



Dear Customer, Attached are the Material Data Safety Sheets (MSDS) you requested for Cylinder# AAL045450 . There is one MSDS for each of the minor components of the mixture with a concentration above one of the 8-hr. exposure limits shown in Section 2 (TLV, PEL, MAC) and one for the balance gas. MSDS for flammable gases are supplied for some mixtures containing flammable gases. Each MSDS describes the physical and hazardous properties and the emergency procedures required for the pure form of the component. The degree of hazard of each component in the mixture will depend on its concentration in the mixture. The supply of individual component MSDS's for a mixture which has not been tested as a whole to determine whether it is a health hazard meets the requirements of United States regulations as defined in 29 CFR, Part 1910, Section 1200, Subsections (d)(5)(ii) and (g)(2)(i)(C) Gas Mixture: CO<sub>2</sub>, O<sub>2</sub> IN NITROGEN Components: CARBON DIOXIDE OXYGEN (DILUTED) NITROGEN



## SAFETY DATA SHEETS

124-38-9/E-4

DATE: 21May2015

SUPPLIER ADDRESS: 1290 COMBERMERE STREET

TROY, MI 48083

EMERGENCY PHONE NUMBER: (248) 589-2950

### 1. CHEMICAL PRODUCT

PRODUCT NAME: CARBON DIOXIDE

SYNONYMS: Carbonic Anhydride, Carbonic Acid Gas

### 2. COMPOSITION, INFORMATION ON INGREDIENTS

Ingredient Name	Formula	CAS#	Concentration	Exposure Limits (PPM)			
				ACGIH TLV	OSHA PEL	MAC	Other STEL
CARBON DIOXIDE	CO2	124-38-9	99+%	5,000	5,000	5,000	30,000

### 3. HAZARD IDENTIFICATION

\*\*\* EMERGENCY OVERVIEW \*\*\*

High pressure liquid and gas.  
Can cause rapid suffocation.  
Can increase respiration and heart rate.  
May cause frostbite.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation

ACUTE EFFECTS: Exposure to carbon dioxide at 1-4% concentrations results in increased respiratory volume. Material acts as a simple asphyxiant by displacing air necessary for life. Symptoms include rapid respiration, muscular incoordination, fatigue, nausea and vomiting and unconsciousness. Liquid may cause frostbite. Pressure drop through valves and piping may cause extreme cold and frostbite on contact.

CHRONIC EFFECTS: None known

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY (US Only):

NTP - No

IARC MONOGRAPHS - No

OSHA REGULATED - No

### 4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: None

SKIN CONTACT: If frostbite occurs, flush

affected areas with lukewarm water. DO

NOT USE HOT WATER.

INGESTION: None

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

### 5. FIRE FIGHTING MEASURES

FLASH POINT: Nonflammable

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: Nonflammable

LOWER:

UPPER:

EXTINGUISHING MEDIA: Use what is appropriate for surrounding fire.

SPECIAL FIRE FIGHTING INSTRUCTION AND

EQUIPMENT: Wear self-contained breathing

apparatus and full protective clothing.

Keep fire exposed cylinders cool with

water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic

carbon monoxide may be given off during

combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Cylinder rupture may occur under fire

conditions. Carbon dioxide decomposes

when heated above 1700 degrees celsius.

### 6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Shut off source if possible and remove source of heat.

Remove leaking cylinder to exhaust hood or safe outdoor area if this can be done safely.

SPECIALIZED EQUIPMENT: None

### 7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE:  
Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

## 8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentration below exposure limits.

### PERSONAL PROTECTION

EYE/FACE PROTECTION: Safety glasses . A face shield is also recommended when handling cold liquid, solid or vapor.

SKIN PROTECTION: Loose fitting gloves of impermeable material, such as leather, when working with cold liquid, solid or vapor.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Odorless

PHYSICAL STATE: Gas

VAPOR PRESSURE: @20 deg.C: 816 psig

VAPOR DENSITY (AIR=1): 1.53

BOILING POINT (C): Sublimes -78.4

SOLUBILITY IN WATER: v/v @68 deg.F: 87.8

SPECIFIC GRAVITY (H2O=1): 1.56

EVAPORATION RATE: N/Av

ODOR THRESHOLD: N/Ap

## 10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: This weakly acidic material will react with alkaline materials to form carbonates and bicarbonates.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide when heated above 1700 deg.C.

## 11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): NONE ESTABLISHED

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

## 12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

## 13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

## 14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Carbon Dioxide

HAZARD CLASS: 2.2 (nonflammable)

IDENTIFICATION NUMBER: UN1013

REPORTABLE QUANTITIES: None

LABELING: NONFLAMMABLE GAS

ADR/RID (EU Only): Class 2, 2a

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

## 15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 204-696-9

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: None

R: As

S: 9,23

## 16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

### ABBREVIATIONS:

N/Ap - Not Applicable

N/Av - Not Available

SA - Simple Asphyxiant

NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.



