

Fugitive Emission Test Report

VDI 2440 (2000) per TA-LUFT

Performed for

PBM, Inc.

www.pbmvalve.com



¾” Stem, VDI 2440 Test Rig (TA LUFT)

Product Code: SK-T044-H-AS01

Project Number: 217344

Test Start Date: November 8, 2017



Performed by

YARMOUTH RESEARCH AND TECHNOLOGY, LLC

434 Walnut Hill Road
North Yarmouth, ME 04097 USA
(207) 829-5359

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Yarmouth Research and Technology, LLC

Customer: PBM, Inc.

Project Number: 217344		Test Start Date: 8-Nov-17
Packing Description: 3/4" Stem, VDI 2440 Test Rig (TA-LUFT)		
Product Code: SSK-T044-H-AS01		
Test Specification: VDI 2440 (2000) per TA-LUFT		
Stem Diameter (mm): 18.72		Circumference (m): 0.059
Test Temperature: 400°F		Amb. Temp. Test Pressure (psig): 1500
Test Medium: Helium		High Temp Test Pressure (psig): 1230
Cycling Rate: 60 seconds		
Leakage Device: Pfeiffer HLT-560		
Pressure Gauge: PG-2000-2		Thermocouple Type: K

Test Results:

Cycle Number	Nominal Temp. (F)	Pressure (psig)	Stem Seal Leakage (mbar-l/sec)	
			Avg.	Max.
100	70	1500	5.1E-10	5.4E-10
200	400	1230	2.6E-08	2.6E-08
300	70	1500	1.8E-07	2.0E-07
Max->			1.8E-07	2.0E-07

Maximum Allowable Leakage: 10-4 mbar-l/sec per mean seal circumference (m) for $\leq 250^{\circ}\text{C}$
10-2 mbar-l/sec per mean seal circumference (m) for $> 250^{\circ}\text{C}$

Calculated Values: 5.88E-06 mbar-l/sec

Were Leakages Below Allowable:	Yes
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Notes:

