

INVITATION TO BID

ITB No. 4381

WATER TREATMENT PLANT CHEMICAL BID CARBON DIOXIDE (CO₂)



Due Date: Thursday, April 30, 2015 at 2:00 p.m.

Issued By:

City of Ann Arbor
Procurement Unit
301 E. Huron Street
Ann Arbor, MI 48104

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ADVERTISEMENT
FOR THE
WATER TREATMENT CHEMICAL BID
CARBON DIOXIDE (CO₂)
ITB NO. 4381

Sealed Bids will be received by the City of Ann Arbor Procurement Unit, 301 East Huron Street, Fifth Floor, Larcom City Hall, on or before Thursday, April 30, 2015 by 2:00 PM for the chemical Carbon Dioxide (CO₂) for use by the City's Water Treatment System. Bids will be publically opened and read aloud at this time.

Carbon Dioxide must be supplied to the City Water Treatment Plan, fob destination, freight prepaid. The selected bidder will be responsible for transferring the product from the transport vehicle to the City storage vessel.

Bid documents, plans, specifications, and addenda shall be downloaded by Bidders at either of the following websites: Michigan Inter-governmental Trade Network (MITN) www.mitn.info or City of Ann Arbor Purchasing website: www.A2gov.org. It is the Bidder's responsibility to verify they have obtained all information before submitting a bid.

Each bidder shall provide the City of Ann Arbor with a complete copy of the U. S. Department of Occupational Safety & Health Administration, Material Safety Data Sheets, (form OSHA-20) for each product bid.

A Bid, once submitted, becomes the property of the City. In the sole discretion of the City, the City reserves the right to allow a bidder to reclaim submitted documents provided the documents are requested and retrieved no later than 48 hours prior to the scheduled bid opening.

Precondition for entering into a Contract with the City of Ann Arbor is compliance with Chapter 112 of Title IX of the Code of the City of Ann Arbor. Further information is outlined in the Contract Documents.

After the time of opening, no Bid may be withdrawn for a period of 60 days. The City reserves the right to accept any Bid, to reject any or all Bids, to waive irregularities and/or informalities in any Bid, and to make the award in any manner the City believes to be in its best interest.

Any further information on bid documents may be obtained from the Procurement Office, (734) 794-6500.

CITY OF ANN ARBOR PROCUREMENT UNIT

INVITATION TO BID

City of Ann Arbor
Guy C. Larcom Municipal Building
Ann Arbor, Michigan 48107

Ladies and Gentlemen:

The undersigned, as Bidder, declares that this Bid is made in good faith, without fraud or collusion with any person or persons bidding on the same Contract; that this Bidder has carefully read and examined the bid documents, including, City Nondiscrimination and Wage requirements, Vendor Conflict of Interest Form, Instructions to Bidders, Bid, Bid Forms, Contract, Bond Forms (if any), General Conditions, Standard Specifications, Detailed Specifications, all Addenda, and the Plans (if applicable) and understands them. The Bidder declares that it is fully informed as to the nature of the work and the conditions relating to the work's performance. The Bidder also declares that it has extensive experience in successfully completing projects similar to this one.

The Bidder acknowledges that it has not received or relied upon any representations or warrants of any nature whatsoever from the City of Ann Arbor, its agents or employees, and that this Bid is based solely upon the Bidder's own independent business judgment.

In accordance with these bid documents, and Addenda numbered _____, the undersigned, as Bidder, proposes to perform all work included herein for the amounts set forth in the Bid Forms.

The Bidder declares that it has become familiar with the City Conflict of Interest Disclosure Form and certifies that the statement contained therein is true and correct.

If the Bidder enters into the Contract in accordance with this Bid, or if this Bid is rejected, then the accompanying check or Bid Bond shall be returned to the Bidder.

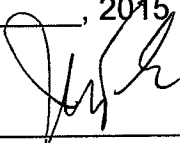
In submitting this Bid, it is understood that the right is reserved by the City to accept any Bid, to reject any or all Bids, to waive irregularities and/or informalities in any Bid, and to make the award in any manner the City believes to be in its best interest.

SIGNED THIS 24th DAY OF April, 2015

Continental Carbonic Products, Inc.
Bidder's Name

3985 E. Harrison Ave., Decatur, IL 62526
Official Address

217-428-2068
Telephone Number


Authorized Signature of Bidder

John W. Funk, President
(Print Name of Signer Above)

info@continentalcarbonic.com
Email Address for Award Notice

Section 1
INSTRUCTIONS TO BIDDERS

General

The City is soliciting bids for Carbon Dioxide (CO₂). Chemical specifications are included in Section 2

Any Bid which does not conform fully to these instructions may be rejected.

Site Inspection

Prior to Tuesday, April 28, 2015, a bidder may inspect the City's site and equipment. Inspections are by appointment only during business hours (8:00 a.m. to 3:00 p.m). Appointments can be scheduled by email to Larry Sanford, Assistant Manager, Water Treatment Unit at LSanford@a2gov.org. No appointments will be scheduled after April 28, 2015

Preparation of Bids

Bids should be prepared providing a straight-forward, concise description of the Bidder's ability to meet the requirements of the ITB. Bids shall be written in ink or typewritten. No erasures are permitted. Mistakes may be crossed out and corrected and must be initialed and dated in ink by the person signing the Bid.

Bids must be submitted on the "Bid Forms" provided with each blank properly filled in. If forms are not fully completed it may disqualify the bid.

Each person signing the Bid certifies that he/she is the person in the Bidder's firm/organization responsible for the decision as to the fees being offered in the Bid and has not and will not participated in any action contrary to the terms of this provision.

Questions or Clarification on ITB Specifications

All questions regarding this ITB shall be submitted via email. Emailed questions and inquires will be accepted from any and all prospective Bidders in accordance with the terms and conditions of the ITB.

All questions shall be submitted by April 24, 2015 and should be addressed as follows:
Specification/Scope of Work questions emailed to Larry Sanford, Asst. Mgr, Water Treatment Services Unit at LSanford@a2gov.org.

Bid Process and HR Compliance questions emailed to Mark Berryman, Purchasing Manager at mberryman@a2gov.org.

Addenda

If it becomes necessary to revise any part of the ITB, notice of the Addendum will be posted to Michigan Inter-governmental Trade Network (MITN) www.mitn.info and/or City of Ann Arbor web site www.A2gov.org for all parties to download.

Each Bidder must in its Bid, to avoid any miscommunications, acknowledge all addenda which it has received, but the failure of a Bidder to receive, or acknowledge receipt of; any addenda shall not relieve the Bidder of the responsibility for complying with the terms thereof.

The City will not be bound by oral responses to inquiries or written responses other than written addenda.

Bid Submission

All Bids are due and must be delivered to the City of Ann Arbor Procurement Unit on or before Thursday, April 30, 2015 by 2:00 PM. Bids submitted late or via oral, telephonic, telegraphic, electronic mail or facsimile **will not** be considered or accepted.

