

FM- 200^{MD}

**Systemes de
suppression des
incendies Série
ECS**

**Manuel du
propriétaire**

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CHAPITRE 2

INSTALLATION ET MAINTENANCE

2-1 INTRODUCTION

Votre système est conçu pour évacuer une quantité spécifique de FM-200^{MD} à travers des gicleurs situés au sein de la zone à risque. La quantité de FM-200 nécessaire pour votre système a été minutieusement calculée pour répondre aux exigences précises définies par les laboratoires Underwriters Laboratories, la Factory Mutual Research Corporation et l'organisation américaine National Fire Protection Association. Des exigences supplémentaires peuvent s'appliquer en fonction de la mise en œuvre, des spécifications de conception et de l'autorité compétente.

Votre système FM-200 est composé des éléments suivants :

- Bouteille(s) de FM-200, tuyaux d'évacuation et gicleurs.
- Dispositifs de déclenchement (électriques, pneumatiques, par câble ou manuels).
- Dispositifs de détection et d'alarme et panneau de commande.

Votre système doit être doté de modes d'actionnement manuels utilisant l'un ou les deux dispositifs suivants, homologués par les laboratoires Underwriters Laboratories :

- Poste d'activation électrique.
- Détecteur automatique (panneau de commande requis).

L'utilisation du système automatique (le cas échéant) peut être électrique, à l'aide de détecteurs de chaleur homologués par les laboratoires Underwriters Laboratories, de détecteurs photoélectriques, de détecteurs de fumée à ionisation ou de détecteurs de fumée optiques.

Une tête de commande électrique permet d'ouvrir la vanne, qui fait partie de la bouteille de stockage de l'agent. Il est possible d'utiliser la pression d'évacuation pour ouvrir les vannes de bouteilles supplémentaires.

Si votre système est doté d'un panneau de commande, consultez le manuel du panneau de commande Kidde approprié.

2-2 INSTALLATION

Seul un distributeur Kidde agréé est autorisé à installer votre système de suppression des incendies FM-200 Kidde. Votre système doit être installé à l'aide de composants et de matériaux d'installation d'origine Kidde, conformément au Manuel de conception, d'installation, d'utilisation et de maintenance (P/N 90-FM200M-011 ou -000).

L'installateur doit être détenteur d'un certificat d'installation Kidde récent.

Une fois le système installé, il est essentiel de vérifier les éléments suivants :

1. Toutes les zones nécessitant une protection sont protégées.
2. Un dispositif d'évacuation manuelle du système FM-200 est mis à disposition dans un lieu facile d'accès dans lequel il est possible de le faire fonctionner tout en s'éloignant de la zone à risque.

La commande manuelle doit être étiquetée de façon claire. L'installateur de votre système FM-200 doit pouvoir répondre à toutes vos questions concernant les composants et la zone de couverture du système.

L'installateur doit également démontrer que le système mis en place est conforme aux exigences du Manuel de conception, d'installation, d'utilisation et de maintenance FM-200 Kidde (P/N 90-FM200M-011 ou -000), ainsi qu'aux exigences de votre société d'assurance et des autorités compétentes de votre région.

2-3 INSTRUCTIONS EN CAS D'INCENDIE

1. Demandez à tous les occupants de quitter immédiatement la zone d'incendie.
AU BESOIN, FAITES FONCTIONNER LE SYSTÈME MANUELLEMENT À L'AIDE DE LA COMMANDE MANUELLE.
2. Suspendez toutes les opérations en cours au sein de la zone d'incendie.
3. Demandez à quelqu'un de contacter immédiatement le service d'incendie, quelle que soit l'importance de l'incendie. **Affichez le numéro du service d'incendie et VOTRE ADRESSE** à proximité de chaque téléphone. Familiarisez-vous avec le service d'incendie le plus proche.
4. Assurez-vous que toutes les personnes ont évacué la zone d'incendie conformément à votre procédure d'urgence.

Votre commande distante de déverrouillage manuel fonctionne de manière électrique. Suivez les instructions indiquées sur l'appareil [LIFT COVER – PULL DOWN (soulevez le couvercle, tirez vers le bas), etc.]. Quittez immédiatement les lieux.

Une fois le feu éteint, n'accédez pas à la zone d'incendie avant l'arrivée du service d'incendie.

2-4 INSTRUCTIONS DE PRÉUTILISATION

Une fois le système déchargé, contactez votre distributeur Kidde pour le réinitialiser et le recharger. Exigez que le système soit immédiatement rechargé avec le type et la quantité d'agent adéquats.

2-5 INSPECTION ET MAINTENANCE DE VOTRE SYSTÈME



Le propriétaire du système de suppression des incendies FM-200 Kidde doit respecter les instructions suivantes. Le non-respect de ces instructions pourrait entraîner de mauvaises performances, des dommages matériels et des blessures corporelles.

Pour plus d'informations sur l'inspection, consultez le Manuel Kidde 90-FM200M-011 ou -000.

2-5.1 Inspection mensuelle

1. Vérifiez la présence de dommages et/ou d'un déplacement sur tous les composants du système, les gicleurs, la tuyauterie de distribution et la course des conduits.
2. Vérifiez la présence éventuelle de dommages ou l'absence de certains composants sur tous les détecteurs et panneaux de commande. Faites immédiatement remplacer les pièces endommagées ou manquantes (contactez votre distributeur Kidde). Consultez le manuel du panneau de commande approprié afin d'obtenir des procédures d'inspection supplémentaires et utiles.
3. Inspectez chaque bouteille. L'aiguille du manomètre doit indiquer une pression de stockage d'environ 2 583,44 kPa (360 psig). Il ne doit pas y avoir de corrosion ou de dommages sur la ou les bouteilles.
4. Inspectez la commande distante de déverrouillage manuel. Pour les dispositifs de déverrouillage manuel électriques, effectuez une vérification visuelle pour vous assurer que le dispositif est en position normale ou d'utilisation. Le chemin d'accès à la commande distante doit être dégagé et libre de toute obstruction.

