

CITY OF AURORA, ILLINOIS
INVITATION TO BID 16-44

**CHEMICALS FOR THE CITY OF AURORA
WATER TREATMENT PLANT**

BID SUBMITTAL CHECKLIST

Each Bid Must Be Placed In An Envelope, Sealed, And Clearly Marked On The Outside: "16-44 CHEMICALS FOR THE CITY OF AURORA WATER TREATMENT PLANT." In order to be considered responsive, the bidder must submit all of the following items in their sealed envelope:

1. x Bidder's Certifications (Page 01)
2. x Bidder's Tax Certification (Page 02)
3. x Bid Proposal Form (Appendix E)
4. x Contact Information (Appendix C)
5. x Reference List (Appendix D)
6. x Contract (Appendix G) → substituted Alternative contract, same as existing agreement
7. N/A Vendor Application (Appendix H) → not applicable, we are current supplier

CITY OF AURORA
16-44
CHEMICALS FOR THE CITY OF AURORA
WATER TREATMENT PLANT
BID PROPOSAL FORM

The Bidder shall furnish the chemicals, F.O.B. Aurora Water Treatment Plant, 1111 Aurora Avenue, Aurora, Illinois with freight allowed to destination.

The undersigned Bidder proposes to furnish all labor, materials, equipment and services to satisfactorily perform the above referenced contract.

If there is a discrepancy between the unit price and the total, the unit price will prevail. Designate below the telephone number and contact person who is to be notified for shipment request:

Telephone # 1-800-227-4163 x 21189

Contact Person Jim Pobiedzinski

The bid price for material shall include shipping and shall remain firm for the duration of this contract year unless otherwise stated below. The City of Aurora reserves the right to limit quantities to meet the needs of the City.

No additional charges over total net bid price will be accepted without written approval of the Purchasing Director.

All bid prices shall be shown as delivered Aurora Destination, Prepaid and Allowed.

Do not add state, federal or local taxes. Municipalities are exempt. Exemption Certification Permit No. Illinois E9996-0842-07.

The City of Aurora reserves the right to reject any or all Bids, or parts thereof, and to waive any technicality, informality or irregularity in the Bids received, and to disregard all nonconforming or conditional Bids or counter-proposals and to hold the best Bids for ninety (90) days from the opening date set forth above. The City further reserves the right to award the Bid to the lowest responsible Bidder whose offer best responds in quality, fitness and capacity to the requirements of the proposed work or usage and therefore is in the best interest of the City.

BID SUBMITTED BY:

COMPANY Air Products and Chemicals, Inc.

ADDRESS 7201 Hamilton Blvd

CITY, STATE, ZIP Allentown, PA 18195

PREPARER'S NAME Jim Pobiedzinski
Please Type

CONTRACT PERSON Ryan Bowen
Please Type

AUTHORIZED SIGNATURE  Sales Manager
Title

PHONE # (800) 227-4163 x21189 FAX # (484) 880-4334 DATE 10/13/2016

EMAIL: POBIEJIM@airproducts.com

**CITY OF AURORA
INVITATION TO BID 16-44
CHEMICALS FOR THE CITY OF AURORA
WATER TREATMENT FACILITY**

BID PROPOSAL FORM

Bidders may bid on any or all of the items. **The Agreement term will be for a one-year period with a 2nd year extension option**, subject to mutual administrative consent between the City of Aurora and the Bidder. Year 1 will be the period of January 1, 2017 through December 31, 2017. Year 2 will be the period of January 1, 2018 through December 31, 2018. Bidders shall familiarize themselves with the General Conditions, Special Conditions and the delivery destination.

All bids must be submitted on this bid form. The quantities listed are approximate:

YEAR 1:

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL AMOUNT
1. Anhydrous Ammonia	40,000	Lbs.	_____	_____
2. Liquid Ferric Chloride	1,100,000	Lbs.	_____	_____
3. Carbon Dioxide	1,400,000	Lbs.	<u>\$ 101.20 / ton</u> <u>(.0506 / lb)</u>	<u>\$ 70,840</u>
4. Sodium Hypochlorite	280,000	Gals.	_____	_____
5. Calcium Oxide	5,400	Tons	_____	_____

YEAR 2:

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL AMOUNT
1. Anhydrous Ammonia	40,000	Lbs.	_____	_____
2. Liquid Ferric Chloride	1,100,000	Lbs.	_____	_____
3. Carbon Dioxide	1,400,000	Lbs.	<u>\$ 101.20 / ton</u> <u>(.0506 / lb)</u>	<u>\$ 70,840</u>
4. Sodium Hypochlorite	280,000	Gals.	_____	_____
5. Calcium Oxide	5,400	Tons	_____	_____

Your Company's Name Air Products and Chemicals, Inc.

CITY OF AURORA, ILLINOIS
INVITATION TO BID 16-44

CHEMICALS FOR THE CITY OF AURORA
WATER TREATMENT FACILITY

BID PROPOSAL FORM

Bid Due Date & Time: 2:00 p.m. CST, Wednesday, October 19, 2016

To: **City of Aurora**
City Clerk's Office
44 E Downer Place
Aurora, Illinois 60507

The following offer is hereby made to the City of Aurora, Aurora, Illinois, hereafter called the Owner.

Submitted By: Air Products and Chemicals, Inc.

- I. The undersigned Vendor proposes and agrees, after having examined the specifications, quantities and other Bid documents, to irrevocably offer to furnish the materials, equipment and services in compliance with all terms, conditions, specifications and amendments (if applicable) contained in the bid solicitation documents. The items in this Invitation to Bid, including, but not limited to, all required certificates, are fully incorporated herein as a material and necessary part of the Bid.
 - A. The Vendor shall also include with their bid any necessary literature, samples, etc., as required within the Invitation to Bid, Instruction to Bidders and specifications.
 - B. For purposes of this offer, the terms Offeror, Bidder, Contractor, and Vendor are used interchangeably.
- II. In submitting this Offer, the Vendor acknowledges:
 - A. All bid documents have been examined: Instructions to Bidder, Specifications and the following addenda:

No._____, No._____, No._____, (Vendor to acknowledge addenda here.)
 - B. To be prepared to execute a contract with the City within ten (10) calendar days after approval by Aurora City Council.

Company Name: Air Products and Chemicals, Inc.

