

Therma-HEXX System testing, Fill and Maintenance Instructions

THERMA-HEXX ThermaPANEL™ / ThermaCEILING™ System Instruction Sheet: Filling with Inhibited Propylene Glycol Solution

IMPORTANT SAFETY AND PRECAUTIONS

- Use only **inhibited propylene glycol** (PG) formulated for hydronic heating/cooling systems (never automotive antifreeze).
- Wear appropriate PPE (gloves, eye protection). Work in a well-ventilated area.
- Consult Therma-HEXX engineering for the exact PG concentration based on your location's worst-case freeze risk (typical range: 30–50% by volume).
- **Pressurization limits:** Fill and operate the system at **18 psi**. Never exceed **60 psi** (the 60 psi pressure relief valve supplied by others and installed on the buffer tank prevents accidental over-pressurization).
- The **Axiom glycol feeder** (Pressure Pal) is used **only** for final system pressurization and automatic makeup when air is removed during normal operation. **Do not** use it as the primary filling source for the mains or circuits.

Air Pressure Testing and System Preparation

1. **Cap off all Spirovent and Spirotop units with 1/2" NPT caps** (this must be done first).
2. Isolate the expansion tank and the Axiom glycol feeder from the system.
3. **Isolate the mains at the manifolds:** Close both the main supply and return shut-off valves at each manifold.
4. Perform a **100 psi air pressure test** on the isolated mains (primary loop including heat pump, buffer tank, and main piping) per ICC-MS guidelines for the ThermaPANEL system.
5. As each individual circuit is installed and connected to the manifold:
 - **Mark each fitting with a permanent marker as you crimp or make the connection.**
 - **Open the supply and return zone valves** for that circuit.
 - Test the piping after the manifolds (individual circuits) to **50 psi** per ICC-MS guidelines for the ThermaPANEL system.
6. **Find and repair any air leaks** during the air test **before introducing any fluid** into the system. Use soapy water solution or an ultrasonic leak detector to locate leaks, then tighten, reseal, or replace fittings as needed. Retest the affected section after repairs until the system holds the required pressure with no drop.
7. **Keep the system pressurized with air** until you are ready to fill with fluid.
8. **Fill the system with fluid prior to covering the panels with final surfaces** (e.g., concrete, flooring, drywall, or other finishes).

1. Filling Method Options

Option 1 – Mixing Onsite with Puropal Filters (Supplied in the Therma-HEXX System Package)

Therma-HEXX estimates the total system volume and provides the estimated number of Puropal filters with the system if they are listed on the Bill of Materials (B.O.M.). Each Puropal filter will treat approximately **65 gallons** of water.

Note: System total volume is estimated and can vary for each system. If the source water is contaminated (high particulates, heavy metals, or other impurities), additional Puropal 1W filters will need to be purchased through Therma-HEXX.

How to use Puropal Model 1W:

1. Select the Puropal Model 1W cartridge(s) supplied with your system.
2. Connect the cartridge inlet to a standard garden hose or fill line.
3. **Before connecting to the mixing barrel, test the maximum flow rate of 1.5 gpm into a bucket first by timing the rate of filling.** (Example: Time how long it takes to fill a 5-gallon bucket — it should take approximately 3 minutes 20 seconds for 1.5 gpm. Adjust hose pressure or use a flow restrictor if needed to stay at or below 1.5 gpm.)
4. Once the flow rate is confirmed, route the outlet hose to a clean mixing barrel or temporary fill tank.
5. **Use clean tap water** as the source. If using well water, it **must be filtered for particulates and heavy contaminants first** before passing through the Puropal cartridge.
6. Run water through the cartridge at the confirmed flow rate (do not exceed 1.5 gpm).
7. Monitor the resin indicator — it changes color (typically blue/purple to beige/tan) when exhausted. Replace the cartridge immediately.
8. Use the collected demineralized water immediately to mix with inhibited PG in the barrel at the ratio specified by Therma-HEXX engineering.

Tip: Produce slightly more demineralized water than calculated to allow for flushing and minor losses.

Option 2 – Using Pre-Mixed Inhibited Propylene Glycol Solution Instead of mixing onsite, you may use **pre-mixed inhibited propylene glycol solution** (already blended with deionized or demineralized water and inhibitors) supplied by an approved glycol manufacturer. This option eliminates the need for Puropal filters and onsite mixing.