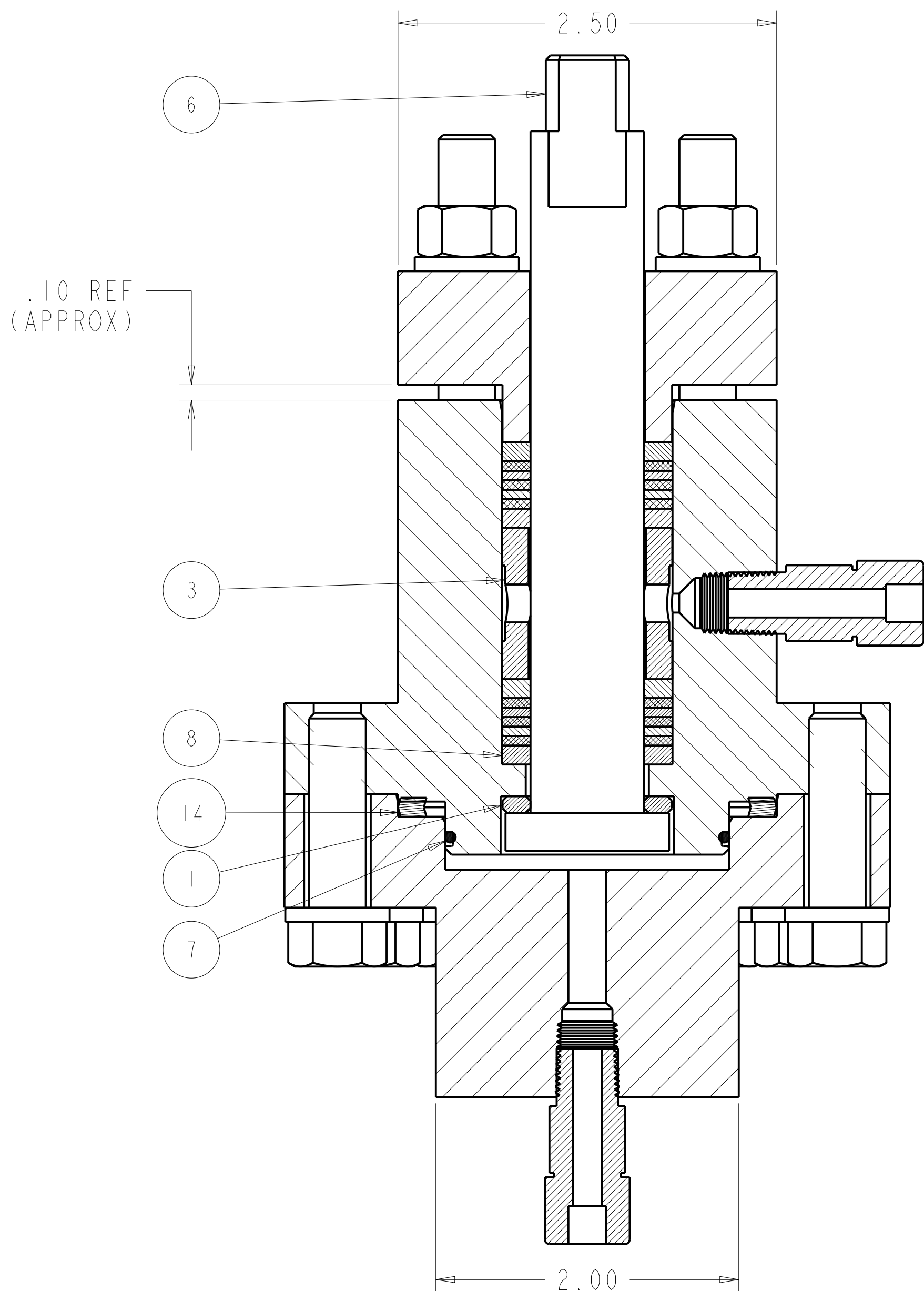
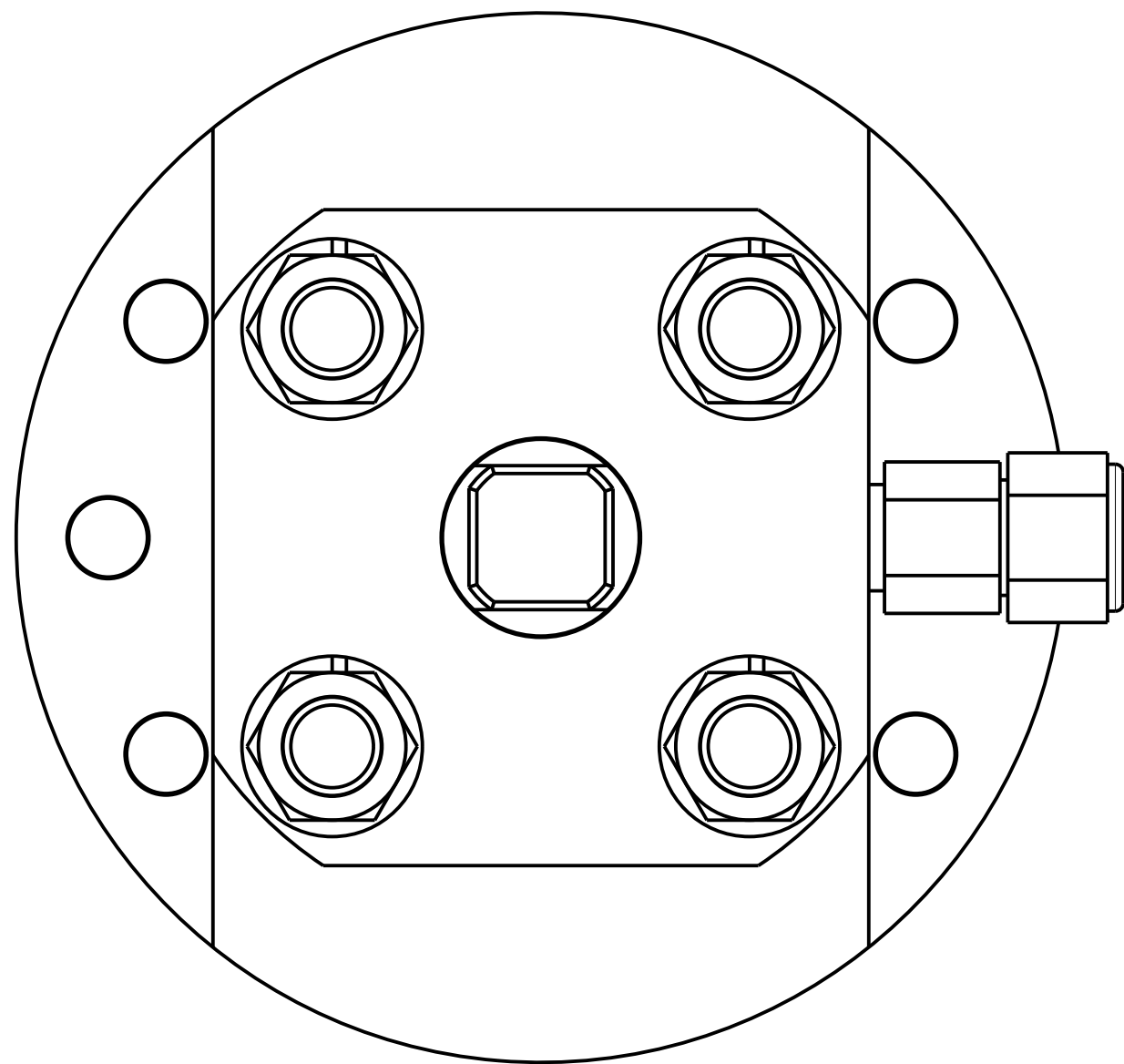
Fixture passed requirements at stated conditions for 300 mechanical cycles.