Signature & Date:  10/13/16

BIDDER'S CERTIFICATION

I/We hereby certify that:

- A. A complete set of bid papers, as intended, has been received, and that I/We will abide by the contents and/or information received and/or contained herein.
- B. I/We have not entered into any collusion or other unethical practices with any person, firm, or employee of the City which would in any way be construed as unethical business practice.
- C. I/We have adopted a written sexual harassment policy which is in accordance with the requirements of Federal, State and local laws, regulations and policies and further certify that I/We are also in compliance with all other equal employment requirements contained in Public Act 87-1257 (effective July 1, 1993) 775 ILCS 5/2-105 (A).
- D. I/We operate a drug free environment and drugs are not allowed in the workplace or satellite locations as well as City of Aurora sites in accordance with the Drug Free Workplace Act of January, 1992.
- E. The Bidder is not barred from bidding on the Project, or entering into this contract as a result of a violation of either Section 33E-3 or 33E-4 of the Illinois Criminal Code, or any similar offense of "bid rigging" or "bid rotating" of any state or the United States.
- F. I/We will abide by all other Federal, State and local codes, rules, regulations, ordinances and statutes.

COMPANY NAME Air Products and Chemicals, Inc.

ADDRESS 7201 Hamilton Blvd

CITY/STATE/ZIP CODE Allentown, PA 18195

NAME OF CORPORATE/COMPANY OFFICIAL Ryan Bowen
PLEASE TYPE OR PRINT CLEARLY

TITLE Sales Manager

AUTHORIZED OFFICIAL SIGNATURE 

DATE 10/13/16

TELEPHONE (800) 227-4163 x21189

FAX No. (484) 880-4339

Subscribed and Sworn to
Before me this 13th day
of October, 2016


Notary Public

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Robin S. Grohotolski, Notary Public
Upper Macungie Twp., Lehigh County
My Commission Expires July 19, 2020
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

STATE OF ILLINOIS)
)
County of Kane) ss.

BIDDER'S TAX CERTIFICATION

(BIDDER'S EXECUTING OFFICER), being first duly sworn on oath, deposes and states that all statements made herein are made on behalf of the BIDDER, that this despondent is authorized to make them and that the statements contained herein are true and correct.

Bidder deposes, states and certifies that Bidder is not barred from contracting with any unit of local government in the State of Illinois as result of a delinquency in payment of any tax administered by the Illinois Department of Revenue unless Bidder is contesting, in accordance with the procedures established by the appropriate statute, its liability for the tax or the amount of the tax, all as provided for in accordance with 65 ILCS 5/11-42.1-1.

DATED this 13th day of October, 2016.

By [Signature]
(Signature of Bidder's Executing Officer)

Ryan Bowen
(Print name of Bidder's Executing Officer)

Sales Manager
(Title)

ATTEST/WITNESS:

By [Signature]
Title ACCOUNT MANAGER

Subscribed and sworn to before me this 13th day of October, 2016.

[Signature]
Notary Public

(SEAL) COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Robin S. Grohotolski, Notary Public
Upper Macungie Twp., Lehigh County
My Commission Expires July 19, 2020
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

CITY OF AURORA, ILLINOIS
INVITATION TO BID 16-44

CHEMICALS FOR THE CITY OF AURORA
WATER TREATMENT PLANT


REFERENCES

(Please Type)
Organization City of Piqua, OH
Address 201 W. Water St.
City, State, Zip Piqua, OH 45356
Phone Number 937-778-2090
Contact Person Bob Jennings
Date of Project 1/1/16 - 12/31/16

Organization City of Fort Wayne, IN
Address 450 Baltes Ave.
City, State, Zip Fort Wayne, IN 46805
Phone Number 260-427-1376
Contact Person Gayle Cooper
Date of Project 1/1/16 - 12/31/16

Organization City of Aurora, IL
Address 44 E. Downer Place
City, State, Zip Aurora, IL 60507
Phone Number 630-256-3250
Contact Person Jean Schouten
Date of Project 1/1/15 - 12/31/16

Bidder's Name: Air Products and Chemicals, Inc.

Signature & Date:  10/13/16

CITY OF AURORA, ILLINOIS
INVITATION TO BID 16-44

CHEMICALS FOR THE CITY OF AURORA
WATER TREATMENT PLANT

CONTACT INFORMATION

Vendor shall provide the following contact information assigned to service the City of Aurora account.

Customer Service/General Information: Ph: 1-800-224-2724

To place an order:

Name: Customer Service
Ph: 1-800-224-2724 Fax: 1-800-545-4548
E-mail: NGEATEAM@airproducts.com


Billing & Invoicing question:

Name: Billing - Mary Lindsay
Ph: 484-634-7758 Fax: 610-706-7148
E-mail: LINDSAM@airproducts.com

Questions:

Name: Jim Pobiedzinski
Ph: 1-800-227-4163 x 21189 Fax: 484-880-4339
E-mail: POBIEDJM@airproducts.com

Bidder's Name: Air Products and Chemicals, Inc.

Signature & Date:  10/13/16

PRODUCT SUPPLY AGREEMENT



This Agreement is made as of the 01 day of January 2015, between Air Products and Chemicals, Inc. ("Seller"), whose address is 7201 Hamilton Boulevard, Allentown, PA 18195-1501, and City of Aurora ("Buyer"), whose address is 44 E. Downer Place, Aurora, IL 60507.

1. Scope. Seller agrees to sell to Buyer, and Buyer agrees to purchase from Seller its entire requirements of Carbon Dioxide ("Product") for use at Aurora Water Treatment Plant 1111 Aurora Avenue Aurora, IL ("Designated Location") subject to and in accordance with the provisions of this Agreement. Seller's specification, price and delivery obligations are predicated on furnishing Buyer's requirements of Product from Seller's producing facilities located within 81 miles of the Designated Location. This Agreement is applicable to all Buyer's activities carried on at the Designated Location. Buyer represents and warrants that Product purchased under this Agreement is solely for Buyer's use and consumption.

2. The Product Specifications are: Carbon Dioxide: 99.5%

3. Term. This Agreement shall be in effect for a period of Two years ("initial Term") beginning as of the date of January 1, 2017 and shall continue to December 31, 2017, base year, and the second term beginning January 1, 2018 through December 31, 2018. If Seller agrees to supply Product to Buyer after the expiration or termination of this Agreement, the terms and conditions of this Agreement shall apply to such transaction unless and until the parties sign an agreement that supersedes this Agreement.

4. Equipment. See Attachment II.

5. Delivery point for Product delivered by Seller's vehicle is the point of connection between Seller's delivery vehicle and the Equipment, and title and risk shall pass from Seller to Buyer at the delivery point.

6. The base Unit Price is: \$5.06 per 100 lbs (\$101.20 per ton) Base Year, and \$5.06 per 100 lbs (\$101.20 per ton) for year two.

