

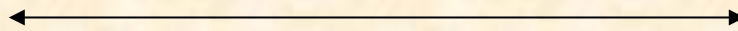
Fire Test Report

API Standard 6FA, Third Edition, April 1999
“Specification for Fire Testing of Valves”

Performed for

Triangle Fluid Controls

www.trianglefluid.com



6 inch Class 300 Durlon 9000 Gasket

Project Number: 218301

Test Date: July 20, 2018

Performed by

YARMOUTH RESEARCH AND TECHNOLOGY, LLC

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Yarmouth Research and Technology, LLC

Customer: Triangle Fluid Controls

Date: 7/20/2018

Specification: API Standard 6FA, Third Edition, April 1999 (R2008)

Product Description: 6 inch Class 300 Durlon 9000 Gasket

Project Number: 218301

GASKET TEST ONLY

Equipment Confirmed to be in Calibration to NIST Standards: Yes

Burn and Cool Down Test

Burn Start Time:	10:53:00	
Average Pressure During Burn:	546	psig
External Leak Rate During Burn/Cool Down:	2.2	ml/min
Allowable External Leak Rate:	600	ml/min
Amount of Time of Avg. Cal. Blocks > 650 deg. C:	19.8	minutes
Were Test Conditions Within Compliance?	Yes	
Were the Valve Leakages Below the Allowables?	Yes	

Post-burn Test

Average Pressure During Test:	51	psig
Average Leak Rate Over 5 Minute Duration:	0	ml/min
Allowable Leak Rate:	120	ml/min
Was the Leakage Below the Allowable?	Yes	

Operational Test - System depressurized and repressurized

Average Pressure During Test:	537	psig
External Leak Rate After Operating:	1.8	ml/min
Allowable External Leak Rate:	1200	ml/min
Was the Leakage Below the Allowable?	Yes	
Does Valve Pass or Fail the Test Standard?	PASS	

Certified By:



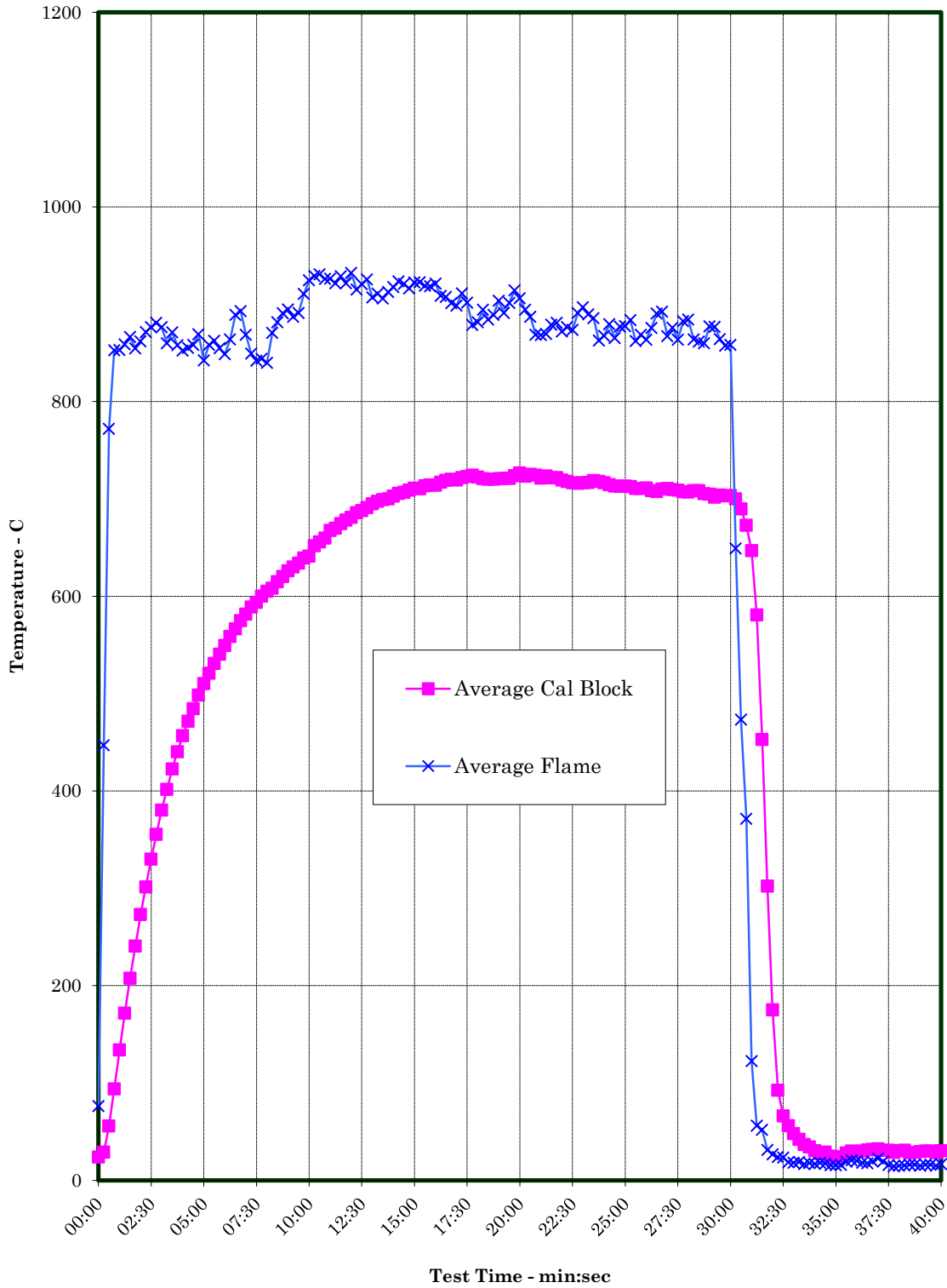
Matthew Wasielewski, PE

President and Manager

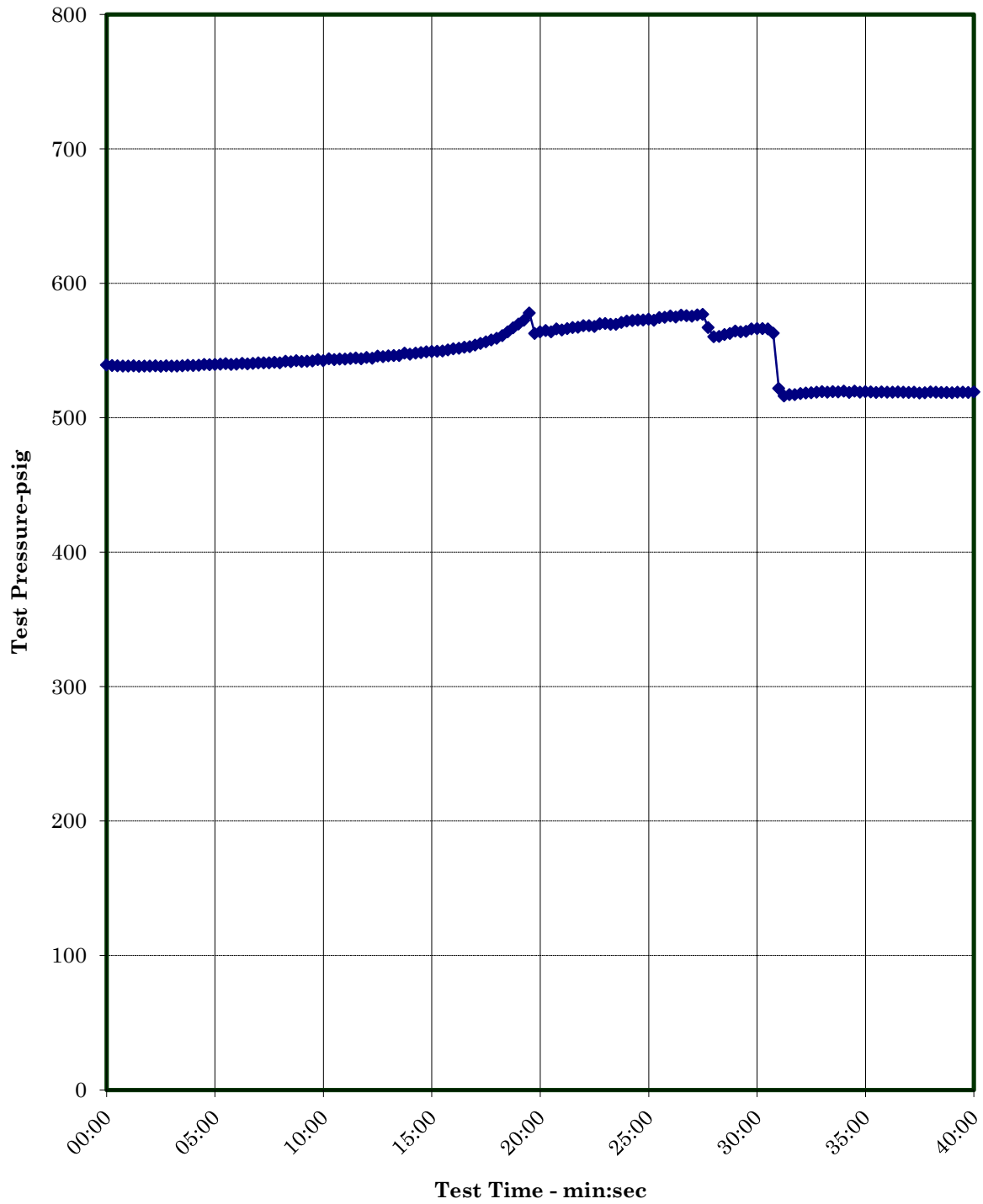
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Temperature verses Time Chart