Si des anomalies sont détectées au cours de l'inspection, **SUSPENDEZ TOUTES LES OPÉRATIONS EN COURS AU SEIN DE LA ZONE PROTÉGÉE.**

Pour toute maintenance et/ou réparation, contactez votre distributeur Kidde.

2-5.2 Inspection semestrielle

Faites minutieusement inspecter le système tous les six mois par un distributeur Kidde. Dans le cadre de cette inspection semestrielle, le fonctionnement du système doit être testé conformément aux instructions énoncées dans le Manuel de conception, d'installation, d'utilisation et de maintenance (P/N 90-FM200M-011 ou -000) du système de suppression des incendies FM-200 Kidde. Ces instructions exigent un essai fonctionnel du système et une vérification de la quantité d'agent dans chaque bouteille. L'agent n'est pas déchargé au cours de l'inspection.

Pour plus d'informations sur l'inspection et la maintenance, contactez Kidde ou votre distributeur Kidde.

2-6 EXIGENCES SUPPLÉMENTAIRES

Outre le système FM-200, des extincteurs portatifs sont requis, notamment au sein des zones non protégées par ledit système. Contactez votre société d'assurance, les autorités locales compétentes et votre distributeur d'extincteurs pour connaître les exigences en termes de taille, de type, d'espace et d'emplacement.

Veillez lire, comprendre et suivre les instructions du présent manuel, ainsi que celles indiquées sur les plaques signalétiques des bouteilles. Tous les six mois ou à des intervalles plus fréquents, passez en revue les présentes instructions avec vos employés. Conservez le présent manuel dans un endroit facile d'accès et à proximité du système FM-200, pour une consultation rapide. Affichez le nom, le numéro de téléphone et l'adresse de votre distributeur Kidde à proximité de votre téléphone. En outre, affichez le numéro d'urgence du service d'incendie et votre adresse à proximité de vos téléphones.

En cas de situation rendant votre système FM-200 inopérant ou inefficace, **SUSPENDEZ IMMÉDIATEMENT TOUTES LES OPÉRATIONS EN COURS AU SEIN DE LA ZONE PROTÉGÉE.** Avant toute réutilisation du système, faites corriger la situation par votre distributeur Kidde.

2-7 DOCUMENTATION ET SPÉCIFICATIONS SUPPLÉMENTAIRES

Votre système doit être conçu, installé, utilisé et entretenu uniquement en conformité avec les documents et spécifications suivants :

- Manuel de conception, d'installation, d'utilisation et de maintenance (P/N 90-FM200M-011 ou -000) du système FM-200 Kidde, disponible auprès de Kidde ou de votre distributeur Kidde.

Kidde-Fenwal, Inc.
400 Main Street
Ashland, MA 01721
Tél. : 508-881-2000
Téléc. : 508-881-8920

- Norme n° 2001 de la National Fire Protection Association (édition actuelle), disponible auprès de :

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269

- Un exemplaire de la fiche signalétique (FS) du système FM-200 est disponible à la fin du présent manuel (Annexe A).

FM-200[®]

ECS Series Fire Suppression Systems

Owner's Manual

UL Listing File No. EX 4674
Factory Mutual Approval J.I. No. 0Y7A2.AF

FM-200[®]

ECS Series

Fire

Suppression

Systems

Owner's Manual

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ATTENTION INSTALLER

This form must be signed by the system owner indicating that he/she has received a copy of this Owner's Manual P/N 90-FM200M-002. Have the system installer fill in this form and retain a copy of this form for your records.

Retain a copy of this form for your records.

1. System Installed:

2. Listing of Major System Components:

3. Description of Hazard Protected by System:

Owner or Authorized Representative

Date

Title

CHAPTER 1

GENERAL INFORMATION

1-1 INTRODUCTION

Thank you for purchasing a Kidde FM-200® Fire Suppression System. This owners manual is provided to instruct and familiarize you and your employees with your Kidde FM-200 Fire Suppression System. You will learn:

- About your system
- How your FM-200 system operates
- How FM-200 works
- Installation of your system
- Instructions in case of fire
- Post-fire instructions
- Inspection and maintenance of your system
- Your responsibilities and related equipment requirements
- Additional specifications and documentation

Note: **IMPORTANT** – This owners manual does not cover every detail of step-by-step installation procedures for the Kidde FM-200 system.

The system consists of components tested within the limitations defined in the detailed design, installation, operation and maintenance manual (P/N 90-FM200M-011 or 000, which is available from Kidde. The system designer must be consulted whenever changes are planned for the system or area of protection.

A Kidde distributor must be consulted after the system has been discharged.

The technical data contained herein is limited strictly for informational purposes only.

It is your responsibility to read this manual and to ensure proper system operation and personnel safety.

Follow the instructions in this manual and on the FM-200 cylinder nameplates. Review this information semiannually or as needed. Place this manual in an accessible place near the FM-200 system for ready reference.

Kidde believes this data to be accurate, but it is published and presented without any guarantee or warranty whatsoever. Kidde disclaims any liability for the information contained herein by any and all other parties.

YOUR KIDDE DISTRIBUTOR IS:

ENTER EMERGENCY NUMBER FOR YOUR LOCAL FIRE DEPARTMENT HERE:

Before handling Kidde products, all personnel must be thoroughly trained in the safe handling of the containers as well as in the proper procedures for installation, removal, filling and connection of other critical devices, such as solenoids, cable assemblies, pressure switches and safety caps. READ, UNDERSTAND and ALWAYS FOLLOW the operation and maintenance manuals, owner's manuals, service manuals, etc., that are provided with the individual systems.

