ITIS B.V.
Columbusweg 64
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Test certificate
202100142-C001

API 641 QUALIFICATION CERTIFICATE

This certificate is to certify that the valve below has passed the requirements for fugitive emission and operability according to standard: API standard 641, first edition, October 2016 "Type Testing of Quarter-turn Valves for Fugitive Emissions".

Test valve details

Manufacturer	:	Armature d.o.o.
Address	:	KOROŠKA CESTA 055, 2366 Muta, Slovenia
Nominal size	:	DN200
Pressure rating	:	Class 600
Type	:	Butterfly valve
Brand name	:	Crane FX®TrieX
Valve design	:	ASME B16.34 / EN 12516
Drawing number	:	H19800001-htms Rev.0 date: 23-12-2020
Body material	:	A216 WCB
Valve serial number	:	H19800001-htms#2

According to API 641, section 11, the specified range for covering other valves is:

Description	Tested valve	Scope
API 641 Valve group	Group A	Group A
Stem Diameter	65mm	32.5mm up to 130mm
Stack height	30mm	15mm up to 37.5mm
Stem motion	¼ turn	¼ turn
Stem Seal Material	Graphite with Inconel and stainless steel	Graphite with Inconel and stainless steel
Stem seal	James Walker Supagraf Premier	James Walker Supagraf Premier

Disclaimer: Under no circumstances ITIS B.V. can be held responsible applying the above mentioned covering range

This certificate refers to the above mentioned test valve. This certificate does not imply assessment of the production of the valves. This certificate is only valid in conjunction with the full ITIS BV test report number 202100142-R001.

Approved signatory		
P. van Tol 10-06-2021		

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Test report: 202100142-R001			
Client: Armature d.o.o.	Reference: Mr. J. Massow (info@cranecpe.com)	Order number: 412058	Annex: 1: Valve assembly drawing 2: Post-test examination strip-down 3: API 622 certificate
Technician: J. van der Hoeff P. van Tol	Test date(s): 20-05-2021 up to 09-06-2021	Parts tested: Fugitive Emission	Procedure: API Standard 641, first edition, October 2016

Procedure

From 20-05-2021 up to 09-06-2021 at the ITIS test laboratory in Goes the Netherlands, a prototype test was conducted on behalf of Armature d.o.o. The test was performed in accordance with API Standard 641, first edition, October 2016 'Type Testing of Quarter-turn Valves for Fugitive Emissions. The valve was randomly selected by the manufacturer and has been delivered clean, free of any oil and grease, dry and without any coating.

Test valve details

Manufacturer	:	Armature d.o.o.
Address	:	KOROŠKA CESTA 055, 2366 Muta, Slovenia
Nominal size	:	DN200
Pressure rating	:	Class 600
Type	:	Butterfly valve
Brand name	:	Crane FX®TrieX
Valve design	:	ASME B16.34 / EN 12516
Drawing number	:	H19800001-htms Rev.0 date: 23-12-2020
Body material	:	A216 WCB
Stem material	:	A276 Gr.431
Stem diameter (OD_{stem})	:	65mm
Stem surface finish	:	Ra 0.4µm
Gland stud / nut material	:	A193 Gr.B8 / A194 Gr.8
Cover gasket material	:	Graphite (brand: Donit Tesnit)
Insert gasket material	:	Metal C-Ring HTMS / Type CI + Polished
Valve serial number	:	H19800001-htms#2
Pneumatic actuator	:	REVO actuator

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Valve stem seal information		
Manufacturer	:	James Walker
Stem seal description	:	Graphite with Inconel and stainless steel
Model/Type	:	Supagraf Premier
Included in API 622 scope	:	Yes
Stem seal material	:	Graphite with Inconel and stainless steel
Number of rings	:	5
Gland torque	:	148Nm at start of the test
Outer stem seal dimension (OD)	:	77mm
Inner stem seal dimension (Od)	:	65mm
Stack Height	:	30mm
Stem seal chamber depth	:	50mm

