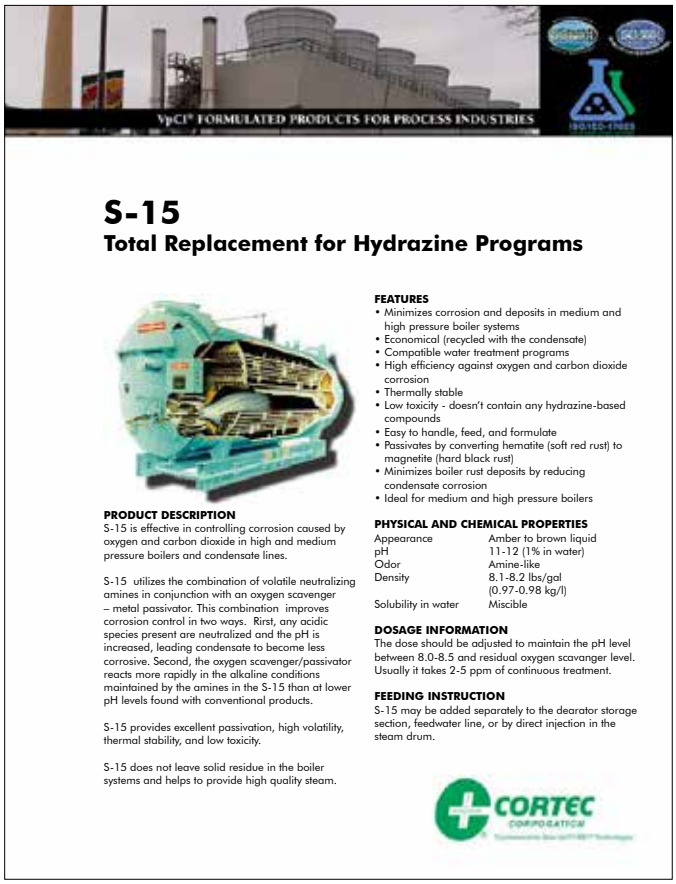
NEWS ALERT

ISO 9001 • ISO 14001
ISO/IEC 17025

New Whitepaper Highlights Advantages of Cortec® S-15 as Alternative to Hydrazine



For more information on Cortec's S-15, please visit:
https://www.cortecvci.com/Publications/PDS/S-15.pdf

A new whitepaper compares the characteristics of Cortec's S-15 with Hydrazine and presents the findings of a 2,200 hour corrosion test on steel pipe inner surface conditions.

The paper, written by a professional engineer with extensive experience in the lay-up of steam generating and other large power plant systems, explains how corrosion is a major problem in steam systems that consume large percentages of make-up water. The make-up water typically contains dissolved oxygen which, combined with high temperatures, creates a highly corrosive environment. While Hydrazine has long been used as an oxygen scavenger, it is toxic and requires extreme care.

S-15 is an excellent alternative that significantly lowers toxicity and can also protect non-wetted surfaces. Testing showed that S-15 (500 ppm) was able to reduce corrosion rates in a 720 hour boiling water test to as low as 0.37 mpy compared to the control rate of 5.23 mpy.

Please continue to read the full paper!

Cortec® S-15 as an Alternate to Hydrazine Treatment in Steam Generating Systems

Overview

Corrosion is a major problem for plant operators with steam systems that have a high consumption rate of make-up water (condensate/feedwater). The make-up water, unless it has gone through a condensate polishing process, contains dissolved oxygen. Oxygen coupled with high temperature creates a highly corrosive environment for the carbon steel components in steam systems.

Hydrazine has been used for years as one of the primary chemicals for oxygen scavenging of steam systems, common in high pressure systems (>1000 psi). However, it is a toxic material and must be handled with extreme care. Because it is a suspected carcinogen, it has been classified by the EPA as a Group B2 product with strict exposure limits.

Cortec® S-15 is a safer alternative to Hydrazine. S-15 is effective in controlling corrosion caused by oxygen and carbon dioxide in high and medium pressure boilers and condensate lines.

S-15 is a synergistic combination of volatile neutralizing amines, a safer oxygen scavenger, and a metal passivator. S-15 protects by neutralizing acidic species and by scavenging oxygen while at the same time forming a protective passivated layer on steel surfaces.

