



**Heat Thaw Cure Dry**

## **Operator Manual Central Mobile Enclosure**



### **Heat Center Pro**

S.N. 183701 –

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## Table of Contents

1. Warranty Policies & Claim Procedures .....	1-6
Warranty Policies.....	1-6
Basic Warranty Policy .....	1-6
Extended Warranty Policy .....	1-6
Heat Exchanger .....	1-6
Exceptions to the Warranty Policies .....	1-7
Owner Obligations .....	1-7
Manufacturer Obligations .....	1-7
Warranty Claim Procedure .....	1-8
2. Safety Concerns .....	2-1
General Safety Guidelines .....	2-1
Water Heater Module .....	2-2
Heat Transfer Fluid .....	2-2
Fluid Handling Precautions.....	2-2
First Aid Measures .....	2-2
Trailer Safety .....	2-3
3. Introduction .....	3-1
Components.....	3-1
Heat Center Pro (HCP) Enclosure .....	3-1
Hose Reel .....	3-2
Accessories.....	3-3
Extension Reservoir Assembly .....	3-3
Mixing/Booster Pump.....	3-3
Optional Remote Manifold .....	3-4
Fluid Circulation Lines .....	3-4
Insulated Line Jackets .....	3-4
Portable Heat Exchangers.....	3-5
Plate Heat Exchanger.....	3-5
D-CAN Desiccant Dehumidifier System.....	3-5
How the System Works.....	3-6
4. Setup .....	4-7
Lifting the Unit.....	4-7
Prerequisites.....	4-7
Tie-Down.....	4-8
Prerequisites.....	4-8
Required Safety Clearances.....	4-9
Elevation Concerns.....	4-9
Electrical Requirements & Connection.....	4-10
Heat Transfer Fluid “HTF” .....	4-11
Heat Transfer Fluid Specifications .....	4-11

Primary HTF circulation lines.....	4-12
Secondary HTF circulation lines.....	4-12
Fuel/Gas.....	4-12
Diesel/Light Oil .....	4-12
Propane Gas .....	4-12
Natural Gas .....	4-12
Burner Identification .....	4-13
Burner Removal .....	4-13
Burner Installation.....	4-14
Fuel Supply Notes .....	4-15
5. Operation .....	5-1
Purging air from the HTF circulation system.....	5-1
Before Firing the System.....	5-1
Temperate Start Procedure .....	5-2
Control settings .....	5-3
Low Flow Situations .....	5-3
High Flow Situations.....	5-3
Purging Air from the Diesel/Light Oil Fuel System .....	5-3
Adding HTF to system .....	5-4
6. Hose Reel.....	6-1
Operating Features.....	6-1
Drive Features & Power Requirements.....	6-1
Setup/Operation.....	6-2
Manual Controls.....	6-2
Reel Power .....	6-2
Reel Direction Modes .....	6-2
Mechanical Drive Components.....	6-3
Electric Motor.....	6-3
GearBox.....	6-4
Torque Limiter Clutch.....	6-4
Maintenance .....	6-5
Precautions .....	6-5
Electric Motor.....	6-5
GearBox .....	6-5
Maintenance & Operation.....	6-5
Oil Filling Procedure.....	6-6
Torque Limiter Adjustment .....	6-6
7. Heat Center Pro Storage Bay .....	7-1
Heat Center Pro Storage Bay .....	7-1
HCP (Heat Center Pro) Edition Heat Exchanger (Fan Coil) .....	7-1
8. Troubleshooting.....	8-2
No Power .....	8-2

- No Power at Terminal #6 (Low Water Cut-off) ..... 8-2
- No Power at Terminal #7 (Flow Switch) ..... 8-3
- No Power at Terminal #8 (High Limit) ..... 8-3
- No Power at Terminal #9 (Aquastat and Burner) ..... 8-3
- 9. Maintenance.....9-1
  - Daily Checklist ..... 9-1
  - Seasonal Checklist..... 9-1
    - Heat Transfer Fluid “HTF” ..... 9-3
- 10. Appendix.....10-1
  - Important Certification & Operational Information ..... 10-1
  - Certification & Heater Specifications ..... 10-2
  - Electrical Schematics ..... 10-3
  - Hose Reel Electrical Schematic ..... 10-3
  - Trailer Electrical Schematics..... 10-4
  - Heat Transfer Fluid Preheater Information ..... 10-6
  - Material Safety Data Sheets ..... 10-8

## Table of Figures

Figure 1 - Safety Decals.....	2-1
Figure 2 - Heat Center Pro Enclosure.....	3-1
Figure 3 - Hose Reel.....	3-2
Figure 4 - Extended Reservoir.....	3-3
Figure 5 - Mixing/Booster Pump.....	3-3
Figure 6 - Optional Remote Manifold.....	3-4
Figure 7 - Circulation Lines.....	3-4
Figure 8 - Hose Loop Length.....	3-4
Figure 9 - Insulated Line Jackets.....	3-4
Figure 10 - Portable Heat Exchangers.....	3-5
Figure 11 - Plate Heat Exchanger Unit.....	3-5
Figure 12 - D-CAN 30 Dessicant Dehumidifier.....	3-5
Figure 13 - How the System Works.....	3-6
Figure 14 - Lifting Points.....	4-7
Figure 15 - Lifting Sling Angles.....	4-7
Figure 16 - Lifting Frame (Part #018-905480).....	4-8
Figure 17 - Sling 4x12' (Part# 017-905675).....	4-8
Figure 18 - Tie-Down Points.....	4-8
Figure 19 - Top-View Clearances.....	4-9
Figure 20 - Side-View Clearance.....	4-9
Figure 21 - Electrical Hookup (230V AC).....	4-10
Figure 22 - Glycol/Water Mixture Chart.....	4-11
Figure 23 - Gas Train Supply.....	4-12
Figure 24 - Valve Positions for Natural Gas.....	4-12
Figure 25 - Valve Positions for Propane.....	4-12
Figure 26 - Diesel/Light Oil Burner.....	4-13
Figure 27 - Propane Gas Burner.....	4-13
Figure 28 - Natural Gas Burner.....	4-13
Figure 29 - Electrical Connection.....	4-13
Figure 30 - Fuel Supply and Return Lines.....	4-14
Figure 31 - Propane Gas/Natural Gas Burner Connections.....	4-14
Figure 32 - Riello Burner Tube & Mounting Bracket.....	4-14
Figure 33 - Combustion Head Adjustment.....	4-15
Figure 34- Control Panel.....	5-1
Figure 35 - Pump Connections.....	5-4
Figure 36 - Hose Reel.....	6-1
Figure 37 - Hose Reel Control Panel.....	6-2
Figure 38 - Motor Features & Data.....	6-3
Figure 39 - Gear Box.....	6-4
Figure 40 - Oil Fill Location Gear Box.....	6-6
Figure 41 - Torque Limiter Clutch.....	6-7
Figure 42 - Storage Bay with 9x 80 Fan Coils.....	7-1
Figure 43 - Storage Bay with 4x ES200 Fan Coils.....	7-1
Figure 44 - Storage Bay with 4x 200 HCP Edition Fan Coils.....	7-1
Figure 45 - Heat Exchanger Breakdown.....	9-2

Figure 46 - Non-Pressure Vessel Decal .....	10-1
Figure 47 - Water Heater Data & Serial Plate .....	10-2
Figure 48 - Heat Center Pro Electrical Schematic .....	10-3
Figure 49 - Hose Reel Electrical Schematic .....	10-4
Figure 50 - Close-up View of Trailer Hook-up .....	10-4
Figure 51 - Trailer Wiring Schematic .....	10-5
Figure 52 - HTF Preheater .....	10-6

# 1. Warranty Policies & Claim Procedures

**DRYAIR MANUFACTURING CORP.** (referred to within as DRYAIR) warrants its new, unused equipment to be free of defects in material and workmanship at the time of delivery to the original retail purchaser.

## Warranty Policies

### Basic Warranty Policy

- DRYAIR will repair or replace, at its option, without charge, any defective part of the equipment for a period of twelve (12) months from delivery to the first retail purchaser, F.O.B St. Brieux, SK., Canada.
- Any parts that are covered by an extended warranty published by DRYAIR are an exception to the Basic Warranty policy and are to be warranted as per the details of the Extended Warranty Policy.
- Labour is covered as per DRYAIR flat labour rate.
- The Warranty Policy, terms, and conditions may change from time to time without prior notice.
- Warranty terms and conditions are transferable in the event of the sale to a second owner.
- Replacement parts will be warranted for 90 days from the repair date. Bill of sale must accompany the warranty claim.
- The terms of this Warranty Policy are subject to provincial and state legislation. DRYAIR reserves the right to make modifications in accordance with provincial and state legislation without prior notice or obligation.

### Extended Warranty Policy

#### Heat Exchanger

- An extended warranty is available on the heat exchanger unit of the water heater assembly. The available warranty for a part, under the extended warranty policy, is prorated by 20% per year.
- Shipment date is the date to be used for the commencement of the warranty period.
- Coverage schedule

Year 1 - 100%

Year 2 - 80%

Year 3 - 60%

Year 4 - 40%

Year 5 - 20%



### **Exceptions to the Warranty Policies**

- Under no circumstance shall the owner be entitled to recover costs for incidental, special, or consequential damages such as, but not limited to loss of profit or revenue, other commercial losses, inconvenience and/or replacement equipment rental cost.
- Maintenance, repair, or service items not related to warrantable defects.
- Loss or damage during shipping.
- Failure resulting from lack of or improper maintenance.
- Damage caused by operator abuse, negligence, or improper operation.
- Damage resulting from improper voltage supply.
- Damage from improper installation. Installation done by other than the manufacturer.
- Non-defective items replaced at the request of the customer.
- Damage due to accidents.
- Damage resulting from improper fuel supply (i.e. pressure or contamination).
- Damage resulting from cracked or broken lines occurring during transport.
- Damage resulting from use of inadequate or improper fluids (i.e. Glycol or oil).
- Mileage is not covered.
- Glycol is considered a consumable and will not be covered under the warranty policy.
- Generators carry their own warranty coverage through their own manufacturers. Please refer generator issues to the OEM. Contact information may be found in the Service & Operators Manual under Optional Equipment.

### **Owner Obligations**

- It is the responsibility of the owner, at the owner's expense, to transport the equipment to the service facility of an authorized DRYAIR distributor/dealer or alternately to reimburse the distributor/dealer, for any traveling expenses incurred in fulfilling this warranty.
- The terms of this Warranty Policy are subject to provincial and state legislation. DRYAIR reserves the right to make modifications in accordance with provincial and state legislation without prior notice or obligation.
- It is the responsibility of the owner to read, understand and implement the maintenance, safety and operational guidelines as laid out in the Operation and Maintenance Guide.
- All parts are to be tagged with warranty claim number and shipped prepaid to DRYAIR within 30 days.

### **Manufacturer Obligations**

- DRYAIR reserves the right to continually improve the product's parts or specifications at any time without notice or obligation.

- The terms of this Warranty Policy are subject to provincial and state legislation. DRYAIR reserves the right to make modifications in accordance with provincial and state legislation without prior notice or obligation.

## Warranty Claim Procedure

- All warranty credits must be processed with the DRYAIR Warranty Claim Form.
- All warranty parts, unless otherwise specified, are to be returned to DRYAIR along with a completed Warranty Claim Form.

**Note:** *Prior to returning warranty parts, please call for an authorization number and shipping instructions from the Warranty department in Canada.*

Location of Warranty Depots:

**USA**  
DRYAIR Manufacturing Corp.  
410 Douglas Road, Box 264  
Bradner, OH 43406  
Ph. 1 (888) 750-1700

**Canada**  
DRYAIR Manufacturing Corp.  
400 Service Road, Box 126  
St. Brieux, SK S0K 3V0  
Ph. 1 (888) 750-1700

- Each warranty claim should only refer to one Serial or Production Schedule numbered unit.
- Warranty parts are to be tagged with warranty claim number.
- When claiming for warranty labour, the allowable warranty labour rate will be \$85.00/hour. The factory reserves the right to adjust the number of hours claimed where deemed necessary.
- The factory may at times specify allowable labour for certain warranty procedures.
- Mileage and travel time to/from the customer are not eligible for warranty credit.
- Freight charges for warranty parts are not eligible for warranty credit.
- Labour flat rates for component changes:
  - Electrical Components - 0.5hr
    - Relays
    - Switches
    - Thermostats
    - Breakers
  - Plumbing Components - 1hr
    - Flow Reverser
    - Flow Switch
    - Valves
  - Electric Motor Changes - 1hr
    - Hose Reel
  - Glycol Pump Changes - 2hrs

**Note:** *Other labour charges will be at the discretion of DRYAIR.*

# 2. Safety Concerns

## General Safety Guidelines

- Make certain that the operator reads and understands all the information in this manual.
- All unauthorized people must be kept away from the equipment while in operation.
- Maintain instructional and safety decals. Replace damaged decals. (Figure 1)
- All guards must be in place when the equipment is in operation.



Figure 1 - Safety Decals

## Water Heater Module

**CAUTION!** *The water heater is a heating appliance.*

- Observe all posted warnings and cautions when dealing with any heating appliance.
- Keep children and pets away from all piping and fuel accessories.
- While the system is operating the water heater housing panels must be kept closed - This prevents drafts from affecting water heater operation.

The key advantage to the Heat Center Pro system, in addition to better temperature control abilities over other heating methods, is that there is only one flame point and only one fueling point. This means fewer sets of environmentally sensitive equipment to manage. In the DRYAIR system, the heat transfer around your site is almost entirely managed by low-pressure Heat Transfer Fluid lines.

## Heat Transfer Fluid

Follow the following precautions and measures when working with “heat transfer fluid” (“DOWFROST\* HTF” & “BOSS CHILL PG”).

### Fluid Handling Precautions

- Ventilation ..... Good general ventilation should be sufficient for most conditions.
- Respiratory protection No respiratory protection should be needed.
- Skin protection ..... For brief contact, no precautions other than clean, body-covering clothing should be needed.  
..... Use impervious gloves when prolonged or frequently repeated contact should occur.
- Eye protection ..... Use safety glasses.

### First Aid Measures

- Eyes ..... Flush eyes with plenty of water.
- Skin ..... Wash off in flowing water or shower.
- Ingestion ..... Induce vomiting if large amounts are ingested.  
..... Consult medical personnel.
- Inhalation ..... Remove to fresh air if effects occur.  
..... Consult a physician.
- Note to Physician ..... No specific antidote.  
..... Supportive care.  
..... Treatment based on judgment of the physician in response to reactions of the patient.

*For complete “heat transfer fluid” information, refer to the Material Safety Data Sheets for “Dowfrost HTF” & “Boss Chill PG” included with the manuals package.*

## Trailer Safety

DRYAIR trailers are equipped with torsion single or tandem axles with electric brakes on each axle. It is necessary to tow units with tandem axles as parallel as possible to the road to ensure equal loading on each axle. The tow vehicle must be equipped with a brake controller for the electric brakes to function.

The tow vehicle operator is responsible for the following:

- Ensure that all the tires are inflated to the manufacturer's specifications.
- Check the tire tread on all tires for indications of wear or misalignment.
- Test the signal lights, brake lights, and park lights for proper operation.
- Ensure that all tire lug nuts are properly torqued to 120 ft·lb.
- The operator must make sure that the brakes are functioning correctly.
- Before towing, the operator of the tow vehicle must ensure that the trailer is hooked correctly to the tow vehicle including:
  - Safety chains
  - Breakaway cable
  - Electrical connection (lights, brakes)
  - Ensuring that the trailer tongue is properly fastened to the trailer frame.

**Note:** *Trailer must be towed level so as not to overload either axle, otherwise axle damage can occur.*

## 3. Introduction

### Components

#### Heat Center Pro (HCP) Enclosure

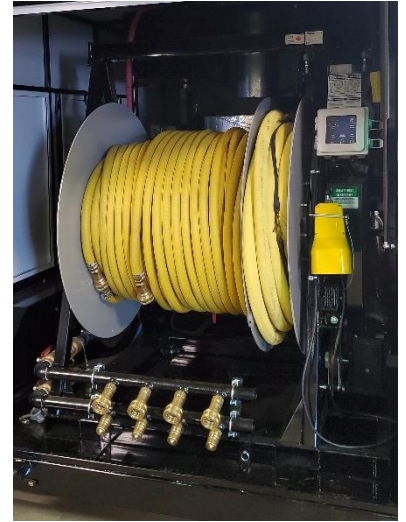
- A compact and portable design.
- Easy access from rear and side doors.
- Automatic temperature control and fuel usage which responds to worksite demands.
- Low pressure, atmospherically vented circulation system.
- No special boiler certification is required to operate the system.
- Circulation system “automatic air vent” component for quick setup-and-go operation.
- A central heat module control center which monitors and controls system operations.
- A multi-light system operation feature for easy system troubleshooting.
- Patented Combustion Environment Control System preheats the air and fuel used for combustion.
- 900-HCP Hose Reel partitioned to accommodate two sizes of circulation hose.
- Storage Bay for Portable Heat Exchangers.



Figure 2 - Heat Center Pro Enclosure

## Hose Reel

- The on-board hose reel comes with 600ft. of 1" or 1,400ft. of ¾" and 100ft. of 1 ½" I.D heat exchanger circulation hose.
- The reel can also be used for the "circulation line heat exchange" hose required for thawing and/or curing concrete.
- The electric drive system provides "power on" or "power off" capability.
- A torque-limiting device provides braking.
- The on-board reel comes with a removable manifold and 1 ½" quick connections to accommodate remote placement of the manifold.