Requirements and limits		
API 641 Valve group	:	Group A
Ambient temperature (T_a)	:	15°C to 40°C
Elevated temperature [T_e]	:	260°C ±5%
Amount of operational cycles	:	610 cycles
Amount of thermal cycles	:	3 thermal cycles
Stem orientation	:	Vertical
Maximum allowable leak rate	:	100 ppmv (measurement according to EPA Method 21)
Test pressure [P_a]	:	41.4barg ±5%
Test pressure [P_e]	:	41.4barg ±5%

Manufacturer published torque/pressure values		
Operating pressure	:	≤8.0barg
Closing pressure	:	≤8.0barg

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Test results

Test	Mechanical cycles (total)	Temperature valve body (T)	Test pressure (P)	Tested parts	Results (ppmv)	Uncertainty leakage measurment	Date	Pass / Fail
1	0	T_a	41.4barg	Body seals	<10	semi-quantitative	21-05-2021	Pass
	0			Stem seal	<10			Pass
	100			Stem seal	<10			Pass
	101			Stem seal	<10			Pass
2	101	260°C	41.4barg	Stem seal	21	semi-quantitative	01-06-2021	Pass
	200			Stem seal	27			Pass
	201			Stem seal	28			Pass
3	201	T_a	41.4barg	Stem seal	23	semi-quantitative	02-06-2021	Pass
	300			Stem seal	23			Pass
	301			Stem seal	25			Pass
4	301	260°C	41.4barg	Stem seal	16	semi-quantitative	03-06-2021	Pass
	400			Stem seal	12			Pass
	401			Stem seal	16			Pass
5	401	T_a	41.4barg	Stem seal	<10	semi-quantitative	07-06-2021	Pass
	500			Stem seal	<10			Pass
	501			Stem seal	<10			Pass
6	501	260°C	41.4barg	Stem seal	47	semi-quantitative	08-06-2021	Pass
	600			Stem seal	57			Pass
	601			Stem seal	51			Pass
7	601	T_a	41.4barg	Stem seal	30	semi-quantitative	09-06-2021	Pass
	610			Stem seal	33			Pass
				Body seals	<10			Pass

Approved signatory

P. van Tol 10-06-2021

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Torque measurements					
Cycle	**Tested part**	**Results**	**Uncertainty**	**Date**	**Pass / Fail**
First mechanical cycle	Running torque	5.5barg	±0.08barg	21-05-2021	Pass
Last mechanical cycle	Running torque	5.5barg	±0.08barg	09-06-2021	Pass

Cycling duration
Total time for the valve to perform 610 mechanical cycles (full stroke) was approximately hours (60 seconds per cycle).

Covering range
According to section 11 of API standard 641, First Edition October 2016, type testing of quarter-turn valves for fugitive emissions, the qualification range mentioned in section 11 may be used to qualify valves of the same quarter-turn design as the test valve if the criteria from points 11.1.1 to 11.1.8 are met.

Description	Tested valve	Scope
API 641 Valve group	Group A	Group A
Stem Diameter	65mm	32.5mm up to 130mm
Stack height	30mm	15mm up to 37.5mm
Stem motion	¼ turn	¼ turn
Stem Seal Material	Graphite with Inconel and stainless steel	Graphite with Inconel and stainless steel
Stem seal	James Walker Supagraf Premier	James Walker Supagraf Premier

Disclaimer: Under no circumstances ITIS B.V. can be held responsible applying the above mentioned covering range

Conclusion and remarks
The remaining gland torque after the final measurement was 58Nm.
The valve meets the requirements for Fugitive Emission and operability stated in API Standard 641, first edition, October 2016 'Type Testing of Quarter-turn Valves for Fugitive Emissions. No notable wear, deformations or damaging was detected on the sealing components during the visual inspection after the strip-down on the valve.