7. Unit Price Adjustment. The base Unit Price shall remain firm through December 31, 2017. This paragraph does not apply to adjustments in the Unit Price due to changes in the "Estimated Volume".

8. Entirety of Contract. This Agreement and its Attachments I & II (which are incorporated into and are a part of this Agreement) contain the entire understanding between the parties, superseding any prior agreements, and cannot be revised or amended unless stated in writing and signed by authorized representatives of each party. This Agreement is subject to acceptance by a duly authorized representative of Seller. Any purchase orders or acknowledgements used by either party shall be deemed intended for record purposes only and shall not add to or modify this Agreement. Each party shall keep the terms and conditions of this Agreement confidential. Electronic documents and signatures will be permitted in substitution for paper-based documents and signatures.

CITY OF AURORA, IL

AIR PRODUCTS AND CHEMICALS, INC.

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

*Note: Air Products and Chemicals, Inc. price quote of \$101.20 per Ton for the supply of Carbon Dioxide is predicated upon City of Aurora accepting the above Product Supply Agreement, along with Attachments I & II.

ATTACHMENT I
ADDITIONAL TERMS AND CONDITIONS

1. Buyer Representation. Buyer represents and warrants that as of the date of first delivery of Product to the Designated Location Buyer will not be obligated under the terms of any other contract to purchase Product for the Designated Location, and Buyer agrees to indemnify, defend and hold harmless Seller from and against all claims, demands and suits to the contrary that may be asserted by any third party.

2. Warranty. Seller warrants that Product shall conform to the specifications set forth in this Agreement and that, at the time of delivery, Seller shall have good title and right to transfer the same and that the same shall be delivered free of encumbrances. Buyer's sole and exclusive remedy for Seller's breach of warranty shall be replacement by Seller of a like quantity of conforming Product at no additional cost to Buyer. THE FOREGOING WARRANTY IS THE SOLE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, IN FACT OR BY LAW, INCLUDING, WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

3. Liability. In the event of Seller's unexcused failure to deliver Product, Buyer shall have the exclusive remedy of "direct cover damages" (i.e., the difference between the Unit Price hereunder for the quantity of Product required and not delivered and the higher price necessarily paid for replacement Product delivered by a third party); provided, however, no claim with respect to Seller's unexcused failure to deliver Product shall be greater than the Unit Price hereunder for the quantity of Product in respect to which such claim is made. Seller shall not be liable in contract or tort (including negligence and strict liability) for any indirect, special, incidental or consequential damages, nor for any direct damages except as expressly set forth in this Agreement, arising out of or during its performance or non-performance under this Agreement. Exclusions of and limitations on damages under this Agreement shall survive failure of an exclusive remedy.

4. Hazards. Buyer acknowledges that there are hazards associated with the Product, that it understands such hazards, and that it is the responsibility of Buyer to warn and protect its employees and others exposed to such hazards through the storage and use of the Product after delivery. Seller shall provide Buyer with copies of Material Safety Data Sheets relating to the Product for Buyer to make such warnings, and Buyer assumes full responsibility and risk and releases Seller from liability for loss, damages or injury to persons or to property of Buyer or others arising out of the storage or use of the Product after delivery to Buyer.

5. Technical Assistance. Buyer assumes full responsibility for making its own independent evaluation whether to use any technical assistance or advice furnished by Seller in connection with this Agreement, and Buyer assumes all risk and releases Seller from liability for results obtained in reliance thereon.

6. Force Majeure. Neither party hereto shall be considered in default in the performance of its obligations hereunder (other than its obligation to make any payment of money hereunder), or be liable in damages or otherwise for any failure or delay in performance which is due to strike or other industrial disturbance; fire, explosion or other natural catastrophe; epidemic; terrorism; civil disturbance; curtailment, shortage, rationing or allocation of normal sources of supply of labor, materials, transportation, energy, or utilities; accident; act of God; delay of subcontractors or vendors; act of government or compliance with government regulations (whether or not valid); embargo; machinery or equipment breakdown; or any other similar or dissimilar cause which is beyond the reasonable control of the party claiming excuse hereunder. Neither party shall be required to make any concession or grant any demand to bring to an end any strike or other concerted act of workers.

7. Curtailment of Supply. If a Force Majeure event only partially reduces Seller's ability to produce or deliver Product, Seller may prorate its available supply among Buyer and Seller's other customers in a fair and equitable manner. Seller is not obligated but, at Buyer's request or authorization, may

use commercially reasonable efforts to obtain Product from another source or take other action to perform, provided Buyer reimburses Seller for any additional costs and expenses incurred by Seller.

8. Buyer Labor Dispute. If Seller is requested by Buyer and determines to attempt deliveries during a strike or other concerted act of workers ("Dispute") at the Designated Location, then any such deliveries will be made at Buyer's sole risk and responsibility, and Buyer agrees to reimburse Seller for additional expenses and indemnify, defend and hold harmless Seller from and against all costs (including legal fees), damages, liabilities, claims or otherwise arising out of such attempted deliveries and whether or not based on allegations of Seller's negligence; provided, however, such Buyer obligation shall not extend to claims for injury or damage which would have occurred irrespective of the existence of the Dispute. In addition, Seller reserves the right, at its sole discretion, to request Buyer to provide qualified personnel to deliver Product to any Equipment affected by such Dispute, and Buyer shall provide such personnel. Nevertheless, if the Dispute renders delivery impracticable and/or dangerous, Seller shall not be obligated to make any such delivery and may elect to treat the Dispute as a Force Majeure event.

9. Invoicing and Payment. Seller may invoice Buyer as each delivery of Product is made, monthly, or at Seller's discretion. All invoices shall be payable net 30 days or upon demand. All claims of Buyer relating to any invoice must be made in writing within 30 days of receipt of invoice or shall be deemed waived. Buyer's failure to make timely payments shall entitle Seller, in addition to other rights or remedies, to change payment terms (e.g., to prepayment or direct debit), suspend deliveries, or terminate the Agreement.

10. Taxes. Seller shall bear and pay all federal, state and local taxes based upon its net income and corporate existence. Any other tax, howsoever denominated and measured, imposed upon Equipment or its installation or operation, or upon Seller's and its affiliates' producing facilities, or upon the production, storage, inventory, sale, transportation, delivery, use or consumption of Product, shall be paid directly by Buyer, or if paid by Seller shall be invoiced to Buyer as a separate item and paid by Buyer to Seller.