WARNING

PRESSURIZED (CHARGED) CONTAINERS ARE EXTREMELY HAZARDOUS AND IF NOT HANDLED PROPERLY ARE CAPABLE OF VIOLENT DISCHARGE. THIS MAY RESULT IN SERIOUS BODILY INJURY, DEATH AND PROPERTY DAMAGE.

1-2 MOVING OF CONTAINERS

1-2.1 Moving by Trucks

Containers must be shipped in the upright position and properly secured in place. Containers must not be rolled, dragged, slid or allowed to be slid from tailgates of vehicles. A suitable hand truck, fork truck, roll platform or similar device must be used.

1-2.2 Rough Handling

Containers must not be dropped or permitted to strike violently against each other or other surfaces.

1-2.3 Storage

Containers must be stored standing upright and secured in place.

1-3 SAFETY CAP

WARNING

THESE INSTRUCTIONS MUST BE FOLLOWED IN THE EXACT SEQUENCE AS WRITTEN TO PREVENT SERIOUS INJURY, DEATH AND/OR PROPERTY DAMAGE.

- a. Each FM-200 container is factory equipped with a safety cap installed on the container outlet and securely chained

to the container to prevent loss. This device is a safety feature and will provide controlled, safe discharge when installed if the container is actuated accidentally.

- b. The safety cap must be installed on the container outlet AT ALL TIMES except when the containers are connected to the system piping.
- c. The safety cap is intentionally chained to the container to prevent loss while in service and must not be removed from its chain.

For additional information on safe handling of compressed gas containers, see CGA Pamphlet P1 titled "Safe Handling of Compressed Gases in Containers." (CGA pamphlets may be purchased from the Compressed Gas Association, Crystal Square Two, 1725 Jefferson Davis Highway, Arlington, VA 22202).

FM-200 will decompose upon contact with temperatures greater than approximately 1300°F (700°C). Decomposed FM-200 has a sharp, acrid odor, which is easily recognized even in small amounts. Decomposed products, including decomposed fuel, are toxic, and minimized with rapid suppression of fire. FM-200 systems are designed to provide rapid discharge (normally 10 seconds or less) and flame suppression in order to minimize equipment damage and reduce danger to personnel.

1-4 ABOUT YOUR SYSTEM

Your FM-200 system is designed for suppression of Class A, B and C fires.

- Class A Surface Fires—cellulosic material (wood, paper, etc.)
- Class B - flammable liquids
- Class C - electrical equipment

Because FM-200 poses minimum risk to personnel due to low toxicity, it is used extensively where people normally occupy the fire hazard area. Examples of typical FM-200 system applications include:

- Computer and data processing rooms
- Tape storage vaults
- Transformers
- Libraries
- Flammable liquid storerooms

Note: IMPORTANT – Per NFPA 2001, FM-200 systems with use concentrations below the NOAEL (9% v/v) are permitted for use in occupied areas. FM-200 systems with use concentrations above the NOAEL are not permitted for use in occupied areas.

1-5 FM-200 OVERVIEW

FM-200 suppression agent is a halogenated alkane - 1, 1, 1, 2, 3, 3, 3-heptafluoropropane (CF₃CHFCF₃). In its normal state, FM-200 is a colorless, odorless gas, which is electrically non-conductive. The agent is stored as a liquid under pressure.

When FM-200 is discharged, it expands throughout the distribution piping system and at the nozzle, returning to the gaseous state. In the proper concentration, FM-200 suppresses fire by breaking the chain reaction of the combustion process. FM-200 suppresses flame rapidly, helps prevent reignition, leaves no residue and requires no cleanup after discharge.

CHAPTER 2

INSTALLATION AND MAINTENANCE

2-1 INTRODUCTION

Your system is designed to discharge a specific amount of FM-200® through nozzles located within the hazard area. The amount of FM-200 necessary for your system has been carefully calculated to meet strict requirements set by Underwriters Laboratories, Factory Mutual Research Corporation and the National Fire Protection Association. Additional requirements may apply depending upon the application, design specifications and the authority having jurisdiction.

Simply, your FM-200 system consists of:

- FM-200 container(s), discharge piping and nozzles.
- Actuation devices - electric, pneumatic, cable or manual.
- Detection, alarm devices and control panel.

Your system must be provided with means for manual operation using one or both of the following UL Listed devices:

- Electric actuation station
- Automatic detector (control panel required)

Automatic system operation (if provided) can be electric using UL Listed heat detectors, photoelectric, ionization smoke detectors or optical flame detectors.

An electrical control head is used to open the valve, which is part of the agent storage container. Pressure from the discharge may be used to open the container valves on additional containers.

If your system has a control panel, refer to the appropriate Kidde control panel manual as applicable.

2-2 INSTALLATION

Your Kidde FM-200 fire suppression system must be installed only by an authorized Kidde distributor. Your system must be installed using genuine Kidde components and installation materials and in accordance with the Design, Installation, Operation, and Maintenance Manual, P/N 90-FM200M-011 or -000.

The installer must have a current Kidde installation certificate.

The following items must be checked after the system is installed:

1. All areas requiring protection are protected.
2. A means of manually discharging the FM-200 system is provided in a readily accessible location where it can be operated while leaving the vicinity of the hazard area. The manual control must be clearly labeled. The installer

of your FM-200 system should answer any questions you have regarding the components and coverage of the system.

The installer must also demonstrate that the installed system conforms to the requirements of the Kidde FM-200 Design, Installation, Operation, and Maintenance Manual, (P/N 90-FM200M-011 or -000) and the requirements of your insurance carrier and the authorities having jurisdiction in your area.