Each Bidder must submit one (1) original Bid and one (1) additional Bid copies in a sealed envelope clearly marked: **ITB No. 4381 – Water Treatment Chemical – Carbon Dioxide.**

Bids must be addressed and delivered to:

City of Ann Arbor
Procurement Unit,
c/o Customer Service, 1st Floor
301 East Huron Street
P.O. Box 8647
Ann Arbor, MI 48107

All Bids received on or before the Due Date will be publicly opened and recorded immediately. No immediate decisions are rendered.

Hand delivered Bids will be date/time stamped/signed by the Procurement Unit at the address above in order to be considered. Normal business hours are 9:00 a.m. to 3:00 p.m. Monday through Friday, excluding Holidays. The City will not be liable to any Bidder for any unforeseen circumstances, delivery or postal delays. Postmarking to the Due Date will not substitute for receipt of the Bid. Each Bidder is responsible for submission of their Bid.

Additional time for submission of bids past the stated due date and time will not be granted to a single Bidder; however, additional time may be granted to all Bidders when the City determines in its sole discretion that circumstances warrant it.

Award

The City intends to award a Contract(s) to the lowest responsible Bidder(s). For unit price bids, the contract will be awarded based upon the unit prices and the lump sum prices stated by the bidder. If the City determines that the unit price for any item is materially different for the work item bid than either other bidders or the general market, the City, in its sole discretion, in addition to any other right it may have, may reject the bid as not responsible or non-conforming.

The City intends to issue a purchase order to the selected Bidder. The City Purchase Order terms and conditions have been included. The contract term is to start approximately July 1, 2015 and continue through June 30, 2016 (twelve-month period). The City reserves the right to renew the contract with the selected Bidder for up to three (3) one-year periods provided that by sixty (60) days prior to the end of the original contract term or renewal term (as applicable) written notice of the City's exercise of its extension rights is provided to the Vendor. Extension to be under the same terms and conditions.

Official Documents

The City of Ann Arbor officially distributes bid documents from the Procurement Unit or through the Michigan Intergovernmental Trade Network (MITN). Copies of the bid documents obtained from any other source are not Official copies. Addenda and other bid information will only be posted to these official distribution sites. If you obtained City of Ann Arbor Bid documents from other sources, it is recommended that you register on www.MITN.info and obtain an official Bid.

Withdrawal of Bids

After the time of opening, no Bid may be withdrawn for the period of 60 days specified in the Advertisement. Bid Pricing must be firm through August 30, 2015

Human Rights Information

All contractors proposing to do business with the City shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the Section 9:158 of the Ann Arbor City Code. Breach of the obligation not to discriminate as outlined in the General Conditions section herein shall be a material breach of the contract. Contractors are required to post a copy of Ann Arbor's Non-Discrimination Ordinance at all work locations where its employees provide services under a contract with the City.

Disclosures

After bids are opened, all information in a submitter's bid is subjected to disclosure under the provisions of Michigan Public Act No. 442 of 1976, as amended (MCL 15.231 et seq.) known as the "Freedom of Information Act." The Freedom of Information Act

also provides for the complete disclosure of contracts and attachments thereto except where specifically exempted.

Bid Protest

All Bid protests must be in writing and filed with the Purchasing Agent within five (5) business days of the award action. The Bidder must clearly state the reasons for the protest. If a Bidder contacts a City Service Area/Unit and indicates a desire to protest an award, the Service Area/Unit shall refer the Bidder to the Purchasing Agent. The Purchasing Agent will provide the Bidder with the appropriate instructions for filing the protest. The protest shall be reviewed by the City Administrator or designee whose decision shall be final.

Reservation of Rights

The City of Ann Arbor reserves the right to accept any bid or alternative bid proposed in whole or in part, to reject any or all bids or alternatives bids in whole or in part and to waive irregularity and/or informalities in any bid and to make the award in any manner deemed in the best interest of the City.

**SECTION 2
CITY OF ANN ARBOR
STANDARD SPECIFICATIONS
FOR
CARBON DIOXIDE**

This standard pertains to carbon dioxide (CO₂) for use in recarbonation and pH adjustment in the treatment of municipal water supplies.

PART 1: General Information

Part 1.1 Definitions

The following definitions shall apply in this standard:

Manufacturer: Any party that produces carbon dioxide as covered by this standard.

Purchaser: Any party that enters into a contract, either written or verbal, to purchase carbon dioxide in accordance with the provisions of this standard.

Vendor: Any party that enters into a contract, either written or verbal, to supply carbon dioxide for purchase in accordance with this standard.

Part 1.2 Affidavit of Compliance

The purchaser requires an affidavit from the manufacturer or vendor that the carbon dioxide furnished under the purchaser's orders meets or exceeds the specifications of this standard.

Part 1.3 Rejection

Notice of Nonconformance. If the carbon dioxide does not meet the requirements of this standard, a notice of nonconformance shall be provided by the purchaser to the vendor within 10 working days of receipt of the shipment at its point of destination. The results of the purchaser's test shall prevail unless the vendor notifies the purchaser within five working days of receipt of the notice of nonconformance that a retest is desired. On receipt of the request for a retest, the purchaser shall forward to the vendor one of the sealed samples taken in accordance to section 4 of this standard. In the event that the retest results do not agree with the test results of the purchaser, the other sealed sample shall be forwarded to a referee laboratory agreed upon by both parties for analysis. The results of the referee laboratory's analysis shall be considered final. If the shipment is found to be in compliance with this standard, then the cost of the referee laboratory shall be assumed by the purchaser. If the shipment is found not to meet the specifications of this standard, the cost of the referee laboratory shall be assumed by the vendor.

If the material delivered is found to not meet the requirements of this standard, the responsibility of removal from the point of destination shall fall wholly on the vendor. An exception to this point may be made if a price adjustment is made between the vendor and the purchaser.

PART 2: Specifications

Part 2.1 Description

Carbon dioxide gas is a colorless, odorless and tasteless gas that forms a very weak acid, carbonic acid, upon addition to water.

Part 2.2 Physical Requirements

Carbon dioxide is colorless gas weighing 1.977 g/L at 0° C and at a pressure of 760 mm of Hg, which creates the characteristic olfactory sensation.

Part 2.3 Chemical Requirements

Commercial carbon dioxide suitable for use in the treatment of potable water supplies shall have a carbon dioxide content of at least 99.5 percent by weight. Carbon dioxide of 99.5 percent purity by weight shall correspond to Quality Verification Level (QVL) F.

Part 2.3 Impurities

The carbon dioxide in accordance with this standard shall contain no soluble inorganic or organic substances in quantities capable of producing deleterious or injurious effects on the health of those consuming water or that would otherwise render the water that has been treated properly with carbon dioxide unfit for public use. The carbon dioxide shall not impart to the water at its rate of feed any contaminants that would cause the established drinking water standards to be exceeded when combined with the concentration of contaminants already present in the water to be treated.