*Figure 3 - Hose Reel  
(Partitioned Heat Center Pro Edition)*

## Accessories

### Extension Reservoir Assembly

(Not required with the 900-HCP, already equipped with back flow prevention. See Elevation Concerns, page 4-9.)

The Extended Reservoir Tank is required in scenarios when “portable heat exchangers” are higher than the top level of the glycol reservoir tank. If the Extended Reservoir tank is not used, the following can occur:

- **Insufficient Fluid in the System**

Fluid can drain back to the heat transfer reservoir tank from the over-elevated fluid lines when the pump is shut off. The heat transfer reservoir tank will show adequate fluid, but when the pump is started extra fluid will be required to recharge the over-elevated fluid lines and portable heat exchangers and the system will then have insufficient fluid in the reservoir.

- **Fluid Overflow**

If fluid is added to maintain proper fluid levels while the pump is running, overflow at the reservoir tank will occur when the pump is shut off. This would occur because of the drain back from the over-elevated fluid lines.

### Mixing/Booster Pump

The multifunctional mixing/booster ensures maximum flexibility in the use of this system.

- Tempering mode supplies lower temperature fluid for concrete cure and radiant floor heat applications, eliminating the need to reduce the water heater operating temperatures below safe operating ranges.
- When operating in booster mode the system can increase flow rates or function as a pumping station to increase pumping distances by over 300ft per station.
- The system also allows for dual-temperature control. High temperature fluid can be provided to portable heat exchangers, along with a lower temperature fluid for concrete cure and radiant floor heat applications.

**Note:** Disengage Flow Reverser when using this accessory.



Figure 4 - Extended Reservoir



Figure 5 - Mixing/Booster Pump



### Optional Remote Manifold

The multifunctional mixing/booster ensures maximum flexibility in the use of this system.

- Allows for additional distribution and/or separation between the central heating trailer and the manifold.



Figure 6 - Optional Remote Manifold

### Fluid Circulation Lines

Fluid circulation lines are designed to endure the toughest work site environments. Portable distribution manifolds connected to the primary circulation system redistribute the heat transfer fluid through secondary lines. All fluid circulation components come with isolation valves and quick couplers, ensuring quick set up, start up, and quick disassembly when the job is done. DRYAIR provides a full range of hoses, adapters, and manifolds for handling and distributing HTF.



Figure 7 - Circulation Lines

The circulation line heat exchangers are the perfect solution for:

- Heating and/or thawing cold or frozen ground.
- Frost prevention.
- Concrete curing and heating in subzero environments.
- Hose loops are typically 500ft in length with maximum of 1,000ft achieved by connecting two hoses together. Refer to the Components, Hose Reel section of the Operator Manual to verify hose length for your unit.

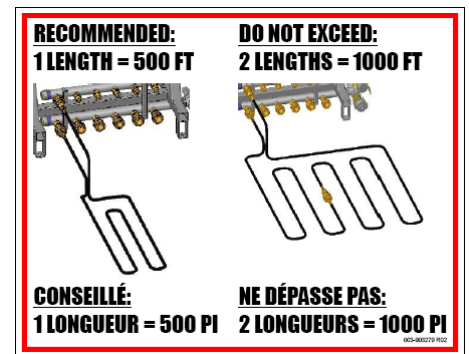


Figure 8 - Hose Loop Length

This system can be applied to all types of concrete applications. Circulation line heat exchangers can be secured directly against the surface of the concrete or concrete forms.

Alternatively, an expendable circulation line can be incorporated into the concrete structure during the pour. This allows the slab floor to continue being heated, to provide radiant floor heat during construction.

### Insulated Line Jackets

Insulated circulation line jackets are also available. These insulated jackets will prevent exposed circulation line heat loss in extreme subzero conditions.



Figure 9 - Insulated Line Jackets

### Portable Heat Exchangers

Portable heat exchangers are the ideal way to heat and/or dry enclosed structures. Their compact and mobile design allows them to be positioned where required on the job site. The efficient fan/coil design provides a high rate of heat transfer. High volume fans then deliver this heat evenly throughout a large area. The clean, low relative humidity heat delivery minimizes energy costs by eliminating the need to draw in fresh outside air. With this system, you just reheat warm internal air, rather than heating cold external air.

**Note:** *Disengage Flow Reverser when using this accessory.*



Figure 10 - Portable Heat Exchangers

### Plate Heat Exchanger

The plate heat exchanger module uses a stacked parallel flat plate braised heat exchanger. This creates two separate and isolated fluid loops. In glycol-glycol situations it can extend the range of the HTF distribution. In other situations, it can be used to transmit heat energy from the glycol to another fluid. The plate heat exchangers combined with a central heating module can be used:

- To extend the effective range and lengths of the primary distribution lines.
- In a multi-story application to extend the vertical range of the primary distribution lines.
- In an HTF to liquid heating application, such as heating a swimming pool or other volume of water (or other low-viscosity non-corrosive liquid).



Figure 11 - Plate Heat Exchanger Unit

**Note:** *Disengage Flow Reverser when using this accessory*

### D-CAN Desiccant Dehumidifier System

The D-CAN 30 delivers all of the benefits of desiccant drying with reduced electrical requirements, lower operating temperatures, and fuel savings compared to other traditional Diesel/Electric systems.

- At 3,000 CFM the D-CAN 30 is capable of removing close to 300 gallons of water per day.
- There are no combustion by-products to vent from the D-CAN 30 granting operators the added flexibility of being able to place the unit inside or outside the structure for easier setup.
- Only two 115V/20A circuits are needed to run the blowers: no high voltage cords means increased safety on the site.
- Turn the desiccant wheel off and the D-CAN 30 offers the added flexibility of operating as a 300,000 BTU heat exchanger to provide temporary heat to the structure.



Figure 12 - D-CAN 30 Dessicant Dehumidifier

## How the System Works

The system uses a low-pressure, open-fluid loop distribution system with an atmospherically vented fluid reservoir. A central heating module warms the heat transfer fluid. This heated fluid is pumped through a distribution system loop, passing through heat exchangers in remote locations.

Two types of exchangers are available: Portable Heat Exchangers and Circulation Line Heat Exchangers.

- Portable Heat Exchangers include a heat transfer coil, fan, and thermostatic temperature control. The heat transfer fluid flows through the transfer coil, where heat is transferred to the air being drawn through the coil by the fan. The coil is specially designed for optimum heat transfer, without adding any moisture or combustion by-products to the air.
- Circulation Line Heat Exchangers use flexible hose with hydraulic-style quick couplers for ease in hookup. Heat transfer occurs by direct contact heat transfer and radiant heat conduction.

The Mixing/Booster unit can be utilized to:

- Provide lower temperature fluid for concrete cure and radiant floor heat applications.
- Provide dual temperature control with a single fluid circulation system.
- Boost fluid flow and increase pumping distances.

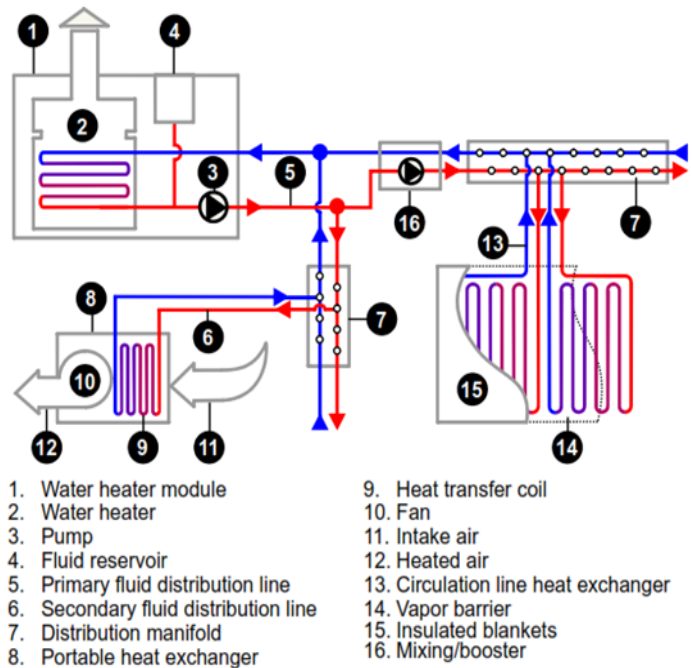


Figure 13 - How the System Works

## 4. Setup

The positioning of all the system components on the site will be influenced by a number of factors. Please read all of the “Setup” section before beginning. Be sure to observe all local electrical codes and fire regulations when positioning the central heating module.

### Lifting the Unit

#### Prerequisites

- Properly rated lifting equipment (crane or hoist). A fully loaded model Heat Center Pro can weigh in excess of 9,000lbs (4,083kgs).
- Inspect lift components for damage and defects. If any of the components are damaged or have defects, replace affected components before proceeding.
- Ensure “018-905033 PKG LIFT FRAME 650GTS” is installed and all fasteners are tight.
- Torque ½” fasteners to 80 ft·lbs and ⅝” fasteners to 150 ft·lbs.
- Attach “017-905675 SLING 4X12’ 10,700 LB @ 60 DEGREES” lift sling.
- Ensure unit is off and all electrical power and HTF circulation lines are disconnected.
- All doors and access covers are closed and secured.

**Warning!** Crushing hazard. You may be crushed if the lifting devices fail.

- Never stand under or get onto the machine while it is being lifted or moved.
- Use only designated lift points to lift the machine.

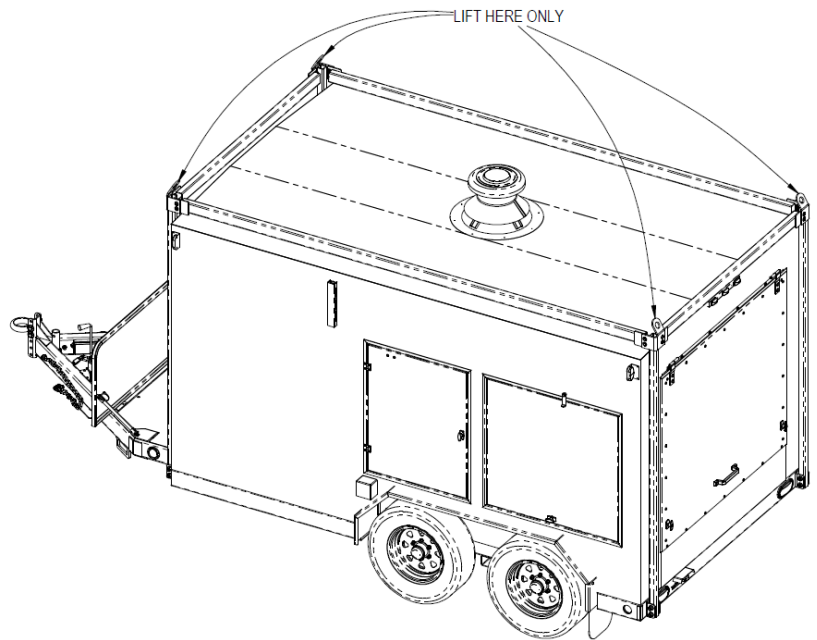


Figure 14 - Lifting Points

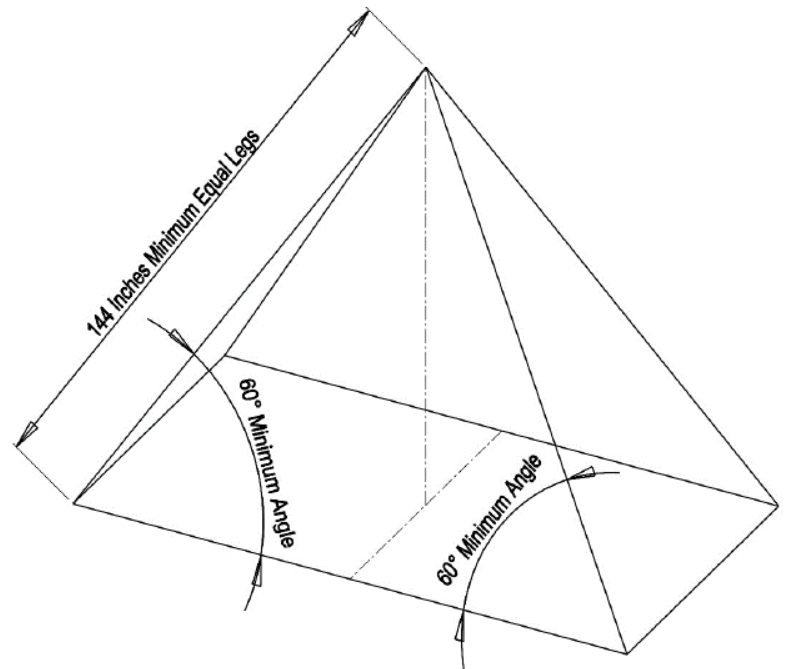


Figure 15 - Lifting Sling Angles

## Tie-Down

Using proper Tie-Down points will allow for safe and easy transport of your unit.

### Prerequisites

- Properly rated chains or straps. A fully loaded Heat Center Pro can weigh in excess of 9,000lbs (4,083kgs).
- All doors and access covers closed and secured.

**Note:** Use only approved tie-down points.

1. After loading the unit onto a deck, deploy the jack. With the assistance of the jack, position substantial blocking under the front most crossmember of the trailer so that the unit is slightly lower front to back. Remove tension from the jack to ensure the jack is not damaged by compressing resulting from tightening chains or straps.
2. Using the rear most tie-down points, through both eyes, strap or chain the unit at a rearward angle. Initially apply only enough tension to keep the unit from rolling. Using the front tie down points, through both eyes, strap or chain the unit, at a forward angle providing both downward pressure on the blocking and slight forward pressure.
3. Alternately tighten rear straps or chains as required to secure the unit for transport.
4. Check chain or strap tension after the first 30 mi (50 km) of travel and every 100mi (160km) thereafter.



Figure 16 - Lifting Frame (Part #018-905480)



Figure 17 - Sling 4x12' (Part# 017-905675)

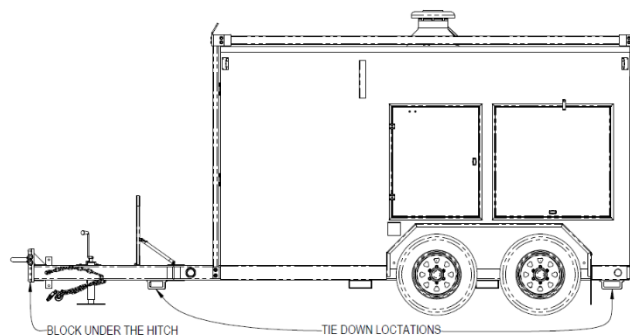


Figure 18 - Tie-Down Points

## Required Safety Clearances

The Heat Center Pro is a heating appliance, therefore safe heat and exhaust clearances must be observed from combustible materials and for service access.

- Maintain 24” (61cm) of clearance on all sides of the unit (*Figure 19*).
- Maintain 36” (91cm) of clearance on all sides of the flue pipe and chimney cap (*Figure 20*).

## Elevation Concerns

Thanks to the inclusion of an electrically actuated, spring-closed valve, portable heat exchangers can be used at a level above the expansion tank to the level of 50ft (15m). Applications greater than 50ft (15m) can be attained, contact DRYAIR service for assistance.

The electrically actuated, spring-closed valve is installed as a backflow prevention unit. With the water heater be operating within acceptable parameters, the valve will be open allowing flow. Should a fault occur in the water heater, or should power be lost, the spring within the valve actuator shall close the valve, blocking flow and eliminating backflow. This is important as it allows overhead heat exchangers and circulation lines to retain their fluid, and hence will prevent fluid overflow in the water heater’s integral atmospherically vented expansion tank.

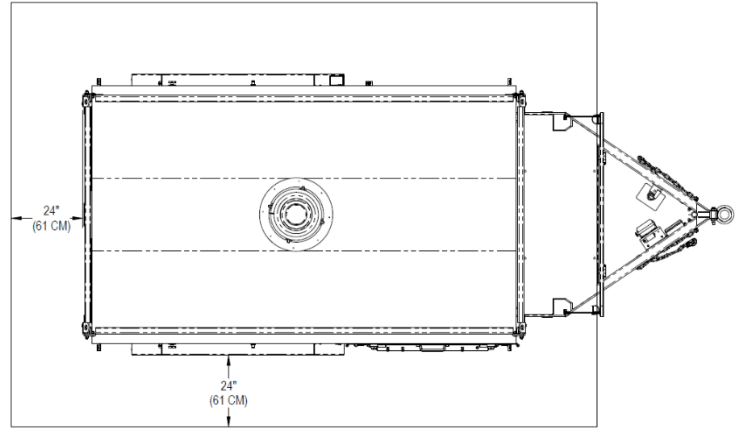


Figure 19 - Top-View Clearances

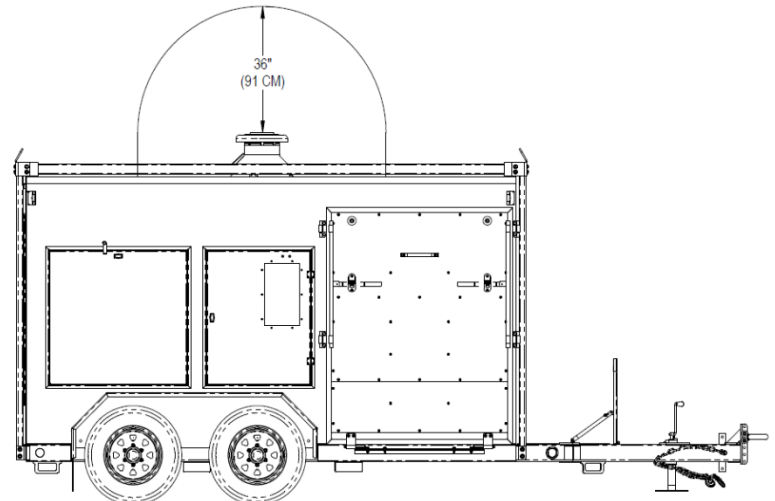


Figure 20 - Side-View Clearance

## Electrical Requirements & Connection

When determining the “central mobile enclosure” location on site, consider setting up near the electrical power supply.