2-3 INSTRUCTIONS IN CASE OF FIRE

1. Direct all occupants to leave the fire area immediately. **OPERATE SYSTEM MANUALLY USING THE MANUAL RELEASE IF REQUIRED.**
2. Suspend all operations in the fire area.
3. Have someone contact the fire department immediately, no matter how small the fire appears to be. **Post the fire department number and YOUR ADDRESS** beside each telephone. Familiarize yourself with the location of the nearest fire department from outside.
4. Make sure all persons have evacuated the fire area in accordance with your emergency procedure.

Your remote manual release is a device which works electrically. Follow the instructions on the device, i.e., "LIFT COVER - PULL DOWN," etc. Exit the vicinity of the hazard immediately.

After the fire is suppressed, do not re-enter the fire area until after the fire department has arrived.

2-4 POST-OPERATION INSTRUCTIONS

After the system has discharged, contact your Kidde distributor to reset and recharge your system. Insist that the system be recharged immediately and with the proper type and quantity of agent.

2-5 INSPECTION AND MAINTENANCE OF YOUR SYSTEM

CAUTION

The owner of the Kidde FM-200 fire suppression system must comply with these instructions. Failure to do so may result in inadequate system performance, property damage, and personal injury.

See Kidde Manual 90-FM200M-011 or -000 for additional inspection information.

2-5.1 Monthly

1. Inspect all system components, nozzles, distribution piping and conduit runs for physical damage and/or displacement.
2. Inspect all detectors and control panels for evidence of damage or missing components. Have damaged or missing parts replaced immediately - contact your Kidde distributor. Refer to applicable control panel manual for additional pertinent inspection procedures.
3. Inspect each container. Needle on pressure gauge must indicate storage pressure of approximately 360 PSIG. Container(s) must not show evidence of corrosion or damage.
4. Inspect remote manual release. For electric manual release devices, check visually to ensure device is in the normal or ready position. The path to the remote release must be clear and unobstructed.

If any discrepancies are noted while making this inspection, **SUSPEND ALL OPERATIONS IN THE PROTECTED AREA.** Contact your Kidde distributor for service and/or repair.

2-5.2 Semi-Annual Inspection

The system must be thoroughly inspected on a semi-annual basis by a Kidde distributor. As part of the semi-annual inspection, the system must be functionally tested per the instructions in the Kidde FM-200 Fire Suppression System Design, Installation, Operation, and Maintenance Manual (P/N 90-FM200M-011 or -000). These instructions call for functional test of the system and verification of the agent quantity in each container. Agent will not be discharged as part of the inspection.

For more information regarding inspection and maintenance, contact your Kidde distributor or Kidde.

2-6 ADDITIONAL REQUIREMENTS

Portable fire extinguishers are required in addition to the FM-200 system and for areas not protected by the system. Consult with your insurance carrier, local authorities having jurisdiction and your portable fire extinguisher distributor for sizes, types, spacing and location requirements.

Read, understand and follow the instructions in this manual and on the container nameplates. Review these instructions with your employees semiannually or more frequently. Place this manual in an accessible area near the FM-200 system for ready reference. Post the name, phone number and address of your Kidde distributor near your telephone. Also, post the emergency telephone number of the fire department and your address near your telephones.

If any condition exists which would render your FM-200 system inoperative or ineffective, **SUSPEND ALL OPERATIONS IN THE PROTECTED AREA IMMEDIATELY.** Have the con-

dition corrected by your Kidde distributor before resuming operations.

2-7 ADDITIONAL SPECIFICATIONS AND DOCUMENTATION

Your system must be designed, installed, operated, and maintained only in accordance with the following documents and specifications:

- Kidde FM-200 Design, Installation, Operation, and Maintenance Manual Part No. 90-FM200M-011 or -000, available from your Kidde distributor or Kidde.

Kidde-Fenwal, Inc.
400 Main Street
Ashland, MA 01721
Phone: 508-881-2000
Fax: 508-881-8920

- National Fire Protection Association Standard No. 2001, current edition, available from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269

- Copies of the Material Safety Data Sheet (MSDS) for FM-200 are available in the back of this manual (Appendix A).

APPENDIX A

MATERIAL SAFETY DATASHEETS

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MSDS Number: 00057
Product Name: FM-200

Effective Date: 4/7/98
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SECTION I - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name:	FM-200		
Manufacturer:	Great Lakes Chemical Corporation		
Address:	P.O. Box 2200		
City:	West Lafayette		
State:	Indiana		
Zip:	47996-2200		
Emergency Telephone Number:	1-800-949-5167		
Information			
Telephone Number:	1-765-497-6100	Fax:	1-765-497-6123
Chemtrec Phone:	1-800-424-9300		
Effective Date:	4/7/98		
Supercede Date:	8/11/97		
MSDS Prepared By:	Regulatory Affairs Department/Great Lakes Chemical Corporation		
Synonyms:	1,1,1,2,3,3,3-Heptafluoropropane, 2H-Heptafluoropropane		
Product Use:	Fire extinguishing, fire suppression, explosion suppression and inerting agent		
Chemical Name:	1,1,1,2,3,3,3-Heptafluoropropane		
Chemical Family:	Halogenated alkane		

Additional Information

No information available

SECTION II - COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS No.	%	EXPOSURE LIMITS
1,1,1,2,3,3,3-Heptafluoropropane	431890	>99	Y (Hazardous) Not established (OSHA PEL TWA) Not established (OSHA PEL STEL) Not established (OSHA PEL CEIL) Not established (ACGIH TLV TWA) Not established (ACGIH TLV STEL) Not established (ACGIH TLV CEIL)

*Mixture. Indented chemicals components of mixture.