The water content of the liquid carbon dioxide shall not exceed 200 ppm (v/v), (-36° F dew point) at the time of delivery.

The non-volatile residues of the carbon dioxide shall not exceed 10 ppm.

All other contaminants should not exceed those as stipulated in Table 1 of AWWA B510-00.

Carbon dioxide is a direct additive used in the treatment of potable water. This material shall be certified as suitable for contact with or treatment of drinking water by an accredited certification organization in accordance with ANSI/NSF Standard 60, Drinking Water Treatment Chemicals-Health Effects.

PART 3: Delivery

Part 3.1 Marking

All shipment containers, cylinders or bulk, shall have markings, tags, labels, or serial numbers as required by the United States Department of Transportation (USDOT).

Part 3.2 Shipping

Bulk shipments shall be accompanied by weight certificates from certified weighers. In lieu of weight certificates, certified liquid meter tickets are acceptable.

PART 4: Verification

Part 4.1 Sampling

Samples shall be taken at the point of destination, in accordance to AWWA510-00, or by another sampling protocol as mutually agreed upon by both the vendor and the purchaser

Part 4.2 Testing Procedures

All testing shall be done in accordance to the most current and applicable AWWA standard for carbon dioxide. It may be unnecessary to test for certain impurities, depending on the method of manufacturing used by the manufacturer. The following is a partial list of chemical and physical characteristics that may be tested for:

- 1. Purity**
- 2. Water content**
- 3. Total hydrocarbon content**
- 4. Oxygen content**
- 5. Carbon monoxide content**
- 6. Hydrogen Sulfide content**
- 7. Nitrogen oxides content**
- 8. Ammonia content**
- 9. Sulfur dioxide content**
- 10. Carbonyl sulfide content**
- 11. Non-volatile residues content**
- 12. Odor (indirect testing procedure)**

SECTION 3: INSURANCE

Effective the date of this Agreement, and continuing without interruption during the term of this Agreement, Contractor shall provide certificates of insurance to the City on behalf of itself, and when requested any subcontractor(s).

A. The certificates of insurance shall meet the following minimum requirements.

1. Worker's Compensation Insurance in accordance with all applicable state and federal statutes. Further, Employers Liability Coverage shall be obtained in the following minimum amounts:

Bodily Injury by Accident - \$500,000 each accident
Bodily Injury by Disease - \$500,000 each employee
Bodily Injury by Disease - \$500,000 each policy limit

2. Commercial General Liability Insurance equivalent to, as a minimum, Insurance Services Office form CG 00 01 07 98 or current equivalent. The City of Ann Arbor shall be an additional insured. There shall be no added exclusions or limiting endorsements including, but not limited to: Products and Completed Operations, Explosion, or Pollution. Limited Pollution endorsement is allowed if Broadened Pollution Liability Coverage is included in the Motor Vehicle Liability Insurance. Further, the following minimum limits of liability are required:

\$1,000,000	Each occurrence as respect Bodily Injury Liability
or	
	Property Damage Liability, or both combined
\$2,000,000	Per Job General Aggregate
\$1,000,000	Personal and Advertising Injury

3. Motor Vehicle Liability Insurance, including Michigan No-Fault Coverages, equivalent to, as a minimum, Insurance Services Office form CA 00 01 07 97 or current equivalent. The City of Ann Arbor shall be an additional insured. There shall be no added exclusions or limiting endorsements. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles. Further, the limits of liability shall be \$1,000,000 for each occurrence as respects Bodily Injury Liability or Property Damage Liability, or both combined. Pollution Liability – Broadened Coverage Required

4. Umbrella/Excess Liability Insurance shall be provided to apply in excess of the Commercial General Liability,

Employers Liability and the Motor Vehicle coverage enumerated above, for each occurrence and for aggregate in the amount of \$1,000,000.

- B. Insurance required under A.2 and A.3 above of this contract shall be considered primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute with this insurance. Further, the Contractor agrees to waive any right of recovery by its insurer against the City.
- C. Documentation must provide and demonstrate an unconditional 30 day written notice of cancellation in favor of the City of Ann Arbor. Further, the documentation must explicitly state the following: (a) the policy number; name of insurance company; name and address of the agent or authorized representative; name and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions which shall be approved by the City, in its sole discretion; (c) that the policy conforms to the requirements specified. An original certificate of insurance may be provided as an initial indication of the required insurance, provided that no later than 21 calendar days after commencement of any work the Contractor supplies a copy of the endorsements required on the policies. Upon request, the Contractor shall provide within 30 days a copy of the policy(ies) to the City. If any of the above coverages expire by their terms during the term of this contract, the Contractor shall deliver proof of renewal and/or new policies to the Administering Service Area/Unit at least ten days prior to the expiration date.

SECTION 4: BID FORM

All Bidders shall submit pricing in the format requested

CARBON DIOXIDE BULK	\$ 100.00*	TON
FREIGHT	\$ 15.00*	TON
TOTAL DELIVERED COST	\$ 115.00*	TON

INVOICE TERMS: Discount of 0 % or \$0.00 will be allowed for payment of invoice thirty (30) days from day of delivery and acceptance.

OTHER TERMS: Less than 30 days, E.O.M., Proximo, etc., will not be considered in determining award of contract.

Liquid Oxygen shall be supplied to the City of Ann Arbor Water Treatment Plant, f.o.b. destination, freight prepaid. Contractor shall be responsible for transferring the product from transport vehicle to the City of Ann Arbor storage vessel. Bidder shall specify minimum shipping amount if any:

TWENTY (20) TON MINIMUM DELIVERY

QUANTITY: The annual quantity is approximately **560 Tons**. This quantity is for estimating purposes only, not a guarantee of actual usage. Product will be ordered on an "as needed" basis. All prices are to remain firm.

MONITORING: The successful Provider may provide a telemetry device(s) for tank monitoring that provides data to the Provider on tank level, so that ordering product is unnecessary and resupply is managed by the supplier according to the needs of the Water Treatment Plant. This device (these devices) will be at no cost to the City of Ann Arbor.

*Subject to a twenty (20) ton minimum and standard CCPI uncontrollable disruption language**. Pricing offered herein is based on a cash discount resulting from Customer paying its CCPI invoices by cash, check or ACH fund transfer (collectively, "Cash Equivalents"). Failure to pay by Cash Equivalent shall result in the application of CCPI's undiscounted prices for the goods and services in question. If Customer chooses to process its purchase orders by means of a third party process that charges CCPI a processing or transaction fee or pay a CCPI invoice by means of a Cash Equivalent through a third party online invoice payment system or any other third party process that charges CCPI a processing or transaction fee (e.g. Ariba), Customer shall be required to reimburse CCPI for such fees. Pricing assumes invoices will be sent electronically.

