
Cooling Tower Basin Cleaning And Legionella Prevention SOP

1.0 Maintenance Objective & Frequency

The objective of this procedure is to thoroughly clean the cooling tower basin to remove sediment, biofilm, and debris that can harbor Legionella bacteria and reduce heat transfer efficiency. This PM is critical for maintaining water quality, preventing biological fouling, and ensuring the cooling tower operates at peak thermal performance. The required frequency is quarterly (every 3 months) or more frequently if water quality tests indicate elevated bacterial counts or visible fouling.

2.0 Lockout/Tagout (LOTO) & Safety

- **Electrical Isolation:** Disconnect and lock out the cooling tower fan motor and any basin heaters or pumps at the main disconnect. Verify zero energy with a voltmeter.
- **Chemical Isolation:** Ensure all chemical feed lines (biocide, corrosion inhibitor) are closed and locked out at the injection point.
- **Water Isolation:** Close the make-up water supply valve and the drain valve to prevent accidental flooding.
- **Mandatory PPE:** Wear chemical-resistant gloves, safety goggles, full-face respirator (if airborne debris or chemical residue is present), rubber boots, and a Tyvek suit to avoid contact with biological contaminants and chemical residues.

3.0 Required Tools, Parts & Lubricants

- Industrial wet/dry vacuum (with HEPA filter for Legionella containment)
- High-pressure washer (3000-4000 psi) with a 15-degree nozzle
- Non-metallic scraper and stiff-bristle brush (nylon or polypropylene)
- Biocide (e.g., sodium hypochlorite 12.5% or chlorine dioxide) as per water treatment plan
- pH test strips or digital pH meter (range 6.0-9.0)
- Total chlorine test kit (DPD method)
- Clean rags and absorbent pads
- Replacement basin drain plug gasket (if applicable)
- Torque wrench (0-150 ft-lb) for drain plug reinstallation

4.0 Step-by-Step Maintenance Procedure

1. Perform LOTO as per Section 2.0. Confirm all energy sources are isolated and tag out the equipment.
2. Open the basin drain valve fully and allow water to drain completely. If the drain is clogged, use the wet/dry vacuum to remove standing water and debris.
3. Remove the basin drain plug and inspect the gasket for cracks or wear. Replace if necessary. Clean the drain opening with a brush.

4. Using the non-metallic scraper and stiff-bristle brush, manually remove all visible sediment, scale, and biofilm from the basin walls, floor, and corners. Pay special attention to areas around the fill and drift eliminators.
5. Rinse the basin thoroughly with a high-pressure washer, directing water toward the drain opening. Continue until all loosened debris is flushed out.
6. Vacuum any remaining standing water and fine sediment using the wet/dry vacuum with HEPA filter. Ensure the basin is completely dry.
7. Prepare a biocide solution per manufacturer instructions (typically 200-500 ppm free chlorine for Legionella disinfection). Apply the solution to all basin surfaces using a sprayer or by flooding the basin. Allow a contact time of at least 30 minutes.
8. After contact time, rinse the basin again with clean water using the high-pressure washer. Drain and vacuum all rinse water.
9. Reinstall the basin drain plug with a new gasket. Torque the plug to 50 ft-lb (or as specified by the manufacturer). Close the drain valve.
10. Open the make-up water supply valve and allow the basin to refill to the normal operating level. Check for leaks at the drain plug and valve.
11. Test the water pH and total chlorine levels. Adjust pH to 7.0-8.0 and free chlorine to 1-3 ppm using the chemical feed system or manual addition.
12. Remove LOTO tags and restore power to the fan motor and pumps. Verify the fan rotates freely and the basin heater (if equipped) cycles on.

5.0 Verification & Return to Service

1. Start the cooling tower and run for 15 minutes. Check for proper water flow, no leaks, and normal fan operation.
2. Take a water sample from the basin and test for total bacteria count and Legionella using a field test kit or send to a lab. Record results in the PM log.
3. Verify that the chemical feed system is injecting biocide and corrosion inhibitor at the correct rates per the water treatment plan.
4. Sign off on the PM work order in ServiceGrid, including any observations of unusual wear, corrosion, or debris accumulation.
5. If Legionella test results are positive (above 100 CFU/L), initiate an immediate shock treatment and retest before returning to normal service.

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.