Certified By

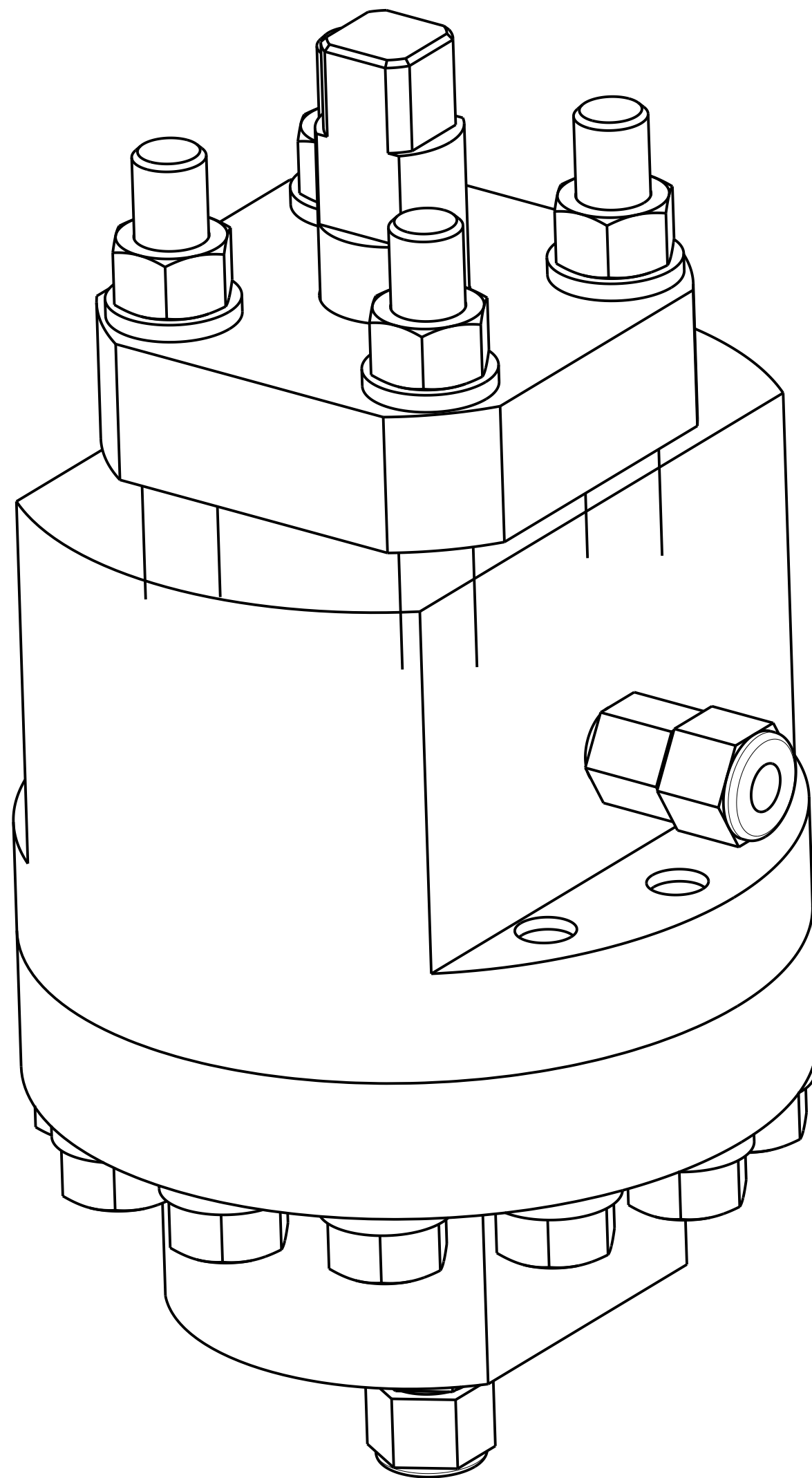
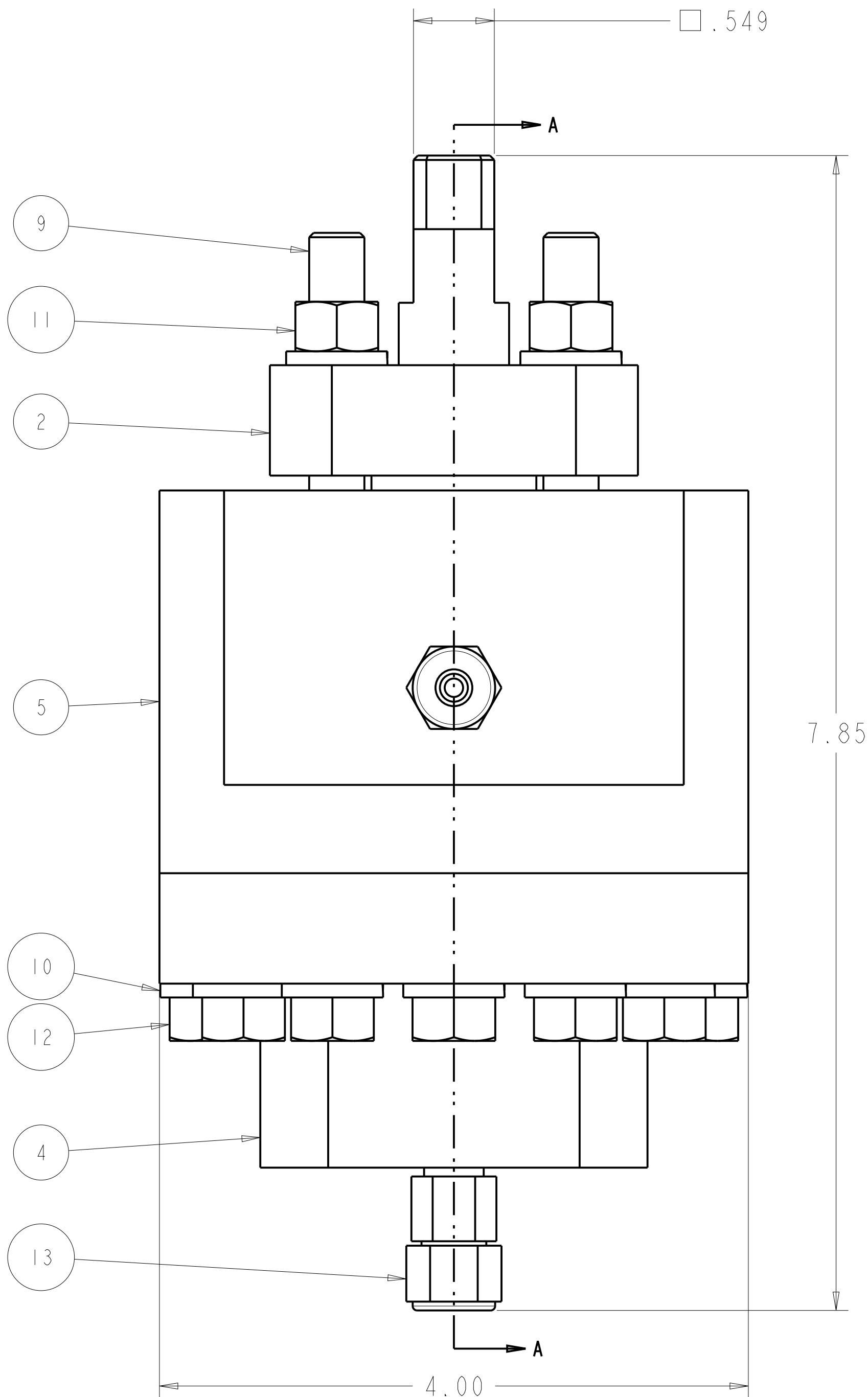