**Neither party hereto will be liable in damages or otherwise to the other for default or delay in the performance of any of its obligations hereunder due to an uncontrollable interruption which shall include Acts of God, accident, fire, flood, storm, riot, war, sabotage, explosion, strike, lockout, labor disturbance, national defense requirement, governmental action, law, ordinance, rule or regulation, whether valid or invalid, inability to obtain or curtailment of electricity or other type of energy, raw material, labor, equipment or transportation, failures of normal sources of supply, or any similar or different contingency beyond its reasonable control which would make performance commercially impracticable whether or not contingency is the same type as those enumerated above. If, as a result of an uncontrollable interruption, CCPI incurs increased cost to produce or deliver the Product, CCPI shall have the right to pass along this cost increase to PURCHASER. PURCHASER shall have the right to decline to purchase Product as long as such price increase is in effect. If PURCHASER purchases Product from CCPI after having received notice of such price increase(s), PURCHASER shall pay its current price for Product plus such increase(s).

SECTION 5: PRICING

Supplier may revise the price semi-annually using the formula below, using the Producers Price Index (PPI) published by the U.S. Bureau of Labor Statistics ("BLS"). The choice of specific BLS Producers Price index or indices and the weighting given to a choice of multiple indices will be mutually agreed upon by the City and the Provider. Seasonally unadjusted indices will be used. The adjusted price will be in effect for six months only, at which time it will be adjusted again or revert to the bid price (base selling price).

- The Supplier should include in their bid an appropriate index or indices and the weighting to be applied to each. The Supplier should include the Series ID number with their bid and include their proposed revision formula.
- The Supplier will adjust the price semiannually, on January 20 and July 20 (if the renewal extensions are exercised or the contract is multiyear). The bid price (base selling price) must be in effect for at least 6 months before the first price adjustment.
- The Base Selling Price will be the amount bid by the Supplier.
- The Base Period Factor, denoted with a subscripted zero (in the example: E_0 and D_0), shall consist of an average of the most recent finalized indices for a period of one year, immediately preceding the date of the approved City Council resolution for the product being purchased, for that particular representative index. For monthly published indices this will be the arithmetic average of the twelve most recently published finalized indices. For quarterly published indices this will be the arithmetic average of the four most recently published finalized indices.
- The Adjustment Factor, denoted with no subscript (in the example: E and D), shall be based upon an average of the six most recently published monthly indices, (or three most recently published quarterly indices) at the time of the revision, for that particular index. For timeliness, if any monthly or quarterly index is still preliminary (designated with a P in the published numbers) at the time of the revision, it will be used in its preliminary state.
- Should the index referenced cease to be published or is published in an alternate form (different Series Number, Base Date, or Period), a mutually agreed upon and similar index will be used for future adjustments.
- When Base Dates are revised by the BLS, rebasing shall be done as needed based upon the old and new reference base period.
- The US Bureau of Labor Statistics Producers Price indices can be found at www.bls.gov/ppi
- The Revision Formula is: $P = P_0[r/100(X/X_0) + s/100(Y/Y_0) + t/100(Z/Z_0) + \dots]$
Where
- P_0 = Base Selling Price or original bid price as per the Bid Documents.
- P = Revised product price for the new future six month period.
- X_0 = Base Period Factor for a selected index.
- X = Adjustment Factor for the same index.

$r + s + t + \dots = 100$ = weighted proportion of selected index in revision formula

Following is an example of a revision formula. The parameters are defined below.

$$P = P_0 \times [0.70 (E/E_0) + 0.30 (D/D_0)]$$

Product Price

P_0 = Base Selling Price or original bid price as per the Bid Documents

P = Revised product price for the new future six month period.

Electric Power

E_0 = Base Period Factor for Electric Power Distribution – East North Central

E = Adjustment Factor for Electric Power Distribution – East North Central PPI Monthly Index - Series ID: PCU221122221122433, Not Seasonally Adjusted, Base Date: 9012

Diesel

D_0 = Base Period Factor for #2 Diesel Fuel

D = Adjustment Factor for #2 Diesel Fuel PPI Monthly Index - Series ID: WPU057303, Not Seasonally Adjusted, Base Date: 8200

LEGAL STATUS OF BIDDER

(The Bidder shall fill out the applicable section and strike out the other two.)

Bidder declares that it is:

- A corporation organized and doing business under the laws of the State of Illinois, Macon County for whom John W. Funk, bearing the office title of President, whose signature is affixed to this Bid, is authorized to execute contracts.

NOTE: If not incorporated in Michigan, please attach the corporation's Certificate of Authority

~~A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.~~

~~A partnership, organized under the laws of the state of _____ and filed in the county of _____, whose members are (list all members and the street and mailing address of each) (attach separate sheet if necessary):~~

~~An individual, whose signature with address, is affixed to this Bid: _____ (initial here)~~

Authorized Official

 _____ Date April 24, 2015

(Print) Name John W. Funk Title President

Company: Continental Carbonic Products, Inc.

Address: 3985 East Harrison Avenue

Contact Phone (217) 428-2068 Fax (217) 424-2325

Email: info@continentalcarbonic.com

Doc Number:	MFG.LIQ.SOP.0020
Title:	Liquid Plant - Carbon Dioxide Testing Procedures
Location:	CCPI Plants

1.0 Purpose

1.1 This procedure is the standard to document LCO2 finished and raw gas quality results.

2.0 Applicability

2.1 All production employees and management are responsible for knowing this procedure and following it.

3.0 Responsibility

3.1 The facility managers are the people responsible for up keep and answering questions on the procedure. They are responsible for ensuring the procedure is updated and personnel are trained in accordance with the newest revisions.

4.0 Definitions

4.1 N/A

5.0 Materials / Supplies Needed

- 5.1 Sodium Hydroxide
- 5.2 Analyzers – Acetaldehyde, Benzene, Total Hydrocarbons, Total Sulfur, Oxygen (Beverage grade)
- 5.3 Zahm & Nagel, Burette CO₂ purity test flask (Models 25772 and 25756)
- 5.4 Gastec sampling pump
- 5.5 Pittsburgh Cup
- 5.6 Tubes as specified in section 8.0

6.0 Safety Assurance Components

- 6.1 Operating the equipment, to be safe and efficient, requires skill: the exercise of extreme care and good judgment, alertness and concentration.
- 6.2 No person should be permitted to operate the equipment if:
 - 6.2.1 They cannot speak the appropriate language or read and understand the printed instructions.
 - 6.2.2 Their hearing or eyesight is impaired (unless suitably corrected with good depth perception).
 - 6.2.3 Unless the employee has carefully read and studied this procedure.
 - 6.2.4 Unless the employee has been properly instructed.
 - 6.2.5 Unless the employee has been properly trained.
- 6.3 Responsibility: Each employee should be held directly responsible for the safe operation of the equipment. Whenever there is any doubt as to SAFETY, the employee should stop and refuse to continue until safety has been assured.
- 6.4 Inspection: Check the integrity of the equipment that will be used.
- 6.5 Proper Personal Protective Equipment:
 - 6.5.1 The employee shall wear safety glasses to protect their eyes. Safety glasses are to be approved by the facility.
 - 6.5.2 The employee shall wear at the minimum a bump cap to protect their head. Head protection is to be approved by the facility.
 - 6.5.3 The employee shall wear appropriate gloves to protect their hands. Gloves are to be approved by the facility.