11. Assignment. This Agreement shall inure to the benefit of and be binding upon the successors and the assigns of both parties, but it may not be assigned by either party without the prior written consent of the other; provided, however, Seller has the right to require assignment of the Agreement to, and assumption by, a purchaser of Buyer's applicable assets.

12. Waiver. A waiver by either party of strict conformance with any of the terms and conditions of the Agreement shall not be a waiver of any subsequent failure to comply with such terms and conditions.

13. Governing Law. THE AGREEMENT SHALL BE GOVERNED BY THE LAWS OF THE COMMONWEALTH OF PENNSYLVANIA, WITHOUT GIVING EFFECT TO ITS CONFLICTS OF LAWS.

14. Termination for Breach. Either party may terminate this Agreement for material breach by the other party that is not cured within 30 days of receipt of written notice thereof; provided, however, if such breach cannot reasonably be cured within 30 days, and provided the breach is not a failure to pay, the other party shall be deemed not to be in breach if that party commences remedial action within the 30 days and diligently prosecutes the remedial action to completion within a reasonable time thereafter.

ATTACHMENT II

BUYER'S EQUIPMENT

1. Buyer Equipment. If Buyer is supplying equipment at any Designated Location(s), Buyer shall, without cost to Seller, furnish the storage units, equipment, piping, controls and other instrumentation and devices (collectively, "Buyer Equipment") required to take delivery, store, and use the Product(s) at such Designated Location(s) and shall maintain and bear all responsibility and liability (including, without limitation, for compliance with laws, regulations and safety standards) for and in connection with the Buyer Equipment. Buyer shall ensure that all Buyer Equipment at all times complies with the safety standards generally accepted in the industry

Any work by Seller in connection with Buyer's Equipment is governed by the terms and conditions of this Agreement and supplied without warranties, express or implied.

2. Notice and Access. Buyer shall monitor the inventory of Product(s) in Buyer Equipment and provide Seller with such notice as is needed to permit delivery prior to exhaustion of such inventory. If Seller notifies Buyer that telemetry systems that could be accessed by Seller from its facilities ("Telemetry") are needed on Buyer Equipment to facilitate delivery of Product to a Designated Location, Buyer shall make commercially reasonable efforts to install and maintain such Telemetry, including the phone lines and electric power required to operate such Telemetry. If Seller furnishes Telemetry for Buyer Equipment, Seller shall retain title to and control of the Seller Telemetry and the right to remove it. Buyer shall prevent unauthorized access, physical or electronic, to Seller Telemetry, and be responsible for any loss or damage caused by Buyer or third parties. Buyer shall also provide Seller's tank trucks and personnel with unrestricted access to Buyer Equipment 24 hours a day, 7 days a week. If Seller determines that the delivery of Product would be unsafe or in violation of applicable law due to a condition present at a Designated Location, Seller may refuse to make further deliveries of Product until Buyer removes the condition, and Seller may terminate this Agreement in whole or in part if Buyer does not promptly remove the condition.

3. Checklist Forms. Qualified inspection and completed Equipment Checklist forms are required prior to delivery into Buyer Equipment at each Designated Location, a copy of which can be found at <http://www.airproducts.com/CustomerSupport/index.asp>.

4. Compliance with Other Laws and Requirements. Buyer shall comply with all relevant reporting obligations under the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11001-11050 (EPCRA, also commonly known as Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA Title III)) resulting from the presence of the Product(s) supplied under the Agreement. Further, it is a responsibility of Buyer to warn and protect its employees, customers and others exposed to the hazards posed by the storage and use of Product(s) and to comply with all federal, state and local legal notification, reporting and/or permit requirements which may be associated with the storage or use of Product(s).



Atlantic Analytical Laboratory

ISBT Beverage Grade Carbon Dioxide (CO₂) Analysis Report

Air Products & Chemicals, Inc.
1120 West 17th Street
Monroe, WI 53566
Attn: Tim Cain
E-mail: caint1@airproducts.com

AAL Number: 41221
Received On: 19 Jul 16
Report Date: 27 Jul 16
P.O. Number: Credit Card

Sample ID: Vaporized Liquid CO₂ Sample – Q3 Final Product
Received in: Low pressure sampling kit TBK 2, Cyl # 7000, SBL # 2041

Sample Date: 14 Jul 16
Final Test Date: 24 Jul 16

RESULT	PARAMETER, CHEMICAL FORMULA (UNITS)	DL	METHOD	ISBT GUIDELINE LIMIT
99.95	Purity CO ₂ (% v/v)	5.	ISBT 2.0	99.9% v/v min.
nd	Moisture H ₂ O (ppm v/v)	1.	ISBT 3.0	20 ppm v/v max.
nd	Oxygen O ₂ (ppm v/v)	4.	ISBT 4.0	30 ppm v/v max.
nd	Carbon Monoxide CO (ppm v/v)	0.5	ISBT 5.0	10 ppm v/v max.
nd	Ammonia NH ₃ (ppm v/v)	0.5	ISBT 6.0	2.5 ppm v/v max.
nd	Nitrogen Monoxide NO (ppm v/v)	0.5	ISBT 7.0-1	2.5 ppm v/v max.
nd	Nitrogen Dioxide NO ₂ (ppm v/v)	0.5	ISBT 7.0-1	2.5 ppm v/v max.
nd	Non-volatile Residue NVR (ppm w/w)	1.	ISBT 8.0	10 ppm w/w max.
nd	Non-volatile Organic Residue NVOR (ppm w/w)	1.	ISBT 8.0	5 ppm w/w max.
nd	Methanol MeOH (ppm v/v)	0.2	ISBT 9.0	10 ppm v/v max.
0.5	Total Volatile Hydrocarbons THC (ppm v/v as CH ₄)	0.1	ISBT 10.0-1	50 ppm v/v max.
0.5	Total Non-Methane HC's TNMHC (ppm v/v as CH ₄)	0.1	ISBT 10.0-1	20 ppm v/v max.
nd	Acetaldehyde AA (ppm v/v)	0.05	ISBT 11.0	0.2 ppm v/v max.
nd	Aromatic Hydrocarbon AHC (ppb v/v as C ₆ H ₆)	2	ISBT 12.0	20 ppb v/v max.
0.03	Total Sulfur Content TSC (ppm v/v as S)	0.02	ISBT 13.0	0.1 ppm v/v max. (excl. SO ₂)
nd	Sulfur Dioxide SO ₂ (ppm v/v)	0.02	ISBT 14.0	1 ppm v/v max.
Sensory Tests				
PASS	Odor of Solid CO ₂ (Snow Residue)	na	ISBT 15.0	No foreign odor
PASS	Appearance of Solid CO ₂ (Snow Residue)	na	ISBT 15.0	No foreign appearance
PASS	Odor in Water	na	ISBT 16.0	No foreign odor
PASS	Taste in Water	na	ISBT 16.0	No foreign taste
PASS	Appearance in Water	na	ISBT 16.0	No color or turbidity