Additional Information

No information available

MATERIAL SAFETY DATA SHEET

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SECTION III - HAZARDS IDENTIFICATION

Emergency Overview:	Colorless gas Odorless Direct eye or skin contact with the liquid or cold gas can cause chilling or possibly frostbite of exposed tissues. May cause central nervous system effects. Inhalation of high concentrations can be harmful or fatal due to oxygen deprivation and/or heart irregularities.
Relevant Routes of Exposure:	Inhalation
Signs and Symptoms of Overexposure:	Symptoms similar to oxygen deprivation (headache, nausea, dizziness or loss of consciousness) may result from overexposure by inhalation. Heart irregularities such as irregular pulse or heart palpitations may indicate cardiac sensitivity. Cold, white or discolored skin or in severe cases blistering, can be a sign of frostbite caused by cold liquids or gases.
Medical Conditions Generally Aggravated By Exposure:	Persons with preexisting cardiac, respiratory, or central nervous system disorders may be more susceptible to effects of an overexposure. The use of epinephrine or similar compounds can increase susceptibility to heart irregularities caused by excessive exposure to these types of compounds.
Potential Health Effects:	See Section XI for additional information.
Eyes:	Direct eye contact with the liquid or cold gas can cause chilling or possibly frostbite of exposed tissues.
Skin:	Direct skin contact with the liquid or cold gas can cause chilling or possibly frostbite of exposed tissues.
Ingestion:	Not expected to be a hazard in normal industrial use.
Inhalation:	Inhalation of high concentrations can be harmful or fatal due to oxygen deprivation and/or heart irregularities (arrhythmias). Misuse of the product by deliberately inhaling high concentrations of this gas could cause death without warning.
Carcinogenicity:	
NTP:	No
IARC:	No
OSHA:	No
ACGIH:	No
OTHER:	No

Additional Information

No information available

SECTION IV - FIRST AID MEASURES

Eyes:	Flush with water. Get medical attention.
Skin:	Flush with water; if frostbite occurs get medical attention.
Ingestion:	No information available
Inhalation:	Remove person to fresh air; if not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical

MATERIAL SAFETY DATA SHEET

MSDS Number: 00057
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SECTION IV - FIRST AID MEASURES

Antidotes: attention.
No information available

**Notes to Physicians and/or
Protection for First-Aiders:** The use of epinephrine or similar compounds can increase susceptibility to heart irregularities caused by excessive exposure to these types of compounds.

Additional Information

No information available

SECTION V - FIRE FIGHTING MEASURES

**Flammable Limits in Air (%
by Volume):** Not applicable

Flash Point: Nonflammable gas

Autoignition Temperature: Not available

Extinguishing Media: All conventional media are suitable.

Fire Fighting Instructions: Keep cylinders cool with a water spray applied from a safe distance. Use a self-contained breathing apparatus if containers rupture or release under fire conditions. Do not allow reentry into areas where this material has been released without first ventilating to remove products of combustion/decomposition.

**Unusual Fire and Explosion
Hazards:** Although containers of our product are provided with pressure and temperature relief devices, containers can rupture if exposed to localized heat. Thermal decomposition will generate toxic and corrosive gases.

**Flammability Classification:
Known or Anticipated
Hazardous Products of
Combustion:** Nonflammable gas

Decomposition by elevated temperatures (fire conditions, glowing metal surfaces) may generate hazardous decomposition products common to other CFCs, HCFCs or HBFCs. These can include hydrogen fluoride, carbon monoxide, carbon dioxide and others.

Additional Information

No information available

SECTION VI - ACCIDENTAL RELEASE MEASURES

**Accidental Release
Measures:** Evacuate the area and ventilate. Do not enter areas where high concentrations may exist (especially confined or poorly ventilated areas) without appropriate protective equipment including a self-contained breathing apparatus.

Personal Precautions: See Section VIII.

Environmental Precautions: No information available

Additional Information

No information available

MATERIAL SAFETY DATA SHEET

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SECTION VII - HANDLING AND STORAGE

Handling: Use the same type of precautions as would be used in handling any cryogenic gas. Protect container from damage. Handle in well-ventilated areas. When this material is used as a firefighting agent in fixed or portable extinguishing systems, follow manufacturer's instructions for operation, inspection, maintenance and repair of the system.

Storage: Store in a cool, dry, well-ventilated area away from incompatible materials.
Keep container tightly closed.

Other Precautions: No information available

Additional Information

No information available

SECTION VIII - EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: No information available

Ventilation Requirements: Use local ventilation to minimize exposure to gas.
Use mechanical ventilation for general area control.

Personal Protective Equipment:

Eye/Face Protection: Chemical splash goggles when handling liquid

Skin Protection: Use lined neoprene gloves if handling liquid.
Clothing designed to minimize skin contact

Respiratory Protection: Wear a NIOSH/MSHA approved self-contained breathing apparatus in emergency situations.
Consult the OSHA respiratory protection information located at 29CFR 1910.134 and the American National Standard Institute's Practices of Respiratory Protection Z88.2.

Other Protective Clothing or Equipment: No information available

Exposure Guidelines: See Section II.

Work Hygienic Practices: Wash thoroughly after handling.
Wash contaminated clothing before reuse.
Make sure piping is empty before doing maintenance work.