Pressure versus Time Chart



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Gasket Prior to Burn



Test Setup Prior to Burn

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Test Setup During Burn



Post-Burn Gasket

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Fire Test Information

Customer: Triangle Fluid Controls

Date: 7/20/2018

Product Code: 6 inch Class 300 Durlon 9000 Gasket

Project Number: 218301

Fire Test Raw Data

Time (EST)	Pressure (psig)	Water Volume (mls)	Cal. Block 1 Temp-C	Cal. Block 2 Temp-C	Avg. Cal Block Temp-C	Bonnet Flame Temp-C	Body Flame Temp-C	Average Flame Temp-C
10:53:00	539	40427	23	24	24	51	102	76
10:53:15	539	40385	27	31	29	422	472	447
10:53:30	539	40402	51	61	56	770	774	772
10:53:45	538	40403	88	100	94	869	836	853
10:54:00	538	40402	129	139	134	862	844	853
10:54:15	539	40416	166	177	172	862	856	859
10:54:30	538	40376	201	214	208	873	860	866
10:54:45	538	40424	232	249	241	857	852	854
10:55:00	538	40406	265	281	273	866	858	862
10:55:15	539	40414	292	311	301	878	865	871
10:55:30	538	40408	319	341	330	884	868	876
10:55:45	539	40412	343	367	355	892	869	881
10:56:00	538	40435	368	392	380	890	863	876
10:56:15	538	40421	389	414	402	887	833	860
10:56:30	539	40425	409	436	423	884	858	871
10:56:45	539	40440	427	454	440	883	832	858
10:57:00	539	40473	442	471	457	847	857	852
10:57:15	539	40437	456	488	472	864	846	855
10:57:30	540	40474	466	503	484	856	861	858
10:57:45	540	40461	479	518	498	869	869	869
10:58:00	540	40491	491	530	510	824	860	842
10:58:15	540	40496	499	543	521	842	874	858
10:58:30	540	40520	508	554	531	856	869	863
10:58:45	540	40508	516	565	541	861	848	855
10:59:00	540	40503	523	576	549	865	832	849
10:59:15	540	40519	531	586	559	878	850	864
10:59:30	540	40527	538	595	566	893	885	889
10:59:45	541	40533	548	602	575	894	892	893
11:00:00	541	40585	555	608	582	882	855	869
11:00:15	541	40543	562	616	589	875	823	849
11:00:30	541	40590	565	622	594	861	823	842
11:00:45	541	40568	571	629	600	852	836	844
11:01:00	541	40599	574	636	605	863	816	840