NOTES: Limits from ISBT "Bulk Carbon Dioxide Quality Guidelines and Analytical Methods Reference" – 2nd Revision, 30 Nov 2010
Parameter results above ISBT Guideline Limits reported in RED.
DL = test detection limit. nd = less than the test detection limit. na = value is non-applicable. sc = see comments below.
-- = test not performed. v/v = volume analyte/volume sample. w/w = weight analyte/weight sample.
LT = less than amount specified. GT = greater than amount specified.
% = parts per hundred. ppm = parts per million. ppb = parts per billion.
Unit Conversions: 0.0001% = 1 ppm = 1,000 ppb = 1µL/L (v/v) or 1µg/g (w/w)

Comments:

Bruce J Gollob
Bruce Gollob
CEO, Analytical Services

Attachments: None
CC: Justin Thain, Email thainj@airproducts.com
Jason Harnish, Email harnisit@airproducts.com
Don Fisher, Email: FISHERDL@airproducts.com



Atlantic Analytical Laboratory, LLC
Mailing address: PO Box 220 • Whitehouse, NJ 08888
Shipping address: 291 Rte 22 East • Salem Industrial Park – Building # 4 • Whitehouse, NJ 08888
Phone (908) 534-5600 • Fax (908) 534-2017 • www.AtlanticAnalytical.com

CO₂ FINAL
Rev 2.0
May 2013

Full Final Product Carbon Dioxide (CO₂) Analysis Report

AIR PRODUCTS & CHEMICALS, INC. – Monroe, WI
 Sample ID: Vaporized Liquid CO₂ Sample – Q3 Final Product

AAL Number: 41221
 Sample Date: 14 Jul 16

RESULT	PARAMETER, CHEMICAL FORMULA (UNITS)	DL	METHOD	ISBT GUIDELINE LIMIT
99+	CO ₂ Identification (% v/v)	5.	na	na
99.95	Purity (% v/v)	5.	ISBT 2.0	99.9% v/v min.
nd	Non-volatile Residue NVR (ppm w/w)	1.	ISBT 8.0	10 ppm w/w max.
nd	Non-volatile Organic Residue NVOR (ppm w/w)	1.	ISBT 8.0	5 ppm w/w max.
0.5	Total Volatile Hydrocarbons THC (ppm v/v as CH ₄)	0.1	ISBT 10.0-1	50 ppm v/v max.
0.5	Total Non-Methane Hydrocarbons TNMHC (ppm v/v as CH ₄)	0.1	ISBT 10.0-1	20 ppm v/v max.
nd	Moisture H ₂ O (ppm v/v)	1.	ISBT 3.0	20 ppm v/v max.
nd	Carbon Monoxide CO (ppm v/v)	0.5	ISBT 5.0	10 ppm v/v max.
nd	Ammonia NH ₃ (ppm v/v)	0.5	ISBT 6.0	2.5 ppm v/v max.
nd	Nitrogen Monoxide NO (ppm v/v)	0.5	ISBT 7.0-1	2.5 ppm v/v max.
nd	Nitrogen Dioxide NO ₂ (ppm v/v)	0.5	ISBT 7.0-1	2.5 ppm v/v max.
Source Specific Parameters (ppm v/v)				
nd	Hydrogen Cyanide HCN	0.5	ISBT SM-1.0	non-detectable
nd	Vinyl Chloride C ₂ H ₃ Cl	0.1	ISBT SM-2.0	non-detectable
nd	Phosphine PH ₃	0.1	ISBT SM-3.0	0.3 ppm v/v max.
Non-Condensable Gases (NCG, ppm v/v)				
nd	Nitrogen N ₂	4.	ISBT 4.0	na
nd	Oxygen O ₂	4.	ISBT 4.0	30 ppm v/v max.
nd	Argon Ar	4.	ISBT 4.0	na
nd	Hydrogen H ₂	10.	ISBT 4.0	na
nd	Helium He	10.	ISBT 4.0	na
Volatile Hydrocarbons (VHC, ppm v/v)				
nd	Methane	0.5	ISBT 10.1	na
nd	Ethylene	0.5	ISBT 10.1	na
nd	Ethane	0.5	ISBT 10.1	na
nd	Propylene	0.5	ISBT 10.1	na
nd	Propane	0.5	ISBT 10.1	na
nd	Isobutane	0.5	ISBT 10.1	na
nd	n-Butane	0.5	ISBT 10.1	na
nd	Butenes	0.5	ISBT 10.1	na
nd	Isopentane	0.5	ISBT 10.1	na
nd	n-Pentane	0.5	ISBT 10.1	na
nd	Pentenes	0.5	ISBT 10.1	na
nd	C ₆ +	0.5	ISBT 10.1	na
Aromatic Hydrocarbons (BTEX, ppb v/v)				
nd	Benzene AHC	2	ISBT 12.0	20 ppb v/v max.
nd	Toluene	2	ISBT 12.0	na
nd	Ethyl Benzene	2	ISBT 12.0	na
nd	m+p Xylene	2	ISBT 12.0	na
nd	o-Xylene	2	ISBT 12.0	na

NOTES: Limits from ISBT "Bulk Carbon Dioxide Quality Guidelines and Analytical Methods Reference" – 2nd Revision, 30 Nov 2010
 Parameter results above ISBT Guideline Limits reported in RED.
 DL = test detection limit. nd = less than the test detection limit. na = value is non-applicable. sc = see comments below.
 -- = test not performed. v/v = volume analyte/volume sample. w/w = weight analyte/weight sample.
 LT = less than amount specified. GT = greater than amount specified.
 % = parts per hundred. ppm = parts per million. ppb = parts per billion.
 Unit Conversions: 0.0001% = 1 ppm = 1,000 ppb = 1µL/L (v/v) or 1µg/g (w/w)

Comments:



Atlantic Analytical Laboratory, LLC
 Mailing address: PO Box 220 • Whitehouse, NJ 08888
 Shipping address: 291 Rte 22 East • Salem Industrial Park Building # 4 • Whitehouse, NJ 08888
 Phone (908) 534-5600 • Fax (908) 534-2017 • www.AtlanticAnalytical.com