## SAFETY DATA SHEETS

### SPECO2/E-2

DATE: 21May2015

SUPPLIER ADDRESS: 1290 COMBERMERE STREET

TROY, MI 48083

EMERGENCY PHONE NUMBER: (248) 589-2950

#### 1. CHEMICAL PRODUCT

PRODUCT NAME: OXYGEN (DILUTED)

SYNONYMS: None

#### 2. COMPOSITION, INFORMATION ON INGREDIENTS

Ingredient Name	Formula	CAS#	Concentration	Exposure Limits (PPM)			
				ACGIH TLV	OSHA PEL	MAC	Other STEL
OXYGEN	O2	7782-44-7	19.5 % - 23.5%	NE	NE	NE	NE
Note: NE = NONE ESTABLISHED							

#### 3. HAZARD IDENTIFICATION

\*\*\* EMERGENCY OVERVIEW \*\*\*  
 High pressure gas.  
 May accelerate combustion.

POTENTIAL HEALTH EFFECTS  
 ROUTES OF ENTRY: Inhalation  
 ACUTE EFFECTS: None  
 CHRONIC EFFECTS: None  
 MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None  
 OTHER EFFECTS OF OVEREXPOSURE: None  
 CARCINOGENICITY (US Only):  
 NTP - No  
 IARC MONOGRAPHS - No  
 OSHA REGULATED - No

#### 4. FIRST AID MEASURES

INHALATION: None  
 EYE CONTACT: None  
 SKIN CONTACT: None  
 INGESTION: None  
 IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN  
 NOTE TO PHYSICIAN: None

#### 5. FIRE FIGHTING MEASURES

FLASH POINT: Nonflammable  
 AUTOIGNITION TEMPERATURE: N/Ap  
 FLAMMABLE LIMITS: Nonflammable  
 LOWER:  
 UPPER:  
 EXTINGUISHING MEDIA: Use what is appropriate for surrounding fire.  
 SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray. If possible, stop the product flow.  
 HAZARDOUS COMBUSTION PRODUCTS: None  
 UNUSUAL FIRE AND EXPLOSION HAZARDS: Escaping gas mixture containing 19-24% oxygen (air) vigorously supports and may accelerate combustion of surrounding materials. Cylinder rupture may occur under fire conditions.

**6. ACCIDENTAL RELEASE MEASURES**

CLEAN UP PROCEDURES: Shut off source if possible and remove source of heat.  
SPECIALIZED EQUIPMENT: None

**7. HANDLING AND STORAGE**

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.  
PRECAUTIONS TO BE TAKEN IN STORAGE:  
Store in well ventilated areas away from combustibles. Keep valve protection cap on cylinders when not in use.

**8. EXPOSURE CONTROLS/ PERSONAL PROTECTION**

ENGINEERING CONTROLS: None  
PERSONAL PROTECTION  
EYE/FACE PROTECTION: Safety glasses  
SKIN PROTECTION: None  
RESPIRATORY PROTECTION: None  
OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

APPEARANCE: Colorless  
ODOR: Odorless  
PHYSICAL STATE: Gas  
VAPOR PRESSURE: @20 deg.C: Gas  
VAPOR DENSITY (AIR=1): 1.00  
BOILING POINT (C): N/Ap  
SOLUBILITY IN WATER: @20 deg.C:18.68 cm<sup>3</sup>/l  
SPECIFIC GRAVITY (H<sub>2</sub>O=1): Gas  
EVAPORATION RATE: Gas  
ODOR THRESHOLD: None

**10. STABILITY AND REACTIVITY**

STABILITY: Stable under normal storage conditions.  
CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.  
MATERIALS TO AVOID: Flammable and combustible materials, especially greases and oils.  
HAZARDOUS POLYMERIZATION: Will not occur.  
HAZARDOUS DECOMPOSITION: None

**11. TOXICOLOGICAL INFORMATION**

LETHAL CONCENTRATION (LC<sub>50</sub>): None established  
LETHAL DOSE 50 (LD<sub>50</sub>): N/Ap  
TERATOGENICITY: N/Ap  
REPRODUCTIVE EFFECTS: N/Ap  
MUTAGENICITY: N/Ap

**12. ECOLOGICAL INFORMATION**

No adverse ecological effects are expected.

**13. DISPOSAL CONSIDERATIONS**

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

**14. TRANSPORT INFORMATION**

CONCENTRATION: 19.5% - 23.5%  
DOT DESCRIPTION (US ONLY):  
PROPER SHIPPING NAME: Compressed gases,  
n.o.s.  
HAZARD CLASS: 2.2 (nonflammable)  
IDENTIFICATION NUMBER: UN1956  
REPORTABLE QUANTITIES: None  
LABELING: NONFLAMMABLE GAS  
ADR/RID (EU Only): Class 2, 1A  
SPECIAL PRECAUTIONS: Cylinders should be  
transported in a secure upright position  
in a well ventilated truck.

