its normal concentration makes fires easier to start and, once started causes them to burn more intensely. In addition, some materials which burn with difficulty in air will burn quite vigorously in the presence of high concentrations of oxygen.
It is necessary to prevent any flammable material from coming into contact with oxygen rich gas (permeate) from the Nitroflator™ and to avoid all possibilities of ignition.
Thus, no oil or grease deposits should be permitted to accumulate or remain anywhere in the vicinity of the Nitroflator™

Any rags which may have been used for wiping oil spillage should be kept in closed metal containers and at no time should they be left near the Nitroflator™ or carried in clothing pockets.

For their own protection, operators or other work people should not wear oily or greasy clothing when working on or near the Nitroflator™. These can be easily ignited and greatly increase the possibility of injury.

It should always be remembered that the only “safe” oxygen concentration is that exciting in atmospheric air. For this reason, the permeate gas venting from the Nitroflator™ should be considered as oxygen enriched air and proper precautions are to be taken.

Nitrogen and Oxygen Deficient Atmospheres
Nitrogen is physiologically inert, non-toxic gas. By displacing the oxygen in the air, it reduces the partial pressure of oxygen and acts as an asphyxiant. Contrary to popular belief, an oxygen-poor atmosphere does not cause respiratory difficulty or a feeling of suffocation in a healthy person, but manifests gradual effects, substantially corresponding to periods of incipient anesthesia.

The easiest detectable symptoms of nitrogen asphyxiation are the following:

- gradual loss of balance, dizziness,
- feeling of tightness or compression in the head, located near the forehead,
- tingling sensation in the tongue, fingertips and toes,
- difficulty and weakening of speech, leading to the inability to utter a sound,
- unnoticeable and then rapid reduction of the ability to exert physical effort and to coordinate movements, leading to total immobility,
- reduced awareness of the outside world and damping of sensory characteristics, particularly the touch,
- frequently heightened mental activity.

It should not be presumed that any of the symptoms enumerated above will necessarily be felt or detected early enough to provide sufficient warning of the hazards involved. In practice, unsuspecting persons can breathe oxygen, nitrogen or air with equal ease, without being promptly aware of the fact.

Difficulties caused by oxygen-poor atmospheres can only be effectively detected by persons who are familiar with the conditions prevailing in incipient anesthesia. Persons who are unaware of these factors generally reach the stage of immobility and effective voiceless ness by the time they notice any peculiarity.

If gaseous nitrogen is accidentally blown into a closed room, the room should be well aired out immediately. Enclosed spaces containing nitrogen producing equipment such as the Nitroflator[tm] should be adequately vented to prevent possible accumulation of nitrogen gas. If personnel must enter an enclosed area in which normal oxygen concentration has been depleted by nitrogen discharge, appropriate breathing apparatus should be worn.

The normal oxygen content of air is approximately 21%. When the oxygen content of air is reduced to about 15 or 16%, the flame of ordinary, combustible materials including those commonly used as fuel for heat or light, will be extinguished. Somewhat below this concentration an individual breathing the air is mentally incapable of diagnosing the situation, as the symptoms of sleepiness, fatigue, lassitude, loss of coordination, errors in judgment and confusion will be masked by state of “euphoria”, giving the victim a false sense of security and well being.

Human exposure to atmospheres containing 12% or less oxygen will bring about unconsciousness without warning and so quickly that the individual cannot help or protect himself. This is true if the condition is reached by immediate change of environment or by gradual depletion of oxygen.

In the case of oxygen concentration in the range of 8 to 12%, unconsciousness can be immediate and without warning.

Personnel Cleanliness
Personnel must clean their hands thoroughly and must change into approved protective clothing before transferring from any general maintenance involving dirt, oil or grease, etc. to Nitroflator[TM] maintenance.

Ventilation of Buildings
Proper ventilation must be provided in buildings where nitrogen may be present. Leak checks of indoor nitrogen piping and connections to other Nitroflator[TM] equipment (i.e., storage tank) is recommended prior to or at initial start up.

PurigeN98™ Overview

PurigeN98™ is de-oxygenated air which contains less than 2% oxygen. **PurigeN98™** is completely inert and moisture free.

Why is **PurigeN98™** better?

