The Importance of Cleaning Closed Loops
Cleaning is an important part of the water treatment program for closed heating and cooling water loops. New closed loop piping must be cleaned before being placed into service. Cleaning may also be required to address problems associated with deposits and disinfection may be required to address problems with microbial growth in an existing closed loop system.

The cleaning and commissioning process for a closed loop involves three steps: cleaning, passivation, and treatment product addition. Cleaning helps remove any oil, grease, dirt, mill scale, corrosion by-products, or other debris that can form deposits on heat exchange surfaces, plug control valves, and interfere with corrosion control measures. Passivation helps rapidly form a protective corrosion inhibitor film on the cleaned metal surfaces. In some applications, cleaning and passivation occur simultaneously. Finally, the immediate addition of one or more inhibitor products to the cleaned and passivated system is necessary to keep corrosion and other waterside problems under control. The use of filtration to remove suspended matter that can damage pump seals and cause deposit problems is highly recommended for all closed loop systems. Filtration is especially beneficial during pre-operational cleaning.

Safety Precautions
Carefully read the labels and Safety Data Sheets (SDS) on all treatment products involved before starting any cleaning procedure. Follow all safety precautions. When handling these products, wear appropriate protective gear. An eye wash station and safety shower with a supply of potable water should always be close at hand.

Pre-Operational Cleaning Procedure
1. If available, follow the manufacturer’s or contractor’s specifications regarding cleaning time and use of system pumps in the cleaning process. Be sure all system piping is opened and receives good circulation during cleaning, passivation, and while adding corrosion inhibitor. All fan coil units should be open and receive flow during the cleaning process.
2. Open high point vent(s) and fill the system completely with clean water. Circulate with all primary and booster pumps running for a minimum of four hours – high flow rates aid cleaning. Flush low point drains, expansion tanks, control valves, etc. while circulating to help remove any debris that has been dislodged.
3. If the system water is “dirty,” flush with constant circulation until the water is relatively clear.
4. If necessary, partially drain the system before adding the cleaning products.
5. If aluminum or galvanized metal is present, contact Chem-Aqua Engineering for recommendations.
6. For systems that do not contain aluminum or galvanized metal, add Chem-Aqua 61502 at a rate of 2.5 gallons per 1,000 gallons system volume and Chem-Aqua 32115 at a rate of 1 gallon per 1,000 gallons system volume. Heavy foaming can occur in some systems. If necessary, apply antifoam such as FC-101, FC-101 Plus, or ANCOOL 3610 at 4-16 fluid ounces per 1,000 gallons.
7. Fill the system back to the normal operating level and circulate for 12-24 hours at ambient temperature. Frequently flush all low point drains, expansion tanks, control valves, etc. while circulating to remove loosened debris.
8. When the cleaning time is complete, open high point vent(s) and drain the system completely. Refill the system with fresh water and circulate to mix. If the system is equipped with an automatic fill valve, initiate a heavy bleed and flush the system until the water is clear and free of foam. The bypass around the pressure regulator can be opened to allow more makeup. The pressure relief valve will prevent over pressurizing the system. Be sure to never bleed the system faster than makeup is added or air will get into the system. If flushing is not practical, the system should be repeatedly drained and filled until the water is clear.
9. All strainers should be removed and cleaned after the cleaning solution is drained. It may be necessary to manually clean control valves to remove insoluble debris loosened by the process.

Consult product labels for complete directions and precautions before using.
10. For additional passivation and corrosion protection, add Chem-Aqua 32115 at a rate of 1 gallon per 1,000 gallons system volume and circulate for five to seven days.

11. After this circulation time is complete, flush system until the phosphate level is <10 ppm. **Once the target phosphate level is reached, add the recommended amount of corrosion inhibitor product to the system.** Failure to add the corrosion inhibitor as soon as flushing is completed could result in “red water” problems due to corrosion.