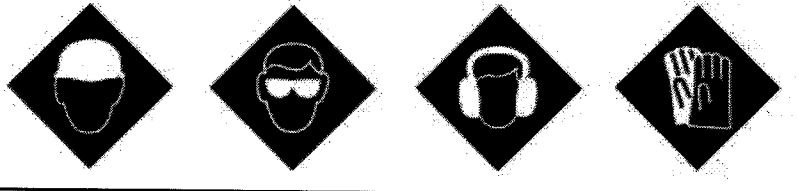
- 6.5.4 The employee shall wear safety footwear i.e. steel toe boots to protect their feet. Footwear is to be approved by the facility.
- 6.5.5 Employee shall wear hearing protection, if required by the facility. However, when using power equipment, hearing protection should be used.

7.0 Quality Assurance Components

7.1 Analyzer shall be calibrated at least monthly.

8.0 Procedure

PPE Suggested – follow local procedures



Finished Gas Procedure

I. Acetaldehyde, Benzene, Total Hydrocarbons, Total Sulfur Test
Apparatus: A/A-Benzene analyzer, Hydrocarbon 4200 series analyzer, Total Sulfur analyzer model 6200E

Procedure:

Record readings as displayed on the analyzers and record on the log sheet every eight hours.

- Acetaldehyde – Maximum allowable, 0.20 ppm
- Benzene – Maximum allowable, 20 ppb
- Hydrocarbons – Maximum allowable, 20 ppm
- Total Sulfur – Maximum allowable, 100 ppb

II. Liquid Carbon Dioxide Purity Test

Apparatus: Zahm & Nagel, Burette CO₂ purity test flask (Model 25756)

******PLEASE BE CAUTIOUS WHEN HANDLING CAUSTIC SOLUTION**

Procedure:

1. Sodium hydroxide Directions: Start with 500ml beaker, fill beaker to 100ml of soda beads, (insure no coagulated pieces), then fill beaker to 300ml line with deionized water, stir mix with metal spoon until soda is dissolved, Finally, using deionized water fill to 500ml line, stir until clear, let it set to cool before using. Gloves, Googles, and apron should be worn during this process.
2. Run carbon dioxide gas stream through Burette Flask to purge the flask of everything by CO₂ and shut the top stopcock. Shut the stopcock closest to the CO₂ test chamber. The sodium hydroxide will absorb the carbon dioxide except for a very small residual bubble. Shut the upper stop cock and turn the Burette flask so the bubble rises to the graduated portion of the flask. The volume of this bubble represents the percentage of impurities in the gas stream. The value represented on the graduated portion of the flask represents the purity of the CO₂. Record the value (i.e. 99.98%) on the log sheet every eight hours.

Minimum level of acceptance 99.95%

III. Dew Point

Apparatus: Pittsburgh Cup

Procedure:

1. Fill dew point apparatus with Acetone. Blow test stream over the test cup in the apparatus.
2. Add dry ice rice, HD, or pellet to the Acetone dropping the temperature of the acetone bath. When the test stream of CO₂ appears as a fog on the test cup, record the temperature on the log sheet every eight hours.

Minimum dew point is -70F

IV. Odor/Taste Testing of Carbon Dioxide

Procedure

1. Bubble approximately 500ml (approx. 2 cups) of CO₂ gas through approximately 250 ml of water in a cup or uncovered container. Dry ice may be substituted for CO₂ gas when necessary. Cautiously smell the gas space above the water in the cup or container for the presence of any foreign odor. Results are to be documented in local plant forms every 12 hours.

CAUTION: When performing the odor test, be careful as to not ingest or let dry ice come in contact of skin.

- V. Non Volatile Residue and Oil/grease – Procedure listed in SOP MFG.ICE.SOP.0030. Also, finish liquid is passed through a 5 micron filter prior to liquid entering storage tanks. Results are to be documented in local plant forms every 12 hours.

The following detector tube testing is performed every 8 hours and logged on the daily LCO₂ quality checks (only necessary if analyzer is not functional or needs to be verified). **Only analyzer monitored finished liquid is acceptable for beverage grade.**

- VI. Detector tube testing of COS, H₂S, SO₂, and Acetaldehyde.

Apparatus:

COS Carbonyl Sulfide – Gastec #21LA or equivalent

H₂S Hydrogen Sulfide – Gastec #4LT or equivalent

SO₂ Sulfur Dioxide – Gastec #5LC or equivalent

Acetaldehyde – Gastec #92M or equivalent

1. For Carbonyl Sulfide, hook up two detector tube together then to the CO₂ stream. With the aspirator pump, pump two (2) 100 ml strokes. Read the concentration value off the graduated tubes after six (6) minutes.
Limit for COS is 0.2 PPM.
2. For Hydrogen sulfide, hook up detector tube to carbon dioxide stream and with the aspirator pump, pump two (2) 100 ml strokes. Read the value of hydrogen sulfide concentration off the detector tube after two (2) minutes.
Maximum limit H₂S is 0.1 PPM.

3. For the Sulfur dioxide follow the instructions from 1 above but use the detector tube and pump two (2) 100 ml stroke, read the concentration value off the graduated tube after four (4) minutes

Limit for SO₂ is 1 PPM.

4. For acetaldehyde, follow the instructions from 1 above but use the detector tube and pump one (1) 100 ml stroke, read the concentration value off the graduated tube after three (3) minutes

Limit for Acetaldehyde is 0.2 PPM

VII. **Batch Test:** The following testing is performed as each tank is filled and the results are logged on a "Diamond Liquid CO₂ Batch Test" form. The batch number to enter on a Certificate of Acceptance is Year/Month/Day/Military Time - tank number. For example for a tank 1 batch on March 1, 2014 at 1:05 pm is 1403011305-01.