Guidelines for Option 2:

- Confirm with Therma-HEXX engineering that the pre-mixed solution meets the required concentration and inhibitor package for your system.
- Use only pre-mixed solutions specifically formulated for closed-loop hydronic systems.

- Deliver the pre-mixed solution in clean containers or directly from a glycol supplier's tanker if volume permits.
- No Puropal filtering is required when using pre-mixed solution.
- Proceed directly to the filling steps below using the pre-mixed solution in place of the onsite-mixed barrel.

2. Filling the System Mains, Buffer Tank, and Heat Pump Circuits (Primary Loop) Using the Transfer Pump

Recommended Transfer Pumps: Milwaukee cordless transfer pump or Liberty 1/2 HP pump.

Important Safety Step for Filling: The **50 psi Pressure Relief Valve (PRV)** is supplied with the Therma-HEXX toolkit. Attach the 50 psi PRV directly to the manifold supply hose bib to which the transfer pump hose will connect. This ensures the system is not over-pressurized during filling (transfer pumps can produce up to 85 psi).

1. Prepare the pre-mixed inhibited PG solution (either mixed onsite per Option 1 or pre-mixed per Option 2).
2. Isolate the manifolds: Close the main supply and return shut-off valves at each manifold.
3. **Set the Axiom glycol feeder pressure setting to match the expansion tank and isolate it during filling.**
4. **Pre-charge the expansion tank with 15- 18 psi of air.**
5. Attach the **50 psi PRV** (from the Therma-HEXX toolkit) to the manifold supply hose bib where the transfer pump hose will connect.
6. **Open all air vents and bleeds on the primary loop and open the expansion tank isolation valve** as the first steps when filling with fluid. At this point, remove the ball valve handle from the expansion tank isolation valve and zip tie it to the pipe so it cannot be accidentally closed.
7. Run a hose from the return side of the system (or manifold return hose bib) back into the fluid barrel to create a closed circulation loop.
8. Use the recommended transfer pump connected to the pre-mixed solution barrel (or pre-mixed supply) to fill and purge the main supply and return lines (including piping to the heat pump, buffer tank, and primary-loop components).
9. **While filling with the transfer pump, continuously monitor system pressure and ensure it does not exceed 50 psi.** The installed 50 psi PRV provides primary protection against over-pressurization.
10. Circulate the fluid through the primary loop until no air bubbles are visible in the return hose and the fluid runs clear and bubble-free.

3. Filling the Individual Circuits on the Manifold

Use the recommended transfer pump (Milwaukee cordless or Liberty 1/2 HP) and a clean barrel (or 5-gallon bucket) to purge each zone individually. This ensures complete air removal from the ThermaPANEL/ThermaCEILING tubing runs.

Tools needed: Recommended transfer pump, two short hoses, clean barrel/bucket, rags, and the 50 psi PRV (installed on the manifold supply hose bib).

Step by step:

1. Keep the main manifold valves closed.
2. Close **all** zone isolation valves on the supply and return ports.
3. Attach short hoses to the supply and return manifold hose bibs (drain/fill ports).
4. Place the return hose into the clean barrel to create a closed loop.
5. Connect the transfer pump hose to the manifold supply hose bib (with the 50 psi PRV already attached); submerge the pump intake in the premixed PG solution barrel (or pre-mixed supply).
6. **Open the air vents** on the circuit (if present).
7. **Open one pair** of supply and return zone valves at a time.
8. Start the transfer pump and circulate fluid through the circuit.
9. Observe the fluid returning into the barrel: Continue pumping **until no air bubbles are visible** and the fluid runs clear and bubble-free (this confirms air has been fully removed).
10. If very small bubbles persist after 15 minutes, stop filling and proceed to the next circuit.
11. Stop the pump, close the zone valves for that circuit.
12. Repeat the process for **each** individual circuit/zone on the manifold.
13. After completing all circuits on a manifold, open all circuit valves on that manifold.
14. Proceed to the next manifold and repeat the purging process until all manifolds have been purged.
15. After all manifolds are complete, run the system pump to further purge any remaining air from the panels over time.

4. Final System Pressurization with the Axiom Glycol Feeder

1. Once all mains and individual circuits are filled and initially purged using the transfer pump, connect the Axiom glycol feeder (pre-filled halfway with the same premixed PG solution).
2. Open all zone valves and main manifold valves.

