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# OXYGEN, REFRIGERATED LIQUID

## Safety Data Sheet

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### 1. IDENTIFICATION

**Product identifier****Product Name** OXYGEN, REFRIGERATED LIQUID**Other means of identification****Safety data sheet number** LIND-P098**UN/ID no.** UN1073**Synonyms** Liquid Oxygen; LOX**Recommended use of the chemical and restrictions on use****Recommended Use** Industrial and professional use. Medical.**Uses advised against** Consumer use**Details of the supplier of the safety data sheet**

Messer North America, Inc. - Messer LLC - Messer Merchant Production LLC  
(formerly known as Linde North America, Inc., Linde LLC and Linde Merchant Production, Inc.)  
200 Somerset Corporate Blvd, Suite 7000  
Bridgewater, NJ 08807  
Phone: 908-464-8100  
[www.messer-us.com](http://www.messer-us.com)

Messer Gas Puerto Rico, Inc.  
(formerly known as Linde Gas Puerto Rico, Inc.)  
Road 869, Km 1.8  
Barrio Palmas, Catano, PR 00962  
Phone: 787-641-7445

\* May include subsidiaries or affiliate companies/divisions.

For additional product information contact your local customer service.

**Emergency telephone number****Company Phone Number** +1 800-232-4726 (Messer National Operations Center, US)

CHEMTREC: 1-800-424-9300 (North America) +1-703-527-3887 (International)

**2. HAZARDS IDENTIFICATION****Classification**

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Oxidizing gases	Category 1
Gases under pressure	Refrigerated liquefied gas

**Label elements****Signal word****Danger****Hazard Statements**

May cause or intensify fire; oxidizer

Contains refrigerated gas; may cause cryogenic burns or injury

Combustibles in contact with liquid oxygen may explode on ignition or impact

**Precautionary Statements - Prevention**

Do not handle until all safety precautions have been read and understood

Keep and store away from clothing and other combustible materials

Keep valves and fittings free from oil and grease

Use and store only outdoors or in a well ventilated place

Wear cold insulating gloves, face shield, and eye protection

Use a backflow preventive device in piping

Use only with equipment of compatible materials of construction and rated for cylinder pressure

Use only with equipment cleaned for oxygen service

Do NOT change or force fit connections

Avoid spills. Do not walk on or roll equipment over spills

Close valve after each use and when empty

Always keep container in upright position

**Precautionary Statements - Response**

IF ON SKIN: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

In case of fire: Stop leak if safe to do so.

**Hazards not otherwise classified (HNOC)**

Not applicable

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Volume %	Chemical Formula
OXYGEN	7782-44-7	>99	O <sub>2</sub>

### 4. FIRST AID MEASURES

#### Description of first aid measures

<b>General advice</b>	Show this safety data sheet to the doctor in attendance.
<b>Inhalation</b>	Move victim to fresh air. Seek immediate medical attention/advice.
<b>Skin contact</b>	For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.
<b>Eye contact</b>	If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.
<b>Ingestion</b>	Not an expected route of exposure.

#### Most important symptoms and effects, both acute and delayed

<b>Symptoms</b>	Oxygen is not acutely toxic under normal pressure. Oxygen is more toxic when inhaled at elevated pressures. Depending upon pressure and duration of exposure, pure oxygen at elevated pressures may cause cramps, dizziness, difficulty breathing, convulsions, edema and death. Contact with evaporating liquid may cause cold burns/frostbite.
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#### Indication of any immediate medical attention and special treatment needed

<b>Note to physicians</b>	Treat symptomatically.
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### 5. FIRE-FIGHTING MEASURES

#### Suitable extinguishing media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media None.

#### Specific extinguishing methods

Continue to cool fire exposed cylinders until flames are extinguished. Damaged cylinders should be handled only by specialists.

#### Specific hazards arising from the chemical

May cause or intensify fire; oxidizer. Combustibles in contact with liquid oxygen may explode on ignition or impact. Will support and accelerate combustion of combustible materials (wood, paper, oil, debris, etc). Cylinders may rupture under extreme heat.

#### Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, NIOSH (approved or equivalent) and full protective gear.

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**6. ACCIDENTAL RELEASE MEASURES****Personal precautions, protective equipment and emergency procedures**

**Personal precautions** Evacuate personnel to safe areas. Ensure adequate ventilation, especially in confined areas. Avoid spills. Do not walk on or roll equipment over spills. Monitor oxygen level. Eliminate all ignition sources if safe to do so. Use personal protection recommended in Section 8.

