WSC 8170 DP

Closed cooling water treatment
Heavy duty corrosion inhibitor

General Description:

WSC 8170 DP is highly effective for treatment of molybdate corrosion inhibitor WSC 8170 DP is buffered with stabilized and unstabilized phosphate, and contains mercaptobenzo thiazole for protection of multi metal systems. The product also contains a specific dispersant for iron oxides and a polymer for dispersion of hardness salts.

WSC 8170 DP can be used in cooling water systems containing a wide range of metals including mild steel, brass and cast iron.

WSC 8170 DP is also designed for use in both hot and chilled water systems.

Technology behind:

Molybdate

The use of molybdate for corrosion protection in cooling water, either open recirculating or closed loop, systems is well documented. While molybdate is not as strong an oxidizing agent as chromate, it can function in this role in the presence of oxygen.

In the presence of oxygen, molybdate will convert hematite (Fe_2O_3 or red rust) to magnetite (Fe_3O_4 or magnetic black rust). This process is quite visible as boilers (either hot water or steam) change from a reddish color to black when treated with molybdate. This mechanism predominates at higher concentrations (>50 mg/L as Mo).

By contrast, molybdate's efficacy as an anodic (or pitting) inhibitor is related to its ability to accumulate within the acidic part of a pit and block the corrosion process.

Use of molybdate alone at <20 mg/L will reduce the risk of pitting type attack but will not offer good general corrosion protection. Regardless of the mode of action at low concentrations, at elevated levels (>50 mg/L as Mo), Molybdate (in the presence of oxygen) is capable of passivating metal.

Phosphate

Among the filmers used, ortho-phosphate is the most common. Ortho-phosphate widely in use in the dual role of corrosion inhibitor and pH buffer in the formulations.

At normal use concentrations (1000 to 5000mg/L as PO_4), phosphate protects against corrosion on ferrous and non-ferrous alloys.

The primary mode of action is via precipitation at the anode to form insoluble metal phosphates. This low solubility of phosphate salts requires using good quality (i.e., soft or distilled/deionized) water.

The ability of phosphate to form a protective film by directly precipitating is both its strength and weakness. While it will film the metal surfaces, it will just as readily precipitate with metal ions or hardness salts in the bulk water. This competition between useful and non-productive reactions is the major liability associated with phosphate.

Since ortho phosphate is an anodic inhibitor, if the concentration falls below the critical level (200 to 300 mg/L), rapid corrosion attack will occur.

Stabilized Phosphate

Partial stabilization of ortho-phosphate (in WSC 8170 DP with hexyl-ethyl alcohol) creates special class of film formers, which combines the advantages of dibasic acids to the advantages of phosphates.

Dibasic acids work because of their limited solubility with transition metals (iron copper) and alkaline earth cations (hardness). As the corrosion process takes place at the anode, iron ions go into solution.

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The dibasic anion reacts with the iron ions and precipitates at the corrosion site, stopping corrosion.

The presence of stabilized phosphate in WSC 8170 DP:

Provides a second anodic inhibitor (dianodic system) and allows the circuit to operate in lower phosphate levels without the danger of accelerated corrosion, if the phosphate concentration, for any reason, drops below 500 ppm.

Due to the different inhibition mechanism, the presence of molybdate is not controlling this phosphate drawback, even under fully aerated conditions.

The dianodic system is the safety, if the conditions of the system became anaerobic, very common in new systems presenting negligible leaks.

Molybdate requires dissolved oxygen for its corrosion inhibition. In absence of dissolved oxygen, molybdate stops protecting the system, and under such conditions, phosphate alone provides pitting attack.

Yellow Metal Inhibitors

Control of copper corrosion is critical in any closed loop. While copper and its alloys are quite corrosion resistant, the impact of even low corrosion rates can be dramatic. When copper corrodes, soluble copper ions plate out onto mild steel components.

When this happens, the more inert copper metal becomes a "permanent" cathode on the metal surface. At this point, the corrosion process, which had been spread over the entire steel surface, now becomes localized and continues at an accelerated rate. As this proceeds, instead of having a low general corrosion rate, high *local* corrosion rates will be seen.

Azoles are used to prevent the initial corrosion of copper alloys, as well as to inhibit copper deposits on mild steel surfaces. MBT (mercaptobenzothiazole) used in WSC 8170 DP, is effective inhibitor, and has been used for many years with good results.

In contrast to precipitating agents, the nitrogen atoms in the azoles bond to the copper metal via copper oxide molecules on the surface. The protective layer that is formed enhances the natural corrosion resistance of copper and copper alloys.

Application

The application dosage will depend on the type of system, water quality and operational parameters.

Typical values:

Initial film formation:	4000 to 8000 ppm
Maintenance:	1500 to 3000 ppm

The recommended feeding method is as received to any convenient point from which good distribution is assured. If dilution is necessary, this should be achieved using softened water or condensate.

Handling

Wear suitable protective clothing (refer to M.S.D.S for further instructions).

Packaging

30 liter pails and 20 liter drums.

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