

# THAVZALL

Tamarack Industries

## HEATZONE™



## TCH250

# Operators Manual

As a new customer of Thawzall we would like to welcome you! We are looking forward to providing you with technical support for your Thawzall unit. Whatever you need we are here to help.

## **Ways to contact us for support**

### **By Phone : 1-888-757-3545**

The main Technical support phone line is staffed monday-friday 7:00 AM to 3:30 PM excluding holidays.

### **After hours support**

Calls received outside of regular hours are directed to the On-call technician. After hours support is reserved for issues that cannot wait until the next business day for resolution. If no answer please leave a message and we will get back to you as soon as possible.

### **By Email : [info@thawzall.com](mailto:info@thawzall.com)**

Feel free to email us at any time with technical questions or parts inquiries. Please include the year make and model of your unit if you have a specific question about your machine so we can better help you. If it is an emergency please call 1-888-757-3545

For more information please visit our website

**[www.thawzall.com](http://www.thawzall.com)**

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# Operators Manual

For model:

**TCH 250**

Please record the following information from your new Thawzall for future reference. This information is required for all warranty claims.

Purchase date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Generator make: \_\_\_\_\_

Machine model: \_\_\_\_\_

Generator KW: \_\_\_\_\_

Machine serial number: \_\_\_\_\_

Generator Serial #: \_\_\_\_\_

\*Serial number located on trailer tongue\*

## **Manufactured by Thawzall, LLC**

A DIVISION OF TAMARACK INDUSTRIES

2736 Lakota Lane Unit B

Alexandria, MN 56308

Phone 320.759.1588

Fax: 320.759.1583

Tech Support 888.757.3545

Website: [www.Thawzall.com](http://www.Thawzall.com)

E-Mail: [info@Thawzall.com](mailto:info@Thawzall.com)

\*Older Models similar are H250 and H250SL.



Maintenance Record for \_\_\_\_\_ - \_\_\_\_\_ Season

*See Recommended Maintenance sheet for frequency details*

**DISCONNECTS**

	<u>DATE</u>	<u>DATE</u>	<u>DATE</u>	<u>DATE</u>
Clean and lubricate—Minimum twice per season	_____	_____	_____	_____

**HOSE REEL**

Grease all Zerk—Minimum of twice per season	_____	_____	_____	_____
Check all Allen screws at gear shaft—As needed	_____	_____	_____	_____
Check Allen screws at bearing keepers—Minimum twice per season	_____	_____	_____	_____

**BOILER**

Clean stack—As needed	_____	_____	_____	_____
Clean flute—As needed	_____	_____	_____	_____
Clean baffles—As needed	_____	_____	_____	_____
Clean combustion chamber—As needed	_____	_____	_____	_____

**BECKETT BURNER/GENISYS CONTROL**

Set air band—As needed	_____	_____	_____	_____
Check nozzle—As needed	_____	_____	_____	_____
Replace flange gasket—As needed	_____	_____	_____	_____
Replace fuel filter—As needed	_____	_____	_____	_____
Check combustion head—As needed	_____	_____	_____	_____
Lubricate motor—As needed	_____	_____	_____	_____
Check gap on ignition probe—As needed	_____	_____	_____	_____
Lubricate circulator—As needed	_____	_____	_____	_____

**PRESSURE RELIEF**

Inspect to ensure working properly—As needed	_____	_____	_____	_____
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**MISCELLANEOUS**

Check pH level of heat transfer fluid—As needed	_____	_____	_____	_____
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A Division of Tamarack Industries.

## LIMITED WARRANTY

### GENERAL:

THAWZALL, LLC hereby extends to the original purchaser of its THAWZALL ("Ground Defrosting, Thawing, Temporary Heat or Concrete Curing Products") a warranty against defects in materials and workmanship for a two year time period as indicated below.

The warranty is only valid on "Ground Defrosting, Thawing, Temporary Heat or Concrete Curing Products" purchased and used in accordance with placards and instructions (e.g. Operators Manuals) provided by Thawzall, LLC. This warranty applies only to the original purchaser and is subject to the terms and conditions set forth below.

THAWZALL, LLC will repair or replace (at its discretion) a ground defrosting, thawing, temporary heat or concrete curing product (or component thereof) if it fails to conform to this warranty. In the event a ground defrosting, thawing, temporary heat or concrete curing product is to be repaired pursuant to this warranty, such repair work will be performed by THAWZALL, LLC or at its direction.

### WARRANTY PERIOD:

The warranty relating to workmanship, materials and labor on THAWZALL ground defrosting, temporary heat or concrete curing products extends for two (2) years from the date of original invoice.

### WARRANTY POLICY:

When claiming warranty, you must give Thawzall the VIN number of the machine and date of invoice or original invoice number of the machine or part and Thawzall will determine if the affected machine and part is within the warranty period:

1. To Start a claim, go to our website and complete a warranty claim and e-mail to [warranty@thawzall.com](mailto:warranty@thawzall.com)
2. Thawzall will issue an RMA # when required for the defective part and provide a pre-paid freight return tag or call tag issued through UPS. If the part(s) is not returned within 30 days from the RMA date, you will no longer be eligible for any credit towards the replacement part.
3. You will need to issue a PO for the replacement part and Thawzall will invoice you for the replacement part and freight.
4. Once Thawzall receives the defective part we will inspect and test the part or have our vendor inspect it. If the part is determined to be defective a credit will be issued for only the part cost. If it is determined that the part is NOT defective, you will be charged for the time it took to inspect and test the part (Labor rate of \$100.00 per hour).

## WARRANTY LIMITATIONS:

Thawzall Ground Defrosting, Thawing, Temporary Heat or Concrete Curing products must be installed (where applicable), operated and maintained in accordance with all instructions provided by Thawzall, LLC. Failure to follow our installation (where applicable), operating or maintenance procedures and/or use of unauthorized parts may void this warranty.

Purchasers and Users are responsible for the suitability of the products for their application.

This warranty does not apply to:

- 1) Repairs or replacements necessitated by any cause beyond the control of THAWZALL, LLC including, but not limited to, any malfunction, defect or failure caused by or resulting from unauthorized service or parts; installation (where applicable), operating or maintenance contrary to furnished instructions; local water conditions, handling, shipping or transit accidents; modifications or repair by the user; abuse; misuse; neglect; accident; incorrect power line voltage; power line surge; lightning damage; or fire, flood, or other Acts of God.
- 2) Repair or replacement in the ordinary course of expendable ground defrosting, thawing, temporary heat or concrete curing product part.
- 3) Elements and controls whose damage or failure is attributable to corrosion, scale, or dirt accumulations or to low water conditions.

**Thawzall, LLC is not liable for labor and other costs incurred in removal, reinstallation, or unauthorized repair of the Ground Defrosting, Thawing, Temporary Heat or Concrete Curing product or for damages of any type whatsoever including incidental or consequential damages.**

There are no warranties which extend beyond the description contained herein and specifically liability for any breach of any implied warranty of merchantability or fitness for a purpose is excluded. The duration of any warranties which may be implied by law notwithstanding the previous sentence (including the warranties of merchantability and fitness) is limited to the term of this warranty. In no event shall Thawzall, LLC be liable for special, incidental or consequential damages arising from ownership or use of any Ground Defrosting, Thawing, Temporary Heat, or Concrete Curing product, or for any delay in the performance of its obligations under this warranty due to causes beyond its control. Some states do not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of consequential damages, so the above limitations and exclusion may not apply to you. This warranty gives you specific legal rights. You may have other rights, which vary from state to state.

This warranty set forth herein is in lieu of all other expressed or implied warranties. THAWZALL, LLC does not assume or authorize any party to assume for it any other obligation or liability.

THAWZALL, LLC  
2736 Latoka Lane, Unit B  
Alexandria, MN 56308 USA  
TF 888.757.3545  
T 320.759.1588  
F 320.759.1583  
Email: [warranty@thawzall.com](mailto:warranty@thawzall.com)  
Website: [www.thawzall.com](http://www.thawzall.com)

# FREQUENTLY ASKED QUESTIONS

## **Q: What can I do with a Thawzall Hydronic heater?**

A: 1) Remove ground frost, 2) Prevent ground frost, 3) Use as a temporary heat source, 4) Cold weather concreting

## **Q: How does it work?**

A: TCH250 utilizes a top draft, high efficiency oil fired furnace which heats a 50/50 water/propylene glycol mix(HTF) and distributes the HTF through the patented multi-zone manifold system thru a series of 600 foot. Industrial hydronic hoses in a low pressure closed loop system. Thawzall uses an automatic tempering valve to cover the various temperatures needed for Thaw, Cure and Heat modes. Under no circumstances, will the furnace ever need to be adjusted down as the electronic tempering valve can adjust the temperature delivery needed for the specific applications.