Additional Information

No information available

SECTION IX - PHYSICAL & CHEMICAL PROPERTIES

Appearance: Colorless gas

Boiling Point: -16.4 degrees C (3 degrees F)

Bulk Density: Not available

Color: Colorless

Decomposition

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SECTION IX - PHYSICAL & CHEMICAL PROPERTIES

Temperature:	Not available
Evaporation Rate:	Not available
Freezing Point:	Not available
Heat Value:	Not available
Melting Point:	-131 degrees C (-204 degrees F)
Molecular/Chemical Formula:	C3HF7
Molecular Weight:	170
Octanol/Water Partition Coefficient:	Not available
Odor:	Odorless
Odor Threshold:	Not available
Particle Size:	Not available
Percent Volatile:	Not available
pH Value:	Not available
pH Concentration:	Not available
Physical State:	Gas
Reactivity in Water:	Not water reactive
Saturated Vapor Concentration:	Not available
Softening Point:	Not available
Solubility in Water:	260 mg/L
Specific Gravity or Density (Water=1):	1.46
Vapor Density:	6.04
Vapor Pressure:	58.8 psia at 70 degrees F (21 degrees C)
Viscosity:	Not available
Volatile Organic Compounds:	Not available
Water/Oil Distribution Coefficient:	Not available
Weight Per Gallon:	Not available

Additional Information

No information available

SECTION X - STABILITY AND REACTIVITY

Stability: Stable under normal conditions of handling and use.
Conditions to Avoid: None

Incompatibility With Other Materials:

Powdered metals (ex. Al, Mg, or Zn) and strong alkalis, oxidizers or reducing agents are not compatible with this and most other halogenated organic compounds.

Hazardous Decomposition Products:

Thermal decomposition may produce the following:

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SECTION X - STABILITY AND REACTIVITY

Hazardous Polymerization: Hydrogen fluoride
Carbon monoxide and carbon dioxide
Will not occur

Conditions to Avoid: None

Additional Information

No information available

SECTION XI - TOXICOLOGICAL INFORMATION

VALUE (LD50 OR LC50)	ANIMAL	ROUTES	COMPONENTS
>788,696 ppm/4H	Rat	Acute Inhalation	1,1,1,2,3,3,3-Heptafluoropropane

Toxicological Information:

The human health hazards of this product are expected to be similar to other liquified gases including N₂, CO₂, CFCs, HCFCs, and HBFCs. Therefore, direct eye or skin contact with the liquid or cold gas can cause chilling or possibly frostbite of exposed tissues. Inhalation of high concentrations can be harmful or fatal due to oxygen deprivation and/or heart irregularities (arrhythmias). Misuse of the product by deliberately inhaling high concentrations of this gas could cause death without warning. Persons with preexisting cardiac or central nervous system disorders may be more susceptible to effects of an overexposure.

When tested with and without metabolic activation over a concentration range of 43.9-93.5%, heptafluoropropane was not mutagenic in *S. typhimurium*. Neither toxicity nor mutagenicity was observed in a mouse lymphoma assay when heptafluoropropane was tested to a concentration of 56.8%. Neither toxicity nor an increase in micronuclei was observed in mice exposed to 10.5% heptafluoropropane. Therefore, there is no evidence that heptafluoropropane is capable of inducing gene or chromosomal mutations in vitro or chromosomal effects in vivo. In other studies, heptafluoropropane did not show genotoxicity or cytotoxicity.

Animal studies have found the rat 4 hour LC₅₀ to be >788,696 ppm (~80%), the highest level tested. A cardiac sensitization study in dogs found the No Observable Adverse Effect Level (NOAEL) to be 9.0%. The Lowest Observable Adverse Effect Level (LOAEL) for this study was reported to be 10.5%. A 90 day inhalation study did not find any exposure related effects at 105,000 ppm (10.5% vol./vol.), the highest level tested. Inhalation studies looking for developmental effects on pregnant rabbits and rats or their offspring did not show any exposure related effects at the highest concentrations tested (105,000 ppm).

Additional Information

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No information available

SECTION XII - ECOLOGICAL INFORMATION

Ecological Information: No information available

Additional Information

No information available

SECTION XIII - DISPOSAL CONSIDERATIONS

Disposal Considerations: Non-contaminated product is reclaimable. Contact Great Lakes Chemical Corporation for information. Otherwise, dispose of waste in an approved chemical incinerator equipped with a scrubber as allowed by current Local, State/Province, Federal/Canadian laws and regulations.

Additional Information

No information available

SECTION XIV - TRANSPORT INFORMATION

U.S. DOT

Proper Shipping Name: Heptafluoropropane
Hazard Class: 2.2
ID Number: UN3296
Packing Group: N/A
Labels: Nonflammable gas
Special Provisions: N/A
Packaging Exceptions: 306
Non-Bulk Packaging: 304
Bulk Packaging: 314, 315
Air/Rail Limit: 75 kg
Air Cargo Limit: 150 kg
Vessel Stowage: A
Other Stowage: N/A
Reportable Quantity: N/A

AIR - ICAO OR IATA

Proper Shipping Name: Heptafluoropropane
Hazard Class: 2.2
ID Number: UN3296
Subsidiary Risk: N/A
Packing Group: N/A
Hazard Labels: Nonflammable gas
Packing Instructions: 200
Air Passenger Limit Per Package: 75 kg
Packing Instruction - Cargo: 200
Air Cargo Limit Per Package: 150 kg
Special Provisions Code: N/A

WATER - IMDG

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SECTION XIV - TRANSPORT INFORMATION

Proper Shipping Name: Heptafluoropropane
Hazard Class: 2.2
ID Number: UN3296
Packing Group: N/A
Subsidiary Risk: N/A
Medical First Aid Guide Code: 350

Additional Information

EmS No. 2-09

SECTION XV - REGULATORY INFORMATION

U.S. Federal Regulations: The components of this product are either on the TSCA Inventory or exempt (i.e. impurities, a polymer complying with the exemption rule at 40 CFR 723.250) from the Inventory.
State Regulations: None known
International Regulations: This material (or each component) is listed on the following inventories:
EU - EINECS

Canadian WHMIS Hazard Class and Division = A.

SARA Hazards:

Acute: Yes
Chronic: No
Reactive: No
Fire: No
Pressure: No

Additional Information

The above regulatory information represents only selected regulations and is not meant to be a complete list.