1. Acetaldehyde, Benzene, Total Sulfur Test – pulled off the tank using the Teledyne analyzer.

Acetaldehyde – Maximum allowable, 0.20 ppm

Benzene – Maximum allowable, 20 ppb (Benzene MUST be checked with an analyzer, no tubes allowed for beverage grade)

Hydrocarbons – Maximum allowable, 20 ppm

Total Sulfur – Maximum allowable, 100 ppb

2. Purity Test (Same procedure as section II except the sample is pulled off the completed tank.)

Minimum level of acceptance 99.95%

3. Dew point is measured from gas from the completed tank per instructions in section III.

Minimum dew point is -70F

4. If analyzer is not functional, detector tubes are used to test the gas off the completed tank. Testing for Acetaldehyde, COS, H₂S, and SO₂ using procedure in section VI. **If beverage grade, only analyzer results are acceptable.**

5. Odor/Taste Test is used to test liquid off tank per instructions in section IV.



6. Additional testing required for lots that will be used for CO₂ liquid sales – Food grade:
- Carbon monoxide (Gastec 1LK or equivalent) - hook up detector tube to carbon dioxide stream and with the aspirator pump, pump three (3) 100 ml strokes. Read the value of CO concentration off the detector tube after 2 minutes and record on the batch test sheet.
Maximum limit CO is 10 PPM.
 - Nitric Oxides (Gastec 11L detector or equivalent) - hook up detector tube to carbon dioxide stream and with the aspirator pump, pump two (2) 100 ml strokes. Read the value of NO concentration off the detector tube after 4 minutes and record on the batch test sheet
Maximum limit NO+NO₂ is 5 PPM.
 - Oxygen (when analyzer not available, 3rd party lab sample sent for evaluation every 6 months). Plant to maintain copies of results.
Maximum limit O₂ is 30 PPM
7. Additional testing required for lots that will be used for CO₂ liquid sales – Beverage grade, in addition to the items in section 6, food grade liquid sales immediately above.
- Oxygen (Analyzer) – Record readings as displayed on the analyzers and record on the batch test sheet.
Maximum limit O₂ is 30 PPM
 - Ammonia (Gastec 3L or equivalent) - hook up detector tube to carbon dioxide stream and with the aspirator pump, pump one (1) 100 mL stroke. Read the value of ammonia concentration off the detector tube after 1 minute and record on the batch test sheet
Maximum limit NH₃ is 2.5 PPM.
 - Nitric Oxide (Gastec 11L detector or equivalent) - hook up detector tube to carbon dioxide stream and with the aspirator pump, pump two (2) 100 ml strokes. Read the value of NO concentration off the detector tube after 4 minutes.
Maximum limit for NO+NO₂ is 2.5 PPM. If value exceeds 2.5 PPM, refer to step d below.
 - Nitric Oxide and Nitrogen Dioxide (Gastec 10 detector or equivalent) - hook up detector tube to carbon dioxide stream and with the aspirator pump, pump two (2) 100 ml strokes. Read the value of NO and NO₂ concentrations off the detector tubes after 2 minutes.

Maximum limit for NO is 2.5 PPM. Maximum limit for NO2 is 2.5 PPM.

- e. Methanol (Gastec 111L or equivalent) - hook up detector tube to carbon dioxide stream and with the aspirator pump, pump four (4) 100 ml strokes. Read the value of methanol concentration off the detector tube after 2 minutes.

Maximum limit for Methanol is 10 PPM.

- f. Phosphine – only applicable for Phosphate rock CO2 source. CCPI does not source CO2 from Phosphate rock.

Maximum limit for Methanol is 0.3 PPM.

Raw Gas Procedure

VIII. Raw Carbon Dioxide Purity Testing

Apparatus: Zahm & Nagel Burette CO2 purity test flask (Model#25772)

******PLEASE BE CAUTIOUS WHEN HANDLING CAUSTIC SOLUTION**

Procedure:

Connect the sample hose to the test flask via the hose coming directly off of D1. Run the gas stream through the test flask to purge everything but CO2. Shut the top stopcock, allow flask to fill 2-4 seconds and then shut the stopcock closest to the sample hose. Add sodium hydroxide solution to the top of the test flask to the labeled fill line. Open the top stopcock slowly to release the liquid into the test flask.

The sodium hydroxide will absorb the CO2 except for a small residue bubble. Shut the top stopcock and turn the test flask so the bubble rises to the graduated portion of the flask. The volume of the bubble represents the percentage of the impurities in the gas stream. The value represented on the graduated portion of the flask represents the purity of the CO2. Record readings from test flask onto the daily check sheet.

Minimum limit for purity is: Albion – 97%, Greenville – 97%, Loudon – 97%, Pekin – 97%, Winnebago – 97%



IX. Raw CO2 Gas Detector Tube Testing

1. Hydrogen Sulfide Testing

Apparatus: Gastec Sampling Pump & Gastec Test Tube #4LL

For Hydrogen Sulfide, hook up the detector tube to the Raw Gas Co2 sample hose coming directly off of D1, and attach to the aspirator pump. Pull (1) 100ml stroke, then wait for 1 minute. Read the value of Hydrogen Sulfide concentration from the detector tube. **Maximum allowable total hydrogen sulfide is 20ppm.**

2. Acetaldehyde Testing

Apparatus: Gastec Sampling Pump & Gastec Test Tube #92L

For Acetaldehyde, hook up the detector tube to the raw Gas Co2 sample hose coming directly from D1. Using the aspirator pump, pull (1) 100ml stroke, then wait for 2 minutes. Read the value of Acetaldehyde concentration from the detector tube.

Maximum allowable total Acetaldehyde is 20ppm.

3. Ethyl Alcohol Testing

Apparatus: Gastec Sampling Pump & Gastec Test Tube #112L

For Ethyl Alcohol, hook up the detector tube to the raw gas Co2 sample hose coming directly off of D1. Using the aspirator pump, pull (1) 100ml stroke, then wait for 3 minutes. Read the value of Ethyl Alcohol concentration from the detector tube.

Maximum allowable total Ethyl Alcohol is 200ppm.

X. Stripper Gas Purity Testing

Apparatus: Zahm & Nagel Burette CO2 purity test flask (Model#25772)

Procedure:

Connect the sample hose to the test flask via the hose coming from PH-6 flow meter. Run the gas stream through the test flask to purge everything but CO2. Shut the top stopcock, allow flask to fill 2-4 seconds, and then shut the stopcock closest to the sample hose. Add sodium hydroxide solution to the top of the test flask to the labeled fill line. Open the top stopcock slowly to release the liquid into the test flask. The sodium hydroxide will absorb the CO2 except for a small residue bubble. Shut the top stopcock and turn the test flask so the bubble rises to the graduated portion of the flask.



The volume of the bubble represents the percentage of the impurities in the gas stream. The value represented on the graduated portion of the flask represents the purity of the CO₂.

Purity range is: Albion – 63%-77%, Greenville – 63%-77%, Loudon – 50%-70%, Pekin – 70%-77%, Winnebago – 63%-77%

Other Test Retention, Calibration and Certification Procedures to be performed:

XI. Detector Tube Retention

Detector tubes used to test CO₂ are to be tagged and dated and retained for **four** weeks as proof tests were conducted on CO₂. Readings will not be readable as time passes.