- **Maintains more consistent pressure:**
  - When tires are inflated with **PurigeN98™**, they will retain pressure better over a longer period of time.
  - Research has proven that tires filled with regular compressed air will lose on average 2psi per month. **PurigeN98™** can greatly reduce this rate of loss to 2PSI over a 6six month period.
  - While **PurigeN98™** should maintain a more consistent pressure, it is important to note that it will not plug or stop small leaks, or punctures. Therefore **PurigeN98™** users must continue to check tire pressure on a regular basis as recommended by the vehicle manufacturer and/or tire manufacturer.
  - Under-inflated tires increase rolling resistance. Increased rolling resistance will lead to increased fuel use, increased wear on the tire, uneven tread wear, reduced vehicle handling and increased braking distances.

- **Decreases Tire Oxidation:**
  - Oxygen may oxidize the rubber in the tire. Over time this oxidizing process can lead to weakening of the tire carcass, separation of the rubber layers, and tire failure. In addition moisture in air aggravates the metal oxidation of radial tires.
  - Tire rims are oxidized by the compressed wet air. This leads to small imperfections in the rim, which can over time cause leakage between the tire bead and rim.

- **Helps Tire Pressure Monitoring Systems (TPMS).**
  - When a vehicle travels, the tires will heat up; and if they contain a high level of moisture, this moisture will expand rapidly. This rapid expansion can cause significant variations in tire pressures, and result in inaccurate pressure readings by the TPMS.
  - By keeping the inside of the tire filled with clean moisture free **PurigeN98™**, there will be fewer particles that can clog the valve stem and TPMS sensor.

Nitroflator™ System Overview

APPLICATION
The Nitroflator comes preset by the factory to produce **PurigeN98™**.

INTENDED USE
The Nitroflator is a pneumatic device that produces deoxygenated air for the purpose of inflating vehicle tires.

METHOD OF PurigeN98™ PRODUCTION
The system is supplied by compressed air, which is separated and filtered in the Nitroflator. The **PurigeN98™** is stored in the 80 gallon storage tank and the waste oxygenated air is vented into the atmosphere. The system is fully automatic, and comes preset from the factory to automatically produce **PurigeN98™** when pressure in the tank falls below 100psi. Once the

storage tank is pressurized at the factory preset level of 125psi, the unit will switch to standby mode. When the system is in standby mode, it will not use any compressed air.

COMPRESSED AIR SUPPLY
The unit is completely self-contained. The unit needs a clean and reliable source of compressed air with a minimum pressure of 125psi.

NITROFLATOR PLACEMENT
The Nitroflator™ new cylindrical design allows the unit to efficiently produce **PurigeN98™** without using lots of floor space. The unit is designed to be installed inside only and is not weatherproof.

The Nitroflator™ may not be installed in an enclosed or confined area. The unit waste oxygenated air will be hazardous if this waste air is allowed to build up in an enclosed area.

Nitroflator™ OPERATION

After the initial set up the unit will not require any further calibration. The unit's only maintenance will be periodic changes of the pre-filters, and changes of the automatic drain valves in those filters. The Nitroflator will capture all filter impurities, oils and moisture and collect these in a container. When this container needs to be emptied the contents must be disposed according to the hazardous materials disposal plan. Under no circumstances may these waste liquids be disposed of in a sewer drain, or plainly dumped on the floor.

Nitroflator™ SERIES Specifications

NITROFLATOR MODEL SERIES						
MODEL	**Min. Inlet Pressure**	**Passenger Tires/Hour**	**Truck Tires/Hou**	**Min. Air Supply CFM**	**LxWxH (In.)**	**Weight**
Standard Series						
PS-4	125	4	1	2	36x26x67	260
PS-8	125	8	1.5	2	36x26x67	265
PS-12	125	12	2	2	36x26x67	270
PS-24	125	24	4	4	36x26x67	275
Dealer & Truck Series						
PD-36	125	36	6	4	36x26x67	280
PD-72	125	72	12	8	36x26x67	300
PT-144	165	144	24	16	36x26x67	320

*(The specs above assume standard passenger size inflated to 35 PSI using three cubic feet of **PurigeN98™** and the truck tire inflated to 100 PSI using 10 cubic feet of **PurigeN98™** with the Nitroflator™ receiving clean compressed air at 165PSI at the inlet and set at 120 PSI in the **PurigeN98™** storage tank).*

Equipment Installation

Installation Considerations

Accessibility: Choose a location that will allow reasonable installation and servicing of the equipment. Allow for allow for crane or forklift access as required. The Nitroflator™ should be installed on a flat, level surface or pad. The legs of the Nitroflator™ should be bolted onto the surface.

Environment: Ensure the chosen location has sufficient lighting and ventilation. Make allowances for dissipation of waste heat from the air compressor. Compressor after cooling exhaust air may have to be ducted outside of the building. A clean area will maximize operability of the unit and decrease maintenance. Ensure that the air compressor will not ingest poor quality air or gases and vapors which could cause damage to the system or membranes.