SECTION XVI - OTHER INFORMATION

NFPA Codes:

Health: 1
Flammability: 0
Reactivity: 0
Other: 0

HMIS Codes:

Health: 1
Flammability: 0
Reactivity: 0
Protection: X

Label Statements: Not available

Other Information:

Abbreviations:

(L) = Loose bulk density in g/ml

LOEC = Lowest observed effect concentration

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SECTION XVI - OTHER INFORMATION

MATC = Maximum acceptable toxicant concentration

NA = Not available

N/A = Not applicable

NL = Not limited

NOEC = No observed effect concentration

NOEL = No observable effect level

NR = Not rated

(P) = Packed bulk density in g/ml

PNOC = Particulates Not Otherwise Classified

PNOR = Particulates Not Otherwise Regulated

REL = Recommended exposure limit

TS = Trade secret

Additional Information

Information on this form is furnished solely for the purpose of compliance with OSHA's Hazard Communication Standard, 29CFR 1910.1200 and The Canadian Environmental Protection Act, Canada Gazette Part II, Vol. 122, No. 2 and shall not be used for any other purpose.

Revision Information:

Section XIV - IMDG Code Information

Section XV - Regulatory Information

Praxair™ Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name:	Nitrogen, Compressed (MSDS No. P-4631-E)	Trade Name:	Nitrogen
Chemical Name:	Nitrogen	Synonyms:	Not applicable
Formula:	N ₂	Chemical Family:	Considered as an inert gas.
Telephone:	Emergencies: 1-800-645-4633* CHEMTREC 1-800-424-9300* Routine: 1-800-PRAXAIR	Company Name:	Praxair, Inc. 39 Old Ridgebury Road Danbury CT 06810-5113

**Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).*

2. Composition / Information on Ingredients

For custom mixtures of this product request a Material Safety Data Sheet for each component. See Section 16 for important information about mixtures.

INGREDIENT NAME	CAS NUMBER	PERCENTAGE	OSHA PEL	ACGIH TLV-TWA
Nitrogen	7727-37-9	>99%	None currently established	Simple asphyxiant

**The symbol ">" means "greater than."*

3. Hazards Identification

EMERGENCY OVERVIEW

**CAUTION! High-pressure gas.
Can cause rapid suffocation.
May cause dizziness and drowsiness.
Self-contained breathing apparatus may
be required by rescue workers.
Odor: None**

THRESHOLD LIMIT VALUE: Simple asphyxiant (ACGIH 1997)

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION–Asphyxiant. Effects are due to lack of oxygen. Moderate concentrations may cause headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill.

SKIN CONTACT–No harm expected.

SWALLOWING–This product is a gas at normal temperature and pressure.

EYE CONTACT–No harm expected.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No harm expected.

OTHER EFFECTS OF OVEREXPOSURE: Nitrogen is an asphyxiant. Lack of oxygen can kill.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: The toxicology and the physical and chemical properties of nitrogen suggest that overexposure is unlikely to aggravate existing medical conditions.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None known.

CARCINOGENICITY: Nitrogen is not listed by NTP, OSHA, or IARC.

4. First Aid Measures

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

SKIN CONTACT: Flush with water.

SWALLOWING: This product is a gas at normal temperature and pressure.

EYE CONTACT: Flush eyes with warm water. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly.

NOTES TO PHYSICIAN: *There is no specific antidote. This product is nearly inert. Treatment of over-exposure should be directed at the control of symptoms and the clinical condition. Refer to section 16.*

5. Fire Fighting Measures

FLASH POINT (test method)	Not applicable	AUTOIGNITION TEMPERATURE	Not applicable
FLAMMABLE LIMITS IN AIR, % by volume	LOWER	Not applicable	UPPER Not applicable

EXTINGUISHING MEDIA: Nitrogen cannot catch fire. Use media appropriate for surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES:

CAUTION! High-pressure gas. Evacuate all personnel from danger area. Immediately deluge cylinders with water from maximum distance until cool, then move them away from fire area if without risk. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Nitrogen cannot catch fire. Heat of fire can build pressure in cylinder and cause it to rupture. No part of cylinder should be subjected to a temperature

higher than 125°F (52°C). Nitrogen cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.)

HAZARDOUS COMBUSTION PRODUCTS: None known.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

CAUTION! High-pressure gas. Immediately evacuate all personnel from danger area. Nitrogen is an asphyxiant. Lack of oxygen can kill. Use self-contained breathing apparatus where needed. Shut off flow if you can do so without risk. Ventilate area or move cylinder to a well-ventilated area. Test for sufficient oxygen, especially in confined spaces, before allowing reentry.

WASTE DISPOSAL METHOD: Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local supplier for assistance.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 125°F (52°C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

PRECAUTIONS TO BE TAKEN IN HANDLING: Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. For other precautions in using nitrogen, see section 16.

For additional information on storage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, "Safe Handling of Compressed Gases in Containers," available from the CGA. Refer to section 16 for the address and phone number along with a list of other available publications.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—Use a local exhaust system, if necessary, to prevent oxygen deficiency.

MECHANICAL (general)—General exhaust ventilation may be acceptable if it can maintain an adequate supply of air.

SPECIAL—None

OTHER—None

RESPIRATORY PROTECTION: None required under normal use. However, air supplied respirators are required while working in confined spaces with this product. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134.

SKIN PROTECTION: Wear work gloves when handling cylinders.

EYE PROTECTION: Wear safety glasses when handling cylinders.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

9. Physical and Chemical Properties

MOLECULAR WEIGHT: 28.01	EXPANSION RATIO: Not applicable
SPECIFIC GRAVITY (air=1): At 70°F (21.1°C) and 1 atm: 0.967	SOLUBILITY IN WATER: % by wt., vol/vol at 32°F (0°C): 0.023
GAS DENSITY: At 70°F (21.1°C) and 1 atm: 0.072 lbs/ft ³ (1.153 kg/m ³)	VAPOR PRESSURE: AT 68°F (20°C): Not applicable
PERCENT VOLATILES BY VOLUME: 100	EVAPORATION RATE (Butyl Acetate=1): Gas, not applicable
BOILING POINT (1 atm): -320.4°F (-195.8°C)	pH: Not applicable
MELTING POINT (1 atm): -345.8°F (-209.9°C)	
APPEARANCE, ODOR, AND STATE: Colorless, odorless, tasteless gas at normal temperature and pressure.	

