API Standard 622 Test Report

"Type Testing of Process Valve Packing for Fugitive Emissions"
Second Edition, 2011

Performed for

Kukil Inntot Co., Ltd.

http://www.kukil.com

Style 601M Braided Packing

Project Number: 214340
Test Start Date: January 2015

Performed by

YARMOUTH RESEARCH AND TECHNOLOGY, LLC

434 Walnut Hill Road
North Yarmouth, ME 04097 USA
(207) 829-5359
info@yarmouthresearch.com
www.yarmouthresearch.com

Yarmouth Research and Technology, LLC

TEST SUMMARY

Project Number: 214340

Customer: Kukil Inntot Co., Ltd.

Date(s) of Test: January - February 2015

Product(s) Tested: Style 601M Braided Rings

Purpose of Test: The test was conducted to examine the compliance with API 622

Test Procedure: API 622, Second Edition, October 2011
"Type Testing of Process Valve Packing for Fugitive Emissions"

Results: See attached sheets for results for each portion of test.

Test Witness:

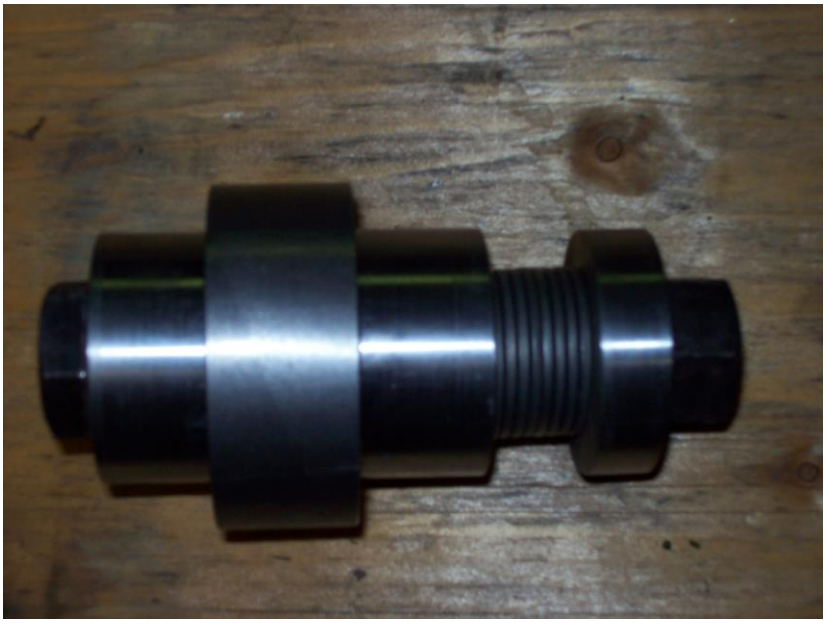
Matthew J. Wasielewski, P.E., President
YARMOUTH RESEARCH AND TECHNOLOGY

STATE OF MAINE
MATTHEW
J
WASIELEWSKI
No. 7437
LICENSED
PROFESSIONAL ENGINEER

Ambient Corrosion Test

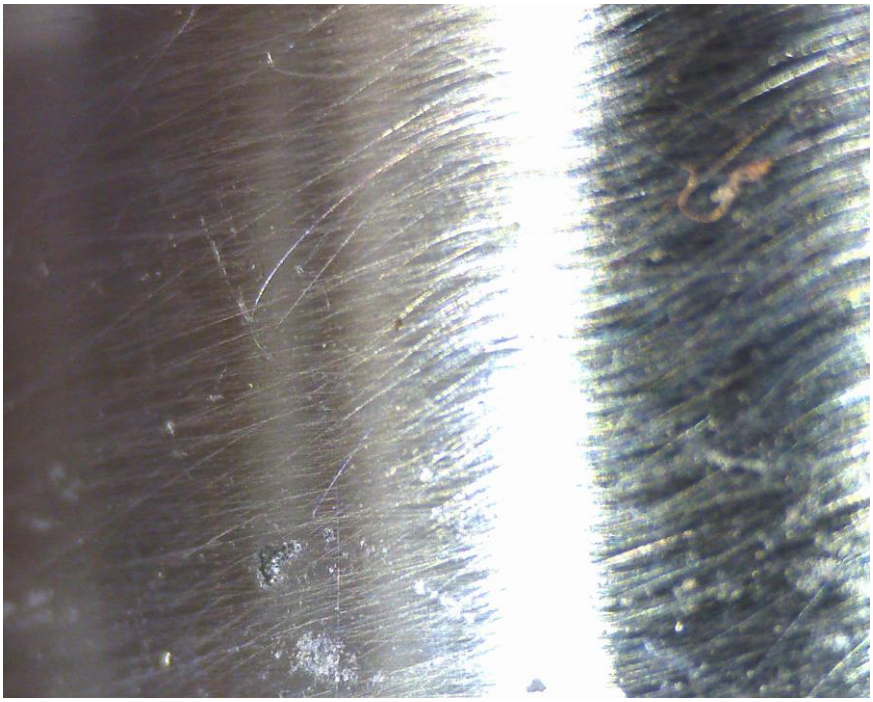
The pre-soaked packing ring was assembled into the test fixture and compressed to the required stress level of 4350 psi. The fixture was placed into the test chamber for 28 days at ambient temperature.

