



Multi-metal corrosion inhibitor for closed circuit water systems containing aluminium

Industry Energy

Type Closed low-pressure heating and cooling system water treatment

Task To develop a multifunctional corrosion inhibitor that effectively protects a broad range of metals, especially aluminium.

Water source Hard, soft, and demineralised water

Description

Closed low-pressure heating and cooling systems can be constructed from various metals, including brass, copper, carbon steel, stainless steel, and aluminium. Such a multi-metal system's main problem is galvanic corrosion. Galvanic corrosion occurs when two or more metals or alloys are immersed in water, and metal starts to lose electrons resulting in the loss of metal mass – corrosion eventually leads to damage to system components.

The use of inhibitors is one of the best options for protecting metals and alloys against corrosion. In this case, a multi-functional solution for system's components protection is required. Thus, a corrosion inhibitor using a blend of organic and inorganic corrosion inhibitors was developed.

Main targets for requirements of product:

- Low toxicity to the environment
- No chromates, nitrites, nitrates, phosphates, or borax compounds in the composition
- Neutral pH and high buffer capacity
- Effective for corrosion and scale inhibition of various types of water
- Protects various metals (steel, copper, aluminium, etc.) from aggressive water impact (corrosion)





Results

Based on over 30 years of Jurby WaterTech International company experience and on the newest scientific data analysis the R&D laboratory specialists developed a new multifunctional corrosion inhibitor for closed low-pressure heating and cooling systems. JurbySoft® 527-2 is a multipurpose corrosion and scale inhibitor which effectively inhibits carbon and stainless steel, copper and brass, aluminium, and alloys from corrosion attack. This inhibitor is suitable to use with demineralized, soft, and hard tap water. JurbySoft® inhibitor has a high buffer capacity. pH control is important due to maintaining the system water pH lower than 8.5 to decrease the impact of aluminium corrosion.

The figure shows untreated and treated with JurbySoft® 527-2 multipurpose inhibitor corrosion coupons of various types of metal (carbon steel, copper, and aluminium, respectively from top to bottom). Such mixed metals system's main problem is galvanic corrosion, and it is visible that carbon steel suffers from severe corrosion meanwhile, copper and aluminium coupons are less damaged from corrosion (see untreated blank coupons in the figure). It is clearly visible the positive results when the multipurpose corrosion inhibitor is used in the heated water (see JurbySoft® treated coupons) – coupons are clean, and no deposits are visible on the surface. JurbySoft® inhibitor works not only as a corrosion inhibitor but due to the other active components in the composition, it decreases the mineral scale formation and has high dispersity properties.



Untreated blank coupons



JurbySoft treated coupons

Summarize

According to the obtained results, it can be concluded that a developed new product JurbySoft® 527-2 is a multifunctional inhibitor. The composition does not contain hazardous components such as chromates, nitrites, nitrates, phosphates, or borate compounds. For this reason, the product has very low toxicity to the environment. Due to the neutral pH of the product solution and low toxicity, it is user-friendly and could be easily dosed into water systems. Synergized molybdate and other components in the JurbySoft® inhibitor give high protection to closed low-pressure heating and cooling system components and ensure the proper work of the systems with high efficiency.