
Products for the Water Treatment Industry

SPI-2400

Penetrant, Dispersant, Barrier-Film Corrosion Inhibitor

SPI-2400 is a unique chemical amide with properties that make it useful in both cooling and boiler water systems as a penetrant, dispersant, and corrosion inhibitor. While these characteristics will be discussed separately in this bulletin, it is important to realize that the dispersing and filming properties of SPI-2400 go hand in hand, and one influences the other.

METHODS OF APPLICATION

Cooling Water Treatment

Deposit control - SPI-2400 is an efficient penetrating and dispersing agent. Unlike most dispersing agents, SPI-2400 has the added benefit of controlling foam in many situations. The uniqueness of SPI-2400 comes from its combined hydrophobic/hydrophilic nature.

SPI-2400 is especially effective in controlling deposits caused by organics such as paraffins, oils, pitch, and microorganisms. When used as a biodispersant, it enhances the performance of any biocide, including chlorine and chlorine dioxide. Its presence effects better penetration of slime and algal masses, thus providing better contact of the biocide with microbial cells.

With or without biocide treatment, SPI-2400 softens and disperses most organic deposits that foul industrial water systems, including air washers. Because organics often act as adhesives for inorganic foulants, SPI-2400 is also useful as an adjunct to mineral scale control agents.

It is easy to see that the required concentration of SPI-2400 will vary according to the amount of deposit present. In some cases only 1 or 2 ppm residual in the recirculating water will be required, but in severe conditions, concentrations as high as 50 ppm may be needed.

Corrosion Control - The hydrophobic property of SPI-2400 attracts it to metal surfaces in cooling water systems where it forms an organic barrier to the corrosion process. The product is especially useful as a corrosion inhibitor in cooling water systems fouled and contaminated with sulfate-reducing bacteria which are well known for their contribution to microbiologically induced corrosion. Neither anodic nor cathodic inhibitors are able to penetrate and uniformly passivate surfaces under these conditions. SPI-2400, however, penetrates and forms a protective film as it disperses the deposits. This dual action makes it the most effective corrosion inhibitor available for control of microbiologically induced corrosion. Removal of deposits eliminates the anaerobic sites necessary for the growth of *Desulfovibrio desulfuricans* and permits the formation of a protective film over the cleaned surfaces.

An initial dose of 50-300 ppm of SPI-2400 is recommended to form the protective film needed to provide control of microbiologically induced corrosion. The thicker the deposit, the higher the dosage of SPI-2400 required. The concentration should be maintained by continuous addition of SPI-2400 to the recirculating water.

TYPICAL PRODUCT CHARACTERISTICS

Density @ 25 °C	0.90 g/ml
Volume per kilogram	1110 ml
Flash Point	> 100 °C
pH (100 ppm in water)	6.5 - 7.5

Boiler Water Treatment

Deposit Control - While occurring only under unusual circumstances, organic contamination of boiler feedwater can create severe fouling problems in boiler tubes, particularly in water tube boilers. Sugars and dextran contaminants or oleo-resinous contaminants create deposits not easily controlled by the typical antiscalant used in most boiler water treatment programs. The accumulation of filming amines in steam/condensate systems causes plugging of steam traps and fouling of return lines that can be cleaned only by periodic shutdown.

Corrosion control - While providing some filming protection in the boiler itself, SPI-2400 is recommended primarily for corrosion protection of the steam/condensate system of boiler operations. Unlike other filming compounds, such as the filming amines which build up an increasingly thicker film, SPI-2400 does not itself contribute to condensate deposit problems. The film formed by SPI-2400 is essentially monomolecular in thickness and remains that way. Again, this property of SPI-2400 is the result of its hydrophobic/hydrophilic character.

The most economical steam/condensate corrosion control is achieved by feeding SPI-2400 directly to the steam line at 5-10 ppm concentrations. However, if desired for convenience of feeding, SPI-2400 can be added to the boiler chemical feed tank and metered to the boiler feed water along with other boiler treatment chemicals. Adequate agitation in the feed tank is necessary to assure uniform mixing of the SPI-2400 with other chemicals. When the product is added to the feed-water, maintain a minimum concentration of 20 ppm SPI-2400 in the boiler water. This level will ensure that the 5-10 ppm needed in the steam/condensate line is achieved.