**Note:** *This applies mainly to systems not equipped with a dedicated generator.*

- The main feed wiring must be adequately sized to carry the minimum ampacity shown on the water heater cabinet’s rating label. All electrical connections, connectors and wire must be CSA/UL compliant and installed according to local laws and codes.
- Before making any electrical connections, be sure that the electric power supply is “Off”.

### Electrical Connection

- The Heat Center Pro requires 115/230V AC Power. The module is factory wired so that the only connection to be made is a 4-wire 230V AC service outlet.
- 30A of power is needed to operate the Heat Center Pro with all accessories. Electrical connection to main is to be a NEMA L14-30R connecting to the recessed L14-30P, located on the front of the unit.
- The main feed wiring must be adequately sized to carry the minimum ampacity shown on the water heater cabinet’s rating label.
- All electrical connections, connectors and wire must be CSA/UL approved, and installed according to local laws and codes.
- A 4-wire hookup is required for all systems to work properly. Warranty is void if the wiring hookup is not done correctly (Figure 21).

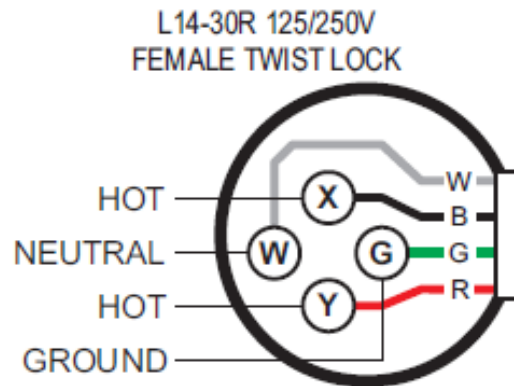


Figure 21 - Electrical Hookup (230V AC)

**Note:** *Warranty is void if the wiring hookup is not done correctly.*

## Heat Transfer Fluid “HTF”

**CAUTION!** At no time should you use automobile antifreeze in your system. The use of automobile antifreeze will void your warranty.

- The heat transfer fluid “HTF” level should show no more than ¼ on the gauge (cold fluid) at start-up. As the “HTF” warms to operating temperature, fluid expansion will raise the level to ½ or ¾ on the gauge (depending on the total volume of fluid in the circulation system).

### Heat Transfer Fluid Specifications

- The system is shipped with pre-mixed “HTF”, made up of 50% “Dowfrost ® HTF” or “Boss Chill PG” and 50% water\*, by weight – freeze protection down to -28°F (-33°C).
- The “glycol/water mixture chart” below will provide you with more information on the proper mixture for your area.
- “Dowfrost ® HTF” or “Boss Chill PG” must be used. The pure “Dowfrost ® HTF” or “Boss Chill PG” heat transfer fluid used in the system is made of a blend of 95-97% Propylene glycol, <5% Dipotassium phosphate and deionized water (see Safety Concerns section – MSDS sheets) for additional information.
- Soft water with a pH level (#7) must be used.

Percent Propylene Glycol		Freezing Point	
By Mass	By Volume	°F	°C
0.0	0.0	32.0	0.0
10.0	9.6	26.1	-3.2
20.0	19.4	17.9	-7.8
30.0	29.4	6.7	-14.0
40.0	39.6	-8.1	-22.3
50.0	49.9	-28.9	-33.8
60.0	60.0	-54.9	-48.3

Figure 22 - Glycol/Water Mixture Chart

**CAUTION!** Whenever coupling or uncoupling quick couplers, make sure that the isolation valves are closed, and the pump is off. Failure to do so may put you at risk of injury from eye and/or skin exposure to hot glycol.



## Primary HTF circulation lines

- If possible, position the primary circulation lines out of high traffic areas.
- If primary HTF circulation lines are required, connect the primary circulation lines to manifold “supply” and “return” camlock couplers to the central mobile enclosure.
- The circulation manifold is located downstream of the primary HTF circulation lines.

## Secondary HTF circulation lines

- The secondary HTF circulation lines connect the circulation manifold to the heat exchangers carried within the Heat Centre Pro.
- Quick couplers are attached to both ends of the secondary circulation lines to enable quick coupling.
- If using certain other heat transfer accessories, it may be necessary to connect to the camlock couplers.

## Fuel/Gas

See “Burner Setup – Burner Identification” – below for burner type.

### Diesel/Light Oil

- Only clean #1 or #2 diesel fuel or light heating oil is suitable for use in the system. \*
- The “central heating module” does not come equipped with its own tank, so therefore an auxiliary fuel tank and hoses are required. Recommended to filter fuel from auxiliary fuel tank before entering CHU.
- The fuel system utilizes a two-pipe system to ensure efficient fuel supply to the burner.

\* Contact your local fuel supplier to inform them of the requirements.

### Propane Gas

- A supply of “Propane Vapor” should be connected to the inlet of the secondary regulator at a pressure of 10 PSI MAX.

\* Provide your local Propane supplier with BTUH input requirements to ensure an adequate volume of vaporized propane even in the coldest ambient conditions.

### Natural Gas

- A supply of “Natural Gas” should be connected to the manual gas train supply valve at a pressure of approximately 12-14” W.C.

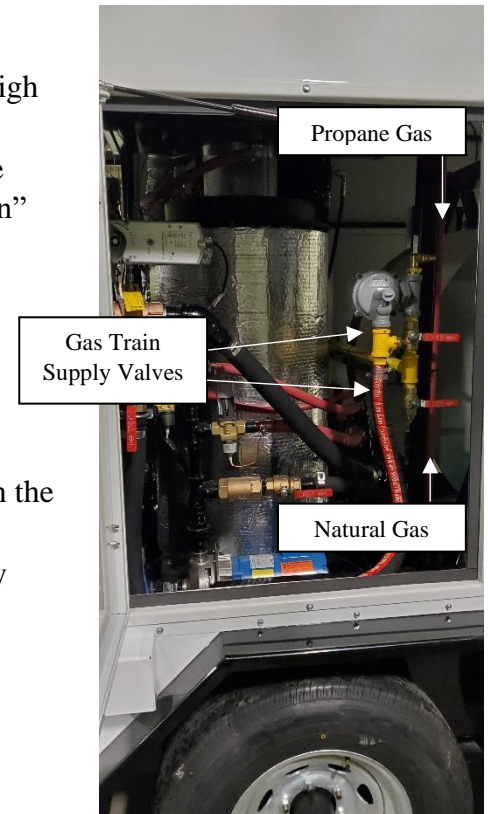


Figure 23 - Gas Train Supply

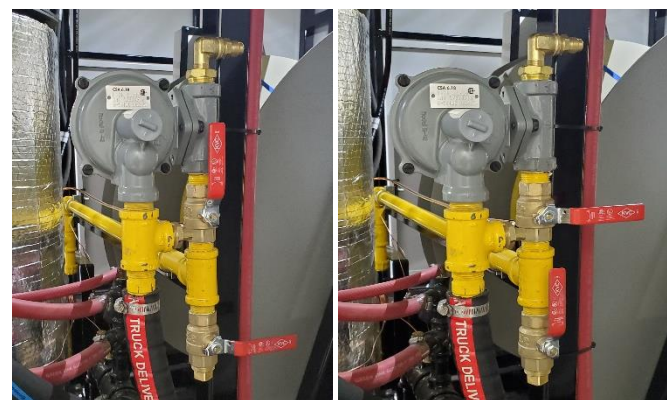


Figure 25 - Valve Positions for Propane

Figure 24 - Valve Positions for Natural Gas

\* Provide your local Natural Gas Utility Company with BTUH input and pressure requirements to ensure adequate volume of gas at the correct pressure range.

## Burner Identification

Riello’s identification label is located on the top flange of the burner’s main chassis plate and identifies if the burner is for use with “Diesel/Light Oil”, “Natural Gas” or “Propane Gas”.

White vinyl labels are also located on both the burners’ main chassis plate and to the top of the burner cover hood:

- Black Lettering = Diesel/Light Oil Burner (*Figure 26*)
- Red Lettering = Propane Gas Burner (*Figure 27*)
- Blue Lettering = Natural Gas Burner (*Figure 28*)

If the installed burner is the correct fuel type to be used, proceed to the applicable startup section.

If a burner of a different format is required, it must be obtained from your DRYAIR Manufacturing Corp. distributor. The existing burner must then be removed before the alternate burner can be installed.

## Burner Removal

To remove an existing **Riello Model 40-F20 Diesel/Light Oil Burner**, use the following sequence:

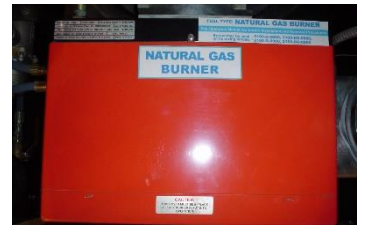
1. Make certain that the power supply to the water heater is disconnected.
2. Disconnect the electrical connection to the burner by unplugging the quick-disconnect multi-pin connector. (*Figure 29*)
3. Disconnect the combustion air duct by loosening the gear clamp-band.
4. Disconnect the fuel supply hose and fuel return hose by uncoupling the quick connections on the side of the burner. The loose supply and return hose ends should be coupled together (to keep connections clean) and pushed aside out of the way inside the cabinet. (*Figure 30*)
5. Remove 2 nuts from top of burner tube bracket. (*Figure 32*)
6. Pull burner toward you and away from the mounting bracket. (*Figure 32*)
7. Remove the gas hose plug to accommodate the propane/natural gas burner union.



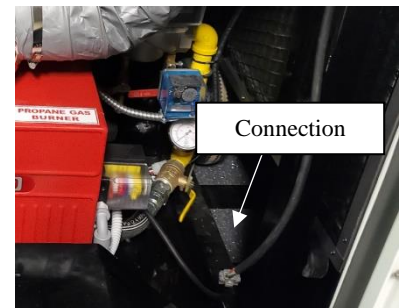
*Figure 26 - Diesel/Light Oil Burner*



*Figure 27 - Propane Gas Burner*



*Figure 28 - Natural Gas Burner*



*Figure 29 - Electrical Connection*

To remove an existing **Riello Model 40-G900 Propane Gas Burner** or **Natural Gas Burner**, use the following sequence:

1. Make certain that power supply and gas supply are shut off and disconnected from the water heater.
2. Disconnect the electrical connection to the burner by unplugging the quick-disconnect multi-pin connector. (Figure 29)
3. Disconnect the combustion air duct by loosening the gear clamp-band. (Figure 31)
4. Close off the manual gas train valve. (Figure 31)
5. Use 2 wrenches to loosen and disconnect the gas supply hose from the gas train to burner. (Figure 31)
6. Remove 2 nuts from top of burner tube bracket. (Figure 32)
7. Pull burner toward you and away from the mounting bracket.
8. Replace the gas train plug to prevent a blockage or debris. (Figure 31)

## Burner Installation

To install an alternate **Riello Model 40-F20 Diesel/Light Oil Burner**:

1. Insert burner into the mounting bracket.
2. Install 2 nuts at top of burner tube bracket. (Figure 32)
3. Connect the fuel supply hose and fuel return hose by coupling them to the quick connections on the side of the burner. (Figure 30)
4. Make the electrical connection to the burner by plugging-in the quick-connect. (Figure 29)

To install an alternate **Riello Model 40-G900 Propane Gas Burner** or **Natural Gas Burner**:

1. Insert burner into the mounting bracket.
2. Install 2 nuts at top of burner tube bracket. (Figure 32)
3. Connect gas supply hose from gas train to burner. Use 2 wrenches to tighten. (Figure 31)
4. Open the manual gas train valve.
5. Remove locking nut and swing burner chassis away to expose the combustion head adjustment mechanism. Loosen Allen screw and move the head assembly until the rear edge of the air tube coincides with the desired number setting. (Figure 33)
  - a. Setting for model “900-HCP” (natural gas or propane) should be 5.0 (all the way in).
6. Lock off the setting, swing the burner closed and replace the locking nut.
7. Connect combustion air duct and tighten the gear clamp-band.

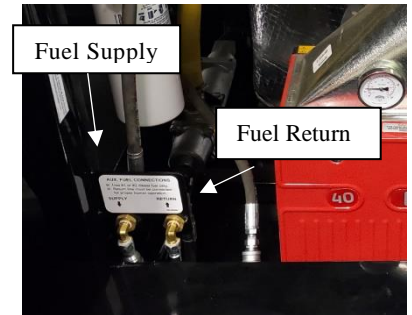


Figure 30 - Fuel Supply and Return Lines

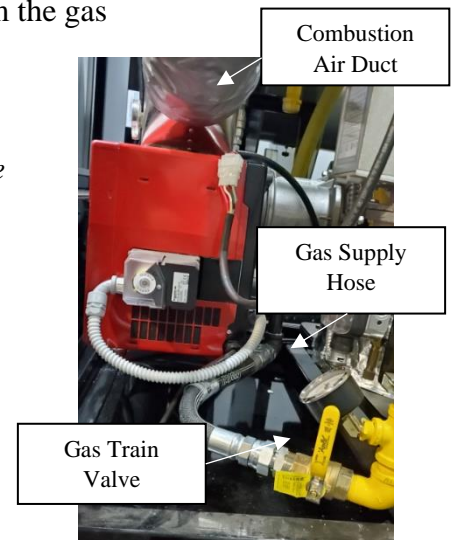


Figure 31 - Propane Gas/Natural Gas Burner Connections

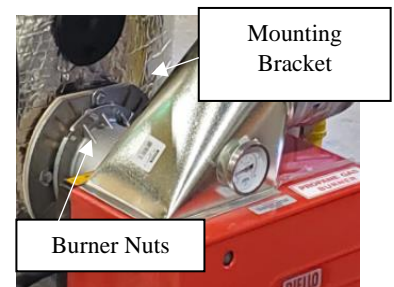


Figure 32 - Riello Burner Tube & Mounting Bracket

8. Make the electrical connection to the burner by plugging in the quick-disconnect. (Figure 29)

### **COMBUSTION HEAD ADJUSTMENTS**

To set combustion head, loosen the Allen screw (A) and move the elbow (B) so that the rear edge of the air tube (C) coincides with the set point number (D). Retighten the Allen screw (A).

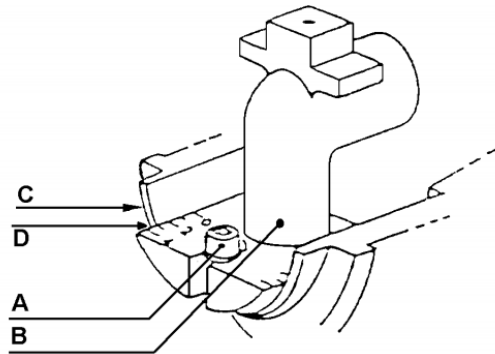


Figure 33 - Combustion Head Adjustment

## **Fuel Supply Notes**

The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1.

When testing the customer supplied gas piping (outside the Heat Center Pro enclosure) the water heater and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of ½ psi (3.5 kPa). The water heater must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ psi (3.5 kPa).

**Note:** *The water heater and its gas connection must be leak tested before placing the water heater in operation.*

**CAUTION!** *Should overheating occur or the gas supply fails to shut off, do not turn off or disconnect the electrical supply to the pump. Instead, shut off the gas supply at a location external to the appliance.*

## 5. Operation

### Purging air from the HTF circulation system

- Verify that the HTF level gauge show approximately  $\frac{1}{4}$  to  $\frac{1}{2}$  full.
- Verify that the primary circulation lines are connected in a way that allows looping (circulation) of the HTF. Verify that the “supply” and “return” isolation valves and the isolation valves at both ends of the primary circulation lines (hard connection) are in the “open” position.
- Toggle the pump switch to the “On” (up) position and run the pump. This will release the air from the system.
- Monitor the HTF sight glass gauge and make sure that the HTF level stays between  $\frac{1}{4}$  &  $\frac{1}{2}$  full at all times during this process.
- Note that there may be a certain amount of air in the system. HTF levels may change as air is displaced from the system. Add HTF to maintain  $\frac{1}{4}$  to  $\frac{1}{2}$  levels when the fluid is cold.
- When the air is eliminated, the “System Pressure” gauge (*Figure 34*) will hold at a steady reading between 15 PSI to 40 PSI.