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Fire Test Data - continued

11:01:15	542	40596	577	639	608	896	845	871
11:01:30	542	40564	586	644	615	908	855	881
11:01:45	542	40585	590	651	620	908	873	891
11:02:00	542	40639	596	656	626	895	894	895
11:02:15	542	40659	601	659	630	877	897	887
11:02:30	542	40639	604	663	634	891	891	891
11:02:45	543	40664	611	668	639	922	899	911
11:03:00	542	40684	612	671	641	937	912	924
11:03:15	544	40735	628	676	652	938	919	929
11:03:30	543	40718	631	681	656	942	920	931
11:03:45	544	40760	639	681	660	935	917	926
11:04:00	544	40762	647	688	668	932	920	926
11:04:15	544	40765	649	690	670	935	908	921
11:04:30	544	40799	655	694	674	939	918	929
11:04:45	544	40777	659	697	678	919	923	921
11:05:00	545	40822	663	699	681	935	929	932
11:05:15	544	40848	668	703	686	923	907	915
11:05:30	546	40876	671	705	688	927	914	921
11:05:45	545	40867	674	708	691	930	921	925
11:06:00	546	40952	680	710	695	917	897	907
11:06:15	546	40914	683	712	698	923	899	911
11:06:30	546	40933	683	715	699	913	898	906
11:06:45	548	40968	683	717	700	924	901	913
11:07:00	547	41012	687	718	703	917	918	918
11:07:15	548	41049	689	722	706	926	921	923
11:07:30	548	41056	688	726	707	925	917	921
11:07:45	549	41086	693	725	709	926	906	916
11:08:00	549	41113	696	726	711	927	917	922
11:08:15	550	41141	696	724	710	928	917	923
11:08:30	550	41166	699	728	713	904	933	919
11:08:45	550	41221	701	728	714	915	922	918
11:09:00	551	41217	699	729	714	921	921	921
11:09:15	552	41291	702	733	717	917	901	909
11:09:30	552	41313	703	736	719	916	899	908
11:09:45	553	41389	707	734	720	915	887	901
11:10:00	554	41446	705	734	719	911	886	899
11:10:15	555	41472	707	737	722	901	922	911
11:10:30	557	41583	707	739	723	904	899	902
11:10:45	558	41688	710	739	724	868	889	879
11:11:00	559	41795	706	739	723	872	891	881
11:11:15	561	41949	702	739	721	890	899	894
11:11:30	564	42082	701	739	720	879	889	884
11:11:45	567	42317	699	741	720	884	894	889

