
Spindle Chiller Fluid Replacement And Circuit Bleeding

1.0 Maintenance Objective & Frequency

The objective of this procedure is to replace the spindle chiller fluid and bleed air from the cooling circuit to maintain optimal spindle thermal stability, prevent overheating, and avoid thermal growth that can cause part dimensional errors. This PM is required every 2000 operating hours or annually, whichever comes first.

2.0 Lockout/Tagout (LOTO) & Safety

- Electrical Isolation: Disconnect the chiller unit from the main power supply and apply a personal lockout tagout device.
- Thermal Hazard: Allow the chiller and spindle to cool to ambient temperature before opening the system to prevent burns from hot fluid or components.
- Fluid Containment: Place absorbent pads and a drip tray under the chiller drain valve to capture any spilled coolant.
- PPE: Wear safety glasses, nitrile gloves, and fluid-resistant coveralls.

3.0 Required Tools, Parts & Lubricants

- Approved spindle chiller fluid (e.g., Mobil Therm 605 or equivalent per OEM spec)
- Clean 5-gallon bucket for waste fluid collection
- Funnel with fine mesh filter (100 micron)
- Adjustable wrench or socket set for drain plug
- Clean lint-free rags
- Absorbent pads and drip tray
- Digital thermometer (range 0-100°C)
- ServiceGrid mobile device for digital sign-off

4.0 Step-by-Step Maintenance Procedure

1. Perform LOTO on the chiller unit and verify zero energy state by attempting to power on the unit.
2. Position the waste collection bucket under the chiller drain valve. Open the drain valve fully and allow all old fluid to drain into the bucket. Dispose of waste fluid per local environmental regulations.
3. Close the drain valve and clean the valve area with a lint-free rag to remove any residue.
4. Remove the chiller fill cap. Insert the funnel with the fine mesh filter into the fill port.
5. Slowly pour new chiller fluid into the reservoir until the fluid level reaches the full mark on the sight glass. Do not overfill.
6. Replace the fill cap securely. Remove LOTO and restore power to the chiller unit.
7. Turn on the chiller and allow it to run for 2 minutes to circulate fluid. Observe the sight glass for air bubbles indicating trapped air in the circuit.

8. If air bubbles are present, locate the bleed valve on the chiller outlet line (typically a Schrader valve or small petcock). Place a rag under the valve and slowly open it to release air until a steady stream of fluid without bubbles exits. Close the valve.
9. Check the fluid level again and top up if necessary to the full mark. Repeat the bleeding process if air re-enters the system.
10. Allow the chiller to run for 10 minutes to stabilize temperature. Use the digital thermometer to verify the chiller outlet temperature is within $\pm 2^{\circ}\text{C}$ of the setpoint.

5.0 Verification & Return to Service

1. Inspect all connections and the fill cap for leaks. Tighten any loose fittings.
2. Run a spindle warm-up cycle per the machine tool OEM procedure to confirm stable temperature control.
3. Monitor the chiller display for any fault codes or alarms. Clear any logged alarms after verifying normal operation.
4. Record the fluid replacement date, hours on the chiller, and fluid type used in the ServiceGrid PM work order.
5. Sign off on the PM work order in ServiceGrid and return the machine to production.

Regulatory Disclaimer: This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.