Weather proofing: The Nitroflator™ is rated for indoor service. Freeze protection should be provided where required, since the drain lines will be full of liquid water.

Other Considerations:

- Refer to the air compressor installation manual for items specific for the compressor.
- Reduce trip hazards by locating piping and electrical conduits overhead.
- Allow generous space around all equipment for service accessibility; at least three feet in each direction.
- Know the weight of the equipment before handling (approximately 300 lbs). Inspect handling equipment before it is used. Slings and spreaders shall be used when lifting with a crane. Always lift the equipment from underneath, in no case have lifting eyes been provided.
- Handle the Nitroflator™ with care. Shocks to the equipment can cause leaks, internal damage, instrument failures and damage to the membrane fibers.
- Personnel operating the Nitroflator™ should be properly trained and qualified.

Electrical Connections

All electrical wiring and power connections shall be done in accordance with the applicable local codes.

Nitroflator™ Power: The Nitroflator™ requires single phase AC electrical power.
110 volts/ 60 Hz

Piping Connections

All field installed piping shall be rated for the maximum pressure which can be produced by the air compressor feeding the system. **The compressor pressure relief safety valve protects the entire system from over pressurization. The Nitroflator™ maximum pressure is 175psig. If not provided by the compressor or in the case of Customer Supplied Air, a separate system pressure relief safety valve must be installed to protect the system from pressure greater than 175psig.**

Refer to the Nitroflator™ General Arrangement for locations of all piping connections.

Un-packing

The unit is shipped directly from the manufacturer to the customer. The manufacturer tests and calibrates the equipment prior to shipment. The Nitroflator is mounted on a shipping pallet and wrapped in protective packaging material.

- Upon delivery of the unit, make a visual inspection that the unit is undamaged. Report damage immediately; do not proceed with installation on the unit.

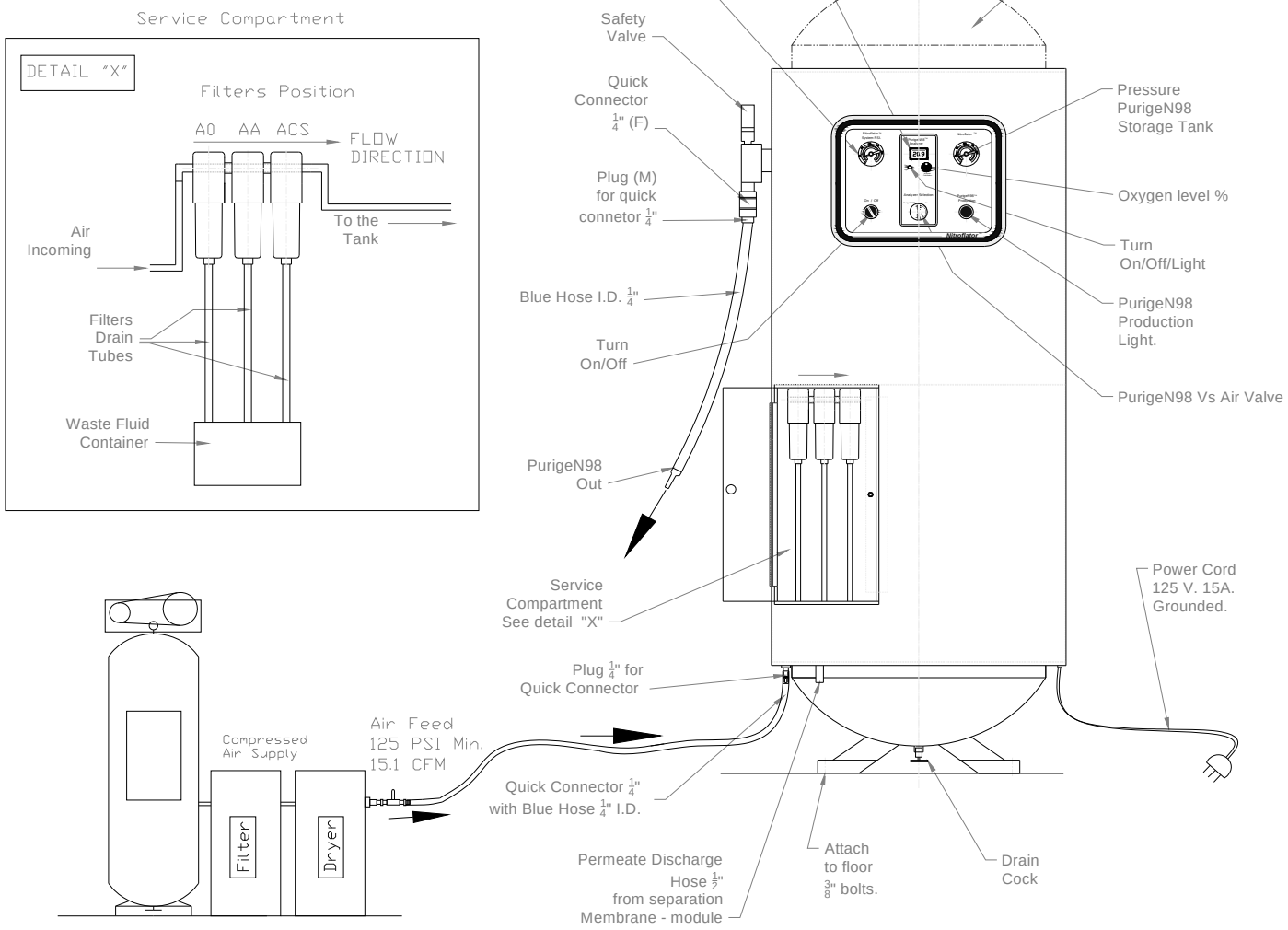
If the unit looks undamaged it may be installed in indoors in a well ventilated area.
Unbolt the machine from the shipping pallet. Use at least two persons and tilt unit of the pallet. Position unit on level surface and anchor unit to the floor through holes in feet of unit. Once the unit is fastened to the floor it may be attached to the compressed air supply. The unit may be coupled using a ¼" quick connect coupling. Attach the **PurigeN98™** hose to the tank output and plug the unit's electrical cord directly into a 120volt 15 amp outlet. Do not use an extension cord.