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Fire Test Data - continued

11:12:00	570	42340	699	742	721	897	911	904
11:12:15	573	42615	700	742	721	898	883	891
11:12:30	578	42900	701	741	721	888	914	901
11:12:45	563	43185	704	743	724	904	924	914
11:13:00	564	43998	708	745	727	894	918	906
11:13:15	565	44159	703	744	723	889	899	894
11:13:30	564	42411	703	748	725	872	902	887
11:13:45	566	44415	703	746	724	839	898	869
11:14:00	565	42447	698	745	721	861	876	868
11:14:15	566	44312	701	746	724	883	856	869
11:14:30	567	43001	697	747	722	877	881	879
11:14:45	567	43972	698	746	722	874	888	881
11:15:00	569	43324	696	743	719	854	890	872
11:15:15	569	44404	690	746	718	872	881	876
11:15:30	568	42459	687	746	716	879	868	874
11:15:45	570	43920	688	743	716	895	887	891
11:16:00	570	44763	689	743	716	882	912	897
11:16:15	569	43814	688	746	717	862	917	889
11:16:30	570	42706	690	748	719	864	907	886
11:16:45	571	42819	688	748	718	858	867	863
11:17:00	572	43289	688	745	716	856	879	868
11:17:15	572	43834	685	744	714	874	884	879
11:17:30	573	43716	682	744	713	848	882	865
11:17:45	573	43421	680	746	713	865	889	877
11:18:00	573	42789	681	745	713	877	878	878
11:18:15	572	43433	680	745	713	877	891	884
11:18:30	575	44997	679	742	711	862	862	862
11:18:45	575	43305	678	743	711	862	876	869
11:19:00	576	44701	678	744	711	862	865	864
11:19:15	575	43041	676	741	708	873	878	876
11:19:30	576	44822	673	742	708	885	896	890
11:19:45	576	44710	678	742	710	879	905	892
11:20:00	576	43667	677	744	711	868	867	867
11:20:15	576	42994	678	741	709	872	880	876
11:20:30	577	43189	678	740	709	854	873	864
11:20:45	567	43997	674	741	707	867	898	883
11:21:00	560	44435	674	740	707	861	907	884
11:21:15	560	43352	676	741	708	846	882	864
11:21:30	562	45241	672	744	708	861	862	862
11:21:45	563	43309	668	742	705	856	864	860
11:22:00	565	45187	669	741	705	847	908	877
11:22:15	564	44658	665	738	702	839	914	877
11:22:30	564	43420	668	740	704	851	877	864

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Fire Test Data - continued

11:22:45	566	44062	667	739	703	842	873	857
11:23:00	566	44646	665	742	703	848	868	858
11:23:15	566	44048	662	738	700	645	653	649
11:23:30	566	44153	651	729	690	472	475	473
11:23:45	563	44182	634	712	673	378	365	371
11:24:00	522	41431	600	694	647	56	189	123
11:24:15	516	41027	502	660	581	49	63	56
11:24:30	517	40869	312	593	453	53	51	52
11:24:45	517	40846	157	447	302	31	32	31
11:25:00	518	40783	91	259	175	22	31	27
11:25:15	518	40727	59	126	93	19	28	24
11:25:30	519	40677	46	87	66	16	31	23
11:25:45	519	40619	36	76	56	16	21	19
11:26:00	519	40643	33	63	48	15	21	18
11:26:15	519	40586	29	55	42	17	21	19
11:26:30	519	40604	27	46	37	15	18	17
11:26:45	519	40572	26	42	34	17	18	18
11:27:00	520	40547	23	37	30	17	17	17
11:27:15	519	40560	22	33	28	16	20	18
11:27:30	520	40491	24	33	29	14	20	17
11:27:45	519	40475	22	27	25	14	17	16
11:28:00	519	40445	19	29	24	14	17	16
11:28:15	519	40473	20	28	24	15	17	16
11:28:30	519	40455	22	34	28	17	22	19
11:28:45	519	40467	23	37	30	18	23	21
11:29:00	519	40439	20	39	29	18	22	20
11:29:15	519	40422	21	39	30	16	20	18
11:29:30	519	40389	22	41	31	16	19	18
11:29:45	519	40405	22	41	32	17	22	19
11:30:00	519	40386	20	44	32	17	28	23
11:30:15	519	40398	23	38	31	16	23	19
11:30:30	518	40387	22	40	31	15	17	16
11:30:45	519	40341	19	38	29	13	16	14
11:31:00	519	40369	21	40	30	15	15	15
11:31:15	519	40361	23	39	31	16	15	15
11:31:30	519	40359	20	37	28	17	16	16
11:31:45	519	40342	22	36	29	15	17	16
11:32:00	519	40318	19	39	29	14	16	15
11:32:15	519	40355	23	37	30	14	18	16
11:32:30	519	40340	23	37	30	15	17	16
11:32:45	519	40339	23	34	28	16	14	15
11:33:00	519	40341	26	35	30	16	17	17

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Leakage Summary for Burn and Cool Down Periods

All pressure transducers and thermocouples are in calibration per YRT's QA program.