3. Start the system circulator(s) and allow continuous circulation with the glycol feeder open to the system and plugged in, set to 18 psi.
4. Run this for a few hours and monitor the fluid level in the glycol feeder as air is removed. It should slow down as air is further removed by the self-purging ThermaPANEL asymmetrical stanchions.
5. The glycol feeder will now automatically pressurize the system to **18 psi** and add makeup fluid as any remaining air is purged via the Spirovent or other air eliminators.
6. Run the system for several hours (or overnight) until pressure stabilizes at 18 psi and no further air is released.

Important: The feeder is for maintaining pressure and replacing minor fluid loss due to air purging under normal operating conditions only.

5. Flushing Filters After Initial Fill

After the system has circulated for several hours and pressure is stable at 18 psi, flush the following filters to remove any residual debris or particles introduced during filling:

- **Spirovent Dirt Eliminator** (located on the suction side of each circulator): While the system is running, open the ball valve at the bottom of the collection chamber to flush out accumulated debris. Place a container or hose to a drain to catch the discharge. Flush until the discharge runs clear. Close the valve when complete.
- **Rusco Spin-Down Filters** (located at each heat pump): Open the ball valve at the bottom of the filter housing while the system is pressurized. Sediment will be pushed out by system pressure. For deeper cleaning, shut off isolation valves (if present), relieve pressure, unscrew the clear bowl by hand, remove and rinse the mesh screen, then reassemble.
- **Y-Filters (Y-Strainers)** (located at each manifold): Close the isolation valves around the Y-strainer. Open the blow-down valve or cap at the bottom to flush debris. If needed, remove the screen for manual cleaning, rinse thoroughly, and reinstall.

Note: Perform these flushes with the system running where possible (Spirovent and Rusco can typically be flushed online). Collect and properly dispose of the flushed fluid.

6. Testing Glycol Concentration (%) and pH

Required tools:

- Propylene-glycol-specific refractometer (not ethylene glycol scale).
- pH test strips or digital pH meter compatible with glycol

Procedure:

1. After full circulation, stable 18 psi pressure, and filter flushing, take a fluid sample from a manifold drain or other accessible point.
2. **Glycol % concentration:** Apply a few drops to the refractometer prism and read the percentage. Adjust by adding concentrated PG or demineralized water/pre-mixed solution if needed, then re-circulate and retest.
3. **pH:** Test the sample. Target range is **8.5-9.0** (follow the specific glycol manufacturer's guidelines). If outside range, consult the glycol supplier for inhibitor correction.
4. Record the initial readings, date, and estimated system volume for reference.

7. Maintenance Schedule

Initial Commissioning (first few weeks):

- Check glycol feeder level daily/weekly — keep it approximately $\frac{3}{4}$ full. Refill only with premixed solution. A continued drop in level could indicate a system leak.
- Monitor system pressure (target 18 psi).
- Flush Spirovent, Rusco spin-down, and Y-strainers as needed (more frequently during initial operation).

Monthly (first 3 months):

- Test glycol % concentration and pH.
- Flush/clean Spirovent dirt eliminators, Rusco spin-down filters, and Y-strainers.

Annually (ongoing):

- Perform full glycol % and pH testing — adjust concentration or inhibitors as needed.
- Inspect and flush all filters (Spirovent, Rusco, Y-strainers), air eliminators, expansion tank, and all connections for leaks.
- Verify water quality if frequent makeup is required.
- Replace PUROPAL cartridges only when preparing fresh fill or makeup water (Option 1 only).

Long-term notes:

- Never isolate the expansion tank while fluid is in the system.
- The Axiom glycol feeder maintains 18 psi automatically and handles minor makeup.
- For specific questions or support, contact Therma-HEXX at (603) 319-8815 ext. 3.

Initial Fill Record:

Date: _____ Glycol %: _____ pH: _____ Technician: _____

Filling Method: Option 1 / Option 2

Following these steps ensures complete air removal, proper freeze and corrosion protection, clean fluid flow, and reliable long-term performance of your Therma-HEXX ThermaPANEL or ThermaCEILING system. Keep this sheet with your project documentation.

Maintenance Record

Date: _____ Glycol %: _____ pH: _____ Technician: _____

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