## **Q: How long does it take to remove frost?**

A: Up to 12 inches of frost can be removed in a 24 hour period depending on layout of hose, insulation used, ambient outside temperature and soil conditions.

## **Q: Can Thawzall operate at high altitudes?**

A: Yes, but operation at high altitudes may require adjustments—see High Altitude section.

## **Q: What kind of vehicle do I need to tow a Thawzall?**

A: A minimum of 3/4 ton truck with a brake controller. Please see Specifications section.

## **Q: What type of fuel does the Thawzall use?**

A: #1 fuel oil is preferred and if not available, then winter blend with anti-gelling additives.

## **Q: What type of power is required to operate the Thawzall?**

A: 120 volt ac, 20 amps. The burner may not fire with less than 112 volts!

## **Q: How long can I expect a tank of fuel to last?**

A: Depending on ambient temperature, work zone insulation and soil conditions, the average fuel consumption is roughly 1 GPH without the generator and with the generator is about 1.6 GPH.



# IMPORTANT SAFETY RECOMMENDATIONS AND WARNINGS

## OUTSIDE SAFETY FEATURES

Your Thawzall is equipped with DOT Certified outside LED lights, reflectors, safety-chains and electronic.

Break-away brakes.

Make use of these features:

Before towing the trailer, be sure that all the lighting is connected and working

Connect the safety chains to the towing vehicle

Connect the small cable from the break-away switch to the towing vehicle close the fuel valve at the top of the fuel tank on your Thawzall

## PARKING YOUR THAWZALL

Avoid unexpected movement of your Thawzall:

Avoid parking on hills

Use blocks or wheel chucks to prevent movement always use the jack to support the hitch

## TOWING YOUR THAWZALL

Tow safely:

At least a  $\frac{3}{4}$  ton truck with a brake controller is recommended for towing the TCH 250.

Thawzall axles, wheels and tires are rated to travel at legal posted speeds on the highway. Connect safety-chains, lights and brake cable to towing vehicle.

Thawzall trailers are equipped with electronic break-away brakes in case the trailer should become disconnected from the towing vehicle. Trailer brakes will apply automatically. Failure to connect trailer in a safe manner could result in a serious accident or death. Always verify that the hitch ball size on the towing vehicle matches the size of the coupler on the Thawzall trailer

## GENERAL OPERATING INSTRUCTIONS

Do not operate your Thawzall without receiving instruction and understanding the start-up and shut down procedures thoroughly—if you do not understand these instructions, call Thawzall Technical Support—888.757.3545

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or the safety and affect the life of the machine.

**Earth Grounding Rod must be installed before operating the machine (2017 model generator packages do not have a bounded neutral)**

Wear hand protection while handling hot hoses and disconnects.

**Hose Reel Danger!** Be very careful to keep hands and gloves clear from the hose reel when rewinding the hose. A glove can get caught between hoses which may cause serious bodily injury.

**Close ball valves on manifold** when coupling or uncoupling the hoses to avoid accidental fluid loss and spillage or possible injury from hot liquid

**No loose clothing.** Do not wear loose clothing that can get caught in the hose reel or on levers or latches on your Thawzall.

**Do not use gasoline or kerosene** to fire the furnace on your Thawzall. This may cause explosion which may result in serious injury or death. Only #1 fuel oil or a winter blend of fuel oil is recommended for the furnace.

**GFI Outlet.** Always plug the electrical cord from your Thawzall into a GFI protected outlet. Failure to do so could cause shock or electrocution.

**Safety glasses.** Always wear safety glasses when operating your Thawzall, especially when connecting and disconnecting hoses, fueling or maintaining the battery on the optional generator.

**Caution and Warning decals.** Carefully observe and maintain all of the caution and warning decals placed on your Thawzall machine. They are there to ensure proper operation of the Thawzall and your safety!

**Never “hot-wire** any of the electrical wiring on your Thawzall or optional generator. Wiring circuits are carefully designed to provide for safe Startup and operation of the furnace, pumps and hose reel. Any alteration may cause an unsafe condition and could cause any or all components to malfunction or operate out of sequence.

**Operate only OUTDOORS!** Never operate an engine or furnace inside a building without proper venting of the exhaust to the outside. Carbon monoxide poisoning and asphyxiation may occur if exhaust is inhaled.

## **HANDLE FUEL SAFELY**

Avoid fires by handling fuel with care. Both diesel fuel used in the generator and #1 fuel oil or a winter blend of fuel oil used in the furnace are extremely flammable!

Do not refuel the machine while smoking or while an open flame or sparks are near the refueling point! Do not refuel while the generator or furnace is running.

A clean machine is a safe machine. Prevent fires by keeping your Thawzall clean of accumulated trash, grease and debris. Clean up spilled fuel properly.

## **HANDLE CHEMICAL PRODUCTS SAFELY**

Direct exposure to hazardous chemicals can cause injury. Potentially hazardous chemicals used in your Thawzall include, grease, paint and adhesives. Grease, paint and adhesives are especially toxic when heated.

Please read with care the Material Safety Data Sheets (MSDS) provided in this manual. They provide specific details on the products used in you Thawzall, physical and health hazards, safety procedures and emergency response techniques.

Check the MSDS sheets before operating your Thawzall so you will know the risks and first aid techniques in case of an accident.

Keep emergency phone numbers for doctors, ambulance service, hospital and fire department near your phone.

## **SAFETY INCLUDES PREVENTITIVE MAINTENANCE**

Remove paint and adhesives before welding or heating.

Avoid heating near pressurized pipes and hoses, and near a fuel tank.

Dispose of waste properly. Improperly disposing of waste including HTF (Heat transfer fluid), grease, and plastics, filters and batteries, threaten the ecology of the environment. Do not pour HTF on the ground, down a drain or into any water source. Inquire about the proper way to dispose of wastes in your area, at your recycling center.

## **HANDLING BATTERIES SAFELY**

Battery gas can explode. Keep sparks and flames away from the battery on the generator on your Thawzall. Never place a metal object across the battery posts. Always disconnect the grounded (-) battery clamp first and re-connect it last. Battery acid is poisonous and can burn skin and eat holes in clothing and cause blindness if splashed into the eyes. Flush contaminated skin with water and baking soda. If acid is swallowed, drink water or milk and get medical attention immediately OR **CONTACT YOUR LOCAL POISON CONTROL CENTER IMMEDIATELY!**

## **STORING YOUR THAWZALL**

To store your Thawzall for the summer months:

Park on level ground and block wheels to prevent accidental movement.

Close the fuel tank valve.

See applicable service bulletins at the back of this manual for annual maintenance items.

## **SAFETY FEATURES OF THE THAWZALL HEAT MACHINE**

The following safety features have been built into your Thawzall Heat Machine to ensure the safest possible use of the machine and convenience that enhances your productivity.

### **Dripless quick connect couplers**

No loss of fluid from the system

### **Shut-off ball valves above couplers**

For maintenance, safety and zone control

### **14 Gallon reservoir tank**

Prevents fluid spill if relief valve opens

### **Dual temperature heat controls on boiler**

Prevents boiler from overheating (Operator and high limit Aquastat control)-**FACTORY PRE- SET—DO NOT ADJUST!**

Electronic Mixing valve—**OPERATIONAL THRU THE CONTROL PANEL WATLOW™ CONTROL—THE ACTUAL VALVE IS PRE-SET AT FACTORY-- DO NOT ADJUST**

### **Hydraulically crimped hose connections**

Strongest possible crimp on hoses

### **Covered foot control for hose reel**

Prevents accidental activation of hose reel from falling objects

### **Interior Light for Enclosure**

Provides visibility for machine operations or setup during early morning or evening hours

### **Gauges at all vital points**

Help to maintain proper operation levels

All hoses and electrical components are UL approved

### **Low-Water Cut-Off control**

Automatically shuts down the furnace if fluid level becomes too low for safe operation

**Trailer axles with electric brakes and breakaway stop system meet safety codes to include NHTSA, CSA, Transport Canada, UL and IBR**

# TCH HEATZONE™ SERIES PRODUCT ENHANCEMENTS

## Performance Improvements

Improved heat distribution (30GPM)  
Improved circulation performance  
Full Strength HTF (heat transfer fluid)  
Simplified Configuration

For faster THAW, more uniform CURE  
For greater head pressure and GPM flow  
For pump-ability down to—80°F  
Easy to operate and understand

## Quality Improvements

Steel manifold and non-copper piping  
DOT certified LED lights  
Industrial door stays

For improved durability and reparability  
For operational reliability  
To secure door open

## Control System Improvements

Centralized controls  
Rooftop mounted message beacon  
Digital display for individual heat zones  
Hour Meter, voltmeter, fuel gage  
Digital control for heat delivery by zone  
Electronic mixing valve

Convenience for startup and monitoring  
For visual assurance of proper operation  
To monitor critical return temperatures  
To monitor hours, volts, fuel  
Ideal for precise curing mode  
Precise temperature delivery

## Operational Improvements

Automatic Fuel Bleed System  
Fork Picks for ease of placement on job site  
Lockable cover over temp controls  
Furnace Troubleshooting guide

no fuel line bleeding required  
to prevent unauthorized tampering  
to reduce non-revenue service calls

## Built-In Features

Reinforced Fiber Combustion Chamber  
Fuel oil Furnace  
AMT Circulation pump  
Closed loop fluid system  
Powder coat finish

For rugged use and durability  
Unit is totally self-contained  
Quality pump, nationally available  
No calcium buildup  
Attractive high quality finish

# Operation

## Quick Start Guide

1. Turn all control panel switches to the off position
2. Open the Fuel valve on the top of the fuel tank
3. Start generator or plug machine into 120VAC power source
4. Spool out hoses and connect as necessary, one 600 ft hose per zone max.
5. Open valves for each hose used.
6. On the control panel turn main switch to “cool down”
7. Make sure both automatic air bleeders are open located on top of boiler and hose manifold.
8. Turn the main switch on the control panel to “run” position.
9. Set desired output temperature on the supply temperature controller on the control panel.