10. Stability and Reactivity

STABILITY:	Unstable		Stable	X
INCOMPATIBILITY (materials to avoid): None currently known. Nitrogen is chemically inert.				
HAZARDOUS DECOMPOSITION PRODUCTS: None				
HAZARDOUS POLYMERIZATION:	May Occur		Will Not Occur	X

CONDITIONS TO AVOID: Under certain conditions, nitrogen can react violently with lithium, neodymium, titanium, and magnesium to form nitrides. At high temperature it can also combine with oxygen and hydrogen.

11. Toxicological Information

Nitrogen is a simple asphyxiant.

12. Ecological Information

No adverse ecological effects expected. Nitrogen does not contain any Class I or Class II ozone-depleting chemicals. Nitrogen is not listed as a marine pollutant by DOT.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Return

cylinder to supplier. For emergency disposal, secure cylinder in a well-ventilated area or outdoors, then slowly discharge gas to the atmosphere.

14. Transport Information

DOT/IMO SHIPPING NAME: Nitrogen, compressed	HAZARD CLASS: 2.2
IDENTIFICATION NUMBER: UN 1066	PRODUCT RQ: Not applicable
SHIPPING LABEL(s): NONFLAMMABLE GAS	PLACARD (When required): NONFLAMMABLE GAS

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.

Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(b)].

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

U.S. FEDERAL REGULATIONS:

EPA (Environmental Protection Agency)

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ): None

SARA: Superfund Amendment and Reauthorization Act:

- **SECTIONS 302/304:** Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of extremely hazardous substances (40 CFR Part 355):

Threshold Planning Quantity (TPQ): None.

Extremely Hazardous Substances (40 CFR 355): None.

- **SECTIONS 311/312:** Require submission of Material Safety Data Sheets (MSDSs) and chemical inventory reporting with identification of EPA hazard categories. The hazard categories for this products are as follows:

IMMEDIATE: No

DELAYED: No

PRESSURE: Yes

REACTIVITY: No

FIRE: No

- **SECTION 313:** Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Nitrogen does not require reporting under Section 313.

40 CFR 68: Risk Management Program for Chemical Accidental Release Prevention: Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Nitrogen is not listed as a regulated substance.

TSCA: Toxic Substances Control Act: Nitrogen is listed on the TSCA inventory.

OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION):

29 CFR 1910.119 : Process Safety Management of Highly Hazardous Chemicals: Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

Nitrogen is not listed in Appendix A as a highly hazardous chemical.

STATE REGULATIONS:

CALIFORNIA: This product is not listed by California under the Safe Drinking Water Toxic Enforcement Act of 1986 (Proposition 65).

PENNSYLVANIA: This product is subject to the Pennsylvania Worker and Community Right-To-Know Act (35 P.S. Sections 7301-7320).

16. Other Information

Be sure to read and understand all labels and instructions supplied with all containers of this product.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: *High-pressure gas.* Use piping and equipment adequately designed to withstand pressures to be encountered. Never work on a pressurized system. *Gas can cause rapid suffocation due to oxygen deficiency.* Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. *Prevent reverse flow.* Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. *Never work on a pressurized system.* If there is a leak, close the cylinder valve. Blow the system down in a safe and environmentally sound manner in compliance with all federal, state and local laws; then repair the leak. *Never ground a compressed gas cylinder or allow it to become part of an electrical circuit.*

MIXTURES: When you mix two or more gases or liquefied gases, you can 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 evaluate the end product.

HAZARD RATING SYSTEMS:**NFPA RATINGS:**

HEALTH = 0
FLAMMABILITY = 0
REACTIVITY = 0
SPECIAL SA (CGA recommends this rating to designate Simple Asphyxiant.)

HMIS RATINGS:

HEALTH = 0
FLAMMABILITY = 0
REACTIVITY = 0

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	0-3000 psig	CGA-580
	3001-5500 psig	CGA-680
	5001-7500 psig	CGA-677
PIN-INDEXED YOKE:	0-3000 psig	CGA-960 (Medical Use)
ULTRA-HIGH-INTEGRITY CONNECTION:	0-3000 psig	CGA-718

Use the proper CGA connections. **DO NOT USE ADAPTERS.**

Ask your supplier about free Praxair safety literature as referenced on the label for this product; you may also obtain copies by calling 1-800-PRAXAIR. Further information about nitrogen can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 1725 Jefferson Davis Highway, Arlington, VA 22202-4102, Telephone (703) 412-0900.

- 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*
- V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*
Handbook of Compressed Gases, Third Edition

Praxair asks users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents and contractors of the information on this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

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Praxair, Inc.
39 Old Ridgebury Road
Danbury CT 06810-5113

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4. CHANGE NO. OR REV. DATE	5. SYSTEM/EQUIPMENT	6. PRIORITY OF COMMENT
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7. USER EVALUATION

MANUAL IS: EXCELLENT GOOD FAIR POOR COMPLETE INCOMPLETE

8. PROBLEM QUESTION SUGGESTION COMMENT: (check one)

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PAGE NO.	PARAGRAPH NO.	LINE NO.	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Use Blank Continuation Sheets as Required)

10. ORIGINATOR	11. COMPANY NAME
-----------------------	-------------------------

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These instructions do not purport to cover all the details or variations in the equipment described, nor do they provide for every possible contingency to be met in connection with installation, operation and maintenance. All specifications subject to change without notice. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to KIDDE-FENWAL INC., Ashland, Massachusetts