Unlimited Polymer Solutions

TECHNICAL BULLETIN TB240

IMPACT OF WATER QUALITY ON SYSTEM COMPONENTS

Product: System Components
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The design engineer and licensed installation contractor must have an understanding of local water conditions and how the chemical makeup of the system fluid can impact the lifetime and performance of the system components. The composition of the system fluid has a major impact on the potential for corrosion within the complete system. The likelihood of corrosion and failure of system components can be greatly reduced by using suitable water quality.

The local design engineer and installer must have an understanding of the potential for water-side corrosion. In certain cases, various forms of corrosion can occur which can result in functional impairments to the system, system leakage, clogging of system components, impairment of heat transmission and flow noise.

Considerations for Closed-loop Systems

When designing and installing closed-loop hydronic piping systems, field experience has shown that risk of corrosion damage is greatly reduced by the following measures:

- System should be completely sealed and operated without additives. If water treatment is necessary, the contractor should ensure that the additives to the system including antifreeze, corrosion inhibitors and system flushing or cleaning chemicals do not lead to corrosion of the system components.
- Fluids or other materials containing wax, mineral oils, threading oils or lubricating oils must not be introduced into the system.
- The complete list of water-contact materials in the system must be reviewed to ensure compatibility with the flushing fluid, system fluid and make-up water.
- The environment which is external to the closed-loop system must be non-corrosive. If there are known local conditions that could lead to either internal or external corrosion of the system components, a water quality expert experienced in corrosion control of piping systems must be consulted.
- If there are no known standards for ensuring proper water quality, then the German engineering standard, VDI 2035 *Prevention of Damage in Water Heating Installations*, should be referenced. (English version of VDI 2035 available for purchase at www.beuth.de or contact REHAU for assistance.)
- System fluid should comply with the requirements set forth in the CDA *Copper Tube Handbook* for minimizing the potential for corrosion.

Considerations for Open-loop Systems

When designing and installing an open-loop, water-based piping system or potable distribution system, the probability of corrosion for all system components must be evaluated. The design engineer and installing contractor must have practical experience within the region of intended use. Consultation with the local plumbing authority and local water authority regarding these experiences should occur before the selection and installation of system components that will come in contact with the system fluid.

REHAU manufactures and supplies piping system components in accordance with all North American requirements including ASTM F876, ASTM F877, NSF 14/61 and CSA B137.5. In general, components are designed for use where drinking water qualities meet the requirements of the EPA *National Primary and Secondary Drinking Water Standards* and the *Guidelines for Canadian Drinking Water Quality* by Health Canada. However, irrespective of the material used, corrosion can occur in the installation as a result of various influencing factors.

In rare and isolated cases, corrosion can occur even when the water quality levels are within the permissible range set forth by the above referenced EPA and Health Canada standards. Some influencing factors on corrosion behavior are pH levels, chloride content, sulfate content and the hydrogen carbonate content of the water. For example, a high chloride content in combination with a low hydrogen carbonate content may aggressively corrode metal components used in open-loop piping systems.

In addition to the quality of the drinking water being supplied, other factors can influence corrosion behavior of metal components. Such factors include hot water recirculation at high temperatures (more than 120°F [49°C]), water softening systems and excessive water velocities.

Also, the use of a water treatment system, for example water softening, will lead to a change in the chemical corrosion behavior of the water. Consult the water treatment expert to define the impact of the system on water chemistry and re-evaluate piping system corrosion potential in light of the expected change in water chemistry. Ensure a procedure is in place to maintain the water treatment system and to monitor water chemistry throughout the life of the system.

Summary

The corrosivity of water and system fluids depends on a multitude of interdependent variables and there are no simple equations or indices for predicting the corrosion potential in open- and closed-loop piping systems. It must be understood that corrosion is a phenomenon associated with the behavior of system components in their operating environment. Every material has a unique tendency to corrode or not corrode in a similar environment. However, with local knowledge of specific water characteristics and the environment in which the system components are installed, the design engineer and installing contractor can make proper material selections and can determine proper system operating parameters to minimize the potential for corrosion of the piping system. If local conditions are known to cause corrosion issues, then a water quality expert with corrosion experience should be consulted.

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