## Quick Shut Down Guide

1. Turn main switch on the control panel from “run” to “cool down”
2. Keep in “cool down” mode until the temperature/pressure gauge on the face of the boiler comes down to at least 140° then turn switch to “off” position.
3. Close valves on manifold
4. Disconnect and spool up hoses
5. Turn off generator or disconnect power from the unit.

## TCH 250 Startup

Ensure the machine is sitting as level as possible. Use grounding rod if possible.

1. Make sure all switches on the control panel are in the off position.

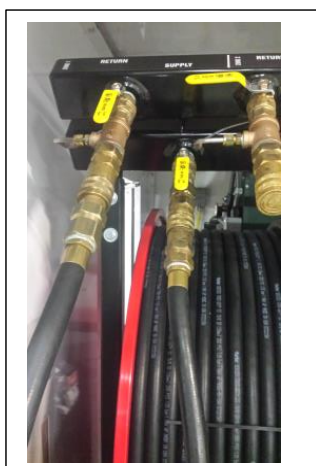


2. Apply power to the machine. There are 2 methods of applying power to the machine. One method is by plugging an extension cord in to the passenger's side rear of the machine from an external 120Volt ac power source. If the Thawzall machine has a generator package installed, the generator can be used to power the machine. The generator will have a twist lock plug plugged in to the front panel of the machine on the driver's side front panel. There is no need to run a separate extension cord from the generator to the plug in on the passenger's rear of the machine. Below are pictures of the 2 methods for powering the machine.





3. Once there is power to the machine, start setting up at least one hose or all 5 hoses to get circulation established. Use the power out function of the hose reel to aid in pulling the hose off of the hose reel. There are switches for the hose reel operation on the control panel. Look inside the back doors to your right to find the hose reel control switches. These 2 switches to control the hose reel operation. Select hose out and press the foot switch and the hose reel will begin to unwind the hose. Alternatively the hose can be freewheeled by removing the reel lock pin and releasing the belt tension with the tensioner knob. Remember each hose is 600 feet in length and each end of a 600 foot hose needs to be connected to a supply and return disconnect on the manifold. After connecting both ends of a 600 foot hose to the manifold, open the ball valves for the disconnect that the hose is connected to. Below are pictures of the switches for the hose reel and an example of a hose connected to the manifold.



4. After connecting a hose or hoses to the manifold, the ball valves inside the passenger's side door need to be opened. There are 3 flange style ball valves that need to be open. Also make sure to open the yellow handled ball valve on the gray expansion tank if it is not already open. Next establish circulation by turning the switch on the control panel to cool down mode. There is a sight flow indicator inside the passenger's side door. The sight flow indicator is to the left as you look in the door and down by the floor of the trailer. The impeller wheel should spin when flow is established. Also, there are two automatic air bleeders that need to be opened. The automatic air bleeders are made out of brass. They are round, about 2" tall and about 1 3/4" in diameter with a little cap on the top of them. One automatic air bleeder is located on the return manifold. Look in the back doors at the right hand side of the manifold for this automatic air bleeder. Once you locate it just loosen the cap a turn or so with your fingers. The other automatic air bleeder is inside the passenger's side door on top of the furnace by the stove pipe. The water jacket of the furnace has an internal air scoop built in and this automatic air bleeder is plumbed into that internal air scoop to evacuate air out of the system. Open this one up also.





5. Open the fuel valve on the fuel tank of the machine. Turn the switch on the control panel to run mode, this will send power to the furnace. After a 30 second delay the furnace will attempt to light. If the furnace does not fire please refer to the furnace trouble shooting guide.

In this photo the valve is shown in the open position.

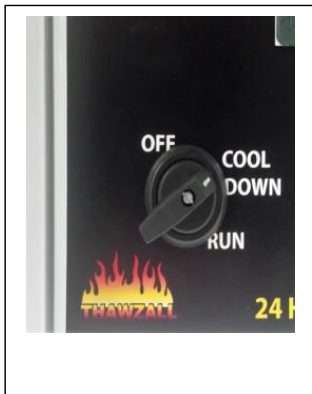


6. The TCH250 uses a mixing valve to control the output temperature to the supply manifold. This valve is electronically controlled by the Temp controller in the upper right hand corner of the control panel. This controller is adjustable from 70 to 180 degrees. There are 2 temperatures that are displayed on this controller. The top temperature in red is the current temperature being discharged from the circulation pump to the supply manifold. The bottom window in green is the set point for the temperature that is desired for the output to the supply manifold. To change the desired set point just arrow up or down to the desired temperature being supplied to the work area. The mixing valve will try to maintain that output temperature. Below is a picture of the Temp Controller.

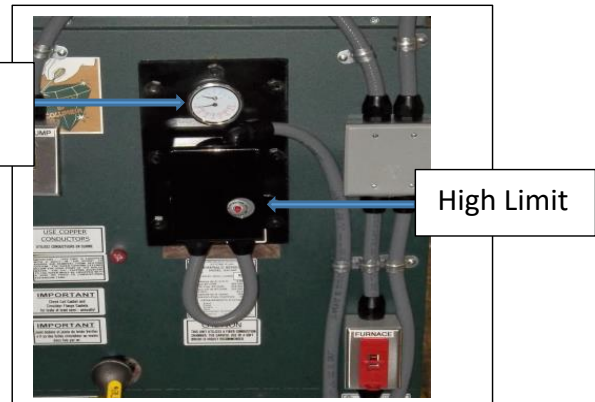


## TCH250 Shut Down Procedures

When the job is done and it is time to shut the machine down start with placing the switch on the control panel into “Cool Down” mode. Place the switch in “Cool Down” mode removes power from the furnace and allows the heat transfer fluid to continue to circulate. The machine should be run in “Cool Down” mode to cool the Heat Transfer Fluid down and the hoses. The machine should be allowed to cool the furnace down to at least 140° F on the temperature/pressure gauge on the face of the furnace. Doing this will allow the hoses to cool down some so they are not hot to the touch but still pliable enough for winding up the hose for storage. Also this will help prevent the High limit from tripping.



Temp/pressure gauge



Once the temperature on the temperature / pressure gauge on the face of the furnace has reached at least 140 °F place the main switch to off. Close the fuel valve on the fuel tank. Closing the fuel valve on the fuel tank will help prevent air from getting in to the fuel supply to the burner. If air get in the fuel supply it may cause the primary controller to go into a lock out condition the next time the machine is fired. Close the automatic air bleeders. Remember to reopen the automatic air bleeders when setting the machine up at the next job. Close the ball valves on the manifold. Disconnect the first hose to wind up. When the hoses are stored on the hose reel they are connected together for ease of winding up. Turn the hose reel switch to the On position and select In. Press the foot switch to begin winding the up on to the hose reel. When you get to the end of one of a hose and connect the next hose to it remember to leave some slack in the hose where at this junction when rolling the hoses up. This will help prevent stress on the ends of the hoses. Once all hoses are reeled up, engage the reel lock pin to prevent the reel from turning during transport.

## Reel Operation

The TCH 250 has hose reel control switches on the control panel. The hose reel can be powered both to extend or retract the hose reel selected by the reel direction switch. The reel can also be released for optional free-wheeling For manual hose deployment.



### SERIES TCH250 CONTROL BOX, features:

- On/Cool Down/Off switch
- Enclosure Light on/off
- Strobe Light on/off
- Reel Direction switch
- Two-speed reel switch
- Brake switch
- Voltmeter
- Fuel Gage
- Hour Meter
- Temperature Delivery Set Switch

TCH250 has six zone temperature displays—five displays for the individual Thaw/Cure zones and one display for the Auxiliary Zone. The Auxiliary Zone display is used for monitoring temperature return for a remote manifold or heat exchanger in temporary heat situations.



