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Evaluation of the Diffusion Distance of VpCI-337: Part 1

Background: Jim Holden requested that VpCI-337 be evaluated to determine if it can diffuse through 100 feet of tubing, in a closed area with no air movement to provide corrosion protection.

Purpose: Determine if VpCI-337 will diffuse over a distance of 100 feet to provide corrosion protection.

Materials:

1) 100 feet of LDPE tubing, I.D. of 1”
2) Plastic box, 2ft³
3) Carbon Steel Q Panels, 3”x5”x.032”
4) Methanol, lab grade
5) EcoAir VpCI-337
6) Sensor Solution
7) Filter Paper

Method: Plenum Test #1, 100 Foot Diffusion Test

Procedure:

1) A hole was cut into the front of each of the boxes (refer to figure 1).
2) Each end of the 100 foot coiled tubing was connected to a plastic box, and secured so there were no gaps between the tubing and the box.
3) 300mL of a 3% solution of glycerol in DI water (w/w) was placed into the bottom of the control box, and the bottom of the box that would contain the panels.
4) The panels were cleaned in methanol, then three panels were suspended from the lid of the box, which was attached to the tubing, and one panel was suspended in the control box. The lids were then securely attached to the plastic boxes.
5) The filter paper was cut into strips, and the end was dipped into the “sensor solution”. This solution was recently developed for detecting the presence of VpCI in the air. The strips of filter paper were then attached with tape to the lid of each of the boxes, to detect for the presence of VCI.

6) Five ounces of VpCI-337 was fogged into the other plenum, which did not contain panels, and the lid was then immediately placed on the box.
7) After 24 hours the VCI sensors were checked for color change, (change from purple to blue indicated the presence of VCI) and the panels were visually evaluated for the presence of corrosion.

Results:

Plenum Test #1, 100 Foot Diffusion Test

Sample	Corrosion	Notes
VpCI-337 Panel 1	No	No Corrosion
VpCI-337 Panel 2	No	No Corrosion
VpCI-337 Panel 3	N/A	Panel fell during test, results not applicable
Control	Yes	Light-Moderate corrosion, >100 rust spots

VCI Sensor Test

Plenum	Hours till VCI Sensor Changed Color
VpCI-337	24
Plenum attached to VpCI-337 Plenum by Tubing	48
Control	DNC*

*Did Not Change Color

Conclusion:

1. Based on the test results, VpCI-337 was able to diffuse 100 feet through a closed area with no air movement and provide sufficient corrosion protection for the carbon steel panels located 100 feet away.

2. The presence of VCI in the box located 100 feet from the point that VpCI-337 was introduced was confirmed by the VCI sensor.

3. The second part of the plenum test, diffusion through water, is going to be tested next, and the results will be in part 2 of this report.

Project #: 09-193-1825
To: Jim Holden
From: Liz Austin
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Date: November 17, 2009
cc: Boris Miksic
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Photos:

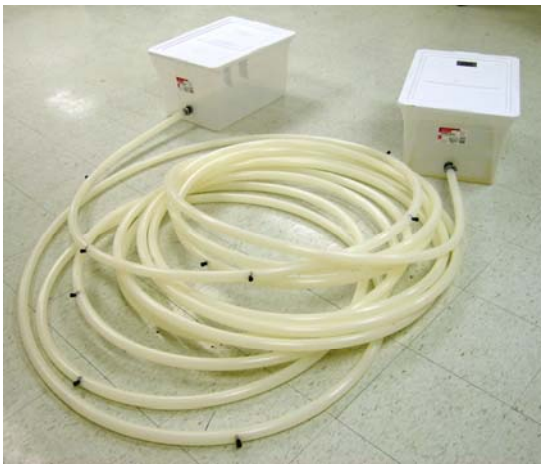

Figure 1.Setup for plenum test.