Matthew J. Wasielewski, PE
President and Manager
Yarmouth Research and Technology, LLC





SECTION A-A



PARTS LIST				
ITEM	PART NO.	DESCRIPTION	QTY.	MATERIAL
1	SPCGH535B--J219	LOWER STEM BEARING	1	METCAR M-1515
2	SK-T044-04	GLAND	1	AS REQUIRED
3	SK-T044-03	TEST FOLLOWER	1	AS REQUIRED
4	SK-T044-02	BODY	1	AS REQUIRED
5	SK-T044-01	END FITTING	1	AS REQUIRED
6	SK-T044--H605	STEM	1	AS REQUIRED
7	ORPF7512---2031	O-RING #2-031	1	FFKM (PPE #G75B)
8	1VGRH609-ASSY	STEM PACKING	2	WIRE-BRAIDED GRAPHITE
9	HWSKCG24	ALL THREAD STUD (3/8-16 X 2-1/2" LG)	4	18-8 SST
10	HWAKXGXL	LOCKWASHER (3/8")	16	18-8 SST
11	HWAKCGXN	HEX NUT (3/8"-16)	4	18-8 SST
12	HWAKCG13	HEX CAPSCREW (3/8"-16 X 1-3/8" LG)	12	18-8 SST
13	ACHLCMC4-2N	1/4" TUBE X 1/8" PIPE CONNECTOR (HY-LOK CMC 4-2N)	2	316 SST
14	ACFLR40150H-G	FLEXITALLIC 1-1/2" STYLE R4 GASKET (150#/2500# CLASS)	1	316 SST / GRAPHITE

	PBM, Inc. 1070 Sandy Hill Road Irwin Pa. 15642-9409				Phone: 724-863-0550 Fax: 724-864-9255	
	THIS DRAWING CONTAINS CONFIDENTIAL INFORMATION DEEMED BY ITS OWNER, PBM, INC. TO CONSTITUTE TRADE SECRETS. THE DRAWING IS SUBMITTED FOR EVALUATION PURPOSES ONLY AND MAY NOT BE COPIED OR SHOWN TO THIRD PARTIES EXCEPT WITH THE PRIOR WRITTEN CONSENT OF PBM, INC. THIS DRAWING MUST BE RETURNED TO PBM, INC. UPON ITS REQUEST.					
	3/4" STEM, VDI 2440 TEST RIG (TA LUFT)					
	DR	INIT	DATE	SIZE	FSCM NUMBER	DWG. NO.
CHK	GPL	5/12/17	D	92021	SK-T044-H-AS01	
APP					0	

SCALE: 1:500 | WEIGHT: APPROX. 17.8 lbs. | SHEET 1 of 1

GENERIC NO.
SK-N042-5

REV. No.	REV. DATE	CHK BY	APP BY	REMARKS
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$\varnothing .750^{+.000}_{-.002}$

16

4.00

$.549 \pm .001$

$.275$

$45^{\circ} \times .03$

$.549 \pm .001$

$.275$

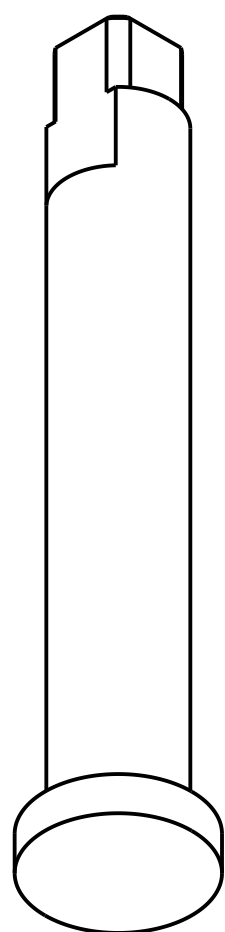
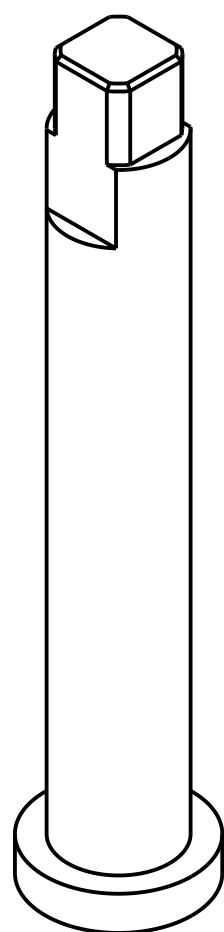
$\varnothing .665$

$.250$

$\varnothing 1.080$

$.50$

5.00



NOTES:

- 1.) ALL MACHINED SURFACES TO HAVE 125 FINISH, UNLESS NOTED.
- 2.) BREAK ALL SHARP CORNERS, UNLESS NOTED.
- 3.) MAKE FROM $\varnothing 1-1/8"$ OR LARGER BARSTOCK.