## **WATLOW™ OUTPUT TEMPERATURE DELIVERY CONTROL**

Press and hold the up or down arrow to select desirable temperature output (temperature range 70° F - 180° F)—the other buttons are disabled.

Normal set temperature for Thaw mode is pre-set at 180° F, 82.2° C

Ideal Cure mode set temperature is approximately 85° F, 29.4° C

Temporary Heat mode can be any set temperature that the environment can endure

### **PERFORMANCE**

THAW AND CURE performance in the field is affected by a wide range of factors which include:

- Soil type
- Moisture content in the soil
- Hose spacing
- Thermal rating of the covering construction blankets
- Outside ambient temperatures

**HEAT** performance in interior work spaces is also affected by several factors which include:

- Outside ambient temperature
- Heat loss
- Volume of space to be heated and type of heat exchanger used

## GROUND THAW SETUP CHARTS

**TEMPERATURE: 30° F or higher/-1° C**

**LAYERS OF BLANKETS TO USE: SINGLE (R6 insulation factor) SOIL CONDITION: Gravel or Sand (good drainage)**

Frost Depth		- - ,			
	12"	24"	36"	48"	60"
Hose Spacing**	24"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

\*\*Hose spacing is measured inches on center

**TEMPERATURE: 30° F or higher/-1° C**

**LAYERS OF BLANKETS TO USE: SINGLE (R6 insulation factor) SOIL CONDITION: Clay or Silt (poor to moderate drainage)**

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing"	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

\*\*Hose spacing is measured inches on center

**TEMPERATURE: 15° F to 30° F/-9° C to -1° C**

**LAYERS OF BLANKETS TO USE: SINGLE (R6 insulation factor) SOIL CONDITION: Gravel or Sand (good drainage)**

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing'	24"	24"	24"	24"	24"
Hours to run	24	48	72	96	120

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing'	24"	24"	24"	24"	24"
Hours to run	24	48	72	96	120

\*\*Hose spacing is measured inches on center

## GROUND THAW SETUP CHARTS, cont.

**TEMPERATURE:** 0° F to 15° F / -18° C to -9° C

**LAYERS OF BLANKETS TO USE:** DOUBLE (R12 insulation factor) **SOIL CONDITION:**  
Gravel or Sand (good drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing	24"	24"	24"	24"	24"
Hours to run	24	48	72	96	120

"Hose spacing is measured inches on center

**TEMPERATURE:** 0° F to 15° F / -18° C to -9° C

**LAYERS OF BLANKETS TO USE:** DOUBLE (R12 insulation factor) **SOIL CONDITION:** Clay or  
Silt (poor to moderate drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

\*\*Hose spacing is measured inches on center

**TEMPERATURE:** -20° F to 0° F / -28° C to -18° C

**LAYERS OF BLANKETS TO USE:** DOUBLE (R12 insulation factor) **SOIL CONDITION:**  
Gravel or Sand (good drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

"Hose spacing is measured inches on center

**TEMPERATURE:** -20° F to 0° F / -28° C to -18° C

**LAYERS OF BLANKETS TO USE:** DOUBLE (R12 insulation factor) **SOIL CONDITION:**  
Clay or Silt (poor to moderate drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing"	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

"Hose spacing is measured inches on center

## GROUND THAW SETUP CHARTS, cont.

**TEMPERATURE: -20° F or lower/ -29° C or lower**

**LAYERS OF BLANKETS TO USE: DOUBLE (R12 insulation factor) SOIL CONDITION:**

**Gravel or Sand (good drainage)**

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

"Hose spacing is measured inches on center

**TEMPERATURE: -20° F to lower/ -28° C or lower**

**LAYERS OF BLANKETS TO USE: DOUBLE (R12 insulation factor) SOIL CONDITION:**

**Clay or Silt (poor to moderate drainage)**

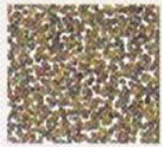
Frost Depth	12"	24"	36"	48"	60"
Hose Spacing"	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

"Hose spacing is measured inches on center



## THAW

When moisture freezes in the soil, it requires 143 BTU's per pound to thaw the ground. Shown are 4 types of soil and their thawing requirements:



**Gravel**

up to 1,001 BTU's  
required to melt ice



**Sand**

up to 2,574 BTU's  
required to melt ice



**Clay**

up to 3,146 BTU's  
required to melt ice



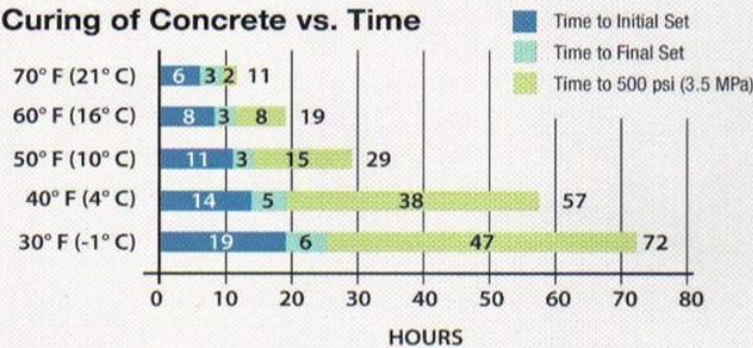
**Silt**

up to 7,436 BTU's  
required to melt ice

## CURE

Concrete cures slowly due to cold temperatures. Here's how temperature affects the concrete curing process:

**Curing of Concrete vs. Time**



## Performance

**Thaw and Cure** performance in the field is affected by a wide range of factors to include soil type, density of frozen ice in the soil, hose spacing, thermal rating of the covering insulating blankets, and ambient temperatures.

**Heat** performance in interior spaces is also affected by several factors to include outside ambient temperatures, heat loss through walls and ceiling, and the volume of the space to be heated.

In general, with proper hose spacing and adequate insulation, the operator should be able to THAW about one foot of soil per day. Consult our Thawzall Technical Support personnel with questions regarding proper hose spacing. 888.757.3545

## HIGH ALTITUDE ADJUSTMENTS

If your Thawzall is to be used at altitudes above 5,000 feet (1,530 meters), the burner nozzle and air intake settings must be changed to accommodate lower oxygen levels at higher altitudes. **Please see service bulletin # 501**



## HOSE CAPACITY FILL CHART

HOSE SIZE	GALLONS PER FOOT
(Inside dia.)	
1/2	0.016
5/8	0.019
3/4	0.023
1.00	0.04
1 1/4	0.063

### DISCONNECT MAINTENANCE

1. Water and dirt may get into a disconnect piece and cause it to corrode or to work improperly. It is vital that dis-connects be cleaned and lubricated at least once per season or when they get dirty. Failure to maintain disconnects properly will void the warranty.

#### To clean disconnects:

- Use a mild soap and water or all-purpose cleaner like dish soap or Windex
- Use a nylon bristle brush to scrub the couplers. (Do not use a metal brush.)
- Rinse and wipe parts dry □ Allow parts to dry

#### To lubricate disconnects:

Use only Silicon based products that do not contain any penetrating oils like LPS or Lubrimatic. Silicone based lubricants are available at automotive parts stores or farm equipment dealerships.

Apply silicone lubricant liberally.

### **DO NOT USE WD-40 OR SIMILAR PRODUCTS THAT CONTAIN PENETRATING OIL.**

Silicone based lubricants will displace water trapped in the disconnects and will not damage the seals inside.