Approved signatory		
 P. van Tol 10-06-2021		

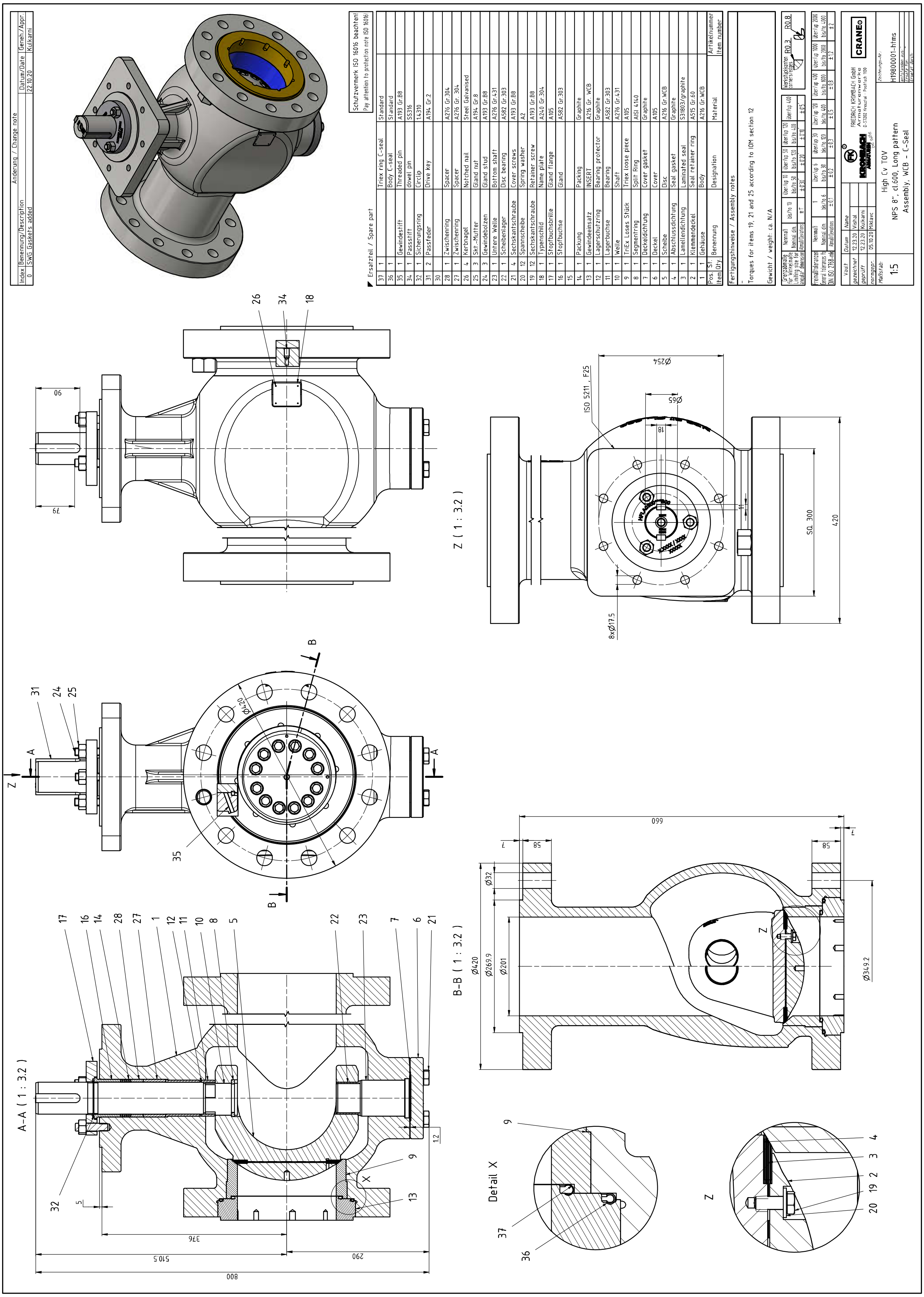
Index | Benennung/Description | Änderung / Change note | Datum/Date | Geneh./Appr.
0 | SWG Gaskets added | 22.10.20 | Kulkarni
Schutzvermerk ISO 16016 beachten!
Pay attention to protection note ISO 16016!
Ersatzteil / Spare part
37 | 1 | | Triex ring C-seal | Standard
36 | 1 | | Body C-seal | Standard
35 | 1 | Gewindestift | Threaded pin | A193 Gr.B8
34 | 1 | Passstift | dowel pin | SS316
32 | 1 | Sicherungsring | Circlip | 1.4310
31 | 2 | Passfeder | Drive key | A194 Gr.2
30
28 | 1 | Zwischenring | Spacer | A276 Gr.304
27 | 1 | Zwischenring | Spacer | A276 Gr. 304
26 | 4 | Kerbnagel | Notched nail | Steel Galvanised
25 | 3 | Skt.-Mutter | Gland nut | A194 Gr.8
24 | 3 | Gewindebolzen | Gland stud | A193 Gr.B8
23 | 1 | Untere Welle | Bottom shaft | A276 Gr.431
22 | 1 | Scheibenlager | Disc bearing | A582 Gr.303
21 | 4 | Sechskantschraube | Cover screws | A193 Gr.B8
20 | 12 | Spannscheibe | Spring washer | A2
19 | 12 | Sechskantschraube | Retainer screw | A193 Gr.B8
18 | 1 | Typenschild | Name plate | A240 Gr.304
17 | 1 | Stopfbuchsbrille | Gland flange | A105
16 | 1 | Stopfbuchse | Gland | A582 Gr.303
15
14 | 1 | Packung | Packing | Graphite
13 | 1 | Gewindeeinsatz | INSERT | A216 Gr. WCB