MACHINING TOLERANCES
(UNLESS NOTED)

2 PL. DECIMAL $\pm .02"$
3 PL. DECIMAL $\pm .005"$
ANGLES $\pm 1^{\circ}$

DO NOT SCALE DRAWING

DR	INIT	DATE
CHK		
APP		

PBM, Inc.
R.D. 6, Box 387-A, Sandy Hill Road
Irwin Pa. 15642-9409
Phone: 412-863-0550
Fax: 412-864-9255

2" H6 VALVE TEST STEM
FOR: VDI 2440 FIXTURE

SIZE	FSCM NUMBER	DWG. NO.	REV.
C	92021	SK-T044--H605	0
SCALE: 2.00		WEIGHT: N/A	SHEET 1 of 1

Yarmouth Research and Technology, LLC



Fixture Markings



Actuator Tag Information

Yarmouth Research and Technology, LLC



Test Setup



Stem Packing Area Prior to Test



Post-Test Stem Packing Area

Yarmouth Research and Technology, LLC

Fixture Description: 3/4" Stem, VDI 2440 Test Rig (TA-LUFT)

Date: 11/9/2017

Cycle Number: 100

Time	Pressure (psig)	Bonnet (deg. F)	Body Temp (deg. F)	Leakage (mbar -l/sec)
9:10:18 AM	1500	60	60	5.4E-10
9:10:19 AM	1500	60	59	5.4E-10
9:10:20 AM	1500	60	59	5.4E-10
9:10:21 AM	1500	60	59	5.3E-10
9:10:22 AM	1500	60	59	5.3E-10
9:10:23 AM	1500	60	59	5.3E-10
9:10:24 AM	1500	60	59	5.3E-10
9:10:25 AM	1500	60	59	5.3E-10
9:10:26 AM	1500	60	59	5.3E-10
9:10:27 AM	1500	60	59	5.3E-10
9:10:28 AM	1500	60	59	5.3E-10
9:10:29 AM	1500	60	59	5.3E-10
9:10:30 AM	1500	60	59	5.3E-10
9:10:31 AM	1500	60	59	5.3E-10
9:10:32 AM	1500	60	59	5.3E-10
9:10:32 AM	1500	60	59	5.2E-10
9:10:33 AM	1500	59	59	5.2E-10
9:10:34 AM	1500	59	59	5.2E-10
9:10:35 AM	1500	60	59	5.2E-10
9:10:36 AM	1500	60	59	5.2E-10
9:10:37 AM	1500	60	59	5.2E-10
9:10:38 AM	1500	60	59	5.2E-10
9:10:39 AM	1500	60	59	5.1E-10
9:10:40 AM	1500	60	59	5.1E-10
9:10:41 AM	1500	60	59	5.1E-10
9:10:42 AM	1500	60	59	5.1E-10
9:10:43 AM	1500	60	59	5.1E-10
9:10:44 AM	1500	59	59	5.1E-10
9:10:45 AM	1500	60	59	5.1E-10
9:10:46 AM	1500	60	59	5.1E-10
9:10:47 AM	1500	60	59	5.1E-10
9:10:48 AM	1500	60	59	5.1E-10
9:10:49 AM	1500	60	59	5.1E-10
9:10:50 AM	1500	60	59	5.0E-10
9:10:51 AM	1500	60	59	5.0E-10
9:10:52 AM	1500	60	59	5.0E-10
9:10:53 AM	1500	60	59	5.0E-10
9:10:54 AM	1500	60	59	5.0E-10
9:10:55 AM	1500	60	59	4.9E-10
9:10:56 AM	1500	59	59	4.9E-10
9:10:57 AM	1500	60	59	4.9E-10
9:10:58 AM	1500	60	59	4.9E-10
9:10:59 AM	1500	60	59	4.9E-10
9:11:00 AM	1500	60	59	4.9E-10
9:11:01 AM	1500	60	59	4.9E-10
9:11:02 AM	1500	60	59	4.9E-10
9:11:03 AM	1500	60	59	4.9E-10
9:11:04 AM	1500	60	59	4.9E-10
9:11:05 AM	1500	60	59	4.9E-10
9:11:06 AM	1500	60	59	4.9E-10
9:11:07 AM	1500	60	59	4.9E-10
9:11:08 AM	1500	60	59	4.9E-10
9:11:09 AM	1500	59	59	4.9E-10
9:11:10 AM	1500	59	59	4.8E-10
9:11:11 AM	1500	59	59	4.8E-10
9:11:12 AM	1500	60	59	4.8E-10
9:11:13 AM	1500	60	59	4.8E-10
9:11:14 AM	1500	60	59	4.8E-10
9:11:15 AM	1500	60	59	4.8E-10
9:11:16 AM	1500	60	59	4.8E-10
Averages ->	1500	60	59	5.1E-10
			Maximum ->	5.4E-10