For repair of the male coupler, please use the following 6 step procedure

1. Place the male coupler in a vise with the valve end up
2. Using a drift punch or other dull or flat tool, push the valve into the coupler body
3. Wedge a steel pick in between the valve and the body to hold the valve down
4. Remove the damaged O-ring and back-up ring with another pick
5. Clean the O-ring seat and install the back-up ring
6. Lubricate the O-ring seal and install it. Then release the valve by removing the pick

---

## GENERAL MAINTENANCE CHART

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PART	MAINTENANCE FREQUENCY
Fuel Filter	Replace once per year
Furnace	Maintenance-annually by qualified technician
Hose Reel	Grease all fittings twice per year
Hoses	Inspect for damage after each use
Quick- Disconnects	Clean thoroughly at least twice per year LUBRICATE WITH SILICON SPRAY

### Basic Features:

Three indicator lights:

- Red reset button/lockout light
- Pump Prime
- Green flame/recycle light

Limited Reset

- Recurring lockouts without a complete heat cycle puts control in restricted (hard lockout) mode

Limited Recycle

- If flame is established and then lost, the control will recycle until the cumulative time trial for ignition budget is exhausted and will then go into hard lockout. This prevents excessive oil accumulation in the appliance

Valve on delay—15 seconds

Motor-off delay—none

### Sequence of Operation

1. Standby
2. Valve-on delay
3. Trial for ignition
4. Lockout
5. Ignition carryover
6. Run
7. Recycle
8. Motor-off delay
9. Pump prime

### OPERATING STATES:

#### STANDBY

- The burner is idle, waiting for a call for heat. When a call for heat is initiated, there is a ½ second delay while the control performs a safe start check

#### VALVE-ON DELAY (pre-time)

- The igniter and motor are on while the fuel solenoid valve remains de-energized—typically 15 seconds. Allows the burner to establish air flow and brings the pump to full speed, helping to keep ignitions smooth and clean

#### TRIAL FOR IGNITION

The oil solenoid valve is energized. A flame should be established within the factory set trial for ignition time (also known as “lockout time”) 15 seconds on the Genisys control

## OPERATING STATES, cont.:

---

### IGNITION CARRYOVER

- Once flame is established, the igniter remains on for 10 additional seconds to ensure flame stability before shutting off

### RUN

- The flame is sustained until the call for heat is satisfied or safety limit shuts down burner

### MOTOR-OFF DELAY (post-time)

- If applicable, the oil solenoid valve is de-energized and the motor continues to run for the preset motor-off delay time. Cools the nozzle to prevent after drip, and expels fumes and combustion
- If the cad cell detects flame in the Motor-Off Delay mode, the control goes into the standby mode. This is to prevent a failed fuel valve from keeping the flame burning

### LOCKOUT—the control has shut down the burner for one of the following safety reasons:

- Trial for ignition (lockout) time expires without flame being established
- Cad cell detects flame at the end of valve-on delay
- Recycle time budget expires
- Relay check failure
- You can **NOT** reset the control by interrupting line voltage

### RECYCLE

- If the flame is lost while the burner is firing, the control shuts down the burner, enters a 60 second recycle delay, and repeats the ignition sequence. The control will continue to recycle each time the flame is lost, until it reaches a preset cumulative trial for ignition time allotment. The control will then go into Hard Lockout instead of recycle. This feature prevents excessive accumulation of oil in the appliance firing chamber.

### PUMP PRIME

- Enter Pump Prime mode by holding down the reset button while in the trial for ignition until the control powers down the equipment. Then oppress the reset button again to enter Pump Prime mode
- The igniter and motor are on 4 minutes, and the cad cell is disregarded. This allows the technician to prime the pump without having to jumper the cad cell
- Terminate the call for heat and the control will exit the pump prime mode and resume normal operation.
- You can remove the control from the Pump Prime mode by holding the reset button for 1 second. The control will return to Standby mode.

## **OPERATING STATES, cont.:**

### **DISABLE FUNCTION**

- Press and hold red reset button for 1 second at any time to disable the burner
- When you release the reset button the burner will return to normal operation
- Genisys control has limited reset
- Initial lockouts result in “soft” lockout.

### **Red light flashing—click the red reset button to restart**

- Recurring lockouts without completing a heat cycle will result in Restricted (“hard”) lockout.

**Red light on steady—hold the red reset button 15 seconds until the yellow light turns on. You can NOT reset the control by interrupting line voltage.**

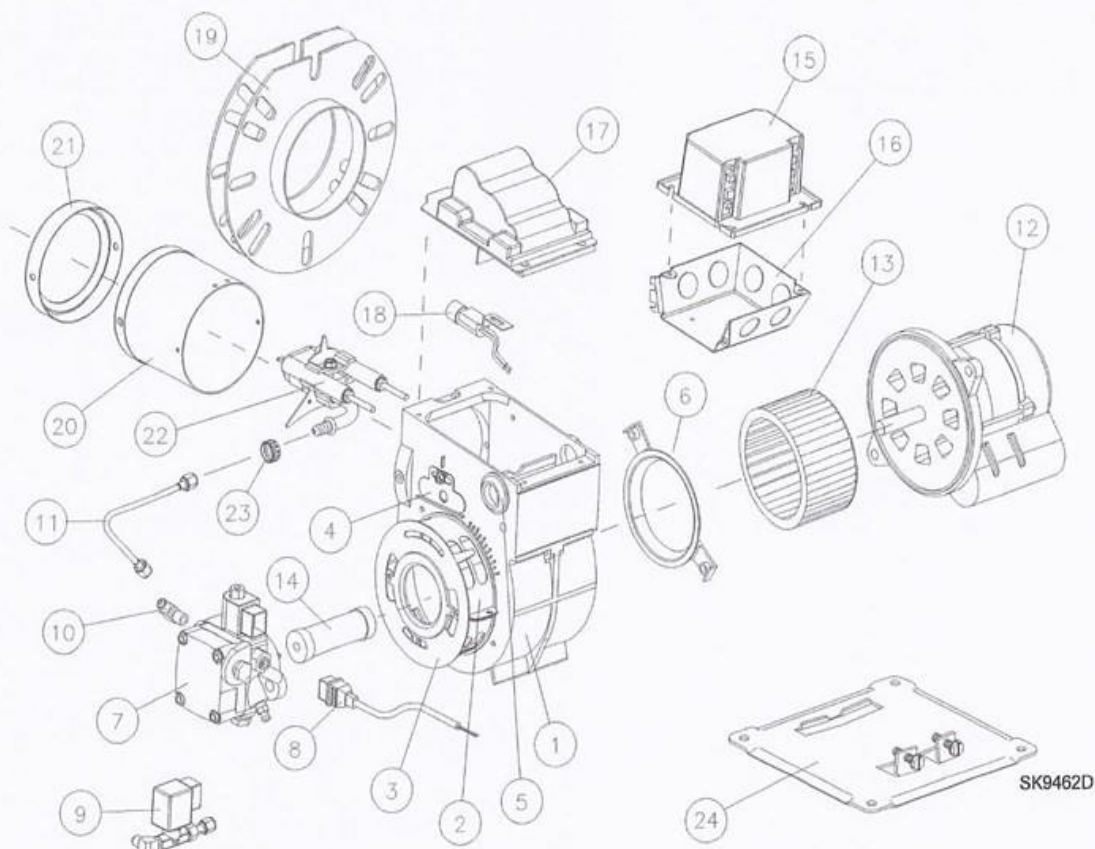
### **PUMP PRIME MODE**

- Prepare the burner for priming
- Initiate a call for heat
- After the burner starts, press and hold the reset button until the yellow light turns on. (15 seconds)
- Release the reset button. The yellow light will turn off and the burner will start again
- At burner start up, click the reset button
- Enters 4-minute dedicated pump prime mode, with motor and igniter on, and oil valve energized. The yellow light is on when in the pump prime mode
- Terminate the call for heat and the control will exit the pump prime mode and resume normal operation

# Service & maintain burner

## Replacement parts

The Air Band Assembly is pre-Set to 2—The Air Shutter is pre-Set to 10. **DO NOT ADJUST UNLESS ALTITUDE CONDITIONS WARRANT DIFFERENT AIR INTAKE!**



Item	Description	Part Number
1	Burner housing assembly	5624B
2	Air band assembly – 8 slot	5151501
(Note 1)	Screw 10-24 x 1/2"	4198
	Nut 10-24 square	4150
3	Air shutter – 8 slot	3494
(Note 1)	Screws 10-24 x 5/16"	4292
4	Escutcheon plate	3493
(Note 1)	Screw 10-32 x 5/16"	4292
5	Hole plug	2139
(Note 1)		
6	Air inlet bell (Note 2)	31841
(Note 1)		
7	Pump A2VA7116 (Suntec)	2460U
	A2EA6520N621L (CleanCut)	21844U
	BFPH071N1161 (Danfoss)	21391U
	Mounting screws 1/4-20 x 7/8"	4189U
8	Valve cordset (for 21844 pump)	21807U
	PD Timer delay cordset (for 21844 pump)	21887U
9	Solenoid valve kit (non-delay)	2182602U
	Solenoid valve kit (includes PD Timer cordset)	2182604U
10	Pump elbow	2256
11	Connector tube assembly – 8"	5394
12	Motor - PSC	21805U

Item	Description	Part Number
13	Blower wheel (use only RWB replacement)	2459U
14	Coupling	2454
15	Primary Control R7184A – interrupted ignition	7455
	R7184B – valve-on delay	7456
	R7184P – valve-on / motor-off delay	7457
	R7184P – with alarm contacts	7458
16	Electrical box	5770
17	Igniter – includes gaskets	51771U
18	Cad cell detector	7006U
19	Flange – universal, adjustable, incl. gasket	5432
	Gasket only	3616
20	Air tube combination – see Table 1, page 2	Specify
21	Heat shield kit – ceramic or fiber	Specify
22	Electrode kit F head air tubes up to 9"	5780
	F head air tubes longer than 9"	5782
23	Splined nut	3666
24	Pedestal kit	5685

Note 1 These items are included in the 5624B burner housing assembly

Note 2 Factory installed. Please do not remove from burner!