Figure 34- Control Panel

### Before Firing the System

- Verify that the power supply is correct and that the electrical hook up is as specified in “Setup”.
- Verify that the water heater is being supplied with the same fuel type as indicated on the burner.
- Verify that the “supply” and “return” isolation valves are closed.
- Verify that the fuel line valves are in the Open/Normal positions.
- Verify that the heat transfer fluid level gauge shows approximately  $\frac{1}{4}$  full.

## Cold Start Procedure

*The system has a patented, built-in electric HTF pre-heater, which will heat the HTF in the heat exchanger without the burner being turned on. This device is unique to DRYAIR equipment. It is not always necessary to use this device, but it will make the unit start more smoothly and reduce maintenance costs associated with “cold starts”. To utilize the HTF preheater, follow the procedure below.*

This procedure is recommended if the ambient outdoor air temperature is lower than 50°F (10° C). Consider initiating this process 10 minutes prior to firing the system. In 0°F (-18° C) conditions, this process will take longer.

- Plug in power supply.
- Confirm that the pump switch and the water heater switch are in the “Off” (down) position.
- Position all breakers to the “On” (up) position. This will automatically energize the electric “cold start” circulation heater.
- Wait until the supply temperature gauge reads above 40° F (10° C). The time required for the heat transfer fluid in the heat exchanger to reach this temperature will depend on the outdoor ambient air temperature.
- Proceed with the “Temperate Start Procedure”.

**Note:** *Length of time required for supply temperature to rise above 40° F (4° C) is dependent on outdoor ambient air temperature and environmental conditions. Unit can be left in “Pre-Heat” mode indefinitely without damage and as such can be placed in “Pre-Heat” mode as soon as power is available. Pre-Heat can be used in all ambient temperatures. Step 1 of equipment set up can be connecting power to the water heater and initiating cold start procedure (pre-heat). While setting up accessories the unit will have ample time to reach desired temperatures ensuring trouble free operation.*

## Temperate Start Procedure

You can proceed with this procedure when:

- a) The ambient outdoor air temperature is above 32° F (0° C) *or*
- b) The recommended “cold start procedure” has been initiated for 10 minutes if between 32° F (0° C) to 0° F (-18° C) *or*
- c) The recommended "cold start procedure" has been completed if below 0° F (-18° C).

## Control settings

### Low Flow Situations

Utilizing only one 80 or 200 portable heat exchanger:

- Water heater heat exchanger temperature overrun can be expected, therefore, initially set the Aquastat at 160°F (71°C).

### High Flow Situations

Utilizing two or more portable heat exchangers:

- Set the Aquastat at 180°F (82°C).
- Turn the supply ball valve back to the “Open” position.

## Purging Air from the Diesel/Light Oil Fuel System

If the burner does not fire, the fuel system may need to be purged of air.

- Confirm that there is an adequate fuel supply.
- Toggle the water heater switch to the “Off” (down) position.
- Open all manual valves in the fuel system.
- Confirm that the pump switch is in the “On” (up) position.
- Toggle the water heater switch to the “On” (up) position.
- Depress the reset button. This will activate the fuel pump & burner firing sequence.
- When the fuel system is primed, the fuel pressure gauge will show a steady reading and the water heater should attempt to ignite.

**Note:** *The reset process can be tried up to six times, at the most. If the water heater does not fire, see the accompanying “Water Heater Module - Service Manual” or “Riello Burner Installation Manual” for information and/or contact DRYAIR Technical Support 1 (888) 750-1700.*

## Adding HTF to system

Verify that the power supply is correct and the electrical hook up is as specified in “Setup”.

- Ensure all breakers are in the “On” position.
- Remove fill/drain hose plug from the Fill/Drain hose.
- Submerge the fill/drain hose into the bottom of the barrel/pail or jug or pre-mixed HTF (See “Setup” for HTF specifications).
- Turn the supply ball valve to the “Closed” position.
- Turn the fill/drain ball valve to the “Open” position.
- Toggle the pump switch to the “On” (up) position.
- Once the pump switch is in the “On” position, the pump will commence to draw the HTF into the system. By watching the HTF level gauge, continue to fill the system until the HTF level gauge shown is 1/2 full.

**CAUTION!** *Caution must be taken when approaching the 1/2 full mark as it could take 2-3 seconds to register the actual level once pumping has ceased.*

- In the case of an overfull situation, do the following:
  - Toggle the pump switch to the “Off” (down) position
  - Verify that the fill/drain ball valve is in the “Open” position
  - Turn the supply ball valve to the “Open” position. Gravity will immediately drain the HTF out of the system through the fill/ drain hose. The fill/drain hose should be submerged into a barrel/ pail or jug with sufficient room for the HTF
  - Once the desired amount of HTF has been attained and the HTF level gauge is showing half full, turn the supply ball valve to the “closed” position and continue with the follow procedures
  - Turn the fill/drain ball valve to the “Closed” position.
  - Toggle the pump switch to the “Off” (down) position.

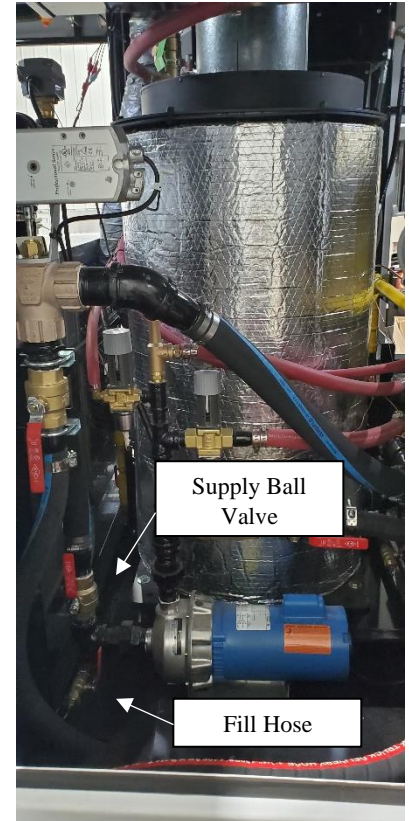


Figure 35 - Pump Connections



## 6. Hose Reel

### Operating Features

**DANGER!** It is very important that you read and understand this manual before operating the reel. Failure to follow the procedures and cautions in this manual could lead to injury or possible death.

The DRYAIR hose reel's primary purpose is to dispense and collect fluid circulation hose on job sites, primarily with respect to ground thaw and/or concrete cure operations.

The hose reel includes the following controls:

- Spool directional controls
- Momentary foot switch for load or unload application
- Hose reel drive speed
- Degree of drive engagement/braking



Figure 36 - Hose Reel

### Drive Features & Power Requirements

- The reel can be run off a 115VAC, 15-amp circuit.
- Reel power and directional control is handled through two toggle switches. One controls Power - On/Off, the other controls the Mode - Load/Unload.
- The reel motor is a high torque permanent magnet DC 1 HP motor capable of variable speed operation. The reel operates between 5 RPM and 15 RPM. This is adjusted by the MOTOR SPEED control dial.
- Drive and motor protection against inertial forces is provided by an adjustable torque-limiter clutch located between the motor/gear box and the reel spool. The torque limiter clutch provides a smooth interface with the spool's high inertial forces.
- Power transmission between the gearbox and the hose reel spool is by means of an adjustable tension belt. This belt also allows freewheeling operation of the hose reel, while allowing drag on the belt to provide a degree of inertial limitation on the hose reel spool.
- An adjustable torque-limiter clutch located between the motor/gearbox and the reel spool provides additional protection against high inertial load as well as offering a degree of safety against entanglement.

## Setup/Operation

**CAUTION!** It is very important that you read and understand this section before operating the hose reel. Failure to follow the procedures and cautions in this manual could lead to injury or possible death.

## Manual Controls

The hose reel has a master power switch, a motor direction switch, a belt tension switch, a motor speed dial, and a circuit breaker.

**CAUTION!** When NOT operating the reel, put the reel Main Power toggle switch in the “Off” position to prevent accidental activation and possible injury.

## Reel Power

Power is present when the MAIN POWER switch is in the “ON” position. The motor is operated by depressing the foot switch, which operates a momentary contact (will only operate when depressed).

## Reel Direction Modes

- Mode 1** - Powered Load
- Mode 2** - Freewheeling Unload
- Mode 3** - Powered Unload
- Mode 4** - Cold Starting

**CAUTION!** Take care not to allow your hands, feet, or clothing to become trapped in any of the reel’s moving mechanisms.



Figure 37 - Hose Reel Control Panel

### Mode 1 - Powered Load

The LOAD mode is achieved when the MOTOR OPERATION toggle switch is in the LOAD position and the belt is sufficiently tightened to transmit power from the motor/gearbox to the hose reel spool.

The foot switch is momentary and will only operate when it is depressed.

The hose must be directed manually into position on the hose reel.

The hose reel speed may be varied by means of the MOTOR SPEED dial.

### Mode 2 - Freewheel Unload

The BELT TENSION switch controls the linear actuator, which positions the pivot arm, on the end of which is an idler sheave that depresses the drive belt. This adjusts the belt tension. With the belt loosened the hose reel may freewheel.

It is important to maintain sufficient tension on the belt to allow a degree of braking on the hose reel spool while unrolling hose. The hose reel spool possesses a variable amount of inertia depending on its mass and its angular velocity.

This necessitates gradually loosening the belt as the hose is unloaded: less spool inertia (from decreased mass) requires less braking.

Note that for transport of the hose reel it is advisable to maintain sufficient tension on the hose reel to arrest any rotation of the hose reel spool caused by motion of the unit.

### Mode 3 - Powered Unload

The UNLOAD mode is achieved when the MOTOR OPERATION toggle switch is in the UNLOAD position and the belt is sufficiently tightened to transmit power from the motor/gearbox to the hose reel spool. The foot switch is momentary and will only operate when it is depressed.

### Mode 4 - Cold Starting

It is advisable that when beginning operation below 18°F (-8°C) that the belt tension be temporarily loosened far enough that motor rotation will not cause spool rotation and that the motor be powered for a minimum of 5 minutes. This will allow the oil in the gearbox to warm up and to allow smooth low-temperature operation.

Re-tension the belt following system warm-up and begin your desired operation.

## Mechanical Drive Components

Access to the internal mechanical drive components is through the access door. This door must be removed.

### Electric Motor

- No regular maintenance is required.
- Low temperature automatic reset thermal protector.
- Totally enclosed and fully gasket construction for dirty environments.
- Make sure that during operation or storage, the motor is not in prolonged contact with moisture.

Refer to the table below for motor features & data:

PRODUCT FEATURE - ENCLOSED HIGH TORQUE PMDC MOTOR			
Model Number:	MPTM-001-1L18	Weight:	29 Lbs
Power:	1 HP	Torque:	2.92 Ft*Lbs.
ω:	1800 RPM	Housing Rating:	TEFC
Voltage:	90VDC	Insulation Class:	F
Frame:	NEMA 56C	Output Shaft:	5/8"
Mounting:	C-FACE	Service Factor:	1.0

*Figure 38 - Motor Features & Data*

## GearBox

- Helical worm gear
- 60:1 Gear reduction
- 5/8” Input shaft size
- 1 1/8” Output shaft

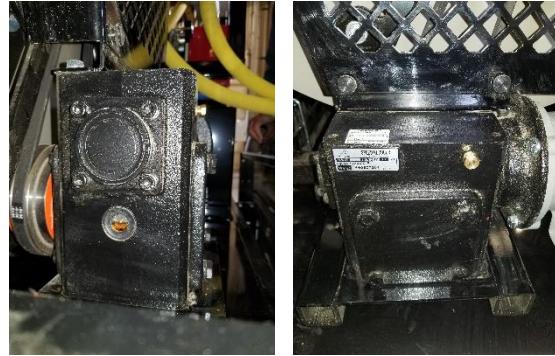


Figure 39 - Gear Box

**CAUTION!** Do not operate the unit without ensuring it contains the correct amount of oil. Do not overfill or under fill with oil. Injury to personnel, unit, or other equipment may result. Oil should be changed with greater frequency if unit is used in severe environment (dusty or high humidity).

**WARNING!** Oil, housing, and other components can reach high temperatures during operation and can cause severe burns. Use extreme care when removing lubrication plugs and vents while servicing the unit.

See “Maintenance - Gear Box” section of the Operator Manual for Gear Box oil filling procedures, service & maintenance.

## Torque Limiter Clutch

- The torque limiter protects the drive line from damage due to overload conditions. The driven center member slips on non-asbestos friction discs during overload situations in the drive line.
- Torque Ratings: Minimum: 60 lb·ft.  
Maximum: 190 lb·ft.

Please note that the torque ratings are estimates. Actual torque capacity may vary significantly depending on many factors. Field conditions such as oil, humidity, water, and temperature as well as the frequency and duration of slippage all affect torque capacity. Although the torque limiter clutch is factory set at DRYAIR, periodic adjustment may be required.

It is recommended the torque setting of the clutch be checked twice per season (see “Maintenance” section). With prolonged use the two friction disks, located on either side of the A-plate sprocket, will eventually show wear.

- It is important that the torque limiter clutch is adjusted properly. The clutch should be set to a slip torque of 100 ft-lb.

***Note:** A visual check may be required to confirm whether it is the clutch that is slipping or the motor.*

*See “Maintenance - Torque limiter adjustment” section of the Operator Manual for Torque Adjustment & Run-In Procedure.*

## Maintenance

***DANGER!*** It is very important that you read and understand this section before operating the hose reel. Failure to follow the procedures and cautions in this manual could lead to injury or possible death.

## Precautions

*Electric shock will result in death or serious injury.*

- The user is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- Install and close all covers before applying power or starting/stopping the hose reel.
- Before servicing:
  - Disconnect all power.
  - Place a “DO NOT TURN ON” label on the power cord.
- Disconnect all power, including external control power that may be presently servicing the drive controller.

## Electric Motor

- No regular maintenance is required.
- Make sure that the motor is not in prolonged contact with moisture during operation or storage.

## GearBox

### Maintenance & Operation

***WARNING!*** Oil, housing, and other components can reach high temperatures during operation, and can cause severe burns. Use extreme care when removing lubrication plugs and vents while servicing the unit.

- Do not operate the unit without making sure it contains the correct amount of oil.
- Do not overfill or under fill with oil, or injury to personnel, unit, or other equipment may result.
- For proper operation in subzero conditions, it is mandatory that the following oil be used: *“Spartan EP 320 industrial gear oil” or equivalent... Any other gear oil will void warranty!*

## Oil Filling Procedure

- Remove Fill and Vent Plug.
- Clean threads on the removed plugs and the plug holes with degreaser.
- Fill gear box with the recommended lubricant (see above) to a level near the center line of the uppermost horizontal shaft or until lubricant comes out of the oil level plug hole.
- Install plugs secure in gear case.

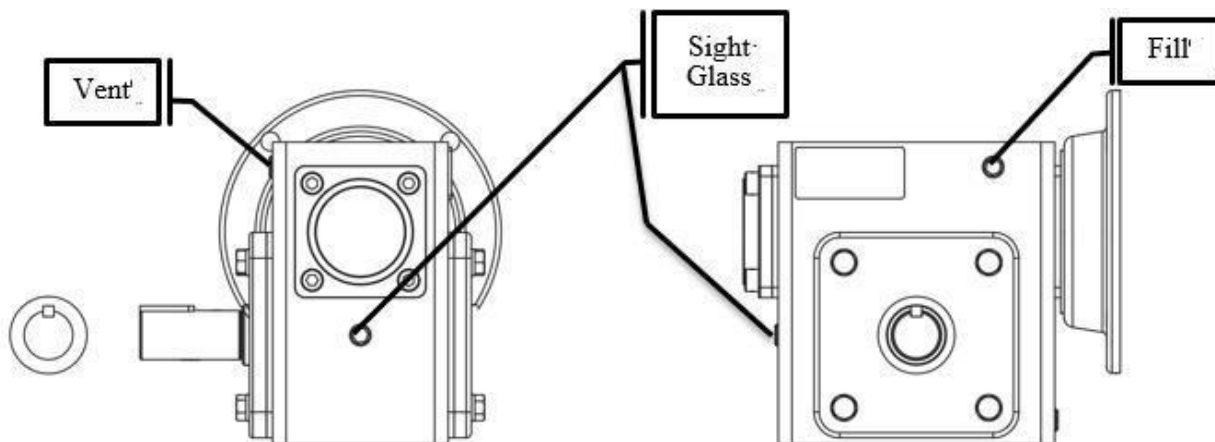


Figure 40 - Oil Fill Location Gear Box

## Break-In Period

After the first 100 hours of operation, drain out initial oil, flush out the gear case with an approved, non-flammable, non-toxic solvent, such as Whitmore’s Flushing Oil (#06802030) or Medallion Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 2,500 operating hours or every 6 months - whichever occurs first.

**Note:** Oil should be changed with greater frequency if the unit is used in severe environments (dusty or high humidity).

## Torque Limiter Adjustment

- Although the torque limiter clutch is factory set at DRYAIR, periodic adjustment may be required. It is recommended that the torque setting of the clutch be checked twice a season. With prolonged use the two friction disks, located on either side of the driven center member, will eventually show wear.

- It is important that the torque limiter clutch is adjusted properly. If the clutch slips too easily the spool will take too long to stop, and hose will pile up on the reel. If the clutch does not slip at all the protection on the drive will take over and the spool will again take too long to stop.

### Physical check

- With no power being applied to the reel grip the edge of the spool plate and apply full upward force, making sure that you are lifting with your legs and not your back.
- You should be able to cause the clutch to just slip with full lifting force.
- If the clutch does not slip or slips too easily, refer to the “torque adjust procedure”, below.

