

THE IMPORTANCE OF PASSIVATION.

Passivation is the formation of an impervious layer of a corrosion inhibitor film on the metal surface. The layer prevents the metal from coming in direct contact with the water & oxygen and thus minimizing corrosion of the metal. Passivation is normally conducted with 4 to 5 times the normal dose level that is regularly maintained in the system. A well-pretreated and clean metal surface is required for the formation of a good passive film. Once the metal surface is pretreated the bare metal surface needs to be rapidly protected with the inhibitor film to prevent accelerated corrosion. This is achieved with high level of corrosion and deposit control inhibitors in the system for 3 to 4 days with heat load (min 3-5 deg. C) in the system. If the corrosion inhibitor is phosphate based, a minimum phosphate level of 24 to 30 ppm should be maintained along with adequate polymeric phosphate inhibitor maintaining the pH of 7.0 - 7.5. However surface preparation is a critical step to achieve a good, sturdy passive film formation. Once the passive film is formed, normal level recommended are maintained in the system. The job of this regular maintenance level is to quickly repair any breaks or damage that may occur to the passive film already formed. If the metal surface is not prepared for passivation, the passive film is not formed properly and it can lead to heavy pitting and under deposit corrosion. Pretreatment and metal preparation to receive the passive film is achieved with the following steps:

- First flush the system thoroughly to remove loose matter.
- Clean with surface-active compound to remove oil and grease.
- Low pH cleaning to remove any scale and iron oxide deposits.
- Bioflushing to clean the system with respect to microbial growth.

Removal of deposits is an important step for good passive layer formation. The system is then ready for passivation. Passivation is also recommended after any system upset particularly low pH (acidic) and /or cleaning (hydrojetting) of exchangers. This is because the operation removes or breaks the earlier passive film and if not passivated can result in accelerated corrosion. Many a times this may prove to be difficult operationally. In that case it is suggested that the entire system be passivated online after major cleaning exercises. In case of exchanger preservation, it can be done in two simple ways. In dry state after cleaning, pressurize the exchanger with inert gas like Nitrogen and maintain it. In wet condition after cleaning, fill the exchanger with Nitrite based inhibitor along with a biocide and preserve it.