Installation Assistance

The Technical support may be contacted to obtain help with equipment setup and initial calibration. Please contact the technical support department at (877) 798-2587 or online at technicalsupport@purigen98.com

Nitroflator
Model 2-80

GENERAL ARRANGEMENT



Nitroflator Operation Procedures

After the unit is connected, and the supply air line is pressurized, the unit may be turned on.

The Nitroflator™ is designed for automatic unattended operation.

When the unit is turned on the unit automatically enters a STANDBY mode. If the **PurigeN98™** storage tank is below the 100psi level then the unit will turn on and start producing **PurigeN98™**. Once the storage tank is pressurized up to 125psi, the unit will return to standby mode.

Instrument Panel

The instrument panel will control and show status of the Nitroflator

Control Switch
The ON/OFF button turns the machine on and off. Once the switch is turned into the ON position the unit will automatically produce **PurigeN98™** and store it into the **PurigeN98™** storage tank.

Information Display
The Nitroflator System PSI gauge shows the level of pressure in the system. This gauge will only show pressure when the unit is turned on and producing **PurigeN98™**. If the unit is turned on but in STANDBY mode this pressure gauge should read 0.

The **PurigeN98™** Tank PSI gauge shows the level of pressure in the **PurigeN98™** storage tank. This gauge will increase when the unit is working and decrease when **PurigeN98™** is used.

PurigeN98™ Production Light .This light will only turn on when the unit is producing **PurigeN98™**

PurigeN98™ Analyzer

The analyzer has a separate on/off switch and should only be turned on when checking the purity of the **PurigeN98™** being produced. The unit is battery operated and should last over 2 years it only turned on when used. To turn on the analyzer push the on/off switch up to turn on. If the switch is pushed down than the display will light up. The analyzer displays the percentage of oxygen moving through the system. The analyzer will only work when the unit is producing **PurigeN98™**, and the **PurigeN98™** production light is on. The selector switch allows the analyzer to measure the oxygen content of the supply air into the Nitroflator and the **PurigeN98™** purity percentage being produced.

Analyzer Calibration
In order to get an accurate reading of the **PurigeN98™** purity, the user must periodically calibrate the sensor. This is can only be done when the Nitroflator is producing **PurigeN98™**.
Select “Air” on the selector switch and wait for the analyzer reading to stabilize. This should take approximately 20 seconds. Then adjust the calibration level by moving the knob clockwise to reduce the percentage and counter clockwise to increase the percentage displayed. The display should read 20.9 which is the oxygen level in normal atmospheric air. The unit is now calibrated.

