



Removing Iron Deposits from Closed Loop Systems with GL-KLEEN4011

General Information:

GL-KLEEN4011 is a unique neutral pH cleaner designed to remove iron oxide deposits from multi-metal closed water systems, while protecting the base metal from corrosion.

GL-KLEEN4011 contains a special ammoniated carboxylic acid formulated for cleaning both new and iron-fouled water systems. GL-KLEEN4011 is not designed for removing hardness-based scale. This product is intended for use in closed systems that have no significant areas open to the atmosphere.

GL-KLEEN4011 is effective at iron removal over a wide temperature range. Higher temperatures increase the speed of iron removal and reduce overall cleaning time. The product is normally added to develop a 3 to 10% solution and then recirculated for 24 – 48 hours at elevated temperatures.

Precleaning Preparation:

Remove any significant bio-film accumulation or organic debris prior to introducing GL-KLEEN4011 into the system. This can be accomplished via the use of biocides, or a combination of biocides and bio dispersant.

Review all local regulatory requirements and chemical safety information to ensure the proper handling and disposal of all chemicals and waste streams generated during the cleaning process.

Prior to beginning the cleaning process, verify the total volume of the system to be cleaned and determine the quantity of GL-KLEEN4011 needed.

NOTE:

Use extreme caution if aluminum or galvanized metal is present in the system.



Cleaning Procedure:

1. **Flush** the system to remove as much loose and suspended matter as possible.
 - a. In an operating system, this can be accomplished by carefully blowing the system down and adding makeup to replace the water lost by blowdown.
2. **Verify** the flow path and **ensure** that all valves are open for the system elements that are to be cleaned.
3. **Add** GL-KLEEN4011 to the system at the rate of 3 – 10% (3 – 10 gallons / 100 gallons) of the system volume.
4. Where possible **heat** the water to 130 – 180oF to speed up the cleaning process.
5. Begin cleaning:
 - a. **Recirculate** the cleaning solution through the system.
 - b. **Flush** all drain valves regularly to blow down any debris and suspended solids.
 - c. With the cleaning solution heated to the recommended temperature range, cleaning should be completed in 24-48 hours.
 - d. Where heating is not possible, the solution can be safely circulated for several days or up to one week.
6. Endpoint Determination:
 - a. GL-KLEEN4011 forms a color complex with iron oxides that provides an indication of the rate of reaction.
 - b. Initially, the color of the solution will go from colorless to a pale-yellow green.
 - c. When it becomes an olive-green color, the solution is saturated, and no more iron can be removed.
7. **Drain** and **flush** the system with clean water until the flushing water remains clear.
 - a. If the cleaning is being done while the system remains in operation, the flushing may be done by blowing down heavily while refilling at the same time.
 - b. Verify the effectiveness of the rinses by comparing the conductivity of the rinse water to the make-up water.
 - c. All valves should be opened and flushed with the rinse water during the rinsing process.
8. After the system is flushed, **add** the proper corrosion inhibitor chemical.



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NOTE:

It is often impossible to entirely remove iron oxide deposits from a fouled system. Most corrosion inhibitors used in closed systems will continue to remove iron deposits after cleaning. The process water may turn turbid and in severe cases an opaque rust-red during initial (post cleaning) service. For these situations, side stream filtration can be used to clear up the system.