After the 28 days, the graphite material that adhered to the inner ring was gently wire brushed.

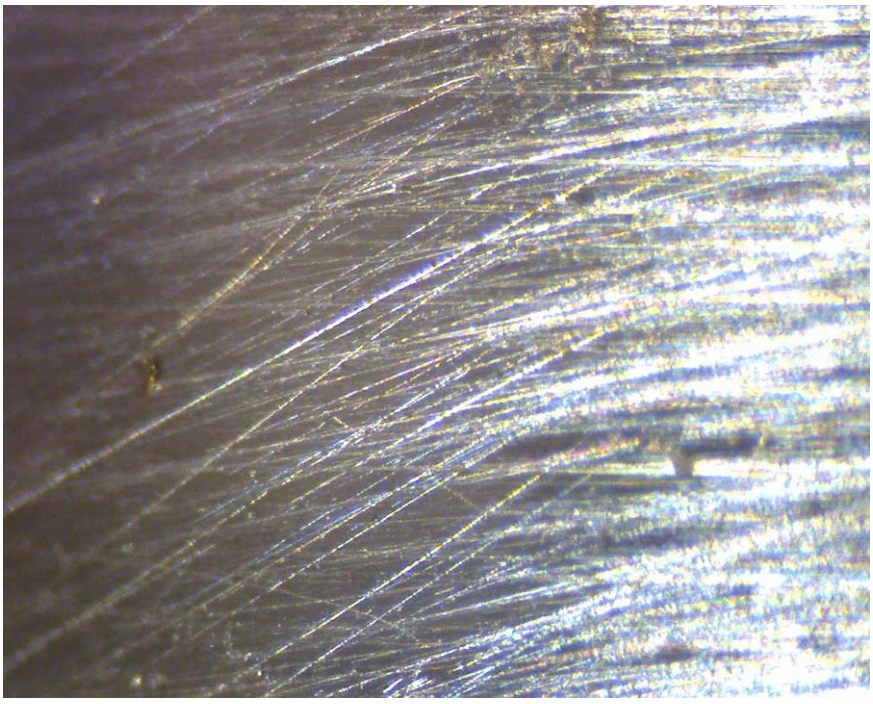


Test Fixture

Sample Ring After Test
Ring showed 50% adhesion



Cylinder surface in contact with packing ring (100X)
<10% corrosion observed.

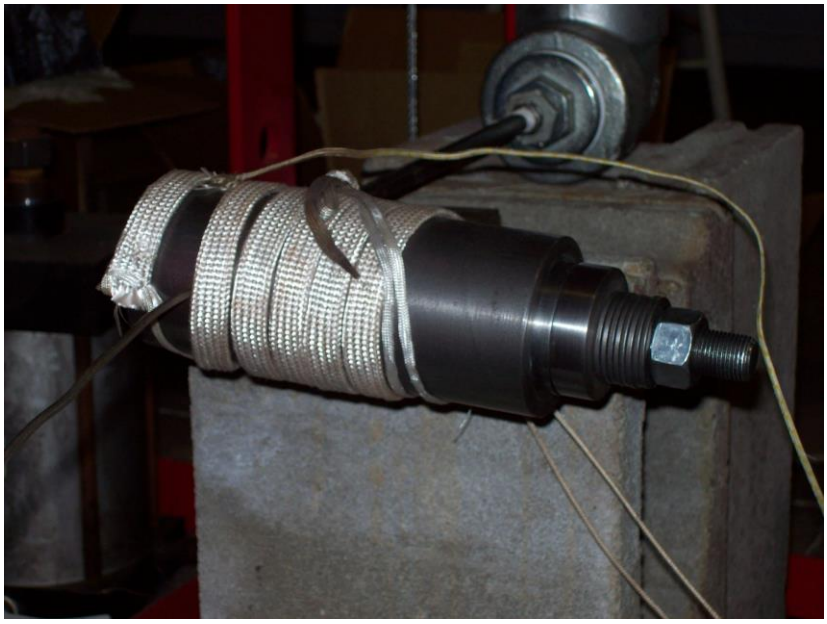


Cylinder surface in contact with packing ring (200X)
<10% corrosion observed.