Once the display reads 20.9% then turn the selector switch to **PurigeN98™** and the purity of the **PurigeN98™** will be displayed. The number on the display should not be more than 2% which means that there is only 2% of oxygen remaining in the **PurigeN98™** being produced. As tank pressure and **PurigeN98™** flow decreases the purity level might increase to .01. During initial startup the purity level might fall below 2% but when normal operating conditions are achieved the unit should be producing **PurigeN98™** at 2.00 or less.
Once the storage tank has been filled with **PurigeN98™** the **PurigeN98™** discharge outlet may be opened and **PurigeN98™** may be used to fill tires.

PurigeN98™ Inflation Protocol

1. On a properly bead seated tire mounted on the vehicle, remove the valve core to allow full release of compressed air.
2. Reinstall the core and pressurize to manufacturer recommended desired pressure level.
3. Place **PurigeN98™** Blue valve sleeved over valve stem and secure valve cap.
4. Repeat process for all remaining tires including spare.

Note: Having the tire secured to the vehicle eliminates the chance of an improperly mounted exploding tire being launched into the air.

Maintenance

The Nitroflator™ has been designed to offer years of headache free operation. In order for the unit to operate efficiently, the unit's filters must be changed regularly.

Weekly Maintenance Schedule

- Calibrate oxygen analyzer
  - Check and empty waste fluid container. Fluids in this container may contain oils and or other hazardous substances. Dispose fluids according to locations hazardous materials disposal plan.

Semi-annual Service Schedule (Every 6 Months)

Service Package #N2-06 will contain all items needed for this service.

- Replace three pre-filters located in service compartment area.
  - Simply twist off the canister holder by turning canister clockwise.
  - Remove filter element and replace with new element. Return canister to filter assembly and turn counter clockwise.
  - Discard used element according to locations hazardous materials disposal plan.

Filters Part Numbers from Left to Right

- N2-10-010 1.0 micron pre-filter replacement element
- N2-01-010 .01 micron fine coalescing filter replacement element
- N2-003-010 .003 p.p.m. activated carbon filter replacement element

MAKE SURE THAT YOU REPLACE THESE FILTERS IN THE CORRECT ORDER. NOT FOLLOWING THIS DIRECTION MAY LEAD TO DAMAGE TO THE SYSTEM AND VOIDING OF THE WARRANTY.

Bi-Annual Service Schedule (Every 24 Months)

Service package #N2-24 will contain all items needed for this service.

- Replace oxygen sensor-probe.
- Replace batteries in oxygen sensor.
- Replace automatic filter drains.

Please contact the technical support department at (954)741-4278 or online at technicalsupport@purigen98.com to obtain service packages.

Maintenance Schedule

Please have the service provider initial services performed. Please see Warranty statement and maintenance directions for details.

First Use Date: _____,20____

[redacted]	Date	Filter 1	Filter 2	Filter 3	Auto Filter Drain	Oxygen Sensor	Oxygen Sensor Battery (AAA)
6th Month					[redacted]	[redacted]	[redacted]
12th Month						[redacted]	[redacted]
18th Month					[redacted]		
24th Month							
30th Month					[redacted]	[redacted]	[redacted]
36th Month							
42nd Month					[redacted]		
48th Month							
54th Month					[redacted]	[redacted]	[redacted]
60th Month						[redacted]	[redacted]
66th Month					[redacted]		
72nd Month							
78th Month					[redacted]	[redacted]	[redacted]
84th Month							
90th Month					[redacted]		

Troubleshooting

The Nitroflator™ is a fully automatic system and all controls are mounted on the front of the cabinet and/or inside the maintenance compartment.

If the unit does not turn on when turned in the power switch is turned into the ON position check the following:

- Check that unit's power plug is plugged into grounded outlet.
- Check that the incoming air supply has a minimum air pressure of 40psi. (The unit has a safety switch that prohibits the unit from turning on if there isn't a sufficient supply of compressed air to the unit.)
- Check the electrical fuse. (The unit is electrically protected by a 5-Amp slow blow fuse. This fuse is located inside the maintenance compartment.)
- Check if the **PurigeN98™** storage tank is at or above the recommended reserve pressure of 100psi. (if the storage tank is at pressure, or within 20psi form set pressure, the unit will be in STANDBY mode only, and will not produce **PurigeN98™** until the storage tank pressure falls below the preset level of 100 psi.

The Unit does not produce **PurigeN98™** at 98% purity or above.