**Technical Service Bulletin** No. 00-06-01-08-501 Rev. 8/13

## HIGH ALTITUDE OPERATION

**Attention:** All Service Managers and Service Technicians

**Subject:** Selection of burner nozzle and air intake setting for operation above 5,000 ft.

**Date Effective:** June 1, 2008 and August 2013

**Models Affected:** H150, TCH150, H250SL, TCH250, 2M, 6A, 12F, 12HU

**Purpose:** To re-rate the burner nozzle and air intake setting based on altitude above sea level

**Other Pertinent Information:** All models affected are shipped with nozzle numbered 1.75 and air intake is set a 2

If your Thawzall is to be used at altitudes above 5,000 feet above sea level, the burner nozzle and air intake setting must be changed to accommodate lower oxygen levels at higher altitudes. Use the table at the top of back page to find the nozzle size and air intake settings for your altitude.

### To change the burner nozzle:

- Turn power off
- Referring to the burner diagram on the back page, locate oil line and disconnect the nut from the top end of the line
- Open the hinged cover by loosening two clips to access the nozzle assembly
- Loosen and remove the splined nut from the outside end of the nozzle assembly. Do not loosen es-cutcheon Plate #4. Nozzle assembly will fall free.
- Turn and remove burner nozzle unit #24.
- With 5/8 and 3/4 open ended wrenches, loosen and replace the nozzle at front end of the assembly with one of the proper size, being careful not to bend the two electrodes.

THAWZALL, LLC

# HIGH ALTITUDE OPERATION Continued from page 1

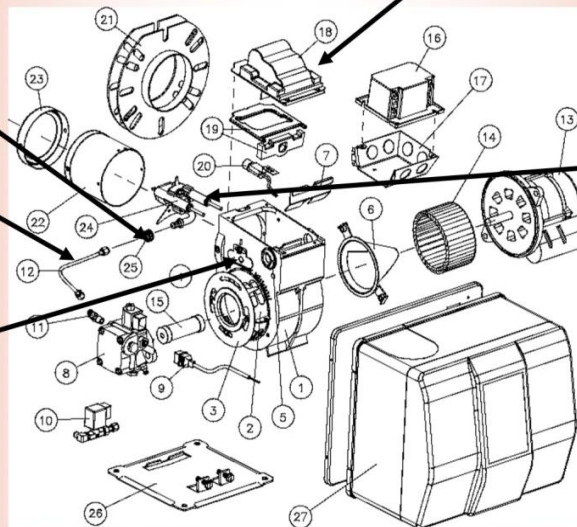
ELEVATION ABOVE SEA LEVEL	NOZZLE SIZE COMBUS- TION HEAD	AIR INTAKE SETTING
2,000—5,000 FT.	1.75 F-22	2
5,000—7,500 FT.	1.5 F-22	3.6
6,000—10,000 FT.	1.5 F-22	5.2
10,000—12,000 FT.	1.35 F-6	5.8

Nozzle and air intake changes affect burner BTU output only slightly at 1.48% for every 1,000 FT. above sea level.



Hinged  
cover

Beckett Burner with GeniSys Control



Splined Nut &  
Oil Line

Escutcheon  
Plate

#24  
Burner  
Nozzle

EXPLODED PARTS BREAKDOWN

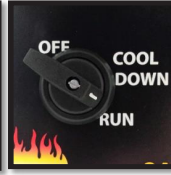
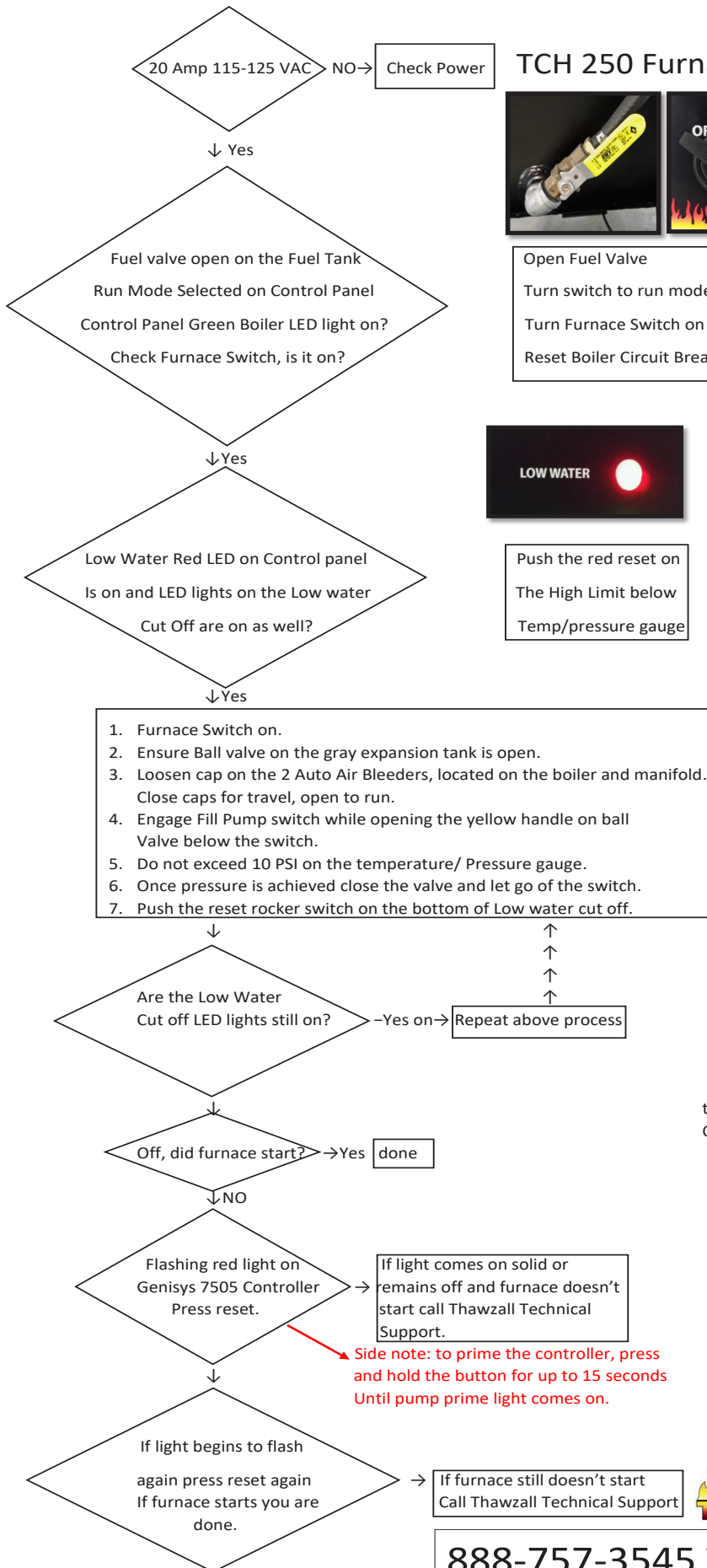


# Common Replacement Parts

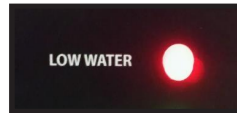
10002 1 1/2" Dielectric Gasket  
10004 Replacement cap for #700 airvent  
10015 Wrench (New Site Flow part '08)  
10130 Slight Flow Indicator Repair Kit (w/o wrench) new 2008  
10240 3" Bi Metal Thermometer  
10255 Brass, 5/8 in. Barb 5/8 in. Barb  
10257 Coupler Set 1/2 in.  
10315 Refractometer  
10330 Hose Crimp Tool  
10340 Hose Mending Kit 5/8" (old #401151)  
10360 Burner Motor  
10390 Beckett Electrode  
10405 Beckett Transformer  
10416 EM 200 Beckett Burner (Ready to install)  
10465 Pump, Clean Cut (fuel pump for 2002 and newer)  
10480 Fuel Pump (old style, no fuel sol. Valve)  
10510 Burner Gasket  
10525 Cad Cell  
10560 Fuel Filter Element Replacement 1a-30  
10615 Relief Valve 30PSI 3/4"M x 3/4"F  
10618 Boiler Inspection Door (Columbia) EM125/EM200  
10627 Delevan Oil Nozzle 1.00 80B  
10628 Delevaan Oil Nozzle 1.75 80A  
10645 Oil Primary 5+ Series H/W R7284 series  
10650 H/W Protector  
10660 Controller, Genisys Primary, (new Nov,2010)  
10675 Pressure/Temperature Gauge  
10710 Bell & Gossett Volute  
10715 Bell & Gossett Volute Body Gasket  
10725 #7 Bell & Gossett Seal Kit  
10730 Pilot Light Lamp 120V  
11890 Swivel Joint 0.75 NPT 1.75 for Nordic Hose Reel  
12040 Lens, At-A-Glance Fuel Gauge Replacement Lens  
22280 Ball Valve IPS 3/4 in  
22475 Brass Hose Ferrule 5/8 in. (7/8 OD)  
22880 Brass, Female Coupling 1/2 in. ISO 3/4 in. NPT  
22895 Brass Coupler Male 1/2 in. ISO 3/4 in. NPT  
22910 Coupler, Female 1 1/4 in. wings  
22925 Coupler, Male 1 1/4 in.  
22940 Coupler, Female Parker Style 1 in.  
22955 Coupler, Male 1 in. (Parker Style)  
23015 Brass Auto Air Bleeder 1/8 in.  
23505 Low Water Cutoff 550SV  
23525 Fuel Oil Fliter  
23600 1 1/4 NPT Flange Ball Valve  
23675 1 in. Flange Gasket

