Propylene Oxide Cylinder Connections (PPO)
Propylene Oxide (PPO)

- Before using this product read the MSDS and be aware of the hazards associated with PPO.
- Wear all appropriate PPE and follow all of your company’s safety procedures
- For additional training contact your ABERCO/Balchem representative.
Cylinders

- The cylinders are DOT 4BW 240 designation.
- The cylinder is filled with 375 pounds of PPO.
- The cylinders are pressurized to 50 PSI nitrogen pressure after filling.
- The nitrogen pressure must be replenished before returning cylinders to the supplier. See PPO handling guide for nitrogen pressure chart.
DOT 4BW 240 Propylene Oxide Cylinder Specifications

- Water Capacity: 480 pounds
- Dimensions: 24 inches X 43 inches
- Tare Weight: 150 pounds
- Net Weight: 375 pounds
- Gross Weight: 525 pounds
Propylene Oxide Cylinder

Standard 55 gallon Drum

Returnable PPO Cylinder
Cylinder Connections

There are two valves used in cylinder service:

- A liquid valve with an attached dip tube.
  - Red hand-wheel
- A vent/nitrogen valve with a pressure relief device (PRV).
  - Silver hand-wheel
Top View of Cylinder Valves and Melt Plug

Vent/Nitrogen Valve with PRV

Liquid Valve With Dip Tube Attached

Melt Plug
Liquid Valve Looking Through Cylinder Collar
Example of Bar Code label and Cylinder Identification Number
Liquid Valve (Red Hand-Wheel)

- The liquid valve is used to unload the contents of the cylinder.
- A dip tube is threaded into the bottom of the liquid valve and extends to the bottom of the cylinder.
- When the liquid valve is open the nitrogen pressure pushes the liquid PPO up through the dip tube and out to the process.
- This valve has a CGA 510 left-handed internal thread connection.
CGA 510 Liquid Valve with Dip Tube

The dip tube has been cut to fit into this picture actual dip tube extends to the bottom of the cylinder.
This is an example of a different type of container that has a dip tube attached to the liquid valve. The 4BW 240 PO cylinders have the same valve configuration of liquid and nitrogen valves.
Liquid Valve  (RED Hand-Wheel)

- CGA 510 left handed threaded valve
- Open valve slowly, only 1 to 2 turns is necessary for full liquid flow.
- Never over torque hand wheel when opening.
- Hand Tighten only. Never use tools or excessive force to close the valve. Only 5 foot pounds of force is needed to close the valve securely.
CGA 510 Liquid Valve
CGA 580 Vent/Nitrogen Valve
(Silver Hand Wheel)

- CGA 580 valve with 75 PSI pressure relief.
- This is a right handed threaded valve.
- Open valve slowly, only 1 to 2 turns is necessary.
- Never over torque hand wheel when opening.
- Hand tighten only. Never use tools or excessive force to close, only 5 foot pounds of force is needed to close the valve securely.
- The PRV is active only when the valve is open.
- The PRV is set to activate when nitrogen pressures are applied over 75 PSI.
CGA 580 Nitrogen Pressurization/Relief Valve
Connections

Propylene Oxide Cylinders
Valve Connection Information

- CGA 510 liquid connection uses a **left handed** stainless steel connecting nut, (same nipple and nut used for Acetylene service).

- CGA 580 vent/nitrogen connection uses a **right handed** stainless steel connecting nut, (same nipple and nut used for Nitrogen service).

- The nipple is the same for each connection, liquid and nitrogen.

- The nipple has a 1/4” NPT external thread.