- Make sure that the unit receives a minimum of 100 PSI compressed air.
- Make sure that the pre-filters are maintained, and exchange if clogged.
- Make sure that the oxygen sensor device is calibrated
- When the unit is running you may adjust the purity gauge found in the bottom right hand side of the service area. The purity valve has a red knob that when turned clockwise will increase the purity, and counterclockwise will decrease the purity.
- The membrane has been contaminated and needs to be replaced.

The unit makes a load noise.

- The Nitroflator™ will produce some hissing noises during the production of **PurigeN98™.** If the unit makes a load noise, then it needs to be turned OFF, and both the electrical and compressed air must be disconnected from the machine. The machine must be checked for loose or broken hoses before continuing operation.

Technical Support

Please contact the technical support department at (954)741-4278 or online at technicalsupport@n2revolution.com

1 YEAR LIMITED WARRANTY

DEFECTS & PERFORMANCE: N2REVOLUTION products ("Equipment") are warranted by N2REVOLUTION Inc., ("Manufacturer"), to be free of defects in materials and workmanship and to perform in accordance with the Manufacturer's specifications and operating manual ("Warranty") for (1) year commencing on the date of delivery (Warranty Period). The manufacturer will provide parts for repair, or at its option, replace the Equipment with like Equipment, free of charge.

WARRANTY COVERAGE AREA: Warranty related repairs for Equipment may be performed on site at the Equipment location by the Manufacturer's authorized service agents or, at the Manufacturer's option, Manufacturer will supply required parts to the customer with detailed installation instructions for on site repair by the customer.

LIMITED WARRANTY: The Manufacturer shall not be responsible under this limited Warranty for damages resulting from (i) failure to follow Manufacturer's installation, operation or maintenance instructions, (ii) Unauthorized system modification or alteration under the customer's control, (iii) accident, abuse, misuse or negligent acts or omissions of the customer or persons under the customer's control; or acts of God. THERE ARE NO OTHER EXPRESSED WARRANTIES, WHETHER WRITTEN OR ORAL, OTHER THAN THE WARRANTY SET FORTH IN PARAGRAPH 1 ABOVE. ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED.

LIMITATIONS OF WARRANTY:

- The customer must supply the unit with clean dry compressed air, and must replace the 3 pre-filters at least once every 6 months. The replacement filter elements must be purchased by the customer from the manufacturer every 6 months, and the customer must maintain a log of filter changes. Failure of the customer to abide by these terms will lead to the immediate cancellation of all further warranties.
- The liability of the Manufacturer and its affiliates, distributors and suppliers for any claims, losses, damages or expenses from any cause whatsoever (including acts or omissions of third parties), regardless of the form of action, whether in contract, tort, or otherwise shall not exceed the lesser of (i) the direct damages proven, (ii) the repair or replacement cost, lease payoff or purchase price, as the case may be, of the Equipment that directly gives rise to the claim. The Manufacturer shall not be responsible for any incidental, special, punitive, exemplary, reliance, consequential (including but not limited to lost profits or lost revenues) or indirect loss or damage incurred in connection with the Equipment to the full extent those damages can be disclaimed by law. For personal injury caused by the Manufacturer's negligence, the Manufacturer's negligence shall be limited to proven damages to person. No action or proceeding against the Manufacturer or its affiliates, distributors or suppliers may be commenced more than twelve (12) months after the cause of action accrues.

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: NITROGEN

SYNONYMS: NF Nitrogen, Nitrogen @ 99%+ UHP (Ultra Zero) CEMs
CHEMICAL FAMILY NAME: Inert Gas
FORMULA: N_2
NOTE: Nitrogen May Be Supplied By Pipeline At Pressures TO 600 psig.

Document Number: 10070

PRODUCT USE: Medical, Inerting and General Analytical Or Synthetic Chemical Uses

MANUFACTURED/SUPPLIED FOR:
ADDRESS: 9101-LBJ-FREEWAY,SUITE-800
DALLAS,TX-75243

EMERGENCY PHONE: CHEMTREC: 1-800-424-9300
BUSINESS PHONE:
General MSDS Information 1-972/301-5200
Fax on Demand: 1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL		NIOSH	OTHER
			TWA ppm	STEL ppm	TWA ppm	STEL ppm	IDLH ppm	ppm
Nitrogen	7727-37-9	> 99.99 %	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					
Maximum Impurities		< 0.01%	None of the trace impurities in Nitrogen contribute significantly to the hazards associated with the product. All hazard information pertinent to Nitrogen has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalents standards.					

NE = Not Established. See Section 16 for Definitions of Terms Used.

NOTE (1): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Nitrogen is a colorless, odorless gas. The main health hazard associated with releases of this gas is asphyxiation, by displacement of oxygen.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for Nitrogen is by inhalation.