### Torque adjust procedure

- Ensure that the adjusting nut is in a finger tight position.
- If the adjustment nut is tighter than finger tight, loosen and complete previous step.
- Match the mark on the adjusting nut with the hub. Using a torque wrench tighten the adjusting nut to 90 ft·lb. After the break-away torque is set, bend the tabs of the lock washer over the hex flats of the adjusting nut.

**Note:** The torque limiter clutch nut requires a reasonable amount of force to adjust. Use a torque wrench that provides you with at least 18” of leverage.

### Run-in procedure

- If the torque limiter has been taken apart and reassembled, or friction disks have been changed, it is recommended that the clutch be “run in” by “slipping” the center member (sprocket).
- Ensure that the adjusting nut is in a finger tight position.
- Match mark the adjusting nut and hub. Advance the adjusting nut ¼ turn from finger tight.
- Slip the torque limiter sprocket for 8 minutes at full RPM.
- Refer back to the “Torque adjust procedure” for final readjustment.

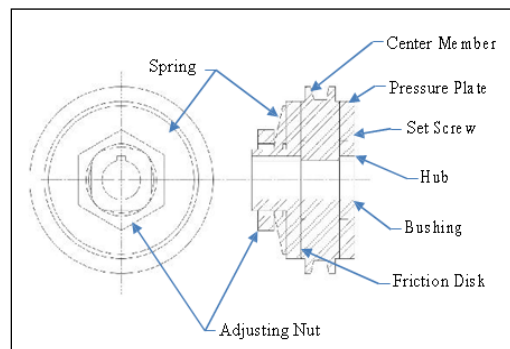


Figure 41 - Torque Limiter Clutch

## 7. Heat Center Pro Storage Bay

### Heat Center Pro Storage Bay

- Accommodates up to 9x HEFA 80 Heat Exchangers, 4x HEFA 200 Heat Exchangers or 4x ES200 Heat Exchangers
- Non-slip grip strips on storage bay floor
- Easy fold down door/ramp to allow quick loading and easy deployment of Heat Exchangers
- Door/ramp coated with non-slip grip, high-visibility paint
- Bumpers along walls to secure and protect Heat Exchangers during transport

### HCP (Heat Center Pro) Edition Heat Exchanger (Fan Coil)

The 200 Fan Coil redesigned with features specific to the Heat Center Pro Edition:

- Folding handle
- Slim style axle with wheels flush under unit
- Rubber bumpers



Figure 42 - Storage Bay with 9x 80 Fan Coils



Figure 44 - Storage Bay with 4x 200 HCP Edition Fan Coils



Figure 43 - Storage Bay with 4x ES200 Fan Coils



## 8. Troubleshooting

- There are 6 green lights on the control panel, which indicate the status of a sequence of functions while the unit is running.
- When burner is on, all green lights should be on as well. Any light which is not on should be considered burned out.
- Aquastat and burner lights go off and on as the burner cycles.
- Pump and burner switches in the **ON** position for troubleshooting.
- The terminal strips, located behind the control panel, must be accessed to initiate troubleshooting procedures.
- Refer to “Appendix – Electrical Schematic” for terminal locations.



### No Power

Check for 120V AC power between letter N and H on the terminal strip. If there is no power check the following:

- a) Check that the water heater circuit breaker has been reset.
- b) Check for power out of the circuit breaker.
- c) Check that the correct power supply is connected to the unit. Investigate power source and be certain that the power characteristics are correct. (120/240V AC, 30 A, single phase, 4-conductor, 0'-100' – 10 AWG, over 100' – 8 AWG)




### No Power at Terminal #6 (Low Water Cut-off)

Check for 120V AC power between letter N and #6 on the terminal strip. If there is no power check the following:

- d) Low water situation. Check fluid level in glycol tank and add if necessary.
- e) Pump not running: Check for power on both terminals of the pump switch. If power is found on one terminal only, replace the pump switch.
- f) Pump running: Check for 120V AC between letter N and #5 on the terminal strip.
  - If there is no power, check for power on both terminals of the burner switch.
  - If power is found on one terminal only, replace the burner switch.
- g) 24V AC power: Check that the 24V circuit breaker has been reset (pushed in). Check for 24V AC power between #1 and #3 on the terminal strip. Replace transformer if 24V AC is not present.
- h) Check for 24V AC power between #1 and LW relay coil feed from glycol tank lower float.
  - If 24V AC is not present, replace glycol tank lower float.
  - If power is present, check for 120V AC on right hand C and N/O contact of LW relay. If power is present on only one contact, replace LW relay.


### No Power at Terminal #7 (Flow Switch)

Check for 120V AC power between letter N and #7 on the terminal strip. If there is no power, check the following:

- 
- b) Pump Not Running: Check for 120V AC power between letter N and terminal 14 and 24 of relay #1.
    - If power is not present, check that the pump circuit breaker has been reset. If power is not present or present on only 1 contact, replace relay #1.
    - If power is present on both contacts, check for power between letter N and terminal 12 and 22 of relay #2. If power is not present or present on only 1 contact, replace relay #2. If power is present on both contacts replace pump.
  - c) Pump Running: Inadequate flow. Check that at least 1 heat exchanger or hose loop is connected allowing flow. Check that all valves are open in the fluid transfer loop. Check that hose quick couplers are fully seated and allowing flow.
  - d) Defective flow switch. If a) and b) check out, the flow switch will need to be re-calibrated or replaced.


### No Power at Terminal #8 (High Limit)

Check for 120V AC power between letter N and #8 on the terminal strip. If there is no power check the following:

- 
- a) Check switch settings. The automatic high limit should be set 10°F higher than the set point of the aquastat.
  - b) With switch setting 10°F above aquastat setting and above current supply temperature, check for 120V AC power on both terminals of the auto high limit switch. If power is present on only 1 terminal, replace auto high limit switch.
  - c) Check switch settings at 215°F, check for 120V AC power on both terminals of the manual reset high limit switch. If power is present on only 1 terminal, replace the manual reset high limit switch.

### No Power at Terminal #9 (Aquastat and Burner)

Check for 120V AC power between letter N and #9 on terminal strip. If there is no power check the following:

- 
- a) Check that the aquastat set point is above current supply temperature.
  - b) Check aquastat sensor and verify that it is positioned properly in its well.
  - c) If a) and b) check out, replace both the aquastat and well sensor.

### Gas Burner Scenario Only

- d) Hi and Low Gas Pressure switches – Check and reset if tripped.
- e) Check that the internal burner fuse is not burned.

In Diesel/Gas units equipped with a gas burner the aquastat and burner lights will not come on if the HI/LOW pressure switch is tripped.

**FOR ADDITIONAL ASSISTANCE CALL DRYAIR TECHNICAL SUPPORT 1 (888) 750-1700**

## 9. Maintenance

The DRYAIR system is designed to be a low maintenance system. All system equipment is assembled using extensively tested and certified components. Following these maintenance procedures will ensure the maximum benefit and minimal downtime for the system. The daily maintenance schedule is designed to be a quick system check and ensures a low risk of operating interruptions. Additional supplemental information provided by component manufactures such as the hose reel and is included with each unit. Use the supplemental information for maintenance procedures and frequency as directed.

### Daily Checklist

A daily inspection of the water heater cabinet should be performed with attention paid to the following:

#### Check for Strong Odor of Fuel

- If a leak or the odor of fuel is noticed immediately turn off all power switches and the main fuel supply to the water heater cabinet.
- Ventilate the water heater cabinet.
- Find and correct the leak before turning on any power or trying to relight the water heater.

#### Check Heat Transfer Fluid “HTF” Level Everyday

- Maintain between  $\frac{1}{4}$  and  $\frac{3}{4}$  on the heat transfer level gauge when fluid is hot.
- Top up, as necessary.
- For “HTF” specifications, see “Setup, Heat Transfer Fluid, “HTF”, Fluid Specifications.
- For “HTF” handling precautions, refer to “Safety Concerns, Material Safety Data Sheet”.
- If loss of fluid is excessive check for leaks at all the fittings and connections in the water heater cabinet, as well as the fluid circulation system.

#### Check the Supply Temperature Gauge

- Verify that the supply temperature gauge is within 10°F of the aquastat setting.

### Seasonal Checklist

#### Fuel (Water Block/Particulate) Filter *(If equipped with diesel burner)*

- The water block/particulate filter should be changed every heating season, or as required.

## Hoses

- Periodically check all hoses for damage due to aging, elevated temperatures, over-torqued hose clamps, abrasion, and weathering.
- Replace damaged hoses as required.
- Seasonally check hose clamp torque and adjust accordingly.

## Water Heater Heat Exchanger

- Keep the flues in the water heater clean. Soot is a nonconductor of heat; a dirty water heater requires more oil to heat a structure than a clean one. Water heaters can corrode on the fireside. This results from corrosive substances in the fuel and can be difficult to control. Some fuel oils contain substances which cause fireside corrosion. Sulphur, vanadium, and sodium are among the materials that may contribute to this problem. The probability of trouble from this source depends to a large degree on the amount of Sulphur in the fuel and on the care used in cleaning the fireside heating surfaces. This is particularly true when preparing a boiler for a period of idleness. Preventing this problem also depends on keeping the boiler heating surfaces dry when a boiler is out of service.
- The person responsible for water heater maintenance should be certain that the fireside surfaces of the water heaters in his care are thoroughly cleaned at the end of the firing season. He should also observe the fireside surfaces during the firing season and if signs of corrosion are discovered, a reputable consultant should be contacted.
- The flue pipe and chimney cap should be taken off once a year and thoroughly cleaned of all soot.

**Note:** Check the gauge panel at regular intervals for any irregular gauge readings.

## Heat Exchanger Cleaning Procedure

- Remove the burner from the water heater (*Figure 45*).
- Remove the plate from the bottom of the water heater (1-2).
- Remove the refractory board from the water heater by reaching into the burner hole and lightly tapping the board with your hand until it drops down (1-3).
- Remove the flue collar (1-4) to expose the burner tubes (1-5).
- Remove all flue baffles (1-6).
- Clean burner tubes with a steel round brush or rag on a piece of rod (1-5).
- Vacuum all debris.

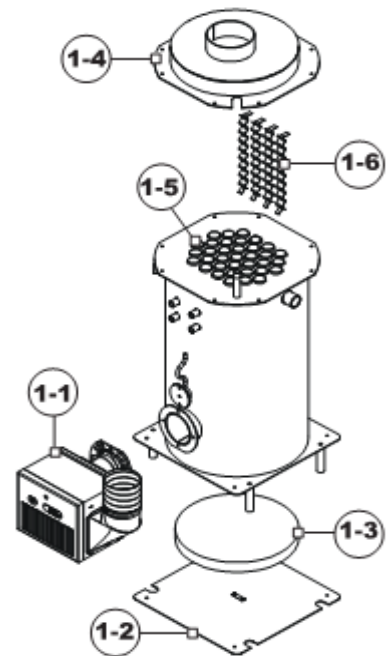


Figure 45 - Heat Exchanger Breakdown

### Heat Transfer Fluid “HTF”

- A clean and properly maintained hot water system should not be drained unless there is a possibility of freezing, the boiler has accumulated a considerable amount of sludge or dirt on the water side, or draining is necessary to perform repairs. Very little sludge should accumulate in a water heater where little make-up water is added and where an appropriate water heater water treatment is maintained at proper strength.
- The “HTF” should be tested from year to year for freeze protection and should be strong enough for your area. The “HTF” should be checked with a refractometer. Check the glycol/water mixture chart (see “Setup, Heat Transfer Fluid) for the mixing ratios.
- The “pH level” of the “HTF” requires an annual check to see if the pH level is neutral. The pH level should be at #7. This should be checked with a pH instrument.

***Note:** See Setup: Heat Transfer Fluid Specifications; page 4-11; Figure 22 - Glycol/Water Mixture Chart for complete HTF specifications.*

### Burner

- For burner seasonal maintenance see the “Service Manual”.

### Hose Reel

- For seasonal maintenance see the “Supplemental information” provided by the manufacturer

### Servicing Electrical Systems

**CAUTION!** *Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.*

- Verify proper operation after servicing.

# 10. Appendix

## Important Certification & Operational Information

### Non-Pressure Vessel

- The unit includes an open atmospherically vented expansion tank
- The expansion tank is integrally connected to the heat-exchanger section of the water heater by means of a permanently open line (no valves).
- The heat exchange section connects to the inlet side of the circulating pump and therefore, only neutral atmospheric pressure is present within the heat exchange section.

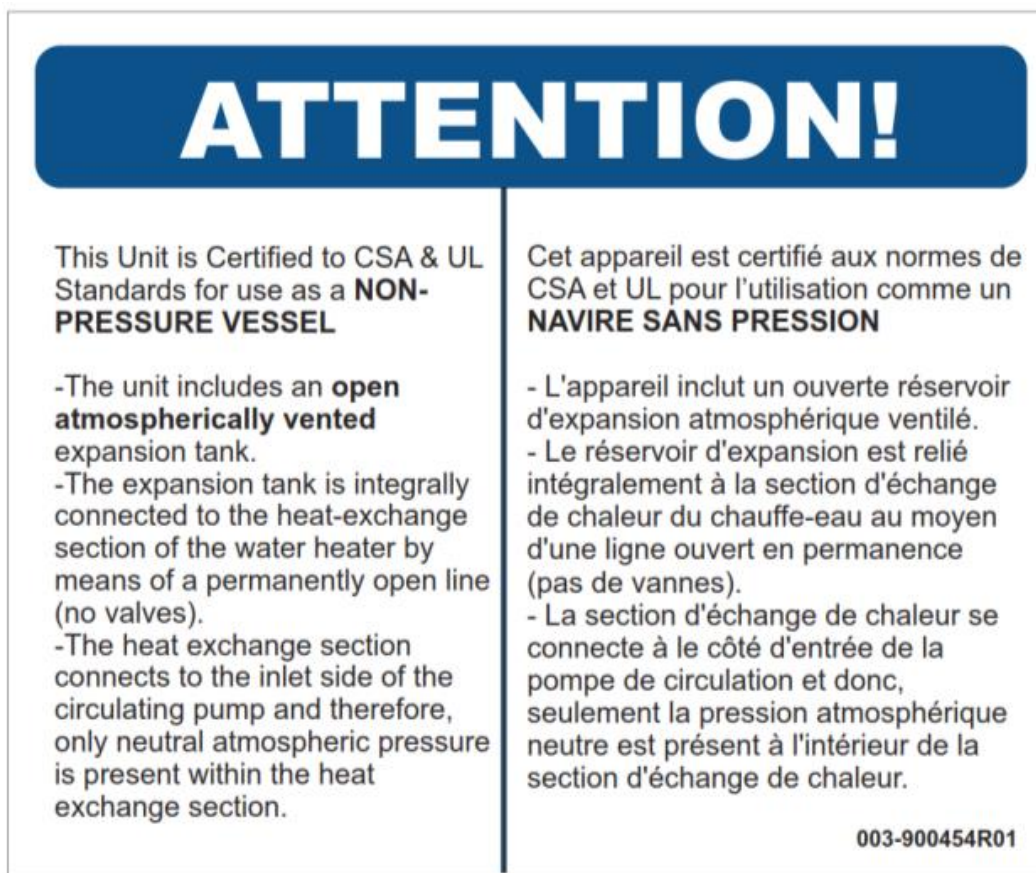




Figure 46 - Non-Pressure Vessel Decal

# Certification & Heater Specifications



P.O. Box 126  
400 Service Road  
St. Brieux, Sk.  
Canada  
S0K 3V0




MADE IN CANADA

DRYAIR Model:		Reference:	
Serial No.:		Prod. Sched.:	

Main Power		Oil Burner		Natural Gas Burner		Propane Gas Burner					
Volts:	240 V(2L,N,G)	Model:	Riello 40-F20		Model:		Riello 40-G900				
Phase:	1	Fuel:	#2 Heating Oil	#1 Heating Oil	Fuel:	Natural Gas		Fuel:	Propane Gas		
Hz:	60 HZ	Calorific Value:	140,000 BTU / US Gal.	136,000 BTU / US Gal.	Calorific Value:	1000 BTU/ft <sup>3</sup>		Calorific Value:	2500 BTU/ft <sup>3</sup>		
Max. Ampacity	30 A	Output:	BTUH	BTUH	Max. Gas Pressure:	14" W.C.		Max. Gas Pressure:	11" W.C.		
Control Voltage	120/24VAC	Fuel Input:	US GPH		Min. Gas Pressure:	12" W.C.		Min. Gas Pressure:	11" W.C.		
Min. Circuit Ampacity	A	Pump Pressure:	P.S.I.		Manifold Gas Pressure:	W.C.		Manifold Gas Pressure:	W.C.		
Max. Overcurrent Protection	A					Input Capacity:	BTUH		Input Capacity:	BTUH	
						Output Capacity:	BTUH		Output Capacity:	BTUH	

**Clearances:**

Sides	24" (61cm) minimum
Flue Pipe	36" (91cm) minimum
Floor	0" (0cm) non-combustible