#### 15. REGULATORY INFORMATION

OSHA: Process Safety Management: Materials are not listed in appendix A of 29  
CFR 1910.119 as highly hazardous chemicals.  
TSCA: Material is listed in TSCA  
inventory.  
SARA: The threshold planning quantity  
for material is 10,000 lbs.  
EU NUMBER: N/Av  
NUMBER IN ANNEX 1 OF DIR 67/548: Not  
listed in annex 1.  
EU CLASSIFICATION: N/Av  
R: N/Av  
S: N/Av

#### 16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface  
cylinders or labels. Cylinders should be refilled by qualified producers of  
compressed gas. Shipment of a compressed gas cylinder which has not been filled  
by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS:

N/Av - Not Applicable  
N/Av - Not Available  
SA - Simple Asphyxiant  
NE - None Established

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## SAFETY DATA SHEETS

7727-37-9/E-2

DATE: 21May2015

SUPPLIER ADDRESS: 1290 COMBERMERE STREET

TROY, MI 48083

EMERGENCY PHONE NUMBER: (248) 589-2950

### 1. CHEMICAL PRODUCT

PRODUCT NAME: NITROGEN

SYNONYMS: None

### 2. COMPOSITION, INFORMATION ON INGREDIENTS

Ingredient Name	Formula	CAS#	Concentration	Exposure Limits (PPM)			
				ACGIH TLV	OSHA PEL	MAC S/A	Other STEL S/A
NITROGEN	N2	7727-37-9	99+%	S/A	S/A	S/A	S/A

Note: S/A = SIMPLE ASPHYXIANT

### 3. HAZARD IDENTIFICATION

\*\*\* EMERGENCY OVERVIEW \*\*\*  
High pressure gas.  
Can cause rapid suffocation.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation

ACUTE EFFECTS: Material acts as a simple asphyxiant by displacing air necessary for life. Symptoms include rapid respiration, muscular incoordination, fatigue, dizziness, nausea, vomiting, unconsciousness, and death.

CHRONIC EFFECTS: None known

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY (US Only):

NTP - No

IARC MONOGRAPHS - No

OSHA REGULATED - No

### 4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: None

SKIN CONTACT: None

INGESTION: None

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

### 5. FIRE FIGHTING MEASURES

FLASH POINT: Nonflammable

AUTOIGNITION TEMPERATURE: N/Ap

FLAMMABLE LIMITS: Nonflammable

LOWER:

UPPER:

EXTINGUISHING MEDIA: Use what is appropriate for surrounding fire.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.

Keep fire exposed cylinders cool with water spray. If possible, stop the product flow.

HAZARDOUS COMBUSTION PRODUCTS: None

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Cylinder rupture may occur under fire conditions.



**6. ACCIDENTAL RELEASE MEASURES**

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat.

SPECIALIZED EQUIPMENT: None

**7. HANDLING AND STORAGE**

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE:

Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

**8. EXPOSURE CONTROLS/ PERSONAL PROTECTION**

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to avoid asphyxiation.

PERSONAL PROTECTION

EYE/FACE PROTECTION: Safety glasses

SKIN PROTECTION: None

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

APPEARANCE: Colorless

ODOR: Odorless

PHYSICAL STATE: Gas

VAPOR PRESSURE: N/Ap

VAPOR DENSITY (AIR=1): 0.967

BOILING POINT (C): -195.5

SOLUBILITY IN WATER: cm<sup>3</sup>/100cm<sup>3</sup> H<sub>2</sub>O  
1.485

SPECIFIC GRAVITY (H<sub>2</sub>O=1): Gas

EVAPORATION RATE: Gas

ODOR THRESHOLD: None

**10. STABILITY AND REACTIVITY**

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Nitrogen reacts with

Li, Nd, and Ti at high temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: None

**11. TOXICOLOGICAL INFORMATION**

LETHAL CONCENTRATION (LC<sub>50</sub>): None established

LETHAL DOSE 50 (LD<sub>50</sub>): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

**12. ECOLOGICAL INFORMATION**

No adverse ecological effects are expected.

**13. DISPOSAL CONSIDERATIONS**

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and

valve protection caps in place.

#### 14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):  
PROPER SHIPPING NAME: Nitrogen,  
compressed

HAZARD CLASS: 2.2(nonflammable)

IDENTIFICATION NUMBER: UN1066

REPORTABLE QUANTITIES: None

LABELING: NONFLAMMABLE GAS

ADR/RID (EU Only): Class 2,1a

SPECIAL PRECAUTIONS: Cylinders should be  
transported in a secure upright position  
in a well ventilated truck.

#### 15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR  
1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA  
inventory.

SARA: The threshold planning quantity  
for material is 10,000 lbs.

EU NUMBER: 231-783-9

NUMBER IN ANNEX 1 OF DIR 67/548: Not  
listed in annex 1.

EU CLASSIFICATION: N/Av

R: As

S: 9, 23

#### 16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface  
cylinders or labels. Cylinders should be refilled by qualified producers of  
compressed gas. Shipment of a compressed gas cylinder which has not been filled  
by the owner or with his written consent is a violation of federal law (49 CFR).

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