3. HAZARD IDENTIFICATION (Continued)

INHALATION: High concentrations of this gas can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with various levels of oxygen are as follows:

CONCENTRATION	SYMPTOM OF EXPOSURE
12-16% Oxygen:	Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea and vomiting, collapse or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to Nitrogen may cause the following health effects:

ACUTE: The most significant hazard associated with this gas is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, and, at high concentrations, unconsciousness or death may occur. The skin of a victim of over-exposure may have a blue color.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	0
FLAMMABILITY HAZARD	(RED)	0
PHYSICAL HAZARD	(YELLOW)	0

PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
SEE SECTION 8			

For Routine Industrial Use and Handling Applications

CHRONIC: Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system.

TARGET ORGANS: ACUTE: Respiratory system. CHRONIC: Heart, central nervous system.

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO NITROGEN WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus Remove victim(s) to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory conditions may be aggravated by over-exposure to Nitrogen.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

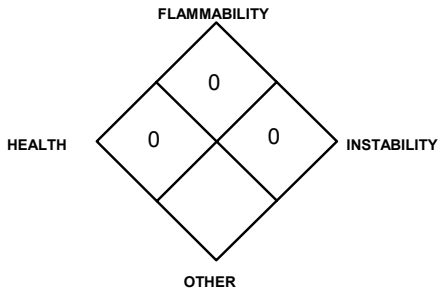
Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: Non-flammable, inert gas. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Nitrogen does not burn; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

NFPA RATING



Explosion Sensitivity to Mechanical Impact: Not Sensitive.

Explosion Sensitivity to Static Discharge: Not Sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment.

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel. Minimum Personal Protective Equipment should be **Level B: Self-Contained Breathing Apparatus.** Locate and seal the source of the leaking gas. Allow the gas, which is lighter than air to dissipate. Monitor the surrounding area for oxygen. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. If leaking incidentally from the cylinder or its valve, contact your supplier.

7. HANDLING and USE

Nitrogen may be supplied by pipeline at pressures up to 600 psig.

WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of Nitrogen could occur without any significant warning symptoms, due to oxygen deficiency.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored upright and be firmly secured to prevent falling or being knocked-over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Keep storage area clear of materials which can burn. Do not allow area where cylinders are stored to exceed 52°C (125°F). Store containers away from heavily trafficked areas and emergency exits. Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Protect cylinders against physical damage.

Use a check valve or other protective device in the discharge line to prevent hazardous backflow. Never tamper with pressure relief valves and cylinders. Keep the smallest amount necessary on-site at any one time. Full and empty cylinders should be segregated. Use a first-in, first-out inventory systems to prevent full containers from being stored for long periods of time.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Compressed gases can present significant safety hazards. The following rules are applicable to work situations in which cylinders are being used.

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap (where provided) in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Do not use oils or grease on gas-handling fittings or equipment. Immediately contact the supplier if there are any difficulties associated with operating cylinder valve. Never insert an object (e.g wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc, on a compressed gas cylinder or make a cylinder part of and electric circuit.

After Use: Close main cylinder valve. Replace valve protection cap. Mark empty cylinders “EMPTY”.

NOTE: Use only DOT or ASME code containers designed for gas storage. Close valve after each use and when empty.

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA: Use the proper CGA connections**,** DO NOT USE ADAPTERS:

THREADED**:**	0-3000 psig	CGA 580
	3001-5500 psig	CGA 680
	5501-7500 psig	CGA 677
PIN-INDEXED YOKE:	0-3000 psig	CGA 960 (Medical Use)
ULTRA HIGH INTEGRITY:	0-3000 psig	CGA 718

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents chemical dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of oxygen.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% or during emergency response to a release of Nitrogen. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHAs Respiratory Protection Standard (1910.134-1998).

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, or Canadian Standards.

HAND PROTECTION: Wear gloves when handling cylinders of Nitrogen. Otherwise, wear glove protection appropriate to the specific operation for which Nitrogen is used. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate for task. Safety shoes are recommended when handling cylinders. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR.

9. PHYSICAL and CHEMICAL PROPERTIES

GAS DENSITY @ 0°C (32°F) and 1 atm: .072 lbs/cu ft (1.153 kg/m^3)

FREEZING/MELTING POINT @ 10 psig: -210°C (-345.8°F)

BOILING POINT: -195.8°C (-320.4°F)

SPECIFIC GRAVITY (air = 1) @ 21.1°C (70°F): 0.906

pH: Not applicable.