RESULT	Volatile Sulfur Compounds (VSC, ppm v/v)	DL	METHOD	ISBT GUIDELINE LIMIT
nd	Hydrogen Sulfide H ₂ S	0.02	ISBT 14.0	na
0.03	Carbonyl Sulfide COS	0.02	ISBT 14.0	na
nd	Sulfur Dioxide SO ₂	0.02	ISBT 14.0	1 ppm v/v max.
nd	Methyl Mercaptan	0.02	ISBT 14.0	na
nd	Ethyl Mercaptan	0.02	ISBT 14.0	na
nd	Dimethyl Sulfide	0.02	ISBT 14.0	na
nd	Carbon Disulfide	0.02	ISBT 14.0	na
nd	i-Propyl Mercaptan	0.02	ISBT 14.0	na
nd	t-Butyl Mercaptan	0.02	ISBT 14.0	na
nd	n-Propyl Mercaptan	0.02	ISBT 14.0	na
nd	Methyl Ethyl Sulfide	0.02	ISBT 14.0	na
nd	sec-Butyl Mercaptan	0.02	ISBT 14.0	na
nd	i-Butyl Mercaptan	0.02	ISBT 14.0	na
nd	Diethyl Sulfide	0.02	ISBT 14.0	na
nd	n-Butyl Mercaptan	0.02	ISBT 14.0	na
nd	Dimethyl Disulfide	0.02	ISBT 14.0	na
nd	Diethyl Disulfide	0.02	ISBT 14.0	na
nd	Other Sulfurs	0.02	ISBT 14.0	na
0.03	Total Sulfur Content TSC as S	0.02	ISBT 13.0	0.1 ppm v/v max. (excl. SO ₂)
Volatile Oxygenates (VOX, ppm v/v)				
nd	Acetaldehyde AA	0.05	ISBT 11.0	0.2 ppm v/v max.
nd	Ethylene Oxide	0.1	ISBT 11.0	na
nd	Dimethyl Ether	0.1	ISBT 11.0	na
nd	Methyl Ethyl Ether	0.2	ISBT 11.0	na
nd	Methanol MeOH	0.2	ISBT 9.0	10 ppm v/v max.
nd	Propionaldehyde	0.2	ISBT 11.0	na
nd	Acetone	0.2	ISBT 11.0	na
nd	Ethanol	0.2	ISBT 11.0	na
nd	Isopropanol	0.2	ISBT 11.0	na
nd	Ethyl Acetate	0.2	ISBT 11.0	na
nd	t-Butanol	0.2	ISBT 11.0	na
nd	n-Propanol	0.2	ISBT 11.0	na
nd	2-Butanol	0.2	ISBT 11.0	na
nd	Isobutanol	0.2	ISBT 11.0	na
nd	n-Butanol	0.2	ISBT 11.0	na
nd	Isoamyl Alcohol	0.2	ISBT 11.0	na
nd	Isoamyl Acetate	0.2	ISBT 11.0	na
Sensory Tests				
PASS	Odor of Solid CO ₂ (Snow Residue)	na	ISBT 15.0	No foreign odor
PASS	Appearance of Solid CO ₂ (Snow Residue)	na	ISBT 15.0	No foreign appearance
PASS	Odor in Water	na	ISBT 16.0	No foreign odor
PASS	Taste in Water	na	ISBT 16.0	No foreign taste
PASS	Appearance in Water	na	ISBT 16.0	No color or turbidity

NOTES: Limits from ISBT "Bulk Carbon Dioxide Quality Guidelines and Analytical Methods Reference" – 2nd Revision, 30 Nov 2010
 Parameter results above ISBT Guideline Limits reported in RED.
 DL = test detection limit. nd = less than the test detection limit. na = value is non-applicable. sc = see comments below.
 -- = test not performed. v/v = volume analyte/volume sample. w/w = weight analyte/weight sample.
 LT = less than amount specified. GT = greater than amount specified.
 % = parts per hundred. ppm = parts per million. ppb = parts per billion.
 Unit Conversions: 0.0001% = 1 ppm = 1,000 ppb = 1µL/L (v/v) or 1µg/g (w/w)

Comments:

Bruce J Gollub
 Bruce Gollub
 CEO, Analytical Services

Attachments: None
 CC: Justin Thain, Email thainj@airproducts.com
 Jason Harnish, Email harnisjt@airproducts.com
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Water Quality Association Gold Seal Certificate

Air Products and Chemicals, Inc.

7201 Hamilton Blvd
Allentown, PA 18195

Facility: Air Products Monroe, WI Plant



Certification Date: October 15, 2014

Authorized By: *Thomas P. Palkon*

Thomas P. Palkon
Director of Product Certification



Water Quality Association
4151 Naperville Road
Lisle, IL 60532, USA

This Certificate, or any part thereof, may not be used in a misleading manner and validation of its use is contingent upon the Official WQA web-listing.

Revision: 01/07/2013

FORM 12046

Water Quality Association Official Gold Seal Listing

Granted to the following Company:

*Air Products and Chemicals, Inc.
7201 Hamilton Blvd
Allentown, PA 18195*

For the Facility Located at:

*Air Products Monroe, WI Plant
1120 West 17th Street
Monroe, WI*

The WQA Gold Seal Certification Department has issued certification for the following model(s) to the standard(s) below. Only models that appear in the official listing are authorized to bear the WQA Gold Seal.

NSF/ANSI 60 (05/02/2011): Drinking Water Treatment Chemicals - Health Effects is within WQA's ANSI and SCC approved scope of accreditation under the Drinking Water Treatment Chemicals Scheme

Liquid Carbon Dioxide

Notice: To request any changes to the certified model(s), please request a Change to Certified Product (CCP) form. Examples include any change to the wetted parts or formulations such as supplier or material types, literature, or a change in company name. This list is not all inclusive. Failure to submit documentation regarding changes may result in non-compliance with the standard(s) as well as de-listing of the affected models.

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1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Carbon dioxide (Refrigerated)

Chemical formula : CO₂

Synonyms : Carbon dioxide (refrigerated)

Product Use Description : General Industrial

Manufacturer/Importer/Distributor : Air Products and Chemicals, Inc
7201 Hamilton Blvd.
Allentown, PA 18195-1501
GST No. 123600835 RT0001
QST No. 102753981 TQ0001

Telephone : 1-610-481-4911 Corporate
1-800-345-3148 Chemicals Cust Serv
1-800-752-1597 Gases/Electronics Cust Serv

Emergency telephone number (24h) : 800-523-9374 USA
+1 610 481 7711 International

2. HAZARDS IDENTIFICATION

GHS classification

Gases under pressure - Refrigerated liquefied gas

GHS label elements

Hazard pictograms/symbols



Signal Word: Warning

Hazard Statements:

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H281:Contains refrigerated gas; may cause cryogenic burns or injury.
May displace oxygen and cause rapid suffocation.
May increase respiration and heartrate.