The use of SPI-2400 can significantly reduce organic deposits in both boiler tubes and steam condensate systems when applied at concentrations recommended for corrosion control. However, apply the minimal use level of SPI-2400 if heavy deposits are known to exist. This will prevent too rapid a removal of the deposits with subsequent plugging further along in the system. As deposits are dispersed and removed in the boiler blowdown, the concentrations of SPI-2400 can be increased to normal use levels.

Industrial Cleaning Compounds

SPI-2400 can perform the same functions described above over a shorter time at higher concentrations. These properties make the product a very useful component of industrial cleaning formulations. The dispersing properties of SPI-2400 also suggest its use as a component of either alkaline or acidic cleaning solutions. Its nonionic, nonaqueous characteristics allow its use at any pH and in the presence of either anionic or cationic materials.

Alkaline Cleaning Compounds - The use of SPI-2400 in alkaline cleaning solutions provides a faster and more complete removal of deposits. Not only does SPI-2400 facilitate the cleaning action, but systems cleaned with SPI-2400 solutions also tend to remain clean longer and thus require less frequent attention.

For alkaline cleaning compounds, SPI-2400 concentrations of 1% - 20%, based on the weight of dry solids (alkali builders, detergents, etc.), are recommended. The amount of SPI-2400 in the compound should be sufficient to provide a concentration of at least 0.1% of SPI-2400 when the compound is added to water to prepare the cleaning solution.

Acid Cleaning Compounds - The use of SPI-2400 in descaling agents and other acid-cleaning solutions improves the penetration of these solutions into the deposits, loosens deposits faster, and reduces the amount of acid attack on metals.

One combination that has been used successfully is 1 part by volume of SPI-2400 to 10 parts of muriatic acid (35% HC1). This amount of SPI-2400 disperses readily in the strong acid, but without additional emulsifiers it slowly separates when agitation stops. However, if this mixture is added to an equal volume of water, a relatively stable emulsion is usually formed.

With appropriate emulsifiers, other ratios of acid to SPI-2400 can be used to form stable products. Products can also be formulated containing other acid inhibitors, such as propargyl alcohol, to provide more complete inhibition of acid attack on metals.

Solvent-Type Cleaning Compounds - SPI-2400 is used with other organic solvents, wetting agents, and emulsifiers to prepare emulsifiable solvent-type cleaning compounds. Inclusion of SPI-2400 into this type of compound greatly increases the solubilizing and dispersing powers of the product.

SPI-2400 is soluble in most polar and nonpolar organic solvents and is compatible with many different types of emulsifiers. The amount of SPI-2400 required in these compounds depends on the requirements of the formulated product and varies from 5% to more than 50%.

PACKAGING AND HANDLING

SPI-2400 is a liquid packed in nonreturnable drums and in bulk. **Refer to Material Safety Data Sheet for suitable materials of construction for handling and storing this product.**

Improper handling of this product can be injurious to workers. **Observe all safety precautions listed on the label and in the Material Safety Data Sheet.**

Technical Bulletin No.: MRA111797/SPI-2400.CAN

Recommendations given in this bulletin are based on tests believed to be reliable. However, the use of the product is beyond the control of Buckman Laboratories, and no guarantees, expressed or implied, are made as to the effects of such or the results to be obtained if not used in accordance with directions or established safe practice. The buyer must assume all responsibility, including injury or damage, resulting from misuse of the product as such, or in combination with other material. This bulletin is not to be taken as a license to operate under or recommendation to infringe any patent.

Buckman Laboratories in Argentina, Australia, Austria, Belgium, Brazil, Canada, France, Germany, Italy, Japan, Mexico, Portugal, Singapore, South Africa, Spain, United Kingdom, and U.S.A.