SOLUBILITY IN WATER vol/vol @ 0°C (32°F) and 1 atm: 0.023

MOLECULAR WEIGHT: 28.01

EVAPORATION RATE (nBuAc = 1): Not applicable.

EXPANSION RATIO: Not applicable.

ODOR THRESHOLD: Not applicable. Odorless.

SPECIFIC VOLUME (ft^3/lb): 13.8

VAPOR PRESSURE @ (21.1°C) 70°F psig: Not applicable.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

APPEARANCE AND COLOR: Nitrogen is a colorless, odorless gas.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of Nitrogen.

10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.

DECOMPOSITION PRODUCTS: None.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Titanium is the only element that will burn in Nitrogen. Lithium reacts slowly with Nitrogen at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: There are no specific toxicology data for Nitrogen. Nitrogen is a simple asphyxiant, which acts to displace oxygen in the environment.

SUSPECTED CANCER AGENT: Nitrogen is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC; therefore it is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Not applicable.

SENSITIZATION OF PRODUCT: Nitrogen is not a sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects Nitrogen on the human reproductive system.

Mutagenicity: Nitrogen is not expected to cause mutagenic effects in humans.

Embryotoxicity: Nitrogen is not expected to cause embryotoxic effects in humans.

Teratogenicity: Nitrogen is not expected to cause teratogenic effects in humans.

Reproductive Toxicity: Nitrogen is not expected to cause adverse reproductive effects in humans.

11. TOXICOLOGICAL INFORMATION (Continued)

REPRODUCTIVE TOXICITY INFORMATION (continued): *A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.*

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) have not been determined for Nitrogen.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: Nitrogen occurs naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to oxygen deficient environments. No adverse effect is anticipated to occur to plant-life, except for frost produced in the presence of rapidly expanding gases.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on Nitrogen's effects on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to Air Liquide. Do not dispose of locally. For emergency disposal, secure the cylinder and slowly discharge the gas to the atmosphere in a well-ventilated area or outdoors.

14. TRANSPORTATION INFORMATION

THIS GAS IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Nitrogen, compressed
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1066
PACKING GROUP: Not Applicable.
DOT LABEL(S) REQUIRED: Non-Flammable Gas
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 121
MARINE POLLUTANT: Nitrogen is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).
SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles present serious safety hazards and should be discouraged.
NOTE: Shipment of compressed gas cylinders which have not been filled with the owners consent is a violation of Federal law (49 CFR, Part 173.301 (b).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas mixture is considered as Dangerous Goods, per regulations of Transport Canada. The use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the following information is applicable.

PROPER SHIPPING NAME: Nitrogen, compressed
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Compressed Gas)
UN IDENTIFICATION NUMBER: UN 1066
PACKING GROUP: Not Applicable
HAZARD LABEL(S) REQUIRED: Class 2.2 (Compressed Gas)
SPECIAL PROVISIONS: None
EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX: 0.12
ERAP INDEX: None
PASSENGER CARRYING SHIP INDEX: None
PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX: 75
MARINE POLLUTANT: Not applicable.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: Nitrogen is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for any component of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. TSCA INVENTORY STATUS: Nitrogen is listed on the TSCA Inventory.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

OTHER U.S. FEDERAL REGULATIONS:

- Generally recognized as safe (GRAS), as a direct human food ingredient when used as a propellant, aerating agent and gas, per 21, CFR, 184.1540. Nitrogen NF is regulated by the FDA as a prescription drug.
- Depending on specific operations involving the use of Nitrogen, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Nitrogen is not listed in Appendix A.
- Nitrogen does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82).
- Nitrogen is not listed as a Regulated Substance, per 40 CFR, Part 68, of the Risk Management for Chemical Releases.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Nitrogen is not on the California Proposition 65 lists.

OTHER CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: Nitrogen is listed on the DSL Inventory.

Nitrogen is categorized as a Controlled Product, Hazard Class A as per the Controlled Product Regulations.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: Nitrogen is not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS REGULATIONS: Nitrogen is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations.

16. OTHER INFORMATION

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about gas mixtures can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923 Telephone: (703) 788-2700.

G-10.1	*"Commodity Specification for Nitrogen"*
P-1	*"Safe Handling of Compressed Gases in Containers"*
P-9	*"Inert Gases, Argon, Nitrogen and Helium"*
P-14	*"Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres"*
SB-2	*"Oxygen Deficient Atmospheres"*
AV-1	*"Safe Handling and Storage of Compressed Gases"*
	"Handbook of Compressed Gases"

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