Fire Test Report

ANSI/API Standard 607, Fifth Edition, June 2005
ISO 10497-5:2004

Performed for

Teadit N.A.

www.teadit.com

Teadit Style 2202 Packing

Project Number: 209119
September 2009

Performed by

YARMOUTH RESEARCH AND TECHNOLOGY

434 Walnut Hill Road
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Yarmouth Research and Technology

Customer:	Teadit North America	**Date:**	9/15/2009
Specification:	ANSI/API Standard 607, Fifth Edition, June 2005		
	ISO 10497-5:2004, "Testing of Valves - Fire type-testing requirements		
Product Description:	Style 2202 packing in a 4 inch Cl300 Gate Valve		
Project Number:	PN209119		
Comments:	Gland bolts tightened to 52 ft-lb		

Yarmouth Engineer: Matthew J. Wasielewski, P.E.

Equipment Confirmed to be in Calibration to NIST Standards: Yes

Burn and Cool Down Test

Burn Start Time:	**16:14:00**	
Average Pressure During Burn:	**572**	psig
External Leak Rate During Burn/Cool Down:	**32**	ml/min
Allowable External Leak Rate:	**400**	ml/min
Amount of Time of Avg. Cal. Blocks > 650 deg. C:	**23.0**	minutes
Were Test Conditions Within Compliance?	**Yes**	
Were the Valve Leakages Below the Allowables?	**Yes**	

Operational Test

Did Valve Unseat and Open Fully?:	**Yes**	
Average Pressure During Test:	**567**	psig
External Leak Rate After Operating:	**0**	ml/min
Allowable External Leak Rate:	**100**	ml/min
Was the Leakage Below the Allowable?	**Yes**	

Valve Pass or Fail the Test Standard?	**PASS**

Witnesses

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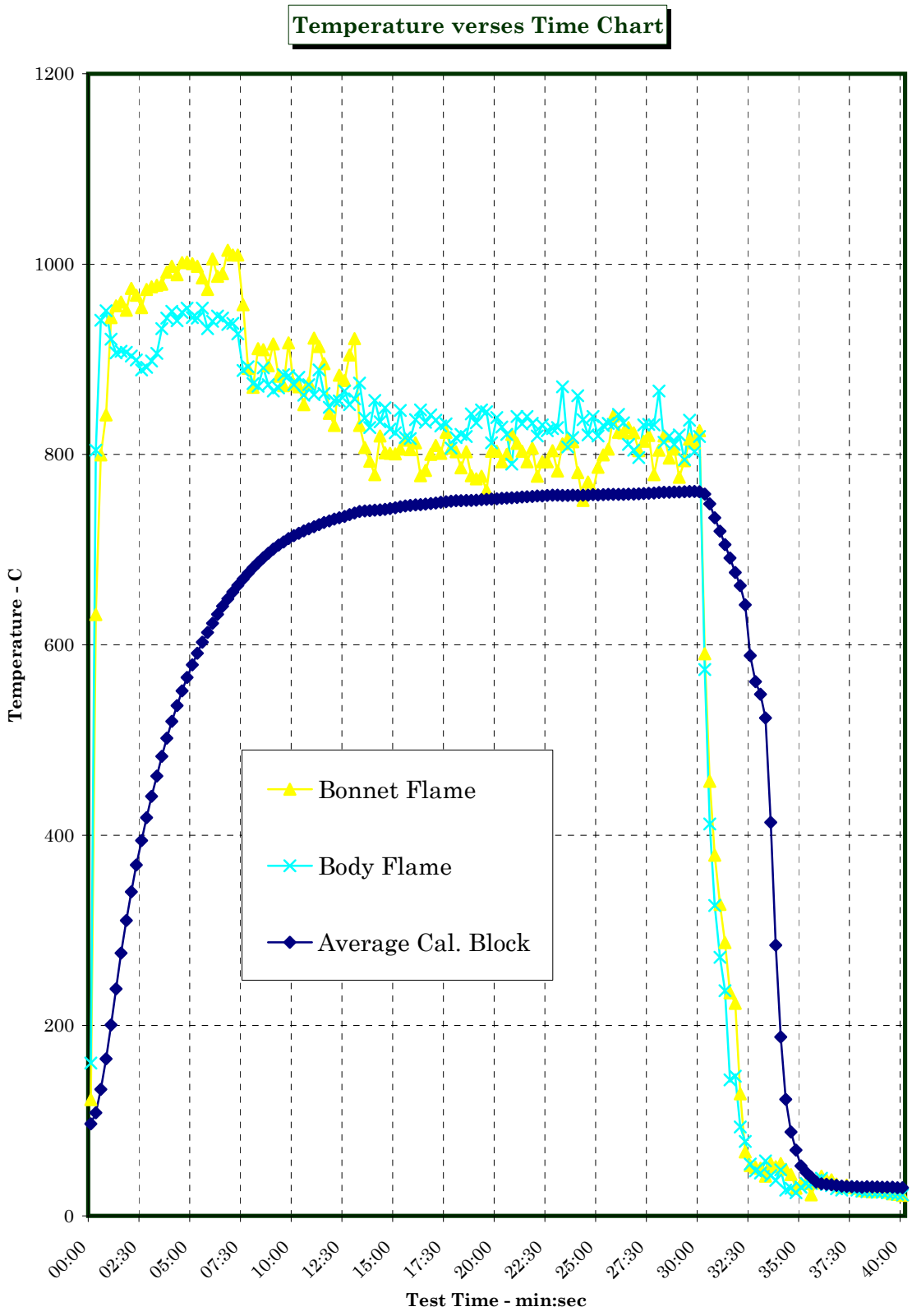