Complies to:  
ANSI Z21.13

003-903389 R02

Figure 47 - Water Heater Data & Serial Plate

# Electrical Schematics

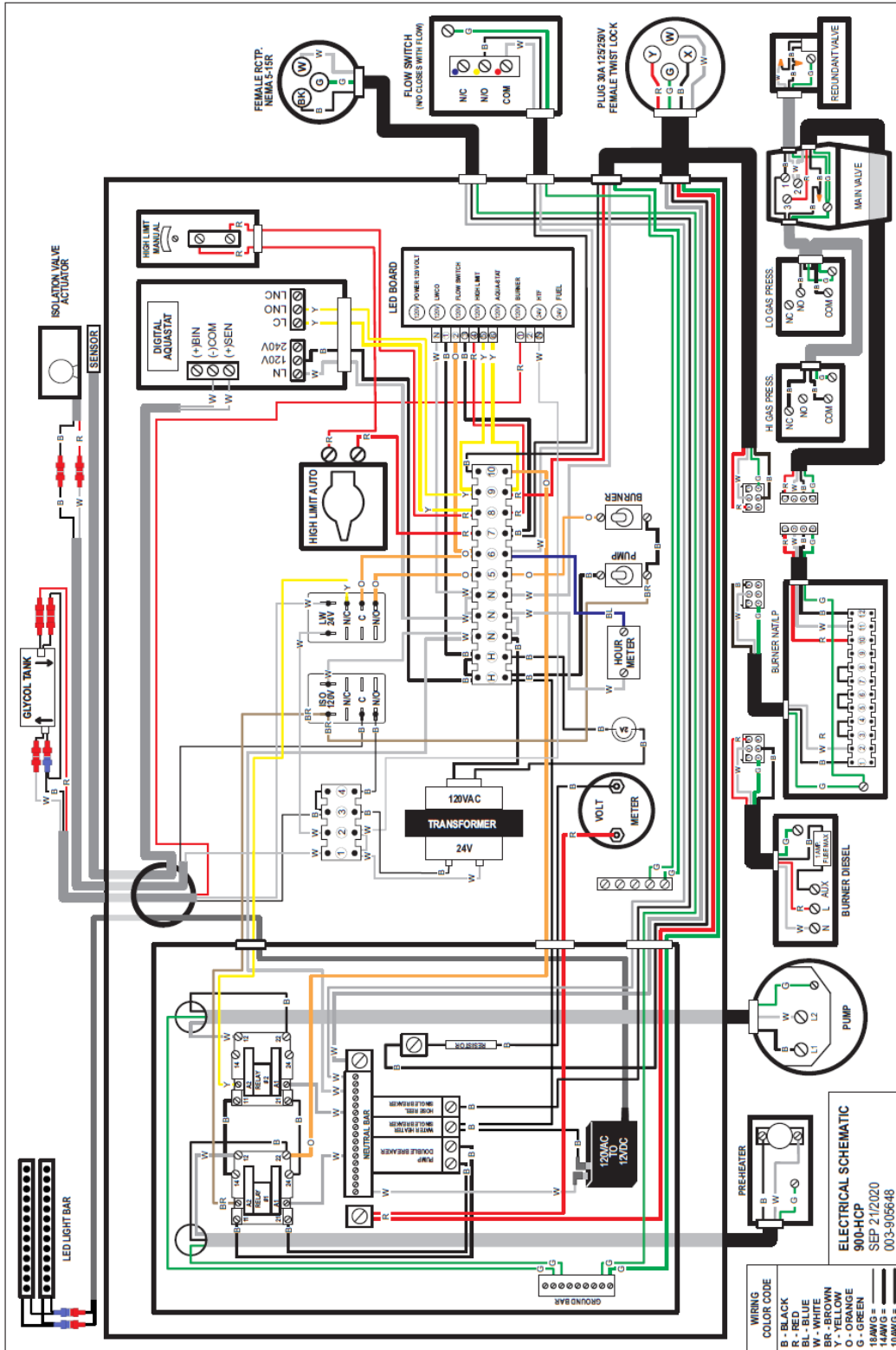


Figure 48 - Heat Center Pro Electrical Schematic



## Hose Reel Electrical Schematic

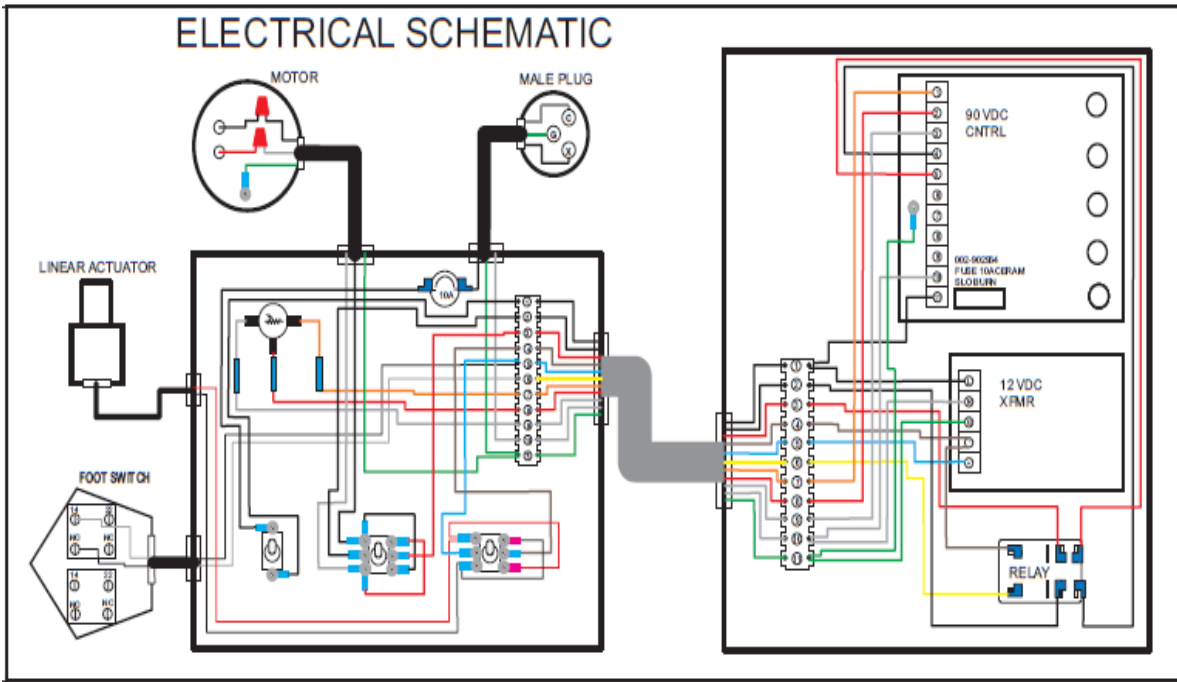


Figure 49 - Hose Reel Electrical Schematic

## Trailer Electrical Schematics

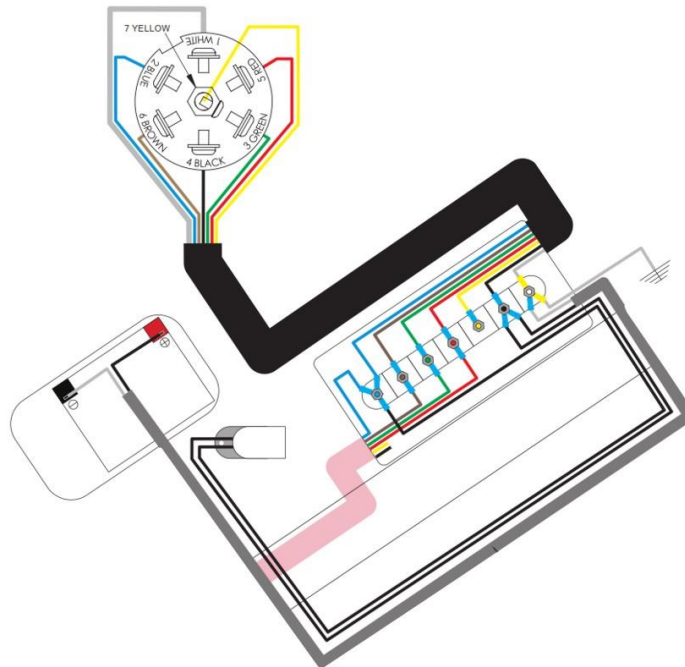


Figure 50 - Close-up View of Trailer Hook-up

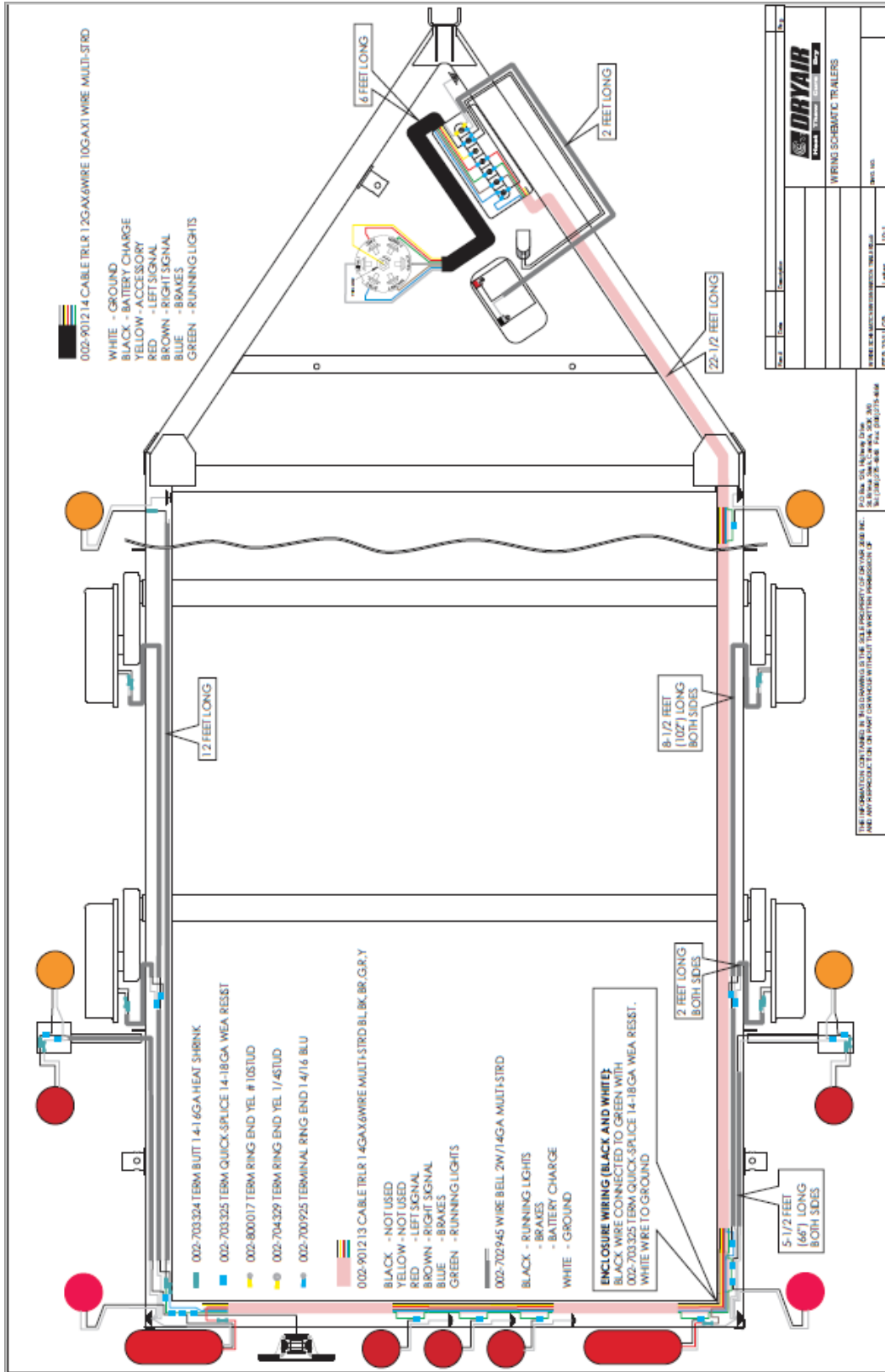


Figure 51 - Trailer Wiring Schematic

## Heat Transfer Fluid Preheater Information

### Function

- The design intention for the HTF preheater is to ensure a smooth start in cold environments. The preheater heats the glycol in the heat exchanger which in turn sends heated glycol to DRYAIR'S patented air and fuel preheater to provide a controlled constant air and fuel temperature thus providing smooth start operations in cold weather.
- While using the HTF preheater it is recommended to have a supply temperature above 40°F (4°C) before turning on the pump and burner switch. The estimated time before these temperatures can be achieved will depend on the ambient temperature outside. Basically, the colder environment outside the longer it will take to achieve the recommended supply temperature.

DRYAIR's Patented HTF Preheater

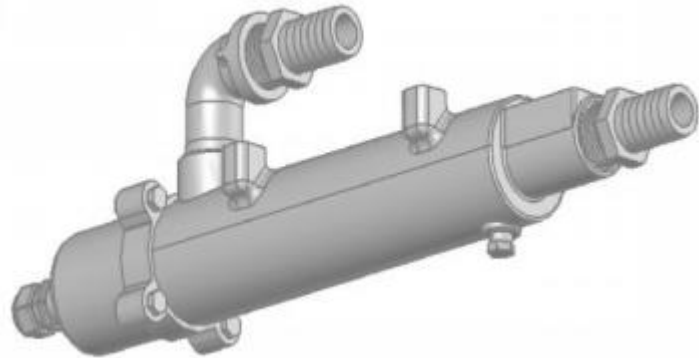


Figure 52 - HTF Preheater

### Pros of Using HTF Preheater:

- Using the HTF preheater according to recommendations will ensure a smooth start in all weather conditions, thus providing a superior product to all users.
- Allows the machine to operate in even the coldest environments with fewer combustion issues.
- Less down time and reduced fuel costs as units will start and run at maximum efficiency.
- Having warm glycol reduces initial load to the glycol circulating pump at start up.
- Increase heat exchanger longevity and efficiency.
- Decreases maintenance costs due to the reduced stress on all components during cold startups.

### Cons of Not Using HTF Preheater:

- Burner may not fire, which in turn will create down time on job locations. For competitor's units that do not have a preheater option, this typically means bringing the unit off site to a heated shop to allow the unit to thaw out before it will fire. Again, it will depend on the ambient temperature inside the shop as to how long this will take but in any event, it will take much longer compared to using the preheater on the DRYAIR unit.

- If the unit does start in cold temperatures, there is potential for the heat exchanger to accumulate soot due to not having a controlled environment of air and fuel going into the burner. Sooting will stop after the unit warms up if the settings on the burner are correct. Every 1 mm of soot accumulated on the heat exchanger results in a 5% loss of efficiency compared to a clean exchanger. Running the preheater on the DRYAIR unit eliminates the need to adjust burner settings in reaction to changing weather conditions.
- Decreases heat exchanger service life.
- Increases maintenance costs due to added stress on all components during cold startups.

### **In Conclusion**

Using the preheater as instructed in the manual will allow you to operate DRYAIR units in colder climates without sacrificing efficiency or long-term reliability of the unit.

DRYAIR recommends planning ahead and starting the preheater to allow it to run while the unit is in transit to the jobsite (running on generator power) and while operators are reeling out and placing hose on the site. This will still make for productive use of the time while allowing the unit to benefit from the patented preheater feature.

If the operator decides they do not want to wait for the preheater to work, the DRYAIR unit will perform just like any of our competitor's units that do not have a preheater option.



## **Material Safety Data Sheets**

The Material Safety Data Sheets (MSDS) included with this manual have been provided by DRYAIR's suppliers.



## Test Certificate

### Bolt-on Lifting Frame Assembly for DRYAIR 900-HCP System

**Certificate No.:** 659 **Project No.:** T21029P  
**Manufacturer:** DRYAIR Mfg. Corp. **Test Location:** PAMI **Test Date:** July 19, 2021  
St. Brieux, SK Humboldt, SK

**Identification of Test Object:** Lift Frame Assembly (DRYAIR Dwg No. 018-905480) for DRYAIR 900-HCP (**Figure 1**).

- Corner posts (quantity of four) consisting of:
  - HSS steel tube, 2 in x 2 in x 0.250 in wall thickness
  - lifting bracket, 3/8 in. thick steel plate formed and with 1-3/4 in. diameter hole for clevis pin or hook; welded to end of HSS steel tube
- Side and end upper rails (quantity of two each) consisting of:
  - HSS steel tube, 3 in x 2 in x 0.188 in wall thickness
  - mount bracket, 1/4 in. steel plate; welded to end of HSS steel tube
- End and side upper rails bolted to corner post lifting bracket with 1/2 in. Gr. 8 fasteners (quantity of two at each end of rail)
- Corner posts bolted to trailer mount bracket with 5/8 in. Gr. 8 fasteners (quantity of two for each corner post)

**Regulations Tested To:** Current Province of Saskatchewan “The Occupational Health and Safety Regulations, 2020” Chapter S-15.1 Reg 10 – Part 13, sections 13-5 and 13-8; Part 14, sections 14-4 and 14-5.

**Test Description:** An applied force of at least 46,500 lb<sub>f</sub> (206.8 kN), or five times the maximum 9,300 lb (4,218 kg) weight of the 900-HCP system, will be applied simultaneously and evenly distributed to the four corner-post lifting brackets. Four individual polyester web slings will be used to simulate the engineered quad-leg polyester web sling that is available for lifting the 900-HCP system.

