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Evaluation of Corrosion Protection Provided by VpCI-609 in Sand Saturated with Sea Water

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Project #:11-136-1225(bis)

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Approved by:
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Date: July 25, 2011

Background: Water sample was collected from inside of an interstitial space of a double bottom above ground storage tank and was provided by customer. (VpCI-609 is applied to sand and the sand is filled into the interstitial space of the double bottom above ground storage tank.)

Purpose: To test water sample for Chloride content, bacteria presence and corrosion protection provided by VpCI-609. It will be applied in the interstitial space of this tank.

Sample Received: July 7, 2011

Sample(s) labeled: N/A

Method:

1) Analytical Chloride content test
2) Bacteria count
3) Immersion corrosion test

Materials:

Water sample
Quantab Titrators for Chloride Cat. 27449-40 distributed by HACH
Duo Bio Dipslidees Cat. # BTM-2
VpCI-609
Playground sand
Panels (Carbon Steel SAE 1010)
Methanol

Procedure:

1. Concentration of Chlorides in water sample was measured according the directions provided on the package of Quantab Titrators for Chloride
2. Bacteria count was determined with Duo Bio Dipslides according to the manufactures instructions
3. VpCI-609 was added to the submitted water sample at a concentration level of 0.5% by weight. Playground sand was saturated with water (Control) and water with VpCI-609. 8 oz jars (see photo 1) were filled with sand. Pre-weighed panels were washed with Methanol, dried, and inserted into sand. Corrosion test was performed at room temperature for 2 weeks. Panels were visually evaluated after one day of testing (See Photo 2) and then weight loss was determined after 13 more days of testing

Results:

1. Concentration of Chlorides in water sample is 3.3%(as NaCl);
2. Water sample contains 10^4 CFU/ml of Bacteria and 10^2 CFU/ml of mold which is considered 'Slight growth' according to the interpretation chart for Duo Bio Dipslides

Immersion test results

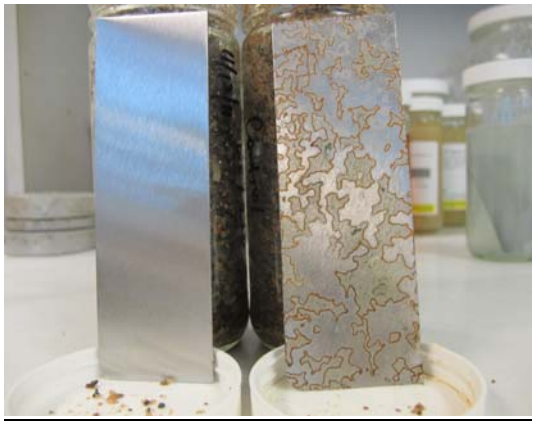
1. No corrosion was found on the panel from the jar with VpCI-609 and ~ 95% of the surface of the panel was corroded in the 'Control' jar after one day (see photo)
2. Data of 2 weeks immersion corrosion test presented in the table below

Material	Initial weight, g	Final weight, g	Weight loss, g	Z,* % Corrosion Protection
Water (Control)	**26.488**	**26.084**	**0.404**	**-**
Water + 0.5%VpCI-609	**25.248**	**25.209**	**0.039**	**90.3**

*** Z= 100(Weight loss of 'Control' –Weight Loss with inhibitor): (Weight loss in 'Control')**

Photos:

Photo 1 Set for corrosion test



With VpCI-609 Control

Photo 2 Panels after one day in sand

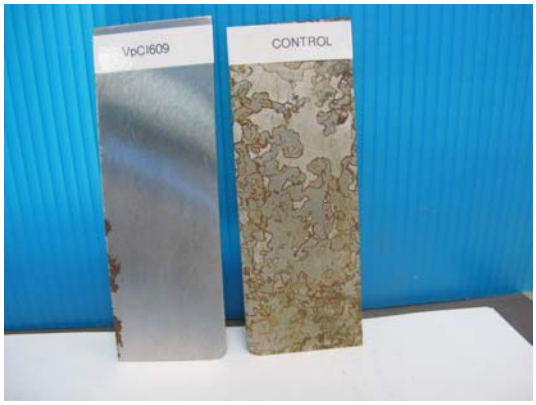


Photo 3 Panels after 2 weeks in sand

Interpretation

1. Submitted for analyzes sample of water contains 3.3% of Chlorides (as NaCl)
2. Water contains Bacteria and Mold on 'Slight' level
3. According to the test results VpCI-609 provide excellent corrosion protection in the sand saturated with the submitted water sample
4. The test was done with a minimum concentration of VpCI-609. In real life long term application with salt water, a greater concentration of VpCI-609 is recommended.