Precautionary Statements:

Prevention : P282:Wear cold insulating gloves/face shield/eye protection.
Response : P315 :Get immediate medical advice/attention.
P336 :Thaw frosted parts with lukewarm water. Do not rub affected area.
Storage : P403:Store in a well-ventilated place.

Hazards not otherwise classified

Extremely cold liquid and gas under pressure.
Direct contact with liquid can cause frostbite.
Can cause rapid suffocation.
Avoid breathing gas.
Self contained breathing apparatus (SCBA) may be required.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Volume)
Carbon Dioxide	124-38-9	100 %

Concentration is nominal. For the exact product composition, please refer to technical specifications.

4. FIRST AID MEASURES

General advice : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact : In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Keep eye wide open while rinsing.

Skin contact : In case of frostbite, obtain medical treatment immediately. As soon as practical, place the affected area in a warm water bath- which has a temperature not to exceed 40 °C (105 °F). Do not rub frozen parts as tissue damage may result. Cover wound with sterile dressing.

Ingestion : Ingestion is not considered a potential route of exposure.

Inhalation : Move to fresh air. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped,

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trained personnel should begin cardiopulmonary resuscitation immediately. In case of shortness of breath, give oxygen.

Most important symptoms/effects - acute and delayed : Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness. Salivation. Nausea. Vomiting. Loss of mobility/consciousness. Shivering fit. Sweating. Blurred vision. Headache. Increased pulse rate. Shortness of breath. Rapid respiration.

Immediate Medical Attention and Special Treatment

Treatment : If exposed or concerned: Get medical attention/advice.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : All known extinguishing media can be used.

Specific hazards : Spill will rapidly vaporize forming an oxygen deficient vapor cloud. Vapor cloud may obscure visibility. Do not direct water spray at container vent. Move away from container and cool with water from a protected position. Keep containers and surroundings cool with water spray.

Special protective equipment for fire-fighters : Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures : Monitor carbon dioxide level. Evacuate personnel to safe areas. Ventilate the area. Monitor oxygen level. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.

Environmental precautions : Prevent further leakage or spillage. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Do not discharge into any place where its accumulation could be dangerous.

Methods for cleaning up : Ventilate the area.

Additional advice : If possible, stop flow of product. Increase ventilation to the release area and monitor oxygen level. Vapor cloud may obscure visibility. Do not spray water directly at leak. If leak is from cylinder or cylinder valve, call the emergency telephone number. If the leak is in the user's system, close the cylinder valve and safely vent the pressure before attempting repairs.

7. HANDLING AND STORAGE

Handling

Know and understand the properties and hazards of the product before use. Only experienced and properly instructed persons should handle compressed gases/cryogenic liquids. Before using the product, determine its identity by reading the label. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system

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into the container is prevented. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Do not remove or interchange connections. Ensure the complete gas system has been checked for leaks before use. Prevent entrapment of cryogenic liquid in closed systems not protected with relief device. A small quantity of liquid produces large volumes of vaporized gas at atmospheric pressure. Containers used in shipment, storage, and transfer of cryogenic liquid are specially designed, well-insulated containers equipped with a pressure relief device and valves to control pressure. Under normal conditions, these containers will periodically vent product to limit pressure buildup. Ensure that the container is in a well-ventilated area to avoid creating an oxygen-deficient atmosphere. Use adequate pressure relief in systems and piping to prevent pressure buildup; liquid in a closed container can generate extremely high pressures when vaporized by warming. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Only transfer lines designed for cryogenic liquids shall be used. Do not subject containers to abnormal mechanical shock. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier.

Storage

Open/close valve slowly. Close when not in use. Wear Safety Eye Protection. Check Safety Data Sheet before use. Use a back flow preventative device in the piping. Do not change or force fit connections. Close valve after each use and when empty. Always keep container in upright position. Read and follow the Safety Data Sheet (SDS) before use. Do not allow storage temperature to exceed 50°C (122°F). Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Full containers should be stored so that oldest stock is used first. Do not store in a confined space. Full and empty cylinders should be segregated. Store containers in location free from fire risk and away from sources of heat and ignition. Return empty containers in a timely manner. Stored containers should be periodically checked for general condition and leakage. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Cryogenic containers are equipped with pressure relief devices to control internal pressure. Under normal conditions these containers will periodically vent product. All vents should be piped to the exterior of the building. Observe all regulations and local requirements regarding storage of containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Provide natural or mechanical ventilation to prevent accumulation above exposure limits.
Natural or mechanical to prevent oxygen deficient atmospheres below 19.5% oxygen.
Keep self contained breathing apparatus readily available for emergency use.

Personal protective equipment

- Respiratory protection : Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmosphere.
Air purifying respirators will not provide protection. Users of breathing apparatus must be trained.
- Hand protection : Wear working gloves when handling gas containers.
If the operation involves possible exposure to a cryogenic liquid, wear loose fitting thermal insulated or cryo-gloves.

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- Eye protection : Safety glasses recommended when handling cylinders.
Protect eyes, face and skin from liquid splashes.
Wear goggles and a face shield when transfilling or breaking transfer connections.
- Skin and body protection : Never allow any unprotected part of the body to touch uninsulated pipes or vessels which contain cryogenic fluids. The extremely cold metal will cause the flesh to stick fast and tear when one attempts to withdraw from it.
Safety shoes are recommended when handling cylinders.
- Special instructions for protection and hygiene : Ensure adequate ventilation, especially in confined areas.

Exposure limit(s)

Carbon Dioxide	Time Weighted Average (TWA): ACGIH	5,000 ppm	-
Carbon Dioxide	Short Term Exposure Limit (STEL): ACGIH	30,000 ppm	-
Carbon Dioxide	Recommended exposure limit (REL): NIOSH	5,000 ppm	9,000 mg/m ³
Carbon Dioxide	Short Term Exposure Limit (STEL): NIOSH	30,000 ppm	54,000 mg/m ³
Carbon Dioxide	Permissible exposure limit: OSHA Z1	5,000 ppm	9,000 mg/m ³
Carbon Dioxide	Time Weighted Average (TWA): TN OEL	10,000 ppm	18,000 mg/m ³
Carbon Dioxide	Short Term Exposure Limit (STEL): TN OEL	30,000 ppm	54,000 mg/m ³

Remarks : Simple asphyxiant.

