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*Evaluating BioCorr and ALMCO 506R Rust
Preventive for Parts*

To: Customer

From: Cortec Laboratories, Inc.
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Project #: 15-253-1125.bis

Results reported by:

A handwritten signature in blue ink that reads 'John Wulterkens'.

John Wulterkens
Technical Service Engineer

Approved by:

A handwritten signature in black ink that reads 'Eric Uutala'.

Eric Uutala
Technical Service Manager



Background:

Customer currently uses Cortec's VpCI-126 zip lock bags and VpCI-130 foam pads in the packaging and shipping of their metal washers of all sizes. They have been receiving complaints from a few customers of rust issues upon arrival of their products. Testing was recommended to ensure the quality of the VpCI-126 bags and to compare the effectiveness of customers current rust preventive (RP) liquid.

Sample Received:

Several dozen washers were received from customer for testing, all were received clean and free from corrosion and other visual contaminants. Also received was a sample of customers current rust preventative, ALMCO 506R, at a ready-to-use dilution; the sample was clear of any visual impurities.

Method: CC-018 (ASTM D-1748 Modified)

Materials:

1. VpCI-126 zip lock bags (Batch # 310240)
2. BioCorr Rust Preventative (Batch #14094)
3. ALMCO 506R Rust Preventive liquid
4. Kim Wipes
5. Koehler Humidity Cabinet

Procedure:

Washers were cleaned with methanol then wiped dry with lint-free Kim wipes. Five different sets of five washers were tested; one set was placed into VpCI-126 bags without additional treatment after cleaning. Two sets of washers were then individually suspended and dipped into a tray containing BioCorr Rust Preventative and hung to dry overnight. The final two sets of washers were individually suspended and dipped into ALMCO 506R rust preventative and also hung to dry overnight.

One set of the BioCorr-treated washers and one set of the ALMCO-treated washers were then placed into VpCI-126 bags for testing. The other two sets of treated washers were arranged to be separated and suspended on coated metal "racks" for testing in ASTM D-1748 conditions. Bags were also hung from the inside of the chamber for testing.

Each set of washers was suspended in the chamber for testing; testing was considered concluded when the both sets of non-bagged parts showed ample signs of corrosion.

Results:

Table 1: Relevant Test Inspection Times and Dates for Un-bagged samples

Inspection Time	Time Run [hrs]	Sample Progress [# Corroded]*	
12/16/15 @ 9:00 am	19	ALMCO	1/5
		BioCorr	0/5
12/17/15 @ 10:00 am	44	ALMCO	2/5
		BioCorr	0/5
12/18/15 @ 12:30 pm	70.5	ALMCO	4/5
		BioCorr	2/5
12/21/15 @ 8:00 am	138	ALMCO	5/5
		BioCorr	2/5
Chamber Start Time: 12/15/15 @ 2:00 pm			
Chamber Stop Time: 12/21/15 @ 9:00 am			
Total Chamber Run Time: 139 hours			

**The number of samples listed as corroded or discolored refers to the inspection as performed in the chamber. Additional, closer inspection was performed after removal from the chamber, as shown in images below.*

Photos:



Picture 1: Washers protected with ALMCO 506R rust preventative, left un-bagged in ASTM D-1748 conditions for 139 hours. Severe rust can be seen on 4/5 washers.



Picture 2: Washers protected with BioCorr Rust Preventative, left un-bagged in ASTM D-1748 conditions for 139 hour. Moderate discoloration can be seen on the washers.



Picture 3: Washers, not coated with a rust preventative, bagged in VpCI-126 in ASTM D-1748 conditions for 139 hours. No discoloration can be seen on the washers.



Picture 4: Washers coated in ALMCO 506R rust preventative and bagged in VpCI-126 in ASTM D-1748 conditions for 139 hours. No discoloration can be seen on the washers.



Picture 5: Washers coated in BioCorr Rust Preventative and bagged in VpCI-126 in ASTM D-1748 conditions for 139 hours. No discoloration can be seen on the washers.

Interpretations:

Washers treated with BioCorr vastly outperformed the ALMCO 506R treatment on pieces left outside the VpCI-126 bags. The ALMCO 506R treatments allowed severe corrosion on the steel washers, whereas BioCorr only lent itself to minor discoloration, as shown above. In addition, all steel washers in VpCI-126 bags outperformed their un-bagged counterparts, showing the enhanced corrosion protection offered by Cortec's VpCI-126 film.

The effectiveness of Cortec's BioCorr Rust Preventative and VpCI-126 film was demonstrated, as well as the effectiveness of the VpCI-126 film used as an integrated corrosion protection solution with other rust preventatives.