- The connecting nuts and nipples can be purchased from a welding supply company.
SS Double Braided Teflon hose Information

- The liquid line is a ½ inch stainless steel double braided over a Teflon core that is rated for 1500 PSI.
- The nitrogen line is 1/4\textsuperscript{th} inch stainless steel double braided over Teflon core that is rated for 1500 PSI.
Typical Connecting Procedure

Propylene Oxide Cylinders
Valve Connections

- Check all connections, valves and lines before using any equipment needed to access Propylene Oxide from cylinders.
- Tools used to connect fittings must be non-sparking. (brass or beryllium copper).
- Ground the cylinders while in use.
Valve Connections

- Raise the protective dome on the top of the cylinder.
- Attach a ground line to the cylinder.
- Check to make sure that the valves are closed.
- Each valve is equipped with a safety plug.
- Slowly loosen the safety valve plugs until they are half way out using a non sparking 5/16” Allen wrench. Once loosened and half way out, leak check the port. If a leak is seen, quickly tighten the plug back into the valve and check the valve hand wheel to make sure it is closed.
- Do not discard safety plugs, they will be re-inserted back into the valves before shipping back to the supplier.
Safety Plug In Valve
Removal of Safety Plug Using Spark Proof Allen Wrench
Liquid Connections

- The liquid line should have a nitrogen source to purge the lines clear of PPO before disconnecting.
- The following picture is an example of a double valve connection, the first valve is the liquid connection and the second valve is a nitrogen supply to clear the line of PPO before disconnecting.
- A nitrogen source further away from the connection can also be designed into the system for the purging of the liquid line.
Nipple and Connector for Liquid Valve (note notch in connector indicates left handed threads)

- Liquid supply valve
- Nitrogen line for Purging liquid line
Liquid Valve CGA 510 Connector and Nipple

Liquid Valve connector has a Notch indicating a left hand thread.
Valve Connections

- Connect the CGA 510 adapter and nipple to the liquid valve which is a left handed thread; tighten using a non-sparking 1-1/8” wrench.

- When connecting to either valve do not cross thread the connections. Cross threading will damage the valve threads and leaks will occur.
Hand Tighten the Liquid Valve Connector and Nipple
Snug the Liquid Valve Connection using a Spark Proof Wrench
Spark Proof Wrench and Liquid Valve Connector
Connected Liquid Valve Leak Check

- When the liquid valve has been connected and tightened a leak test can be completed.
- Prior to opening the valves it is recommended that a leak test be completed using nitrogen pressure only. The liquid valve connection should have a nitrogen source, (see slide number 26) to purge the line free of liquid Propylene Oxide before disconnecting.
- With the liquid valve closed, pressurize the connection using the nitrogen supply attached to the liquid line and leak test.
Leak Tests

- Do not spray leak check solutions into the valve port. Do all leak tests with the valves connected to the process. If leaks are found, check the connections for tightness using a spark proof wrench and recheck. If the leak continues, close and disconnect the system and notify the supplier for instructions.
Vent/Nitrogen Valve Connection
(Optional)

- Filled PPO cylinders are shipped with nitrogen pressure on the headspace above the liquid in the cylinder. This pressure is typically sufficient under most circumstances to fully discharge the cylinder contents.

- The vent/nitrogen valve is only used if additional nitrogen “push” is desired for discharging the cylinder contents more quickly.
Vent/Nitrogen Valve Connection (Optional)

- Connect the CGA 580 adapter and nipple, which is connected to a regulated nitrogen line, (Max. 50 psig nitrogen pressure), to the pressurizing relief valve. The valve is a right handed thread; tighten using a non-sparking wrench.

- The pressure relief is only active when the valve is connected to a nitrogen line and is opened.
Nipple and Connector for Vent/Nitrogen Valve
Connect the Nitrogen Line Using the same procedure used for the Liquid line.
Processing

- When all connections are made properly, Propylene Oxide can be safely applied to the process using the procedures each customer has developed for their individual applications.
- Remember - open the liquid valve slowly for two full turns of the hand wheel. The valve will be in the full open position after the two turns.
General Guide for Return of Empty Propylene Oxide Cylinders

Use only nitrogen for all PPO processes.
Cylinder Inerting

- Cylinders should contain pressure according to “Recommended Inerting Policy.” Nitrogen pressure per the following chart should be left in the container for return to shipper. Pressure in containers must never exceed 50 psig.