XII. Maintenance and Calibration of Sampling Pump

Sampling Pump must be tested for proper operation every 8 hours and results kept on record for future reference. Operation of sampling pump must be tested in the following manner:

1. Confirm inlet clamping nut is firmly tightened.
2. Push the pump handle fully in and align the guide marks on the pump shaft and the handle. Then insert a fresh, unbroken detector tube into the rubber inlet of the pump.
3. Pull out the handle fully until it is locked and wait 1 minute.
4. Unlock the handle (by turning it more than ¼ turn) and guide it back gradually.
5. Confirm the handle returns within 1/8 inch of the initial position. If more than 1/8 inch of gas had leaked around pump, send pump in for repairs.
6. Record that the pump check was completed on the LCO₂ quality shift check

Each plant should have at least one back up pump in proper working order at all times

Doc Number:	MFG.LIQ.SOP.0020
Title:	Liquid Plant - Carbon Dioxide Testing Procedures
Location:	CCPI Plants

XIII. Certification and Qualification of Testing Personnel

The Plant Manager is responsible for and must certify and qualify each individual that they have been trained and can demonstrate proper procedures and techniques for testing LCO₂. Certification records must be readily available for review.

9.0 Training

- 9.1 Hands on practical training by a qualified employee prior to performing the work.
- 9.2 Employee training records will be completed documenting the employee's knowledge of this procedure and practical demonstration of box marking.
- 9.3 Training documents will be kept in the employee's personnel record.

10.0 References

- 10.1 MFG.ICE.SOP.0030 – Pellet Quality Assurance and Contamination Mitigation
- 10.2 MFG.LIQ.SOP.0020.Form-01 - LCO₂ Batch Test Form
- 10.3 MFG.LIQ.SOP.0020.Form-02 - LCO₂ Pellet Check Form
- 10.4 MFG.LIQ.SOP.0020.Form-03 - LCO₂ Quality Shift Check Form

NSF International

RECOGNIZES

CONTINENTAL CARBONIC PRODUCTS, INC.
ALBION, MI

AS COMPLYING WITH NSF/ANSI 60.
PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE
AUTHORIZED TO BEAR THE NSF MARK.



This certificate is the property of NSF International and must be returned upon request. For the most current and complete information, please access NSF's website (www.nsf.org).

A handwritten signature in black ink, appearing to read "D. Pukiss".

April 23, 2007
Certificate# 53480 - 01

David Pukiss, General Manager
Water Distribution Systems

Safety Data Sheet

Material Name CARBON DIOXIDE, LIQUID

SDS ID: 00244558

Section 1 - IDENTIFICATION

Product Identifier: CARBON DIOXIDE, LIQUID

Trade Names/Synonyms

CARBONIC ACID; CARBON DIOXIDE LIQUID; CARBON DIOXIDE, REFRIGERATED LIQUID; CARBONIC ANHYDRIDE, REFRIGERATED LIQUID; UN 2187; CO2

Chemical Family

inorganic liquid

Recommended Use

industrial

Restrictions on Use

None known.

Manufacturer Information

Continental Carbonic Products, Inc.
3985 East Harrison Avenue
Decatur, IL 62526

General Information: 217-428-2068
Emergency #: 1-800-424-9300 (CHEMTREC)
Outside the US: 703-527-3887 (Call collect)

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with 29 CFR 1910.1200

Gas under pressure, Refrigerated liquefied gas

Specific Target Organ Toxicity - Single Exposure, Category 3 (central nervous system)

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

WARNING

Hazard Statement(s)

Contains refrigerated gas; may cause cryogenic burns or injury

May cause drowsiness and dizziness

Precautionary Statement(s)

Prevention

Wear cold insulating gloves/face shield/eye protection. Avoid breathing gas. Use only outdoors or in a well-ventilated area.

Response

Thaw frosted parts with lukewarm water. Get immediate medical advice/attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

Storage

Store in a well-ventilated place. Keep container tightly closed. Store locked up.

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Disposal

Dispose in accordance with all applicable regulations.

Hazard(s) Not Otherwise Classified

May cause frostbite upon sudden release of liquefied gas.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component	Percent
124-38-9	CARBON DIOXIDE, LIQUID	100

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Carbon dioxide and ethylene oxide mixtures (8070-50-6).

Section 4 - FIRST AID MEASURES

Description of Necessary Measures

Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin

If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

Eyes

Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion

If swallowed, get medical attention.

Most Important Symptoms/Effects

Acute

frostbite, central nervous system effects

Delayed

No information on significant adverse effects.

Indication of Immediate Medical Attention and Special Treatment

For inhalation, consider oxygen.

Section 5 - FIRE FIGHTING MEASURES

Suitable Extinguishing Media

Use extinguishing agents appropriate for surrounding fire.

Unsuitable Extinguishing Media

Do not direct water at source of leak or safety devices; icing may occur.

Specific Hazards Arising from the Chemical

Negligible fire hazard. Containers may rupture or explode if exposed to heat.

Hazardous Combustion Products

Combustion: oxides of carbon, oxygen

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Fire Fighting Measures

Move container from fire area if it can be done without risk. Damaged cylinders should be handled only by specialists. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. Stay away from the ends of tanks. For tank, rail car or tank truck, evacuation radius: 800 meters (1/2 mile). Use extinguishing agents appropriate for surrounding fire. Cool containers with water spray until well after the fire is out. Do not get water directly on material. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

Special Protective Equipment and Precautions for Firefighters

Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

Wear personal protective clothing and equipment, see Section 8. Avoid release to the environment.

Methods and Materials for Containment and Cleaning Up

Do not touch or walk through spilled material. Stop leak if possible without personal risk. If possible, turn leaking containers so that gas escapes rather than liquid. Use water spray to reduce vapors or divert vapor cloud drift. Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Prevent entry into sewers, drains, ditches, underground or confined spaces and waterways. Damaged cylinders should be handled only by specialists.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling

Wear cold insulating gloves/face shield/eye protection. Avoid breathing gas. Use only outdoors or in a well-ventilated area.

Conditions for Safe Storage, including any Incompatibilities

Store in a well-ventilated area. Keep container tightly closed. Store locked up. Store and handle in accordance with all current regulations and standards. Keep container tightly closed. Store locked up. Protect from physical damage. Store in a well-ventilated area. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Keep separated from incompatible substances.

Incompatibilities combustible materials, oxidizing materials, metal salts, reducing agents, metal carbide, metals, bases, potassium, sodium, ethyleneimine

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

CARBON DIOXIDE, LIQUID (124-38-9)

ACGIH: 5000 ppm TWA
30000 ppm STEL

Europe: 5000 ppm TWA; 9000 mg/m3 TWA

OSHA (Final): 5000 ppm TWA; 9000 mg/m3 TWA

OSHA (Vacated): 10000 ppm TWA; 18000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL

NIOSH: 5000 ppm TWA; 9000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL

Component Biological Limit Values

There are no biological limit values for any of this product's components.