Yarmouth Research and Technology, LLC

Fixture Description: 3/4" Stem, VDI 2440 Test Rig (TA-LUFT)

Date: 11/10/2017

Cycle Number: 200

Time	Pressure (psig)	Bonnet (deg. F)	Body Temp (deg. F)	Leakage (mbar -l/sec)
3:20:10 PM	1230	400	407	2.6E-08
3:20:11 PM	1230	400	407	2.6E-08
3:20:12 PM	1230	401	407	2.6E-08
3:20:13 PM	1230	400	407	2.6E-08
3:20:14 PM	1230	400	407	2.6E-08
3:20:15 PM	1230	401	407	2.6E-08
3:20:16 PM	1230	400	407	2.6E-08
3:20:17 PM	1230	400	407	2.6E-08
3:20:18 PM	1230	400	407	2.6E-08
3:20:19 PM	1230	400	407	2.6E-08
3:20:20 PM	1230	400	407	2.6E-08
3:20:21 PM	1230	400	407	2.6E-08
3:20:22 PM	1230	400	407	2.6E-08
3:20:23 PM	1230	400	407	2.6E-08
3:20:24 PM	1230	400	407	2.6E-08
3:20:25 PM	1230	400	407	2.6E-08
3:20:26 PM	1230	400	407	2.6E-08
3:20:27 PM	1230	400	407	2.6E-08
3:20:28 PM	1230	400	407	2.6E-08
3:20:29 PM	1230	400	407	2.6E-08
3:20:30 PM	1230	400	407	2.6E-08
3:20:31 PM	1230	400	407	2.6E-08
3:20:32 PM	1230	400	407	2.6E-08
3:20:33 PM	1230	400	407	2.6E-08
3:20:34 PM	1230	400	407	2.6E-08
3:20:35 PM	1230	400	407	2.6E-08
3:20:36 PM	1230	400	407	2.6E-08
3:20:37 PM	1230	400	407	2.6E-08
3:20:38 PM	1230	400	407	2.6E-08
3:20:39 PM	1230	400	407	2.6E-08
3:20:40 PM	1230	400	407	2.6E-08
3:20:41 PM	1230	400	407	2.6E-08
3:20:42 PM	1230	400	407	2.6E-08
3:20:43 PM	1230	400	407	2.6E-08
3:20:44 PM	1230	400	407	2.6E-08
3:20:45 PM	1230	400	407	2.6E-08
3:20:46 PM	1230	400	407	2.6E-08
3:20:47 PM	1230	400	407	2.6E-08
3:20:48 PM	1230	400	407	2.6E-08
3:20:49 PM	1230	400	407	2.6E-08
3:20:50 PM	1230	400	407	2.6E-08
3:20:51 PM	1230	400	407	2.6E-08
3:20:52 PM	1230	400	407	2.6E-08
3:20:53 PM	1230	400	407	2.6E-08
3:20:54 PM	1230	400	407	2.6E-08
3:20:55 PM	1230	400	407	2.6E-08
3:20:56 PM	1230	400	406	2.6E-08
3:20:57 PM	1230	400	407	2.6E-08
3:20:58 PM	1230	400	407	2.6E-08
3:20:58 PM	1230	400	407	2.6E-08
3:20:59 PM	1230	400	407	2.6E-08
3:21:00 PM	1230	400	407	2.6E-08
3:21:01 PM	1230	400	407	2.6E-08
3:21:02 PM	1230	400	407	2.6E-08
3:21:03 PM	1230	400	406	2.6E-08
3:21:04 PM	1230	400	407	2.6E-08
3:21:05 PM	1230	400	407	2.6E-08
3:21:06 PM	1230	400	407	2.6E-08
3:21:07 PM	1230	400	406	2.6E-08
3:21:08 PM	1230	400	406	2.6E-08
Averages ->	1230	400	407	2.6E-08
			Maximum ->	2.6E-08