S-15 (Vapor phase Corrosion Inhibitor) Water Additive Solution

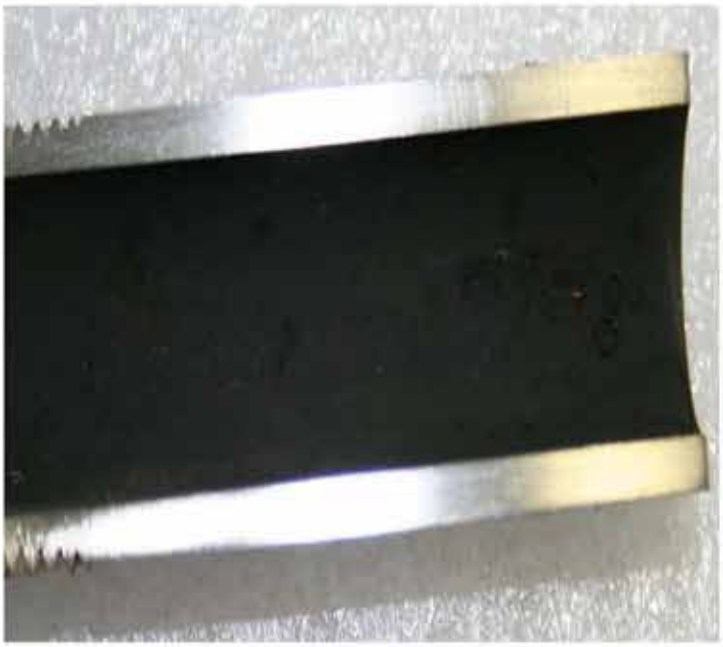
Table 1 provides a comparison between S-15 and Hydrazine and Table 2 provides corrosion rates of S-15 in closed loop testing.

TABLE 1:

Comparison: S-15 vs. Hydrazine		
Characteristic	S-15	Hydrazine
Off-line boiler corrosion	pH buffer to prevent low pH and system corrosion	Forms ammonia which acts as a pH adjuster or pH neutralizer (lowers pH)
Oxygen control	Similar to Hydrazine but with an organic molecule	
Adverse impact on yellow metals	No	Yes
Oral Toxicity LD_{50} (Oxygen Scavenger)	2190 ppm (GOOD)	~15 – 22 ppm (BAD)
*Boiling point	360°F	237°F
Auto-ignition temperature	550°F – 560°F	550°F – 560°F
Dry lay-up	No	No
Type of inhibitor	anodic	cathodic

***Assumption is that if hydrazine can survive the steam cycle, then S-15 should also provide effective corrosion control in the same application.**

720 hours in boiling water @50 ppm @100 ppm @200 ppm @500 ppm	corrosion rate dropped to 1.94 mpy 1.36 mpy 0.97 mpy 0.37 mpy	5.23 mpy
2200 hours in closed loop hot steam test @ 500 ppm initial charge and then maintained @ 100 ppm	0.72 mpy - .74 mpy	8.29 mpy



100 ppm VCI

The above figures show the comparison of steel pipe inner surface conditions of an S-15 treated loop and control test after a 2,200 hour corrosion test in a hot steam/water closed loop.

Laboratory testing conducted by Behzad Bavarian and Lisa Reiner, California State University, Northridge, CA 91330, has confirmed that the Cortec® Vapor phase Corrosion Inhibitor S-15 is an effective replacement for hydrazine to protect steel from corrosion in hot steam/hot water environments.

As indicated in Table 2, corrosion rates can be reduced from ~5.3 mpy for the control to as low as 0.37 mpy with the addition of 500ppm S-15.

The major advantages of S-15 are:

1. EHS (environmental health and safety) impact. S-15 (oxygen scavenger) has very low toxicity with a LD50 (Lethal Dose) of 2190 ppm for rats whereas Hydrazine has a LD50 of ~15-20 ppm for rats.
2. Vapor phase activity. Due to the vapor activity of S-15 it is not necessary for the product to be in direct contact with the metal to protect it. The inhibitor will travel to non-wetted surfaces and provide corrosion protection.