**Cleaning a Fouled Closed Loop**

1. Cleaning is also recommended for any operational closed loop that becomes fouled with corrosion by-products and/or microbiological growth. The procedure for cleaning a fouled closed loop is essentially the same as for pre-operation cleaning, but with different products and dosages.

2. If the system water is visibly dirty, it should be flushed prior to cleaning.

3. Filtration should be strongly considered when cleaning closed loops heavily fouled with corrosion. Unless removed from the system, the dislodged corrosion by-products can plug control valves, damage pump seals, and re-deposit in low flow areas.

4. Severely biofouled closed loops should be disinfected prior to cleaning. Contact Chem-Aqua Engineering for the appropriate disinfection procedures.

5. Immediately add the appropriate dosage of inhibitor and, if necessary, biocide.

The table below summarizes the products and dosages for cleaning fouled closed loop systems.

**Summary of Closed Loop Cleaning Procedures**

<table>
<thead>
<tr>
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<th>Step 1 - Cleaning</th>
<th>Step 2 - Additional Passivation</th>
<th>Step 3 - Treatment</th>
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<tbody>
<tr>
<td><strong>Pre-Operational Cleaning of New Closed Loop</strong></td>
<td>1. Add 2.5 gallons Chem-Aqua 61502 per 1,000 gallons system volume and 1 gallon Chem-Aqua 32115 per 1,000 gallons of system volume 2. Circulate 12-24 hrs 3. Drain and thoroughly flush system</td>
<td>1. Refill system 2. Add 1 gallon Chem-Aqua 32115 per 1,000 gallons system volume 3. Circulate 5-7 days 4. Drain and flush the system</td>
<td>1. Refill system 2. Add the appropriate treatment product(s)</td>
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<tr>
<td><strong>Closed Loop Fouled with Corrosion Byproducts or Red Water problems</strong></td>
<td>1. Add 1 gallon Chem-Aqua 32115 per 1,000 gallons system volume 2. Circulate 12-24 hrs 3. Drain and thoroughly flush system</td>
<td>1. Refill system 2. Add 1 gallon Chem-Aqua 32115 per 1,000 gallons system volume 3. Circulate 5-7 days 4. Drain and flush the system</td>
<td>1. Refill system 2. Add the appropriate treatment product(s)</td>
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<tr>
<td><strong>Closed Loop Fouled with Microbiological Deposits</strong></td>
<td>1. Add 2.5 gallons Chem-Aqua 61502 per 1,000 gallons system volume and 1 gallon Chem-Aqua 32115 per 1,000 gallons of system volume 2. Circulate 12-24 hrs 3. Drain and thoroughly flush system</td>
<td>1. Refill system 2. Add a suitable biocide, such as Bacticide 45B or Chem-Aqua 40215, at maximum label dosage 3. Add 1 gallon Chem-Aqua 32115 per 1,000 gallons system volume 4. Circulate 5-7 days 5. Drain and flush the system</td>
<td>1. Refill system 2. Add the appropriate treatment product(s) to include a suitable biocide 3. To reduce MB fouling concerns, consider Mo based corrosion inhibitor if acceptable. 4. Routinely monitor MB growth</td>
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**Notes**

1. If the system is severely biofouled, please contact Chem-Aqua Engineering for disinfection procedures.

2. Cleaning a fouled system may remove corrosion byproducts that result in leaks.

3. Cleaning dosages can be increased if you are cleaning a severely fouled closed loop that is already in service.

4. Heavy foaming can occur in some systems. If necessary, apply antifoam, such as FC 101 or FC 101 Plus, at 4-16 fluid ounces per 1,000 gallons.

*If you are trying to degrease a new closed loop, Chem-Aqua 61502 needs to be added at a rate of 1 gallon per 50 gallons of system volume. This is an effective degreaser at this dosage rate. (Please contact Chem-Aqua Engineering for proper application procedures and recommendations if a large volume system needs to be degreased.)*

Consult product labels for complete directions and precautions before using.

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