12 | 1 | Lagerschutzring | Bearing protector | Graphite
11 | 1 | Lagerbuchse | Bearing | A582 Gr.303
10 | 1 | Welle | Shaft | A276 Gr.431
9 | 1 | TriEx Loses Stück | Triex loose piece | A105
8 | 1 | Segmentring | Split Ring | AISI 4140
7 | 1 | Deckeldichtung | Cover gasket | Graphite
6 | 1 | Deckel | Cover | A105
5 | 1 | Scheibe | Disc | A216 Gr.WCB
4 | 1 | Abschlussdichtung | Seal gasket | Graphite
3 | 1 | Lamellendichtung | Laminated seal | S31803/graphite
2 | 1 | Klemmendeckel | Seal retainer ring | A515 Gr.60
1 | 1 | Gehäuse | Body | A216 Gr.WCB
Pos. Item | St. Qty. | Benennung | Designation | Material | Artikelnummer Item number
Fertigungshinweise / Assembly notes
-
Torques for items 19, 21 and 25 according to IOM section 12
Gewicht / weight: ca. N/A
Grenzabmaße für Winkelmaße Limiting size for angular dimension
Freimaßtoleranzen General tolerances to DIN ISO 2768-mK
Werkstückkanten corners/edges R0.3 R0.8
Vault | Datum | Name
gezeichnet | 12.23.20 | Vishal
geprüft | 12.23.20 | Kulkarni
normgepr. | 05.10.20 | Miklavc
Maßstab: 1:5
FRIEDRICH KROMBACH GmbH Armaturenwerke
D-57202 Kreuztal · Postfach 1130
CRANE
High Cv TOV
NPS 8", cl.600, Long pattern
Assembly, WCB - C-Seal
Zeichnungs-Nr.: H19800001-htms
Z (1 : 3.2)
A-A (1 : 3.2)
B-B (1 : 3.2)
Detail X
ISO 5211 - F25
8xØ17.5
SQ. 300