**Other Information** When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

**Environmental precautions**

**Environmental precautions** Prevent spreading of vapors through sewers, ventilation systems and confined areas.

**Methods and material for containment and cleaning up**

**Methods for containment** Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Messer location.

**Methods for cleaning up** Return Portable Cryogenic Container to Messer or an authorized distributor.

## 7. HANDLING AND STORAGE

### Precautions for safe handling

#### **Advice on safe handling**

Liquid oxygen cannot be handled in carbon or low alloy steel, 18-8 and 18-10 stainless steel are acceptable as are copper and its alloys, brass bronze, silicon alloys, Monel®, Inconel®, and beryllium. Teflon®, Teflon® composites, or Kel-F® are preferred non-metallic gasket materials. Oxygen should not be used as a substitute for compressed air in pneumatic equipment since they generally contain flammable lubricants. Equipment able to use oxygen must be "cleaned for oxygen service". Check with the equipment supplier to verify oxygen compatibility for the service conditions. Keep valves and fittings free from oil and grease Use only equipment of compatible materials of construction Do NOT change or force fit connections Open valve slowly "NO SMOKING" signs should be posted in storage and use areas. Separate flammable gas cylinders from oxygen and other oxidizers by a minimum distance of 20 ft. or by a 5 ft. high barrier with a minimum fire resistance rating of a half an hour. Never allow any unprotected part of the body to touch uninsulated pipes or vessels that contain cold fluids. The extremely cold metal will cause moist flesh to stick fast and tear when one attempts to withdraw from it. Stationary customer site vessels should be operated in accordance with the manufacturer's and Linde's instruction. Do not attempt to repair, adjust or in any other way modify the operation of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the closest Linde location immediately for assistance.

Protect cylinders from physical damage; do not drag, roll, slide or drop. Never attempt to lift a cylinder by its valve protection cap. When moving cylinders, even for short distance, use a cart designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Use only with adequate ventilation. Use a backflow preventive device in piping. Close valve after each use and when empty. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Ensure the complete gas system has been checked for leaks before use.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

Only experienced and properly instructed persons should handle gases under pressure. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

For additional recommendations, consult Compressed Gas Association's Pamphlets SB-7, G-4.3, G-4.1, G-4.4, P-2.5, G-4.9, P-14, and SB-2.

### Conditions for safe storage, including any incompatibilities

#### **Storage Conditions**

Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Stored containers should be periodically checked for general condition and leakage. Do not store near combustible materials.

#### **Incompatible materials**

Combustible materials. Organic material. Reducing agents. Oil. Grease.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Control parameters

**Exposure Guidelines** This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies

### Appropriate engineering controls

**Engineering Controls** Showers. Eyewash stations. Use local exhaust in combination with general ventilation as necessary to keep oxygen concentrations below 23.5%. Consider installation of leak detection systems in areas of use and storage. Systems under pressure should be regularly checked for leakages.

### Individual protection measures, such as personal protective equipment

**Eye/face protection** Wear safety glasses with side shields (or goggles). If splashes are likely to occur, wear: Goggles. Face-shield.

**Skin and body protection** Work gloves and safety shoes are recommended when handling cylinders. Gloves must be clean and free from grease or oil. Wear cold insulating gloves when handling liquid.

**Respiratory protection** No special protective equipment required.

**General Hygiene Considerations** Handle in accordance with good industrial hygiene and safety practice. Do not get in eyes, on skin, or on clothing.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Information on basic physical and chemical properties

Physical state	Gas
Appearance	Pale blue
Odor	Odorless
Odor threshold	No information available
pH	Not applicable
Melting/freezing point	-218.8 °C / -361.8 °F
Evaporation rate	Not applicable
Flammability (solid, gas)	See Section 5.
Lower flammability limit:	Not applicable
Upper flammability limit:	Not applicable
Flash point	Not applicable
Autoignition temperature	No data available
Decomposition temperature	No data available
Oxidizing properties	Oxidizer
Water solubility	Slightly soluble
Partition coefficient	No data available
Kinematic viscosity	Not applicable

Chemical Name	Molecular weight	Boiling point/range	Vapor Pressure	Vapor density (air =1)	Gas Density kg/m <sup>3</sup> @20°C	Critical Temperature
OXYGEN	31.99	-182.9 °C	Above critical temperature	1.11	1.331	-118.6 °C

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**10. STABILITY AND REACTIVITY****Reactivity**

Not reactive under normal conditions

**Chemical stability**

Stable under normal conditions.

**Explosion data**

**Sensitivity to Mechanical Impact** None.

**Sensitivity to Static Discharge** None.

**Possibility of Hazardous Reactions**

May cause or intensify fire; oxidizer. Will support and accelerate combustion of combustible materials (wood, paper, oil, debris, etc).

**Conditions to avoid**

None under recommended storage and handling conditions (see Section 7).

**Incompatible materials**

Combustible materials. Organic material. Reducing agents. Oil. Grease.

**Hazardous Decomposition Products**

None known.

## 11. TOXICOLOGICAL INFORMATION

### Information on likely routes of exposure

<b>Inhalation</b>	No data available
<b>Skin contact</b>	Contact with evaporating liquid may cause cold burns/frostbite.
<b>Eye contact</b>	Contact with evaporating liquid may cause cold burns/frostbite.
<b>Ingestion</b>	Not an expected route of exposure.

