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## *Comparison of EcoLine Pump Protector to Universal Pump Defender*

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**Project #:** 11-026-1825(bis)

**Test conducted by:**

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**Background:** It was requested that the corrosion protection provided by EcoLine Pump Protector and Universal Pump Defender be evaluated and compared.

**Sample Received:** Universal Pump Defender, labeled 11-026-1825A, good condition, received 02-24-11

**Method:**

- 1) Humidity Test CC-018
- 2) VIA Test CC-027

**Materials:**

- 1) VIA Test Kit
- 2) Carbon Steel Q-Panels, SAE 1010
- 3) EcoLine Pump Protector, B#02266
- 4) Cast Aluminum Panels

**Procedure:**

VIA Test

- 1) The VIA test was done in triplicate for each sample. 5.0g of EcoLine Pump Protector and Universal Pump Defender were added to dishes that were placed into each of the VIA setups.
- 2) The VIA test was then performed according to the VIA test method.

Humidity Test

- 1) The carbon steel and cast aluminum panels were cleaned in methanol.
- 2) The panels were then coated with the Universal Pump Defender and Pump Protection.
- 3) After coating, the panels were allowed to hang so that excess product would drip off from the panels.
- 4) After two hours, the panels were placed into the humidity chamber.
- 5) Then carbon steel panels were removed from the chamber after being in the chamber for 67 hours. The cast aluminum was not removed until after 44 hours. The panels were inspected for signs of corrosion.

**Results:**

**VIA Test**

| Sample                 | Plug #1 | Plug #2 | Plug #3 |
|------------------------|---------|---------|---------|
| Pump Defense           | Grade 0 | Grade 0 | Grade 0 |
| EcoLine Pump Protector | Grade 3 | Grade 3 | Grade 3 |
| Control                | Grade 1 | -       | -       |

Note: VIA Grading system is attached at the end of the report.

### Humidity Chamber Test on Carbon Steel

| Sample                  | Corrosion After 67 Hours |
|-------------------------|--------------------------|
| Universal Pump Defender | Moderate Corrosion       |
| EcoLine Pump Protector  | Very Light Corrosion     |

### Humidity Chamber Test on Cast Aluminum

| Sample                  | Corrosion After 44 Hours |
|-------------------------|--------------------------|
| Universal Pump Defender | Moderate Corrosion       |
| EcoLine Pump Protector  | Very Light Corrosion     |

#### Photos:

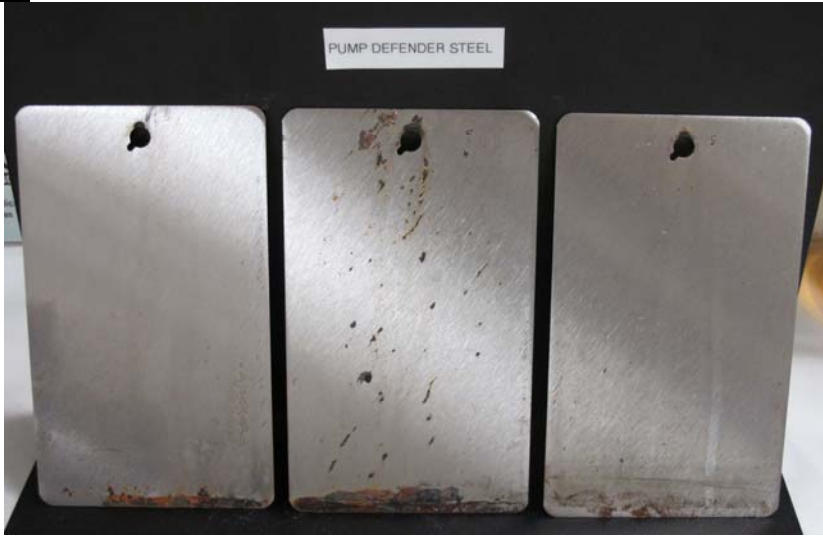


Figure 1. Panels that were coated with Universal Pump Defender, after being in the humidity chamber for 67 hours.



Figure 2. Panels that were coated with EcoLine Pump Protector after being in the humidity chamber for 67 hours.


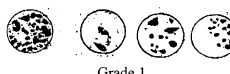

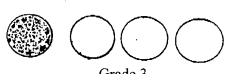


Figure 3. Universal Pump Defender and EcoLine Pump Protector on cast aluminum, after being in humidity chamber for 44 hours.

**Interpretations:**

1. Based on the Humidity test results, Universal Pump Defender does not provide sufficient corrosion protection for carbon steel or cast aluminum. The VIA test results indicated that the Universal Pump Defender does not provide vapor-phase corrosion inhibition as well.
  
2. EcoLine Pump Protector provided sufficient corrosion protection for carbon steel and cast aluminum according to the Humidity Chamber test results. It passed the VIA test as well, and provides excellent vapor-phase corrosion protection.

**VIA Grading System**

|   |   |
|---|---|
| <p>Grade 0: Blind test<br/>No corrosion inhibiting effect</p>     |  <p>Grade 0</p> |
| <p>Grade 1: Blind test<br/>Minute corrosion inhibiting effect</p> |  <p>Grade 1</p> |
| <p>Grade 2: Blind test<br/>Medium corrosion inhibiting effect</p> |  <p>Grade 2</p> |
| <p>Grade 3: Blind test<br/>Good corrosion inhibiting effect</p>   |  <p>Grade 3</p> |