9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance : Liquefied gas. Colorless.
- Odor : No odor warning properties.
- Odor threshold : No data available.
- pH : Not applicable.
- Melting point/range : -70 °F (-56.6 °C)
- Boiling point/range : -109 °F (-78.5 °C)
- Flash point : Not applicable.
- Evaporation rate : Not applicable.
- Flammability (solid, gas) : Refer to product classification in Section 2
- Upper/lower explosion/flammability limit : No data available.
- Vapor pressure : 831.04 psia (57.30 bara) at 68 °F (20 °C)

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Water solubility	: 2.000 g/l
Relative vapor density	: 1.52 (air = 1)
Relative density	: 1.03 (water = 1)
Partition coefficient (n-octanol/water)	: Not applicable.
Auto-ignition temperature	: No data available.
Decomposition temperature	: No data available.
Viscosity	: Not applicable.
Molecular Weight	: 44 g/mol

10. STABILITY AND REACTIVITY

Chemical Stability	: Stable under normal conditions.
Conditions to avoid	: No data available.
Materials to avoid	: Carbon steel.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Possibility of hazardous Reactions/Reactivity	: No data available.

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Likely routes of exposure

Effects on Eye	: Contact with liquid may cause cold burns/frostbite.
Effects on Skin	: Contact with liquid may cause cold burns/frostbite. May cause severe frostbite.
Inhalation Effects	: Concentrations of 10% CO ₂ or more can produce unconsciousness or death. Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. Carbon Dioxide is physiologically active, affecting circulation and breathing. At concentrations between 2 and 10%, carbon dioxide can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Asphyxiation

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may bring about unconsciousness without warning and so rapidly that victim may be unable to protect themselves.

Ingestion Effects : Ingestion is not considered a potential route of exposure.

Symptoms : Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness. Salivation. Nausea. Vomiting. Loss of mobility/consciousness. Shivering fit. Sweating. Blurred vision. Headache. Increased pulse rate. Shortness of breath. Rapid respiration.

Acute toxicity

Acute Oral Toxicity : No data is available on the product itself.

Inhalation : Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. 5% CO₂ has been found to act synergistically to increase the toxicity of certain other gases (CO, NO₂). CO₂ has been shown to enhance the production of carboxy- or met-hemoglobin by these gases possibly due to carbon dioxide's stimulatory effects on the respiratory and circulatory systems.

Acute Dermal Toxicity : No data is available on the product itself.

Skin corrosion/irritation : No data available.

Serious eye damage/eye irritation : No data available.

Sensitization. : No data available.

Chronic toxicity or effects from long term exposures

Carcinogenicity : No data available.

Reproductive toxicity : No data is available on the product itself.

Germ cell mutagenicity : No data is available on the product itself.

Specific target organ systemic toxicity (single exposure) : No data available.

Specific target organ systemic toxicity (repeated exposure) : No data available.

Aspiration hazard : No data available.

Delayed and Immediate Effects and Chronic Effects from Short and Long Term Exposure

Not applicable.

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12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity : Not applicable.

Toxicity to fish - Components

Carbon Dioxide LC50 (1 h) : 240 mg/l

Species : Rainbow trout (Oncorhynchus mykiss).

Carbon Dioxide LC50 (96 h) : 35 mg/l

Species : Rainbow trout (Oncorhynchus mykiss).

Toxicity to other organisms : Not applicable.

Persistence and degradability

Biodegradability : No data is available on the product itself.

Mobility : Because of its high volatility, the product is unlikely to cause ground pollution.

Bioaccumulation : Refer to Section 9 "Partition Coefficient (n-octanol/water)".

Further information

When discharged in large quantities may contribute to the greenhouse effect.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : Return unused product in original cylinder to supplier. Contact supplier if guidance is required.

Contaminated packaging : Return cylinder to supplier.

14. TRANSPORT INFORMATION

DOT

UN/ID No. : UN2187
Proper shipping name : Carbon dioxide, refrigerated liquid
Class or Division : 2.2
Label(s) : 2.2
Marine Pollutant : No

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IATA

UN/ID No. : UN2187
Proper shipping name : Carbon dioxide, refrigerated liquid
Class or Division : 2.2
Label(s) : 2.2
Marine Pollutant : No

IMDG

UN/ID No. : UN2187
Proper shipping name : CARBON DIOXIDE, REFRIGERATED LIQUID
Class or Division : 2.2
Label(s) : 2.2
Marine Pollutant : No

TDG

UN/ID No. : UN2187
Proper shipping name : CARBON DIOXIDE, REFRIGERATED LIQUID
Class or Division : 2.2
Label(s) : 2.2
Marine Pollutant : No

Further Information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact customer service.

15. REGULATORY INFORMATION

Toxic Substance Control Act (TSCA) 12(b) Component(s):

None.

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on Inventory.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
Japan	ENCS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.

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EPA SARA Title III Section 312 (40 CFR 370) Hazard Classification
Acute Health Hazard

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)
This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other harm.

16. OTHER INFORMATION

Prepared by : Air Products and Chemicals, Inc. Global EH&S Product Safety Department

Telephone : 1-610-481-4911 Corporate
1-800-345-3148 Chemicals Cust Serv
1-800-752-1597 Gases/Electronics Cust Serv

Preparation Date : 08/22/2016

For additional information, please visit our Product Stewardship web site at
<http://www.airproducts.com/productstewardship/>

Request for Taxpayer Identification Number and Certification

**Give Form to the
 requester. Do not
 send to the IRS.**

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.
Air Products and Chemicals, Inc.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification; check only **one** of the following seven boxes:
 Individual/sole proprietor or single-member LLC
 C Corporation S Corporation Partnership Trust/estate
 Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____
Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.
 Other (see instructions) ▶ _____

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):
 Exempt payee code (if any) **5**
 Exemption from FATCA reporting code (if any) _____
(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.)
7201 Hamilton Boulevard

6 City, state, and ZIP code
Allentown, PA 18195-1501

7 List account number(s) here (optional)

Requester's name and address (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number									
OR									
Employer identification number									
2	3	-	1	2	7	4	4	5	5

Part II Certification

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
- I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
- I am a U.S. citizen or other U.S. person (defined below); and
- The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here Signature of U.S. person ▶ *Arthur Antonucci* Date ▶ *11/7/2016*

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at www.irs.gov/fw9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)

- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding?* on page 2.

By signing the filled-out form, you:

- Certify that the TIN you are giving is correct (or you are waiting for a number to be issued).
- Certify that you are not subject to backup withholding, or
- Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
- Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