High Temperature Corrosion Test:

The packing ring was installed into the test fixture and loaded to an initial stress of 4350 psi. The fixture was pressurized with deminerized water at 300 deg F (+/- 10) at 650 psig for 35 days.

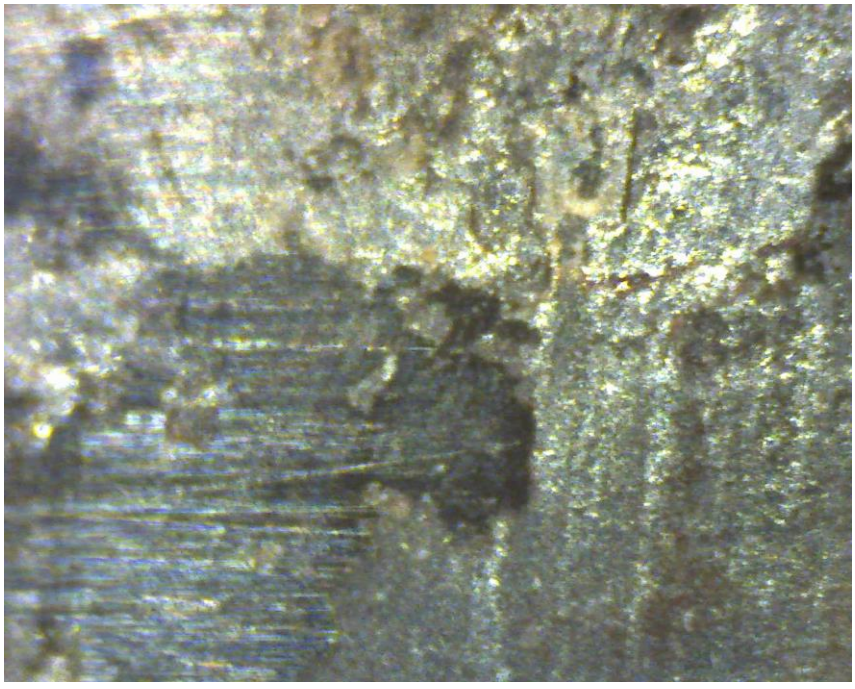
After the 35 days, the graphite material that adhered to the inner ring was gently wire brushed. .



Test stand includes heated chamber. (insulation removed for photo) Water was pressurized utilizing an air-over-water setup.

Packing ring and cylinder after test.
50% adhesion was observed.

Cylinder surface in contact with packing ring (100X)
<10% corrosion observed.



Cylinder surface in contact with packing ring (200X)
<10% corrosion observed.

Weight Loss: The weightloss test was performed in gravity-convection flow oven. Weight loss readings were made after heating the packing for 1 hour each to 300 deg F, 500F, 600F, 700F, 800F, 900F and 1000F. Three samples were tested simultaneously. The following results were achieved.

Test Dates: Feb. 19, 2015

Temp (F)	Sample 1 Weight (g)	Sample 2 Weight (g)	Sample 3 Weight (g)
300	7.05	7.09	7.28
500	7.03	7.08	7.26
600	6.99	7.02	7.20
700	6.86	6.93	7.10
800	6.69	6.74	6.92
900	6.67	6.73	6.92
1000	6.60	6.64	6.84

Temp (F)	Sample 1 Weight Loss (%)	Sample 2 Weight Loss (%)	Sample 3 Weight Loss (%)	Average Weight Loss (%)
300	Basis			
500	0.3%	0.1%	0.3%	0.2%
600	0.9%	1.0%	1.1%	1.0%
700	2.7%	2.3%	2.5%	2.5%
800	5.1%	4.9%	5.1%	5.0%
900	5.4%	5.1%	5.1%	5.2%
1000	6.4%	6.3%	6.2%	6.3%

Post-Test Packing Sample:

Density: The test material was supplied as rings. The density is calculated as the weight divided by the volume of material.

Test Date: Feb. 19, 2015

Braided Rings

Sample	Sample 1	Sample 2	Sample 2
ID (in.)	1.323	1.311	1.317
OD (in.)	1.812	1.812	1.812
Height (in.)	0.249	0.245	0.246
Weight (g.)	7.05	7.08	7.29
Density (g/in3)	23.52	23.52	24.36
Average Density	**23.80**	(g/in3)	

Lubricant Content: The Fluorine and Lubricant content was determined by ASTM D4327-11.

Lubricant	Total Fluorine
<0.2%	<0.02%

Leachables: The fluoride and chloride content was determined by ion chromatography per ASTM D4327-11.

Fluoride Composition (PPM)	Chloride Composition (PPM)
<5	14