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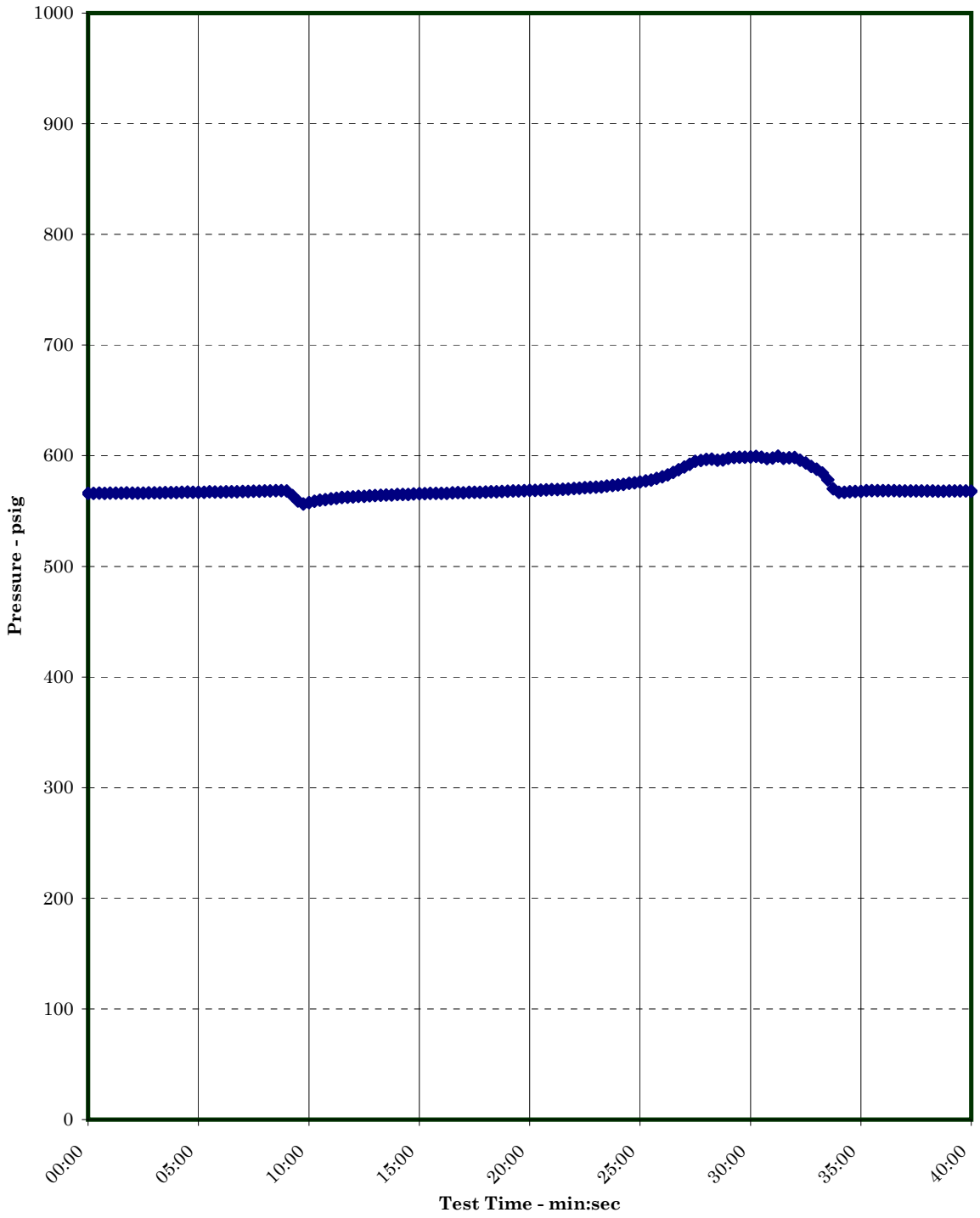
Pressure verses Time Chart