### Information on toxicological effects

<b>Symptoms</b>	Oxygen is not acutely toxic under normal pressure. Oxygen is more toxic when inhaled at elevated pressures. Depending upon pressure and duration of exposure, pure oxygen at elevated pressures may cause cramps, dizziness, difficulty breathing, convulsions, edema and death.
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### Delayed and immediate effects as well as chronic effects from short and long-term exposure

<b>Irritation</b>	Not classified.
<b>Sensitization</b>	Not classified.
<b>Germ cell mutagenicity</b>	Not classified.
<b>Carcinogenicity</b>	This product does not contain any carcinogens or potential carcinogens listed by OSHA, IARC or NTP.
<b>Reproductive toxicity</b>	Not classified.
<b>STOT - single exposure</b>	Not classified.
<b>STOT - repeated exposure</b>	Not classified.
<b>Chronic toxicity</b>	Prolonged inhalation of high oxygen concentrations (>75%) may affect coordination, attention, and cause tiredness of respiratory irritation.
<b>Target Organ Effects</b>	None known.
<b>Aspiration hazard</b>	Not applicable.

### Numerical measures of toxicity

<b>Product Information</b>	
<b>Oral LD50</b>	No information available
<b>Dermal LD50</b>	No information available
<b>Inhalation LC50</b>	No information available

## 12. ECOLOGICAL INFORMATION

### Ecotoxicity

No known acute aquatic toxicity.

### Persistence and degradability

Not applicable.

### Bioaccumulation

Will not bioconcentrate.

### Other adverse effects

Can cause frost damage to vegetation.



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**13. DISPOSAL CONSIDERATIONS****Waste treatment methods****Disposal of wastes**

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Messer for proper disposal.

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**14. TRANSPORT INFORMATION****DOT**

<b>UN/ID no.</b>	UN1073
<b>Proper shipping name</b>	Oxygen, refrigerated liquid
<b>Hazard Class</b>	2.2
<b>Subsidiary class</b>	5.1
<b>Special Provisions</b>	T75, TP5, TP22
<b>Description</b>	UN1073, Oxygen, refrigerated liquid, 2.2 (5.1)
<b>Emergency Response Guide Number</b>	122

**TDG**

<b>UN/ID no.</b>	UN1073
<b>Proper shipping name</b>	Oxygen, refrigerated liquid
<b>Hazard Class</b>	2.2
<b>Subsidiary class</b>	5.1
<b>Description</b>	UN1073, Oxygen, refrigerated liquid, 2.2 (5.1)

**IATA**

<b>Description</b>	Forbidden by Passenger Air
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<b>Description</b>	Forbidden
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**IMDG**

<b>UN/ID no.</b>	UN1073
<b>Proper shipping name</b>	Oxygen, refrigerated liquid
<b>Hazard Class</b>	2.2
<b>Subsidiary hazard class</b>	5.1
<b>EmS-No.</b>	F-C, S-W
<b>Description</b>	UN1073, Oxygen, refrigerated liquid, 2.2 (5.1)

## 15. REGULATORY INFORMATION

### INTERNATIONAL INVENTORIES

<b>TSCA</b>	Complies
<b>DSL/NDSL</b>	Complies
<b>EINECS/ELINCS</b>	Complies

#### Legend:

**TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory

**DSL/NDSL** - Canadian Domestic Substances List/Non-Domestic Substances List

**EINECS/ELINCS** - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

### US FEDERAL REGULATIONS

#### **SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

#### **SARA 311/312 Hazard Categories**

Should this product meet EPCRA 311/312 reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

#### **CERCLA**

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

#### **Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)**

This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

#### **CWA (Clean Water Act)**

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

#### **Risk and Process Safety Management Programs**

This material, as supplied, does not contain any regulated substances with specified thresholds under 40 CFR Part 68. This product does not contain any substances regulated as Highly Hazardous Chemicals pursuant to the 29 CFR Part 1910.110.

### US STATE REGULATIONS

#### **California Proposition 65**

This product does not contain any Proposition 65 chemicals

#### **U.S. State Right-to-Know Regulations**

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Oxygen 7782-44-7	X	X	X

**16. OTHER INFORMATION**

**NFPA**                      **Health hazards** 3                      **Flammability** 0                      **Instability** 0                      **Physical and Chemical Properties** OX

**Note:** Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

**Issue Date**    24-Feb-2015  
**Revision Date**    01-Mar-2019  
**Revision Note**    SDS sections updated; 15

LIND-P098

**General Disclaimer**

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between Messer LLC, Messer Merchant Production LLC or Messer North America, Inc. (or any of their affiliates and subsidiaries) and the purchaser.

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**End of Safety Data Sheet**