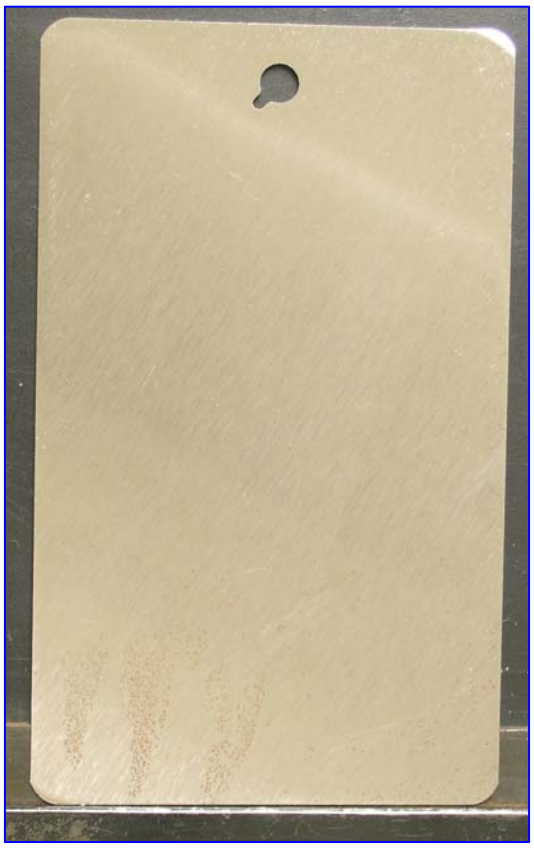

Figure 2. Both sides of the carbon steel panel that was in the control chamber (No VpCI-337).

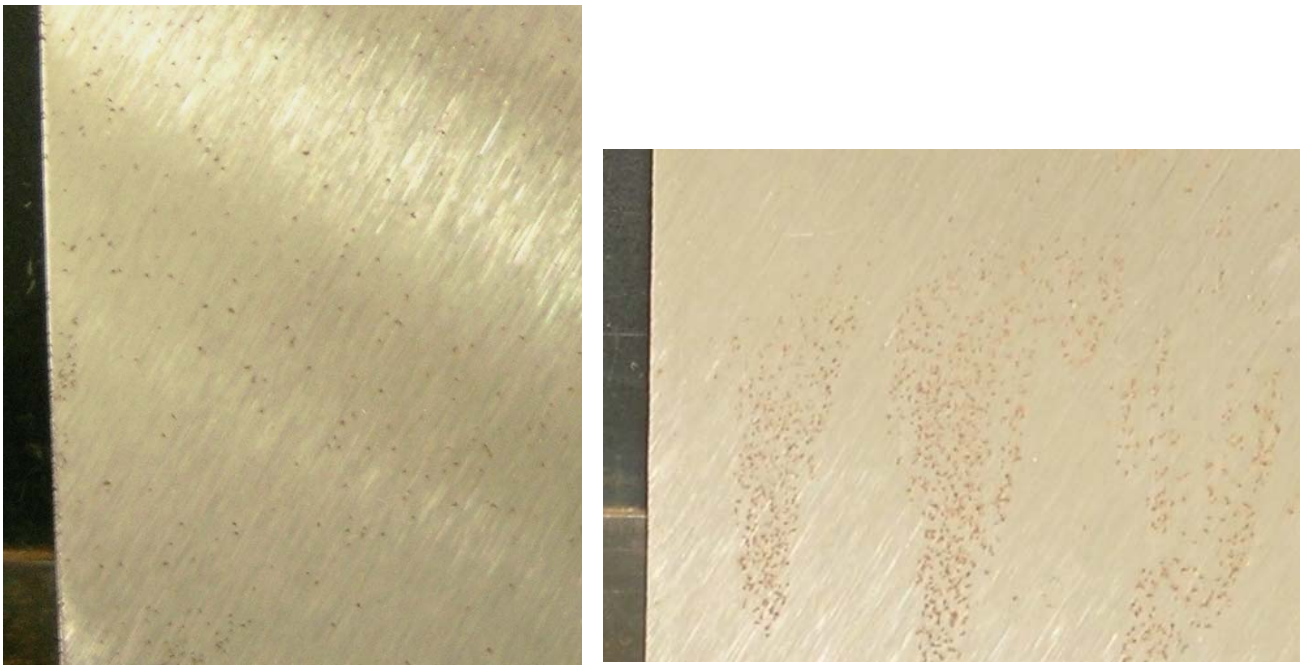

Figure 3. Zoomed in pictures of the control panel from figure 2.

Figure 4. Front side of two panels that were exposed to VpCI-337.

Figure 5. Backside of two panels that were exposed to VpCI-337.