- No other gases, carbon dioxide or air, can be introduced back into the cylinder at any time (USE NITROGEN ONLY).
Chart of inerting pressure for Propylene Oxide cylinders. The inerting pressure is determined by outside ambient temperature and corresponding required pressure, using nitrogen as an inerting gas.

<table>
<thead>
<tr>
<th>TEMPERATURE (°F)</th>
<th>PRESSURE (PSIG)</th>
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<tr>
<td>10</td>
<td>7</td>
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<tr>
<td>20</td>
<td>8</td>
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<td>110</td>
<td>25</td>
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<td>120</td>
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Returning Empty Cylinders

- Containers should be clearly tagged with return address. Return container to address prescribed on the Valve Tag.

- Applicable DOT placarding and shipping paper requirements (bill of lading & ERG) must be met. (see examples) For additional information contact ABERCO/Balchem Customer Service.

- Prior to shipping, ensure valves are closed, and that valve plugs are installed. Inspect containers prior to return to ensure that they are properly marked and that there is no damage or leaks.
### Straight Bill of Lading

- **Short Form - Original - Not Negotiable**

**CARRIER**

**ARC TRUCK**

**SHIPTO**

ARC SPEC PRODUCTS - GREEN POND
95 BALCHEM LANE
ROUTE 17 SOUTH
GREEN POND, SC 29446-5443

**SHIP FROM**

**ARC SPECIALTIES PRODUCTS**

P.O. Box 800 New Hampton, NY 10958
TEL 845/226-5611 FAX 845/226-5100

<table>
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<tr>
<th>CUST. NO.</th>
<th>SALES AGENT</th>
<th>OPERATOR</th>
<th>FREIGHT</th>
<th>FOB REMARK</th>
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<td>237000-20</td>
<td>239</td>
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**SHIPTO**

**BALCHEM CORPORATION**

P.O. Box 800 New Hampton, NY 10958
TEL 845/226-5611 FAX 845/226-5100

### Quantities

<table>
<thead>
<tr>
<th>QUANTITY ORDERED</th>
<th>QUANTITY SHIPPED</th>
<th>PACKAGING</th>
<th>HM</th>
<th>DESCRIPTION</th>
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<td>3750 Lb CYLINDER</td>
<td>RQ</td>
<td>RESIDUE, LAST CONTAINED: LIN 1280, PROPYLENE OXIDE, 3 (FLAMMABLE LIQUID), PG I</td>
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</table>

*FOR EMERGENCY RESPONSE:*

USG ERG 2098 GUIDE 127 (P)

*"SHIP & STORE IN UPRIGHT POSITION"

STORE IN COOL, DRY PLACE

### For Chemical Emergency - Spill, Leak, or Accident

**CALL CHEMTREC - 800 - 424 - 9300**

**SHIPPED BY**

**ARC SPEC PRODUCTS - GREEN POND**

**PERMANENT POST OFFICE OF SHIPPER**

**PO BOX 800 NEW HAMPTON, NY 10958**

**CODE Amt:** $0

**FREIGHT TERMS:** COLLECT

**Pieces:**

**Date:**

---

See next slide for BOL details.
Return Bill of Lading Details

375.0 LB CYLINDER

RQ RESIDUE: LAST CONTAINED: UN 1280, PROPYLENE OXIDE, 3 (FLAMMABLE LIQUID), PG I

*FOR EMERGENCY RESPONSE:
USE ERG 2008 GUIDE 127 (P)

"SHIP & STORE IN UPRIGHT POSITION"
STORE IN COOL, DRY PLACE
POTENTIAL HAZARDS

FIRE OR EXPLOSION
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a “P” may polymerize when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH
- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY
- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters’ protective clothing will only provide limited protection.