**Tests Result Required:** The lifting frame assembly must withstand a total applied load of at least five times the maximum weight of the 900-HCP system without failing. The maximum load applied divided by five will define the load rating of the lifting frame assembly.

Test Equipment:	Description	Date Calibrated	Calibration Due Date
	Load Cell – Serial No. 13479 ( <b>Figure 5</b> )	October 9, 2017	October 9, 2021
	Indicator – Serial No. 17168961	Verified with load cell - July 6, 2021	

**Test Results:** A maximum force of 48,489 lb<sub>f</sub> (215.7 kN) was applied to the lifting frame assembly by means of the four lifting slings and shackles attached to each of the corner post lifting brackets. No deformation or failure of any lifting frame components occurred during the test. This result allows the lifting frame assembly, when used on the 900-HCP system, to have a maximum load rating of 9,698 lb (4,399 kg).

***I hereby certify these results meet or exceed the requirements of the performance regulations.  
This certificate is based on results obtained by testing the equipment as indicated herein.  
This Test Certificate shall not be reproduced except in full, without written approval of PAMI.***

**Certified by:** Mark Marianchuk, P.Eng.  
Project Leader **Date:** August 18, 2021

### Test Procedure:

1. A sample trailer frame of the 900-HCP frame assembly with the lifting frame installed (**Figure 1**) was placed on a rigid test bed and secured with steel beams and chains to allow the application of a vertical force perpendicular to the mounting surface.
2. The 900-HCP product is intended to be lifted from a single point using an engineered quad-leg polyester web sling with 12-ft legs (**Figure 2**). To ensure the maximum force could be applied to the lifting frame assembly for the purpose of the test, the quad-leg sling was substituted with four individual web slings, each load rated for 46,000 lb (**Figure 3**).
3. A crane and its cable lifting system were used to apply the load.
4. The applied force was measured using a load cell installed between the crane hook and a shackle that the four individual web slings were attached to.
5. An indicator connected to the load cell provided an instantaneous readout of applied load (**Figure 4**).
6. The force application was video recorded.
7. The applied force was gradually increased from zero to approximately 46,500 lb<sub>f</sub>. This target force was based on applying at least five times the maximum weight of the fully assembled 900-HCP product, indicated by the Client to be approximately 9,300 lb.
8. Once the target force was reached and exceeded, the applied force was held for at least ten seconds and then removed. The peak force applied was retrieved from the indicator (**Figure 4**) and used to calculate a load rating for the lifting frame as follows (imperial units):

Peak force applied = 48,489 lb<sub>f</sub>

Allowable maximum rating for the lifting frame assembly system using a five-times design factor or working load limit =

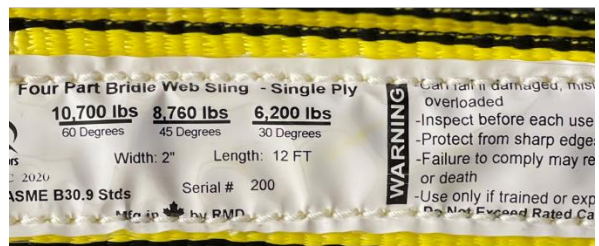
$48,489 \text{ lb} \div 5 = 9,698 \text{ lb}$

This is the maximum allowable total weight of the final 900-HCP assembly that can be lifted with the lifting frame, as tested, installed. The Client indicated the maximum weight of the complete product would be approximately 9,300 lb. Therefore, the 9,698 lb rating is adequate.

**PAMI recommends the above rating be conspicuously marked on the lifting frame, along with any other additional information required in accordance with OH & S regulations for jurisdictions where the lifting frame may be used.**



**Figure 1.** 900-HCP trailer frame and installed lifting frame assembly secured to test bed.



**Figure 2.** Polyester web sling intended to be used to lift the 900-HCP at four corner post lifting bracket locations.



**Figure 3.** Test set-up for application of force.



**Figure 4.** Peak force applied during the lifting frame test.



# LOAD CELL CALIBRATION CERTIFICATION

CUSTOMER : PAMI PRAIRIE  
 ADDRESS : CANADA  
 CONDITION: AS FOUND & FINAL S.O. #: 170810 P.O. #: 23848  
 MODEL: 1220AF-50K-B SERIAL: 13479 BRIDGE: A CAPACITY: 50 Klbf  
 PROCEDURE: C-1257 Mounting Per Interface Installation Instruction 15-5  
 ZERO BALANCE: 0.326 %RO

### TEST CONDITIONS

TEMPERATURE: 73 °F HUMIDITY: 27% EXCITATION: 10 VDC

### TRACEABILITY

FORCE STANDARD: STD-10 NIST#: STD-10C3116 DUE: 15-MAR-2018  
 STANDARD INDICATOR: BRD108 NIST#: 050898  
 TEST INDICATOR: BRD330 NIST#: 050898

### SHUNT CALIBRATION

	Shunt (+/- .01%)	Output	Straight Line Conversion	Connections*
TENSION	30.0 KOhm	2.90648 mV/V	35.653 Klbf	-Out to -Exc
COMPRESSION	30.0 KOhm	-2.90713 mV/V	35.646 Klbf	-Out to +Exc

Shunt calibration resistor connections for tension and compression respectively are (-Exc to -Out) and (+Exc to -Out) for connector models; (-Sense to -Out Shuntcal) and (+Sense to -Out Shuntcal) for 7 wire models.

### PERFORMANCE

	Rated Output	SEB Output	Nonlinearity	Hysteresis	SEB
TENSION	4.07552 mV/V	4.07606 mV/V	0.016 %FS	0.009 %FS	± 0.013 %FS
COMPRESSION	-4.07772 mV/V	-4.07777 mV/V	-0.021 %FS	0.043 %FS	± 0.021 %FS

STATIC ERROR BAND (SEB) The band of maximum deviations of the ascending and descending calibration points from a best fit straight line through zero OUTPUT. It includes the effects of NONLINEARITY, HYSTERESIS, and nonreturn to MINIMUM LOAD.

TEST LOAD APPLIED (Klbf)	RECORDED READINGS (mV/V)	
	Tension	Compression
0	.00000	.00000
10	.81502	- .81489
20	1.63060	-1.63024
30	2.44594	-2.44595
40	3.26108	-3.26174
50	4.07552	-4.07772
20	1.63097	-1.63198
0	- .00018	.00008

Interface Inc. certifies that force measurements are traceable to primary standards at NIST. Calibration performed per Interface QA program and the requirements of ISO/IEC 17025, MIL-STD-45662A & ANSI/NCSL Z540-1994. Estimated measurement uncertainty is 0.040% RDG. expressed as the expanded uncertainty at 95% confidence level using a coverage factor of k=2. Results relate to load cell serial 13479 only. DO NOT REPRODUCE THIS REPORT except in full or with Interface Inc. written approval.

TECHNICIAN : Joseph Pezzi

CALIBRATION DATE : 09-OCT-2017

APPROVED : Josh Smith - Repair Supervision

Interface Inc.  
 7401 East Butherus Drive- Scottsdale, Arizona 85260 U.S.A  
 Telephone (480)-948-5555 - FAX (480)-948-1924

Figure 5. Calibration certificate for load cell SN 13479.





# SAFETY DATA SHEET

Issuing Date 03-Jun-2019

Revision date 03-Jun-2019

Revision Number 1

## 1. Identification

### Product identifier

Product Name BOSS Chill Propylene Glycol

### Other means of identification

Product Code(s) GHSRBS-041

UN/ID no. UN 3082

Synonyms None

### Recommended use of the chemical and restrictions on use

Recommended use Heat transfer medium

Restrictions on use No information available

### Details of the supplier of the safety data sheet

#### Initial supplier identifier

BOSS Lubricants

#### Manufacturer Address

6303 30 ST SE Calgary, AB T2C 1R4

### Emergency telephone number

Initial supplier phone number (800) 844-9457  
Emergency Telephone Chemtrec 1-800-424-9300

## 2. Hazard(s) identification

### Classification

Not a hazardous substance or mixture according to the Globally Harmonized System (GHS) and Canada's Hazardous Products Regulations

### Label elements

#### Hazard statements

Not a hazardous substance or mixture according to the Globally Harmonized System (GHS) and Canada's Hazardous Products Regulations.



**Precautionary Statements - Disposal**

Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

**Other information****3. Composition/information on ingredients****Substance**

Chemical name	CAS No.	Weight-%	Hazardous Material Information Review Act registry number (HMIRA registry #)	Date HMIRA filed and date exemption granted (if applicable)
Water	7732-18-5	0.1 - 1	-	
Propylene glycol	57-55-6	80 - 100	-	
PROPRIETARY ADDITIVES	PROPRIETARY	1 - 5	-	

If CAS number is "proprietary", the specific chemical identity and percentage of composition has been withheld as a trade secret.

**4. First-aid measures****Description of first aid measures**

<b>Inhalation</b>	Remove to fresh air. If not breathing, give artificial respiration. IF exposed or concerned: Get medical advice/attention.
<b>Eye contact</b>	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
<b>Skin contact</b>	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if symptoms occur.
<b>Ingestion</b>	Do NOT induce vomiting. Call a physician or poison control center immediately. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. Never give anything by mouth to an unconscious person.

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

<b>Symptoms</b>	Prolonged contact may cause redness and irritation.
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**Indication of any immediate medical attention and special treatment needed**

<b>Note to physicians</b>	Treat symptomatically.
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**5. Fire-fighting measures**

<b>Suitable Extinguishing Media</b>	Carbon dioxide (CO <sub>2</sub> ). Foam. Dry chemical. Water spray or fog. Alcohol resistant foam.
<b>Unsuitable extinguishing media</b>	Do not scatter spilled material with high pressure water streams.
<b>Specific hazards arising from the chemical</b>	Use water spray to cool fire-exposed containers and structures. Isolate and restrict area access. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Container may rupture from gas generation in a fire situation. Fight fire from a safe distance and from a protected location. Do not direct a solid stream of water or foam into hot, burning pools; this may cause frothing and increase fire intensity. Consider use of unmanned hose holder or monitor nozzles.
<b>Explosion data</b>	
<b>Sensitivity to mechanical impact</b>	None.
<b>Sensitivity to static discharge</b>	None.
<b>Special protective equipment for fire-fighters</b>	Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

## 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

**Personal precautions** Use personal protective equipment as required. See section 8 for more information. Ensure adequate ventilation.

### Methods and material for containment and cleaning up

**Methods for containment** Stop leak if you can do it without risk. Keep out of drains, sewers, ditches and waterways. Ventilate the area. Avoid breathing vapors or mists.

**Methods for cleaning up** Cover liquid spill with sand, earth or other noncombustible absorbent material. Prevent product from entering drains.

## 7. Handling and storage

### Precautions for safe handling

**Advice on safe handling** Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid contact with skin, eyes or clothing. Use only with adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Do not ingest. If swallowed then seek immediate medical assistance. For industrial use only.

### Conditions for safe storage, including any incompatibilities

**Storage Conditions** Keep container tightly closed in a dry and well-ventilated place. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Do not contaminate food or feed stuffs. Store only in containers resistant to alkaline solutions with a pH of 9.0 to 12.0.

## 8. Exposure controls/personal protection

### Control parameters

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

### Appropriate engineering controls

**Engineering controls** Ensure adequate ventilation, especially in confined areas.

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

**Eye/face protection** Wear safety glasses with side shields (or goggles). If splashes are likely to occur, wear safety glasses with side-shields. Avoid contact with eyes.

**Hand protection** Wear suitable gloves.

**Skin and body protection** Wear suitable protective clothing.

**Respiratory protection** No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

**General hygiene considerations** Handle in accordance with good industrial hygiene and safety practice.

## 9. Physical and chemical properties

### Information on basic physical and chemical properties

**Physical state** Liquid  
**Appearance** No information available  
**Color** purple  
**Odor** Odorless  
**Odor threshold** No information available

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
pH	9.0– 10.5	
Melting point / freezing point	No data available	None known
Boiling point / boiling range	188 °C / 317 °F	ASTM D7213
Flash point	116 °C / 240 °F	ASTM D93
Evaporation rate	No data available	None known
Flammability (solid, gas)	No data available	None known
Flammability Limit in Air		None known
Upper flammability or explosive limits	No data available	
Lower flammability or explosive limits	No data available	
Vapor pressure	No data available	None known
Vapor density	No data available	None known
Relative density	No data available	None known
Water solubility	completely soluble	
Solubility in other solvents	No data available	None known

Partition coefficient	No data available	None known
Autoignition temperature	No data available	None known
Decomposition temperature	No data available	None known
Kinematic viscosity	No data available	None known
Dynamic viscosity	No data available	None known

**Other information**

Explosive properties	No information available.
Oxidizing properties	No information available.
Softening point	No information available
Molecular weight	No information available
VOC Content (%)	No information available
Liquid Density	No information available
Bulk density	No information available

**10. Stability and reactivity**

Reactivity	No information available.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	None under normal processing.
Conditions to avoid	Heat, flames and sparks.
Incompatible materials	Strong oxidizing agents. Strong acids.
Hazardous decomposition products	Thermal decomposition can lead to release of irritating and toxic gases and vapors.

**11. Toxicological information****Information on likely routes of exposure****Product Information**

Inhalation	No known effects under normal use conditions.
Eye contact	Irritating to eyes.
Skin contact	Avoid contact with skin and clothing.
Ingestion	Harmful if swallowed. Ingestion of larger amounts may cause defects to the central nervous system (e.g. dizziness, headache). Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. May cause adverse kidney effects.

**Symptoms related to the physical, chemical and toxicological characteristics**

Symptoms	No information available.
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**Acute toxicity**

**Numerical measures of toxicity**  
No information available

**Unknown acute toxicity** No information available  
Product Information

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
Propylene glycol 57-55-6	= 20 g/kg ( Rat )	= 20800 mg/kg ( Rabbit )	Not available

#### **Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Skin corrosion/irritation** Based on available data, the classification criteria are not met.

**Serious eye damage/eye irritation** Based on available data, the classification criteria are not met.

**Respiratory or skin sensitization** Based on available data, the classification criteria are not met.

**Germ cell mutagenicity** Based on available data, the classification criteria are not met.

**Carcinogenicity** Based on available data, the classification criteria are not met.

**Reproductive toxicity** Based on available data, the classification criteria are not met.

**STOT - single exposure** Based on available data, the classification criteria are not met.

**STOT - repeated exposure** Based on available data, the classification criteria are not met.

**Aspiration hazard** No information available.

## **12. Ecological information**

**Ecotoxicity** Harmful to aquatic life.

**Persistence and degradability** No information available.

**Bioaccumulation** No information available.

**Other adverse effects** No information available.

## **13. Disposal considerations**

### **Waste treatment methods**

**Waste from residues/unused products** Dispose of waste in accordance with environmental legislation.

**Contaminated packaging** Do not reuse empty containers.

## 14. Transport information

<u>Transport Canada</u>	Not regulated
<u>TDG</u>	Not regulated
<u>DOT</u>	Not regulated unless shipping container holds at least 5,000 pounds.
UN/ID no.	UN 3082
Hazard class	9
Packing group	III
<u>MEX</u>	Not regulated
<u>ICAO (air)</u>	no data available
<u>IATA</u>	no data available
<u>IMDG</u>	no data available
<u>RID</u>	no data available
<u>ADR</u>	no data available
<u>ADN</u>	no data available

## 15. Regulatory information

### Safety, health and environmental regulations/legislation specific for the substance or mixture

#### International Regulations

The Montreal Protocol on Substances that Deplete the Ozone Layer Not applicable

The Stockholm Convention on Persistent Organic Pollutants Not applicable

The Rotterdam Convention Not applicable

#### International Inventories

TSCA	Complies.
DSL/NDSL	Complies.
EINECS/ELINCS	Contact supplier for inventory compliance status.
ENCS	Contact supplier for inventory compliance status.
IECSC	Contact supplier for inventory compliance status.
KECL	Contact supplier for inventory compliance status.
PICCS	Contact supplier for inventory compliance status.
AICS	Contact supplier for inventory compliance status.