Photo 1: Valve marking and tagging

Photo 2: Stem Sealing Area and Bushing

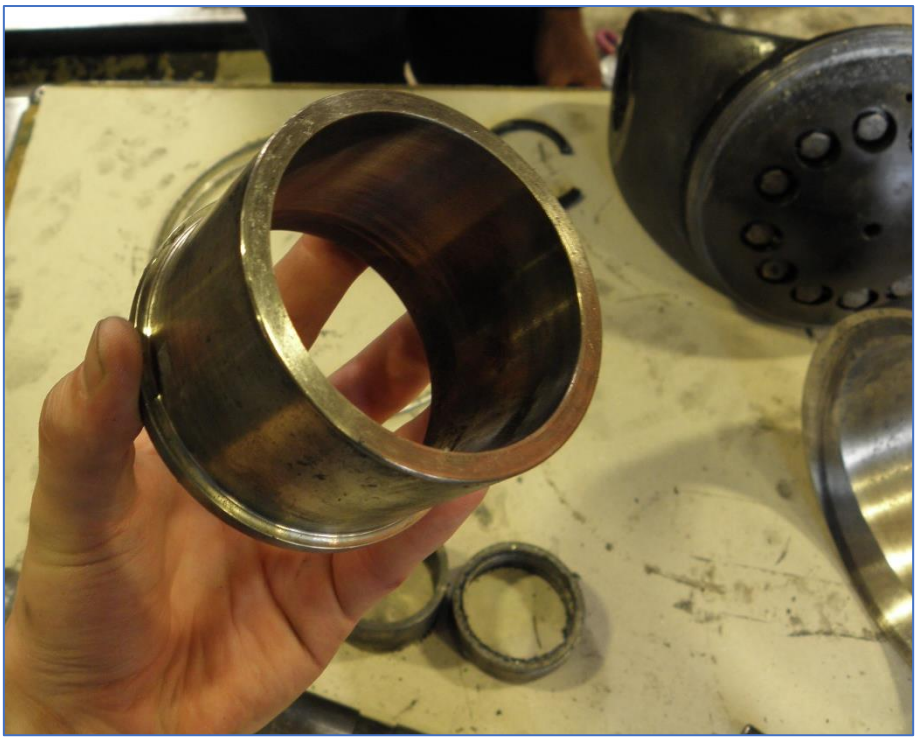

Photo 3: Stem seal gland and gland follower

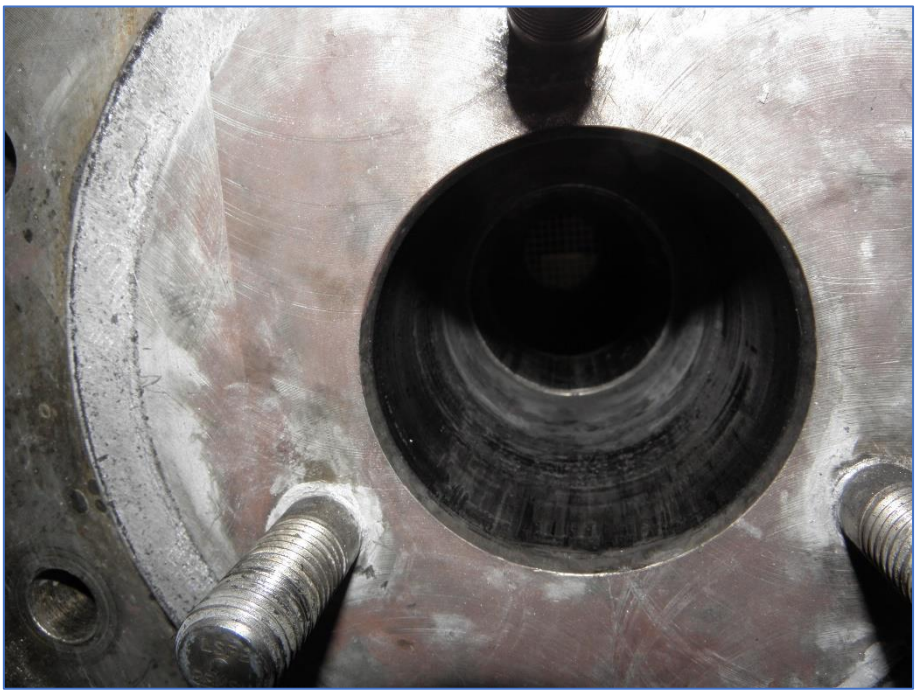

Photo 4: Stem Seal chamber interior

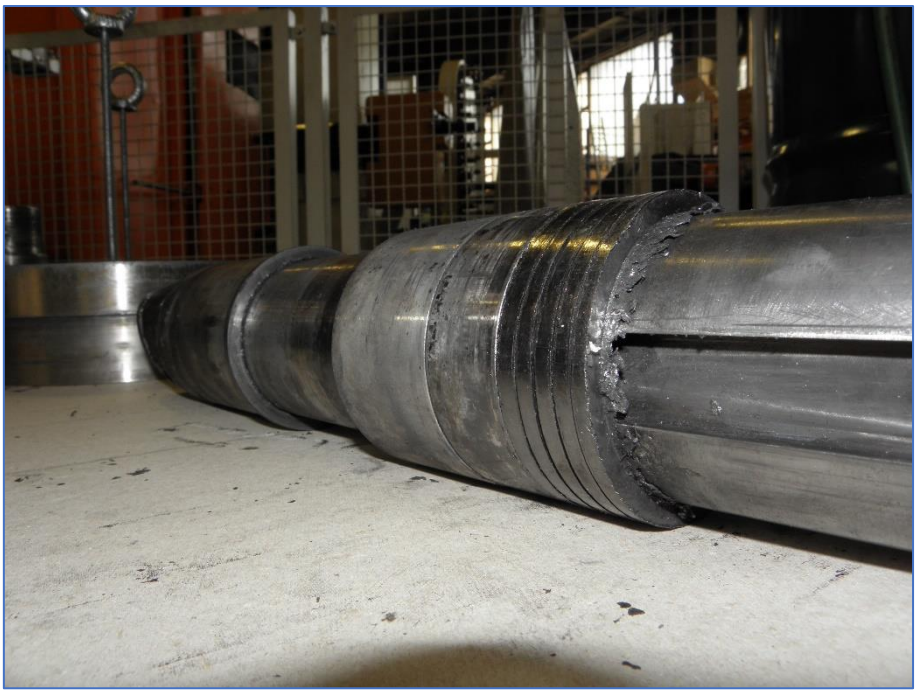

Photo 5: Stem seals and spacers

Photo 6: Stem seals and spacers

Fugitive Emission Test Report

In Accordance with

API 622 2nd Edition Standard

Performed for

James Walker

SUPAGRAF Premier Rings
6 Ring Set

Start Date: May 20, 2013
End Date: May 28, 2013

Performed by

United Valve

9916 Gulf Freeway
Houston, TX77034
Phone: 713-944-9852
Fax: 713-944-5964
www.unitedvalve.com

United Valve

API 622 TESTING SUMMARY

Start Date: 5/28/2013

Customer: James Walker

Packing Information

Packing Description: James Walker
SUPAGRAF Premier Rings
Packing Set: 6 Braided Graphite
Packing Cross Section: 1 X 1.5 X 1/4
Test Fixture: API 622 packing test fixture

Testing Criteria

EPA Maximum Allowable Leakage:	100 PPM
Test Pressure (Ambient):	600 psig
Test Pressure (500°F):	600 psig
Test Media:	99% Methane
Recommended Gland Nut Torque:	55 ft-lb
Tested Stem Travel Per Stroke:	4.00 inches
Cycling Speed:	N/A
Cycling Rate:	20 seconds per cycle

Results

Number of Mechanical Cycles Required:	1510 Cycles Required
Number of Mechanical Cycles Completed:	1510 Cycles Complete
Number of Thermal Cycles Required:	5 Thermal Required
Number of Thermal Cycles Completed:	5 Thermal Completed
Number of Packing Adjustments:	0 Adjustments

Stem Seal Leakage (PPMv)				Operational Torque (ft-lb)		Gland Torque (ft-lb)	
Static Leakage		Dynamic Leakage		Open/Close	Open/Close	Right/Left	Right/Left
Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.
9	35	11	37	N/A	N/A	39	55

Tested By: James A. Nelson

James A. Nelson, Production Engineer