EVACUATION
Large Spill
- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
EMERGENCY RESPONSE

FIRE
CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fires
- Dry chemical, CO₂, water spray or alcohol-resistant foam.

Large Fires
- Water spray, fog or alcohol-resistant foam.
- Use water spray or fog; do not use straight streams.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spills
- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID
- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
Return of Empty Cylinders

- Containers must be in proper condition for transportation, set upright and braced to prevent movement during transit, as per DOT regulations.

- When returned, containers possess residual material, and are therefore considered hazardous.
Returning Empty Cylinders

- Before disconnecting from the valves, purge all liquid lines with nitrogen. This nitrogen purge step will push the liquid Propylene Oxide from the line and the connection back into the cylinder.
Returning Empty Cylinders; Inerting Using the Liquid Valve

- If you are using the liquid valve only, inert with nitrogen at this point to the recommended nitrogen pressure.

- Once clear and cylinder head space inerted, close the liquid valve, then the nitrogen purge valve. Ensure that the cylinder valve is completely closed hand tight but do not use any tools or over tighten.
Returning Empty Cylinders; Inerting Using the Nitrogen Valve

- Prior to closing the nitrogen pressurizing safety valve, inert with nitrogen at this point to the recommended nitrogen pressure.
- Close the valve on the cylinder then close the valve on the nitrogen process supply line and disconnect.
Returning of Empty Cylinders: Safety Plugs

- After the liquid and nitrogen lines have been disconnected from the valves, replace the safety valve plugs prior to returning empty cylinders.

- The plug must be tool tight not finger tight. Use the long section of the Allen Wrench to tool tighten, this will not allow an operator to over tighten the safety plug or damage the valve threads.
Correct Use of Spark Proof Allen Wrench and Safety Plugs

Long section of Allen Wrench used to tighten plugs.
Returning PO Cylinders

- Once the valve safety plugs have been reinserted into the cylinder.
- Leak check the cylinder valves prior to shipping to the supplier.
Movement Of Cylinders

Example of Movement Using a Cylinder Hand Truck
Cylinder Hand Truck Movement
Movement of Cylinders – push hand truck under cylinder
Cylinder Hand Truck Prongs Around the Base of the Cylinder
Place the safety chain around the top of the cylinder
Safety chain around top of cylinder
Slowly while using leverage and foot placement pull back on the handles of the cylinder truck.
Once the cylinder is safely balanced it can be moved.
Additional Information

- Due to hazardous properties of Propylene Oxide, we urge you to advise all personnel handling our containers of these guidelines.
- This is only a guide. Always ensure that appropriate regulations for OSHA as well as other applicable Federal, State, and Local regulations are followed. Make available and be familiar with Aberco/Balchem’s current MSDS and the North American Emergency Response Guidebook.
- Propylene Oxide, including residual product is a hazardous material: Users must comply with all DOT HAZMAT shipping and handling regulations.
Chemical Emergencies

- In the event of an uncontrolled Chemical Emergency:

Follow your site Emergency Plan and then:

Call CHEMTREC 24/7 at 1-800-424-9300
ABERCO/Balchem Contact Information

- Customer Service Manager: Claudette Rathbun
  - Phone: 845-326-5676
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  - Email: Crathbun@balchemcorp.com

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  - Fax: 845-326-5706
  - Email: AEraide@balchemcorp.com

- Transportation Supervisor: Ron Davignon
  - Phone: 845-326-5605
  - Fax: 845-326-5706
  - Email: r davignon@balchemcorp.com
## ABERCO/Balchem Contact Information

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<th>Name</th>
<th>Phone</th>
<th>Cell Phone</th>
<th>Email</th>
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<td>914-886-5702</td>
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<td>843-297-8551</td>
<td>845-270-5005</td>
<td><a href="mailto:bbogart@balchemcorp.com">bbogart@balchemcorp.com</a></td>
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<td><a href="mailto:Rviscomi@balchemcorp.com">Rviscomi@balchemcorp.com</a></td>
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