23690 Utility Pump PC4 1/2 HP	
23735 Flange Ball Valve 1 in. ISO	
32151 AMT old style pump Assm	:
32156 AMT New Style Pump Assm (ylw cords)	:
32355 1 in. Square Hose Reel Clutch	
32356 2 in. Square Hose Reel Clutch	
40150 Thermostat Controller	
40165 Instru Meter, Volt P3ILVVAP 080UL	
40360 Aquastat Controller 100-240 deg.	
40375 Aquastat Controller 130-270 deg. High Limit	
40690 Switch Industrial Toggle - Pilot Light	
40720 Switch Double Throw Momentary - 15 Amp, Ivory	
40765 Flanged Inlet 20A	
43805 Temperature Display	

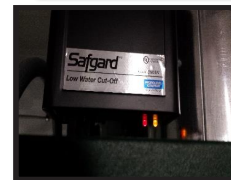
## TCH 250 Furnace Troubleshooting



Open Fuel Valve  
Turn switch to run mode  
Turn Furnace Switch on  
Reset Boiler Circuit Breaker



Push the red reset on  
The High Limit below  
Temp/pressure gauge



there are 2 switches on the Low Water Cut-Off  
Outside edge is the reset, middle is the test



888-757-3545 Technical Support

# Specifications

Fuel	#1, #2 Diesel
Fuel Capacity	160 Gal
	608 L
HTF Capacity	83 Gal
	314 L
HTF Durability	-80° F
	-62° C
HTF Circulation Pump	1-Closed Loop Centrifugal
Maximum BTU output	280,000 Size: 170 IN. X 84 IN. X 93 IN.
	4,318 mm X 2,133 mm X 2362 mm
Weight:	5,900 LB
	2676 kg
Electrical service required	120 v, 20 amp
Hose (3,000 Lineal Feet, 918 Lineal Meters)	5 x 600 Ft.
	5 x 184 m
Optional Generator: GL 7,000 WATT DIESEL FIRED WATER COOLED	
Available hitch	2", 2 5/16", Pintle
Safety Codes:	NHTSA, CSA, UL, IBR

## TCH250 PORTABLE HYDRONIC HEATER

Minimum Thaw Area	3,000 SQ FT	278 m <sup>2</sup>
Maximum Thaw Area	6,000 SQ FT	550 m <sup>2</sup>
Concrete curing area	6,000 SQ FT	550 m <sup>2</sup>
With accessories	18,000 SQ FT	1,670 m <sup>2</sup>
Frost prevention	9,000 SQ FT	840 m <sup>2</sup>
With accessories	27,000 SQ FT	2,500 m <sup>2</sup>
Heat buildings	400,000 CU FT	11,320 m <sup>3</sup>
Operating Pressure	1 - 5 psi	6895 Pa-34474 Pa
Fuel Consumption (full load)	1.0 GPH	4.54 LPH
Run Time	3 + days	3 + days
Pump Capacity	30 GPM/1,800 GPH	110 PM/6,800 LPH



# SAFETY DATA SHEET

## THE DOW CHEMICAL COMPANY

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

**Issue Date:** 04/09/2015

**Print Date:** 04/10/2015

THE DOW CHEMICAL COMPANY 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**

THE DOW CHEMICAL COMPANY  
2030 WILLARD H DOW CENTER  
MIDLAND MI 48674-0000  
UNITED STATES

**Customer Information Number:**

800-258-2436

SDSQuestion@dow.com

**EMERGENCY TELEPHONE NUMBER**

**24-Hour Emergency Contact:** 800-424-9300

**Local Emergency Contact:** 989-636-4400

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## 2. HAZARDS IDENTIFICATION

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**Hazard classification**

This material is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

**Other hazards**

no data available

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## 3. COMPOSITION/INFORMATION ON INGREDIENTS

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**Chemical nature:** Glycol

This product is a mixture.

Component	CASRN	Concentration
Propylene glycol	57-55-6	> 95.0 %
Dipotassium hydrogen phosphate	7758-11-4	< 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:** 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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**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.

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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**Control parameters**

Exposure limits are listed below, if they exist.

Component	Regulation	Type of listing	Value/Notation
Propylene glycol	US WEEL	TWA	10 mg/m3

**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 alcohol ("PVA"). Polyvinyl chloride ("PVC" or "vinyl"). 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

<b>Physical state</b>	Liquid.
<b>Color</b>	Colorless
<b>Odor</b>	Characteristic
<b>Odor Threshold</b>	No test data available
<b>pH</b>	10.0 50% <i>Literature</i>
<b>Melting point/range</b>	Not applicable to liquids
<b>Freezing point</b>	supercools
<b>Boiling point (760 mmHg)</b>	152 °C ( 306 °F) <i>Literature</i>
<b>Flash point</b>	<b>closed cup</b> 104 °C ( 219 °F) <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
<b>Evaporation Rate (Butyl Acetate = 1)</b>	<0.5 <i>Estimated.</i>
<b>Flammability (solid, gas)</b>	Not applicable to liquids
<b>Lower explosion limit</b>	2.6 % vol <i>Literature</i> Propylene glycol.
<b>Upper explosion limit</b>	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 (68 °F) / 20 °C <i>Literature</i>
Water solubility	100 % <i>Literature</i>
Partition coefficient: n-octanol/water	no data available
Auto-ignition temperature	371 °C (700 °F) <i>Literature</i> Propylene glycol.
Decomposition temperature	No test data available
Kinematic Viscosity	43.4 cSt at 20 °C (68 °F) <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 on this product or its components appear in this section when such data is available.*

### Acute toxicity

#### 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

**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

**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.

**Skin corrosion/irritation**

Prolonged contact is essentially nonirritating to skin.  
Repeated contact may cause flaking and softening of skin.

**Serious eye damage/eye irritation**

May cause slight temporary eye irritation.  
Corneal injury is unlikely.

**Sensitization**

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

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.

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

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

**Carcinogenicity**

Similar formulations did not cause cancer in laboratory animals.

**Teratogenicity**

For the major component(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.

**Mutagenicity**

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

**Aspiration Hazard**

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

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## 12. ECOLOGICAL INFORMATION

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*Ecotoxicological information on this product or its components appear 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

#### Dipotassium hydrogen phosphate

##### **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.

**Dipotassium hydrogen phosphate**

**Biodegradability:** Biodegradation is not applicable.

**Bioaccumulative potential**

**Propylene glycol**

**Bioaccumulation:** Bioconcentration potential is low ( $BCF < 100$  or  $\log P_{ow} < 3$ ).

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

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

**Dipotassium hydrogen phosphate**

**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 ( $K_{oc}$  between 0 and 50).

**Partition coefficient( $K_{oc}$ ):** < 1 Estimated.

**Dipotassium hydrogen phosphate**

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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### DOT

Not regulated for transport

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

Transport in bulk  
according to Annex I or II  
of MARPOL 73/78 and the  
IBC or IGC Code

Not regulated for transport  
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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### OSHA Hazard Communication Standard

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

### Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

This product is not a hazardous chemical under 29CFR 1910.1200, and therefore is not covered by Title III of SARA.

### Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

### Pennsylvania Worker and Community Right-To-Know Act:

The following chemicals are listed because of the additional requirements of Pennsylvania law:

**Components**

Propylene glycol

**CASRN**

57-55-6

**California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)**

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

**United States TSCA Inventory (TSCA)**

All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

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**16. OTHER INFORMATION**

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**Hazard Rating System****NFPA**

Health	Fire	Reactivity
0	1	0

**Revision**

Identification Number: 101234106 / A001 / Issue Date: 04/09/2015 / Version: 7.0

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

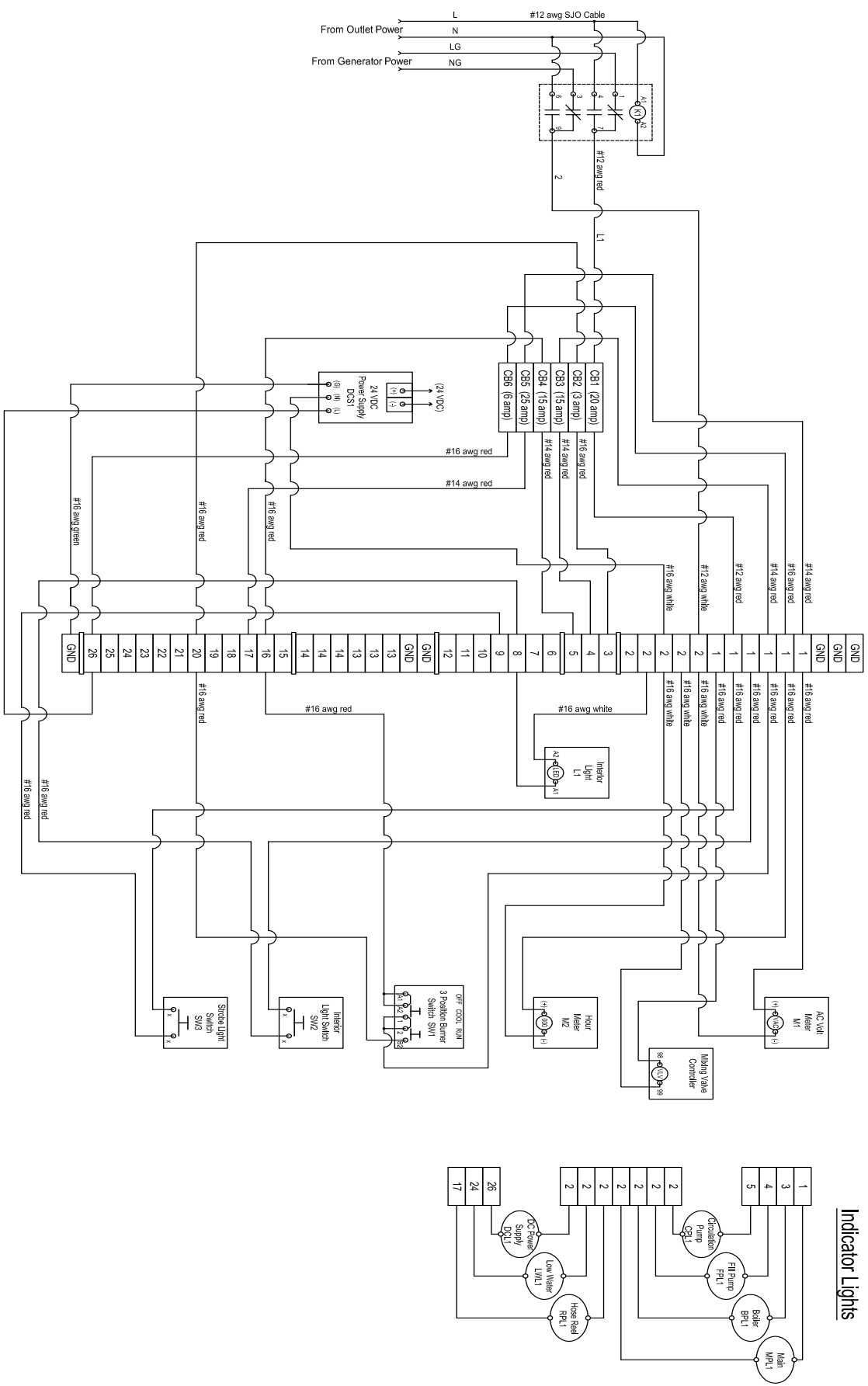
**Legend**

TWA	8-hr TWA
US WEEL	USA. Workplace Environmental Exposure Levels (WEEL)

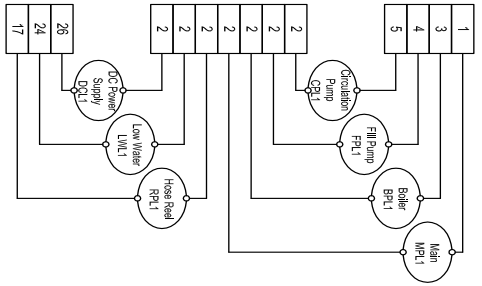
**Information Source and References**

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

THE DOW CHEMICAL COMPANY 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.



Indicator Lights



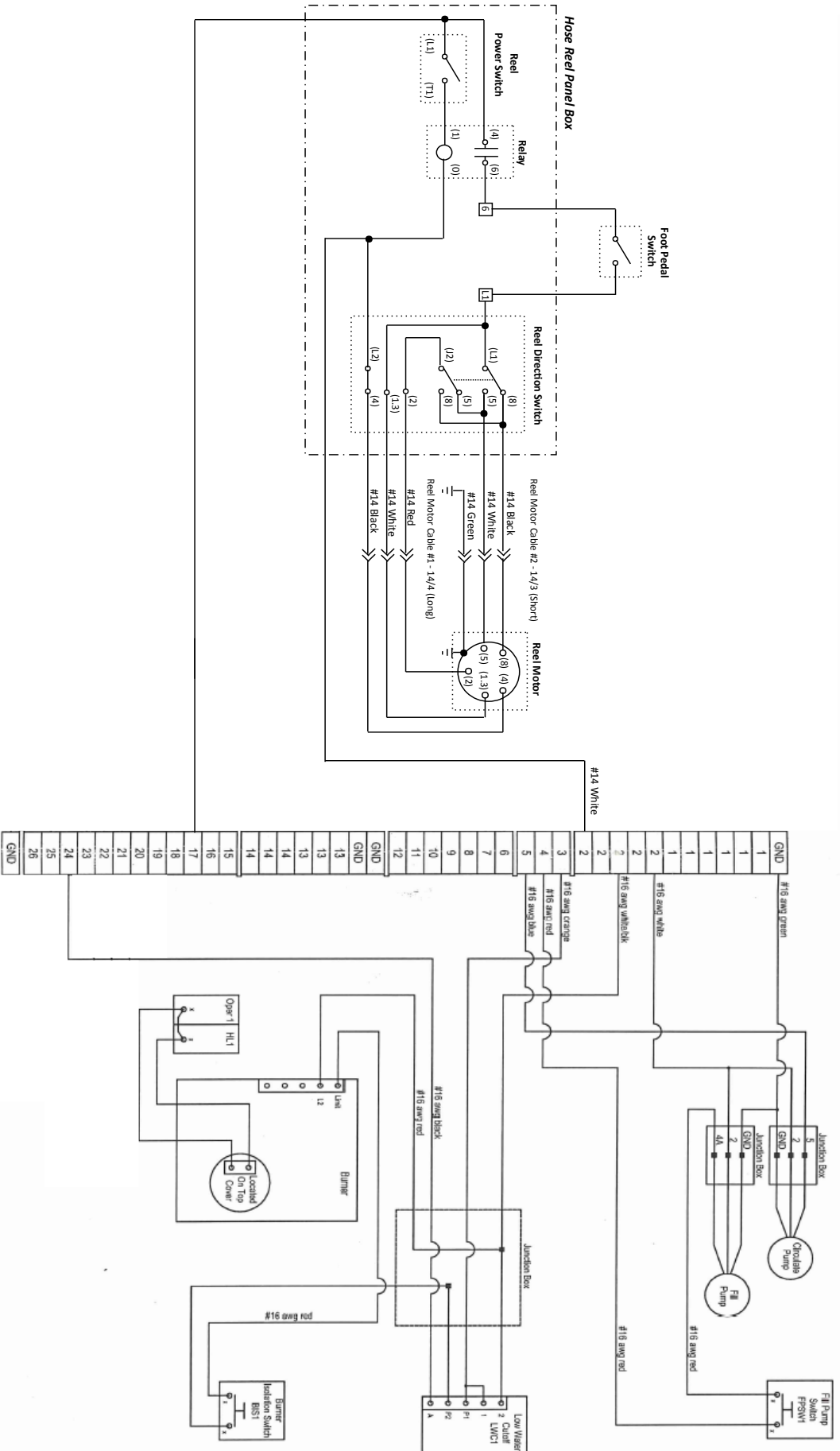
THAWZALL, LLC		THAWZALL, LLC	
VAC Power Distribution		VAC Power Distribution	
5/1/14		5/1/14	
1		1	
4		4	
TC250-01		TC250-01	





## Temperature Control Diagram





# THAWZALL

Tamarack Industries

2736 Latoka Lane, Unit B  
Alexandria, MN 56308  
USA



[WWW.THAWZALL.COM](http://WWW.THAWZALL.COM)



[Info@thawzall.com](mailto:Info@thawzall.com)



1-888-757-3545



1-320-759-1583