Yarmouth Research and Technology, LLC

Fixture Description: 3/4" Stem, VDI 2440 Test Rig (TA-LUFT)

Date: 11/14/2017

Cycle Number: 300

Time	Pressure (psig)	Bonnet (deg. F)	Body Temp (deg. F)	Leakage (mbar -l/sec)
9:26:21 AM	1500	63	62	1.9E-07
9:26:22 AM	1500	63	62	1.9E-07
9:26:23 AM	1500	63	63	2.0E-07
9:26:24 AM	1500	63	62	1.8E-07
9:26:25 AM	1500	63	62	1.8E-07
9:26:26 AM	1500	63	62	1.9E-07
9:26:27 AM	1500	63	63	1.9E-07
9:26:28 AM	1500	63	62	1.8E-07
9:26:29 AM	1500	63	63	1.8E-07
9:26:30 AM	1500	63	63	1.8E-07
9:26:31 AM	1500	63	63	1.8E-07
9:26:32 AM	1500	63	63	1.8E-07
9:26:33 AM	1500	63	62	1.8E-07
9:26:34 AM	1500	63	63	1.8E-07
9:26:35 AM	1500	63	63	1.8E-07
9:26:36 AM	1500	63	63	1.8E-07
9:26:37 AM	1500	63	63	1.8E-07
9:26:38 AM	1500	63	63	1.8E-07
9:26:39 AM	1500	63	63	1.8E-07
9:26:40 AM	1500	63	63	1.8E-07
9:26:41 AM	1500	63	63	1.8E-07
9:26:42 AM	1500	63	62	1.8E-07
9:26:43 AM	1500	63	63	1.8E-07
9:26:44 AM	1500	63	63	1.8E-07
9:26:45 AM	1500	63	63	1.8E-07
9:26:46 AM	1500	63	63	1.8E-07
9:26:47 AM	1500	63	63	1.8E-07
9:26:48 AM	1500	63	62	1.8E-07
9:26:49 AM	1500	63	63	1.8E-07
9:26:50 AM	1500	63	63	1.8E-07
9:26:51 AM	1500	63	63	1.8E-07
9:26:52 AM	1500	63	63	1.8E-07
9:26:53 AM	1500	63	63	1.8E-07
9:26:54 AM	1500	63	63	1.8E-07
9:26:55 AM	1500	63	63	1.8E-07
9:26:56 AM	1500	63	63	1.8E-07
9:26:57 AM	1500	63	63	1.8E-07
9:26:57 AM	1500	63	63	1.8E-07
9:26:58 AM	1500	63	63	1.8E-07
9:26:59 AM	1500	63	63	1.8E-07
9:27:00 AM	1500	63	63	1.8E-07
9:27:01 AM	1500	63	63	1.8E-07
9:27:02 AM	1500	63	63	1.8E-07
9:27:03 AM	1500	63	63	1.7E-07
9:27:04 AM	1500	63	63	1.7E-07
9:27:05 AM	1500	63	63	1.8E-07
9:27:06 AM	1500	63	63	1.8E-07
9:27:07 AM	1500	63	63	1.7E-07
9:27:08 AM	1500	63	63	1.7E-07
9:27:09 AM	1500	63	63	1.8E-07
9:27:10 AM	1500	63	63	1.9E-07
9:27:11 AM	1500	63	63	1.8E-07
9:27:12 AM	1500	63	63	2.0E-07
9:27:13 AM	1500	63	63	1.9E-07
9:27:14 AM	1500	63	63	1.8E-07
9:27:15 AM	1500	63	63	1.8E-07
9:27:16 AM	1500	63	63	1.8E-07
9:27:17 AM	1500	63	63	1.8E-07
9:27:18 AM	1500	63	63	1.8E-07
9:27:19 AM	1500	63	63	2.0E-07
Averages ->	1500	63	63	1.8E-07
			Maximum ->	2.0E-07