Seat leakages were collected manually. External leakage was collected electronically.

Total Water Volume Lost Over 40 Minute Burn and Cool Down:	86	mls
Water Collected in System Relief Valve:	0	mls
Calculated External Leakage During 40 Minute Duration:	86	mls
Average Leak Rate Over 40 Minute Duration:	2.2	ml/min
Allowable Leak Rate:	600	ml/min

Were the Valve Leakages Below the Allowables?	Yes
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Summary of Test Parameters During Burn and Cool Down Periods

Amount of Time Pressure Dropped Below 50%:	0.0	minutes
Maximum Allowable Low Pressure Time:	2.0	minutes
Maximum Pressure During Burn/Cool Down:	578	psig
Average Pressure During Burn/Cool Down:	546	psig
Minimum Pressure During Burn/Cool Down:	516	psig
Amount of Time of Avg. Cal Block > 650 deg.C:	19.8	minutes
Minimum Allowable Time at Temperature:	15.0	minutes
Maximum Avg Cal Block Temperature:	727	deg. C
Average Cal Block Temperature:	497	deg. C
Lowest Avg Cal. Block Temperature:	24	deg. C
Maximum Body Flame Temperature During Burn:	933	deg. C
Average Body Flame Temperature During Burn:	875	deg. C
Maximum Bonnet Flame Temperature During Burn:	942	deg. C
Average Bonnet Flame Temperature During Burn:	875	deg. C
Average of Both Flame Temperatures During Burn:	875	deg. C

Note

Were Test Conditions Within Compliance?	Yes
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Yarmouth Research and Technology, LLC

Post-Burn Seat Test Information

Customer: Triangle Fluid Controls

Date: 7/20/2018

Product Code: 6 inch Class 300 Durlon 9000 Gasket

Project Number: 218301

Test Data

Time	Pressure (psig)	Cal Block Temp - C
11:38:31	51	27
11:38:46	51	26
11:39:01	51	26
11:39:16	51	28
11:39:31	51	27
11:39:46	51	28
11:40:01	51	27
11:40:16	51	28
11:40:31	51	28
11:40:46	51	27
11:41:01	51	29
11:41:16	51	27
11:41:31	51	28
11:41:46	51	27
11:42:01	50	27
11:42:16	51	26
11:42:31	51	27
11:42:46	51	26
11:43:01	51	28
11:43:16	52	27
11:43:31	51	27

Total External Leakage Collected Over 5 Minute Duration:	0	mls
Average Leak Rate Over 5 Minute Duration:	0	ml/min
Allowable Leak Rate:	120	ml/min

Was the Valve Leakage Below the Allowable?	Yes
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Yarmouth Research and Technology, LLC

Operational Test Information

Customer: Triangle Fluid Controls

Date: 7/20/2018

Product Code: 6 inch Class 300 Durlon 9000 Gasket

Project Number: 218301

Test Data

Time	Pressure (psig)	Cal Block Temp - C
11:46:07	537	27
11:46:22	539	27
11:46:37	536	27
11:46:52	533	27
11:47:07	532	28
11:47:22	539	27
11:47:37	539	27
11:47:52	538	27
11:48:07	528	28
11:48:22	538	28
11:48:37	537	27
11:48:52	537	27
11:49:07	541	28
11:49:22	541	27
11:49:37	540	28
11:49:52	539	27
11:50:07	538	28
11:50:22	538	28
11:50:37	538	27
11:50:52	538	28
11:51:07	538	28

Leakages were collected manually.

Total External Leakage Collected Over 5 Minute Duration:	9	mls
Average Leak Rate Over 5 Minute Duration:	1.8	ml/min
Allowable Leak Rate:	1200	ml/min

Was the Valve Leakage Below the Allowable?	Yes
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