#### Legend:

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

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

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

**ENCS** - Japan Existing and New Chemical Substances

**IECSC** - China Inventory of Existing Chemical Substances

**KECL** - Korean Existing and Evaluated Chemical Substances

**PICCS** - Philippines Inventory of Chemicals and Chemical Substances

AICS - Australian Inventory of Chemical Substances

**16. Other information**

<b>NFPA</b>	Health hazards 2	Flammability 1	Instability 0	Physical and chemical properties -
<b>HMIS</b>	Health hazards 2	Flammability 1	Physical hazards 0	Personal protection X

**Key or legend to abbreviations and acronyms used in the safety data sheet****Legend Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
Ceiling	Maximum limit value	*	Skin designation

**Key literature references and sources for data used to compile the SDS**

Agency for Toxic Substances and Disease Registry (ATSDR)  
 U.S. Environmental Protection Agency ChemView Database  
 European Food Safety Authority (EFSA)  
 EPA (Environmental Protection Agency)  
 Acute Exposure Guideline Level(s) (AEGl(s))  
 U.S. Environmental Protection Agency Federal Insecticide, Fungicide, and Rodenticide Act  
 U.S. Environmental Protection Agency High Production Volume Chemicals  
 Food Research Journal  
 Hazardous Substance Database  
 International Uniform Chemical Information Database (IUCLID)  
 Japan GHS Classification  
 Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)  
 NIOSH (National Institute for Occupational Safety and Health)  
 National Library of Medicine's ChemID Plus (NLM CIP)  
 National Library of Medicine's PubMed database (NLM PUBMED)  
 National Toxicology Program (NTP)  
 New Zealand's Chemical Classification and Information Database (CCID)  
 Organization for Economic Co-operation and Development Environment, Health, and Safety Publications  
 Organization for Economic Co-operation and Development High Production Volume Chemicals Program  
 Organization for Economic Co-operation and Development Screening Information Data Set  
 RTECS (Registry of Toxic Effects of Chemical Substances)  
 World Health Organization

**Issuing Date** 03-Jun-2019

**Revision date** 04-Jun-2019

**Revision Note** No information available.

**Disclaimer**

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

**End of Safety Data Sheet**

**Data for Regulatory Rules**



Region	Template name	Revision Note
Canada	HGHS	2.0

**GHS Product Information**

pH	9.0– 10.5
Physical state	Liquid
Flash point °C	116
Boiling point / boiling range °C	188

**Component Information****Canada****GHS Classification**

Not Hazardous

Not a hazardous substance or mixture according to the Globally Harmonized System (GHS) and Canada's Hazardous Products Regulations

Precautionary Statements - Disposal

Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable



# SAFETY DATA SHEET

## DOW CHEMICAL CANADA ULC

**Product name:** DOWFROST™ Heat Transfer Fluid

**Issue Date:** 12/16/2019

**Print Date:** 12/17/2019

DOW CHEMICAL CANADA ULC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

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## 1. IDENTIFICATION

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**Product name:** DOWFROST™ Heat Transfer Fluid

### **Recommended use of the chemical and restrictions on use**

**Identified uses:** Intended as a heat transfer fluid for closed-loop systems. This product is acceptable for use where there is possibility of incidental food contact and as a product for use in the immersion or spray freezing of wrapped meat and packaged poultry products. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

### **COMPANY IDENTIFICATION**

DOW CHEMICAL CANADA ULC  
#2400, 215 - 2ND STREET S.W.  
CALGARY AB T2P 1M4  
CANADA

**Customer Information Number:**

800-258-2436  
SDSQuestion@dow.com

### **EMERGENCY TELEPHONE NUMBER**

**24-Hour Emergency Contact (transportation emergencies only):** 1-800-424-9300

**Local Emergency Contact (transportation emergencies only):** 1-800-424-9300

**24-Hour Emergency Contact:** 1-989-636-4400

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## 2. HAZARDS IDENTIFICATION

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### **Hazard classification**

This product is not hazardous under the criteria of the Hazardous Products Regulation (HPR) as implemented under the Workplace Hazardous Materials Information System (WHMIS 2015).

### **Other hazards**

No data available

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## 3. COMPOSITION/INFORMATION ON INGREDIENTS

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This product is a mixture.

Component	CASRN	Concentration (w/w)
Propylene glycol	57-55-6	> 95.0 %
Inorganic corrosion inhibitor	not hazardous	< 3.0 %
Water	7732-18-5	< 3.0 %

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#### 4. FIRST AID MEASURES

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##### Description of first aid measures

##### General advice:

If potential for exposure exists refer to Section 8 for specific personal protective equipment.

**Inhalation:** Move person to fresh air; if effects occur, consult a physician.

**Skin contact:** Wash off with plenty of water.

**Eye contact:** Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

**Ingestion:** Rinse mouth with water. No emergency medical treatment necessary.

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

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

##### Indication of any immediate medical attention and special treatment needed

**Notes to physician:** No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

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#### 5. FIREFIGHTING MEASURES

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##### Extinguishing media

**Suitable extinguishing media:** Water fog or fine spray.. Dry chemical fire extinguishers.. Carbon dioxide fire extinguishers.. Foam.. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective..

**Unsuitable extinguishing media:** Do not use direct water stream.. May spread fire..

**Special hazards arising from the substance or mixture**

**Hazardous combustion products:** During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating.. Combustion products may include and are not limited to:.. Carbon monoxide.. Carbon dioxide..

**Unusual Fire and Explosion Hazards:** Container may rupture from gas generation in a fire situation.. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids..

**Advice for firefighters**

**Fire Fighting Procedures:** Keep people away. Isolate fire and deny unnecessary entry.. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed.. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles.. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container.. Burning liquids may be extinguished by dilution with water.. Do not use direct water stream. May spread fire.. Move container from fire area if this is possible without hazard.. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage..

**Special protective equipment for firefighters:** Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves).. If protective equipment is not available or not used, fight fire from a protected location or safe distance..

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**6. ACCIDENTAL RELEASE MEASURES**

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**Personal precautions, protective equipment and emergency procedures:** Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

**Environmental precautions:** Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

**Methods and materials for containment and cleaning up:** Small spills: Absorb with materials such as: Cat litter. Sawdust. Vermiculite. Zorb-all®. Collect in suitable and properly labeled containers. Large spills: Dike area to contain spill. Recover spilled material if possible. See Section 13, Disposal Considerations, for additional information.

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**7. HANDLING AND STORAGE**

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**Precautions for safe handling:** No special precautions required. Keep container closed. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION. Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

**Conditions for safe storage:** Do not store in: Galvanized steel. Opened or unlabeled containers. Store in original unopened container. See Section 10 for more specific information. Additional storage

and handling information on this product may be obtained by calling your sales or customer service contact.

### Storage stability

**Shelf life:** Use within 60 Month

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Control parameters

If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Consult local authorities for recommended exposure limits.

Component	Regulation	Type of listing	Value
Propylene glycol	US WEEL	TWA	10 mg/m3
	CA ON OEL	TWAEV Total	155 mg/m3 50 ppm
	CA ON OEL	TWAEV	10 mg/m3
	Further information: C: For assessing the visibility in a work environment where 1,2-propylene glycol aerosol is present.		
	CA ON OEL	TWA	155 mg/m3 50 ppm
	CA ON OEL	TWA	10 mg/m3
	Further information: (c): For assessing the visibility in a work environment where 1,2-propylene glycol aerosol is present		
	CA ON OEL	TWA Vapour and aerosols	155 mg/m3 50 ppm
	CA ON OEL	TWA aerosol	10 mg/m3
	Further information: (c): For assessing the visibility in a work environment where 1,2-propylene glycol aerosol is present		

### Exposure controls

**Engineering controls:** Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

### Individual protection measures

**Eye/face protection:** Use safety glasses (with side shields).

#### Skin protection

**Hand protection:** Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl chloride ("PVC" or "vinyl"). Avoid gloves made of: Polyvinyl alcohol ("PVA"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

**Other protection:** Wear clean, body-covering clothing.

**Respiratory protection:** Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit

requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. In misty atmospheres, use an approved particulate respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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### Appearance

Physical state	Liquid.
Color	Colorless
Odor	Characteristic
Odor Threshold	No test data available
pH	10.0 50% <i>Literature</i>
Melting point/range	Not applicable to liquids
Freezing point	supercools
Boiling point (760 mmHg)	152 °C <i>Literature</i>
Flash point	<b>closed cup</b> 104 °C <i>Pensky-Martens Closed Cup ASTM D 93</i> (based on major component), Propylene glycol. <b>open cup</b> <i>Cleveland Open Cup ASTM D92</i> None
Evaporation Rate (Butyl Acetate = 1)	<0.5 <i>Estimated.</i>
Flammability (solid, gas)	Not applicable to liquids
Flammability (liquids)	Not expected to be a static-accumulating flammable liquid.
Lower explosion limit	2.6 % vol <i>Literature</i> Propylene glycol.
Upper explosion limit	12.5 % vol <i>Literature</i> Propylene glycol.
Vapor Pressure	2.2 mmHg <i>Literature</i>
Relative Vapor Density (air = 1)	>1.0 <i>Literature</i>
Relative Density (water = 1)	1.05 at 20 °C / 20 °C <i>Literature</i>
Water solubility	<i>Literature</i> completely soluble
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	371 °C <i>Literature</i> Propylene glycol.
Decomposition temperature	No test data available
Kinematic Viscosity	43.4 cSt at 20 °C <i>Literature</i>
Explosive properties	No data available
Oxidizing properties	No data available
Molecular weight	76.9 g/mol <i>Literature</i>

NOTE: The physical data presented above are typical values and should not be construed as a specification.

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## 10. STABILITY AND REACTIVITY

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**Reactivity:** No data available

**Chemical stability:** Stable under recommended storage conditions. See Storage, Section 7.  
Hygroscopic

**Possibility of hazardous reactions:** Polymerization will not occur.

**Conditions to avoid:** Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems. Avoid direct sunlight or ultraviolet sources.

**Incompatible materials:** Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

**Hazardous decomposition products:** Decomposition products depend upon temperature, air supply and the presence of other materials.. Decomposition products can include and are not limited to: Aldehydes.. Alcohols.. Ethers.. Organic acids..

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## 11. TOXICOLOGICAL INFORMATION

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*Toxicological information appears in this section when such data is available.*

### Information on likely routes of exposure

Ingestion, Inhalation, Skin contact, Eye contact.

**Acute toxicity (represents short term exposures with immediate effects - no chronic/delayed effects known unless otherwise noted)**

#### Acute oral toxicity

Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

For the major component(s): Propylene glycol.  
LD50, Rat, > 20,000 mg/kg

#### Information for components:

##### Propylene glycol

LD50, Rat, > 20,000 mg/kg

##### Inorganic corrosion inhibitor

LD50, Rat, female, > 2,000 mg/kg No deaths occurred at this concentration.

#### Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

For the major component(s): Propylene glycol.  
LD50, Rabbit, > 20,000 mg/kg

#### Information for components:

**Propylene glycol**

LD50, Rabbit, > 2,000 mg/kg No deaths occurred at this concentration.

**Inorganic corrosion inhibitor**

LD50, Rabbit, > 5,000 mg/kg

**Acute inhalation toxicity**

At room temperature, exposure to vapor is minimal due to low volatility. Mist may cause irritation of upper respiratory tract (nose and throat).

For the major component(s):

LC50, Rat, 4 Hour, vapour, 6.15 mg/l No deaths occurred following exposure to a saturated atmosphere.

**Information for components:**

**Propylene glycol**

LC50, Rabbit, 2 Hour, dust/mist, 317.042 mg/l No deaths occurred at this concentration.

**Inorganic corrosion inhibitor**

Based on information for a similar material: Maximum attainable concentration. LC50, Rat, male and female, 4 Hour, dust/mist, > 0.83 mg/l No deaths occurred at this concentration.

**Skin corrosion/irritation**

Based on information for component(s):

Prolonged contact is essentially nonirritating to skin.

Repeated contact may cause flaking and softening of skin.

**Information for components:**

**Propylene glycol**

Prolonged contact is essentially nonirritating to skin.

Repeated contact may cause flaking and softening of skin.

**Inorganic corrosion inhibitor**

Prolonged contact may cause slight skin irritation with local redness.

**Serious eye damage/eye irritation**

Based on information for component(s):

May cause slight temporary eye irritation.

Corneal injury is unlikely.

**Information for components:**

**Propylene glycol**

May cause slight temporary eye irritation.

Corneal injury is unlikely.

Mist may cause eye irritation.

**Inorganic corrosion inhibitor**

May cause slight eye irritation.

May cause slight temporary corneal injury.



Dust may irritate eyes.  
Mist may cause eye irritation.

**Sensitization**

For the major component(s):  
Did not cause allergic skin reactions when tested in humans.

For respiratory sensitization:  
No relevant data found.

**Information for components:**

**Propylene glycol**

Did not cause allergic skin reactions when tested in humans.

For respiratory sensitization:  
No relevant data found.

**Inorganic corrosion inhibitor**

For similar material(s):  
Did not demonstrate the potential for contact allergy in mice.

For respiratory sensitization:  
No relevant data found.

**Specific Target Organ Systemic Toxicity (Single Exposure)**

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

**Information for components:**

**Propylene glycol**

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

**Aspiration Hazard**

Based on physical properties, not likely to be an aspiration hazard.

**Information for components:**

**Propylene glycol**

Based on physical properties, not likely to be an aspiration hazard.

**Chronic toxicity (represents longer term exposures with repeated dose resulting in chronic/delayed effects - no immediate effects known unless otherwise noted)**

**Specific Target Organ Systemic Toxicity (Repeated Exposure)**

In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

**Information for components:**

**Propylene glycol**

In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

**Inorganic corrosion inhibitor**

Based on available data, repeated exposures are not anticipated to cause significant adverse effects.

**Carcinogenicity**

Similar formulations did not cause cancer in laboratory animals.

**Information for components:**

**Propylene glycol**

Did not cause cancer in laboratory animals.

**Inorganic corrosion inhibitor**

No relevant data found.

**Teratogenicity**

For the major component(s): Did not cause birth defects or any other fetal effects in laboratory animals.

**Information for components:**

**Propylene glycol**

Did not cause birth defects or any other fetal effects in laboratory animals.

**Inorganic corrosion inhibitor**

For similar material(s): Did not cause birth defects or any other fetal effects in laboratory animals.

**Reproductive toxicity**

For the major component(s): In animal studies, did not interfere with reproduction. In animal studies, did not interfere with fertility.

**Information for components:**

**Propylene glycol**

In animal studies, did not interfere with reproduction. In animal studies, did not interfere with fertility.

**Inorganic corrosion inhibitor**

For similar material(s): In animal studies, did not interfere with reproduction.

**Mutagenicity**

In vitro genetic toxicity studies were negative. For the major component(s): Animal genetic toxicity studies were negative.

**Information for components:**

**Propylene glycol**

In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

**Inorganic corrosion inhibitor**

In vitro genetic toxicity studies were negative.

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## 12. ECOLOGICAL INFORMATION

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*Ecotoxicological information appears in this section when such data is available.*

### Toxicity

#### Propylene glycol

##### **Acute toxicity to fish**

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).  
LC50, Oncorhynchus mykiss (rainbow trout), static test, 96 Hour, 40,613 mg/l, OECD Test Guideline 203

##### **Acute toxicity to aquatic invertebrates**

LC50, Ceriodaphnia dubia (water flea), static test, 48 Hour, 18,340 mg/l, OECD Test Guideline 202

##### **Acute toxicity to algae/aquatic plants**

ErC50, Pseudokirchneriella subcapitata (green algae), 96 Hour, Growth rate inhibition, 19,000 mg/l, OECD Test Guideline 201

##### **Toxicity to bacteria**

NOEC, Pseudomonas putida, 18 Hour, > 20,000 mg/l

##### **Chronic toxicity to aquatic invertebrates**

NOEC, Ceriodaphnia dubia (water flea), semi-static test, 7 d, number of offspring, 13,020 mg/l

#### Inorganic corrosion inhibitor

##### **Acute toxicity to fish**

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).  
LC50, Leuciscus idus (Golden orfe), static test, 48 Hour, > 900 mg/l, Method Not Specified.

### Persistence and degradability

#### Propylene glycol

**Biodegradability:** Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Biodegradation may occur under anaerobic conditions (in the absence of oxygen).

10-day Window: Pass

**Biodegradation:** 81 %

**Exposure time:** 28 d

**Method:** OECD Test Guideline 301F or Equivalent

10-day Window: Not applicable

**Biodegradation:** 96 %

**Exposure time:** 64 d

**Method:** OECD Test Guideline 306 or Equivalent

**Theoretical Oxygen Demand:** 1.68 mg/mg

**Chemical Oxygen Demand:** 1.53 mg/mg

**Biological oxygen demand (BOD)**

Incubation Time	BOD
5 d	69.000 %
10 d	70.000 %
20 d	86.000 %

**Photodegradation**

**Atmospheric half-life:** 10 Hour

**Method:** Estimated.

**Inorganic corrosion inhibitor**

**Biodegradability:** Biodegradation is not applicable.

**Bioaccumulative potential**

**Propylene glycol**

**Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

**Partition coefficient: n-octanol/water(log Pow):** -1.07 Measured

**Bioconcentration factor (BCF):** 0.09 Estimated.

**Inorganic corrosion inhibitor**

**Bioaccumulation:** No bioconcentration is expected because of the relatively high water solubility.

**Mobility in soil**

**Propylene glycol**

Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Potential for mobility in soil is very high (Koc between 0 and 50).

**Partition coefficient (Koc):** < 1 Estimated.

**Inorganic corrosion inhibitor**

No relevant data found.

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## 13. DISPOSAL CONSIDERATIONS

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**Disposal methods:** DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR

UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler. Reclaimer. Incinerator or other thermal destruction device.

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## 14. TRANSPORT INFORMATION

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### TDG

Not regulated for transport

### Classification for SEA transport (IMO-IMDG):

	Not regulated for transport
<b>Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code</b>	Consult IMO regulations before transporting ocean bulk

### Classification for AIR transport (IATA/ICAO):

Not regulated for transport

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

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## 15. REGULATORY INFORMATION

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### Canadian Domestic Substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

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## 16. OTHER INFORMATION

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### Hazard Rating System

#### NFPA

Health	Flammability	Instability
0	1	0

### Revision

Identification Number: 11045208 / A208 / Issue Date: 12/16/2019 / Version: 8.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

### Legend

CA ON OEL	Canada. Ontario OELs
TWA	8-hr TWA
TWAEV	time-weighted average exposure value
US WEEL	USA. Workplace Environmental Exposure Levels (WEEL)

### Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

### Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

DOW CHEMICAL CANADA ULC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his

activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.  
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