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IDLH

40,000 ppm

Appropriate Engineering Controls

Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eyes/Face Protection

Wear splash resistant safety goggles with a faceshield. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection

For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.

Glove Recommendations

Wear appropriate protective, cold insulating clothing.

Respiratory Protection

The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

40,000 ppm

Any supplied-air respirator.

Any self-contained breathing apparatus with a full facepiece.

Emergency or planned entry into unknown concentrations or IDLH conditions -

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Escape -

Any appropriate escape-type, self-contained breathing apparatus.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Gas	Appearance:	colorless, gas
Color:	colorless	Physical Form:	compressed, liquefied gas
Odor:	odorless	Odor Threshold:	Not available
Taste:	acid taste	pH:	Not available
Melting/Freezing Point:	-70.0 - -56.56 °C	Boiling Point:	-78.50 - -61.7 °C
Flash Point:	none	Decomposition:	Not available
Evaporation Rate:	Not available	LEL:	Not available
UEL:	Not available	Vapor Pressure:	569 mmHg @ -82 °C
Vapor Density (air = 1):	1.5	Specific Gravity (water=1):	1.101 @ -37 °C
Water Solubility:	soluble	Log KOW:	Not available
Auto Ignition:	Not available	Viscosity:	0.0000701 Pa.s @20 °C
Sublimation Point:	-78.50 °C	Triple Point:	-56.6 °C @3883.6 mmHg
Volatility by Volume:	100 %	Molecular Weight:	44.01
Molecular Formula:	C-02		

Other Property Information

Solvent Solubility

Soluble: hydrocarbons, organic solvents, acetone, alcohol

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SDS ID: 00244558

Section 10 - STABILITY AND REACTIVITY

Reactivity

Containers may rupture or explode if exposed to heat.

Chemical Stability

Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions

Will not polymerize.

Conditions to Avoid

Protect from physical damage and heat. Containers may rupture or explode if exposed to heat. Avoid contact with water or moisture.

Incompatible Materials

combustible materials, oxidizing materials, metal salts, reducing agents, metal carbide, metals, bases, potassium, sodium, ethyleneimine

Hazardous Decomposition

Combustion: oxides of carbon, oxygen

Section 11 - TOXICOLOGICAL INFORMATION

Acute and Chronic Toxicity

Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and no selected endpoints have been identified.

RTECS Acute Toxicity (selected)

The components of this material have been reviewed, and RTECS publishes the following endpoints:

CARBON DIOXIDE, LIQUID (124-38-9)

Inhalation: 200000 ppm/2 hour Inhalation Mouse LC50; 361 gm/m³/2 hour Inhalation Mouse LC50

Acute Toxicity Level

CARBON DIOXIDE, LIQUID (124-38-9)

Non Toxic: inhalation

Information on Likely Routes of Exposure

Inhalation

ringing in the ears, nausea, irregular heartbeat, headache, drowsiness, dizziness, tingling sensation, visual disturbances, suffocation, convulsions, coma

Ingestion

frostbite

Skin Contact

blisters, frostbite

Eye Contact

frostbite, blurred vision

Immediate Effects

frostbite, central nervous system effects

Delayed Effects

No information on significant adverse effects.

Medical Conditions Aggravated by Exposure

heart or cardiovascular disorders, respiratory disorders

Irritation/Corrosivity Data

No data available.

Safety Data Sheet

Material Name CARBON DIOXIDE, LIQUID

SDS ID: 00244558

RTECS Irritation

The components of this material have been reviewed and RTECS publishes no data as of the date on this document.

Target Organs

CARBON DIOXIDE, LIQUID (124-38-9)

central nervous system

Respiratory Sensitization

No data available.

Dermal Sensitization

No data available.

Carcinogenicity

Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, NTP, OSHA or DFG.

Mutagenic Data

No data available.

Reproductive Effects Data

No data available.

RTECS Reproductive Effects

The components of this material have been reviewed, and RTECS publishes the following endpoints:

CARBON DIOXIDE, LIQUID (124-38-9)

2 pph Inhalation Mouse TLo (8 hour, pregnant 10 day(s)); 55 pph Inhalation Mouse TLo (4 hour, 6 day(s)); 55 pph Inhalation Mouse TLo (2 hour, 3 day(s)); 13 pph Inhalation Rabbit TLo (4 hour, pregnant 9-12 day(s)); 6 pph Inhalation Rat TLo (24 hour, pregnant 10 day(s)); 6 pph Inhalation Rat TLo (24 hour, pregnant 10 day(s))

Tumorigenic Data

No data available.

Specific Target Organ Toxicity - Single Exposure

central nervous system

Specific Target Organ Toxicity - Repeated Exposure

No data available.

Aspiration Hazard

Not applicable.

Section 12 - ECOLOGICAL INFORMATION

Component Analysis - Aquatic Toxicity

No LOLI ecotoxicity data are available for this product's components.

Persistence and Degradability

No data available.

Bioaccumulative Potential

No data available.

Mobility

No data available.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods

Dispose in accordance with all applicable regulations.

Component Waste Numbers

The U.S. EPA has not published waste numbers for this product's components.

Safety Data Sheet

Material Name CARBON DIOXIDE, LIQUID

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Section 14 - TRANSPORT INFORMATION

US DOT Information

Shipping Name: Carbon dioxide, refrigerated liquid
UN/NA #: UN2187 Hazard Class: 2.2
Required Label(s): 2.2

IMDG Information

Shipping Name: Carbon dioxide, refrigerated liquid
UN #: UN2187 Hazard Class: 2.2
Required Label(s): 2.2

Section 15 - REGULATORY INFORMATION

Component Analysis

U.S. Federal Regulations

None of this products components are listed under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), or require an OSHA process safety plan.

SARA 311/312 Hazardous Categories

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

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
CARBON DIOXIDE, LIQUID	124-38-9	Yes	Yes	Yes	Yes	Yes

Not regulated under California Proposition 65

Component Analysis - Inventory

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ
CARBON DIOXIDE, LIQUID	124-38-9	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes

Section 16 - OTHER INFORMATION

NFPA Ratings: Health: 3 Fire: 0 Reactivity: 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Safety Data Sheet

Material Name CARBON DIOXIDE, LIQUID

SDS ID: 00244558

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

Other Information

Continental Carbonic Products, Inc. makes no express or implied warranties, guarantees or representations regarding the product or the information herein, including but not limited to any implied warranty or merchantability or fitness for use. Continental Carbonic Products, Inc. shall not be liable for any personal injury, property or other damages of any nature, whether compensatory, consequential, exemplary, or otherwise, resulting from any publication, use or reliance upon the information herein.

End of Sheet 00244558