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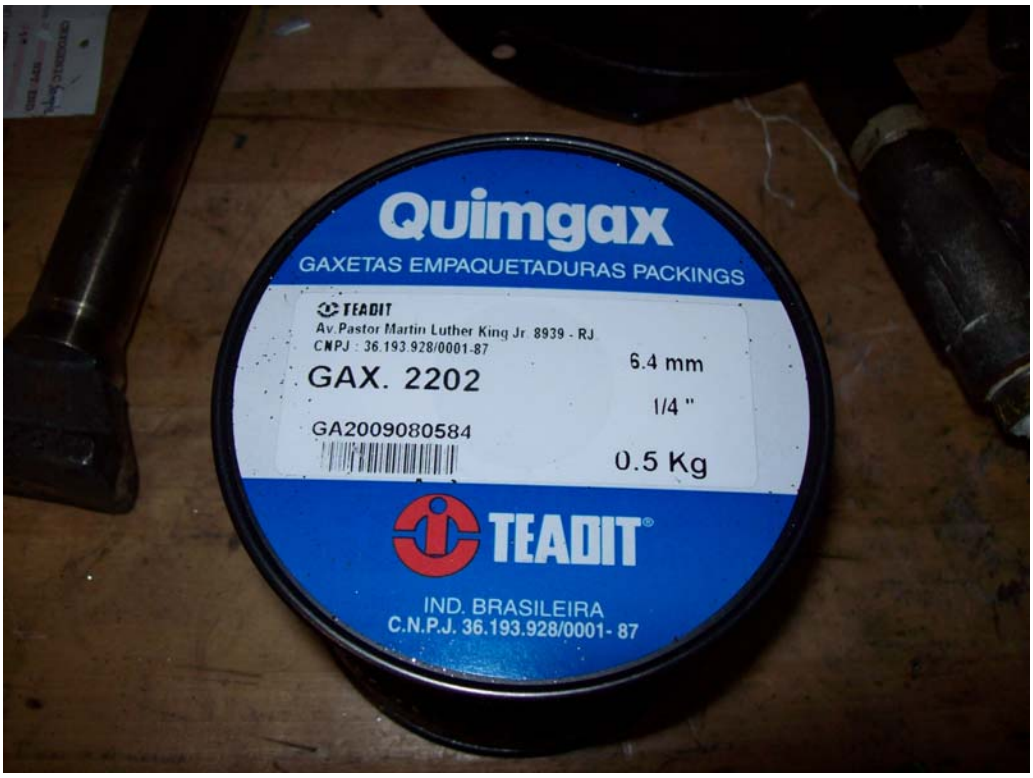

Packing rings cut from spool by Yarmouth prior to test

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4 inch Class 300 gate valve used as test fixture.

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Fire Test Information

Customer: Teadit North America **Date:** 9/15/2009

Product Code: Style 2202 packing in a 4 inch Cl300 Gate Valve

Project Number: PN209119

Fire Test Raw Data

Time	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
16:14:00	566	21801	60.6	132.8	96.7	122.2	160.6	141.4
16:14:15	566	21820	64.4	152.2	108.3	631.7	804.4	718.1
16:14:30	566	21789	81.1	185.0	133.1	799.4	941.1	870.3
16:14:45	566	21811	111.7	218.3	165.0	841.7	951.1	896.4
16:15:00	566	21781	150.6	250.6	200.6	943.9	921.1	932.5
16:15:15	566	21829	193.3	283.9	238.6	956.1	906.7	931.4
16:15:30	566	21803	236.1	316.1	276.1	960.0	908.3	934.2
16:15:45	566	21824	273.3	347.2	310.3	951.7	907.2	929.4
16:16:00	566	21811	305.0	376.1	340.6	974.4	903.3	938.9
16:16:15	566	21830	333.3	403.9	368.6	967.2	899.4	933.3
16:16:30	566	21844	359.4	429.4	394.4	954.4	888.9	921.7
16:16:45	566	21853	383.3	453.3	418.3	973.3	891.7	932.5
16:17:00	566	21853	406.1	475.6	440.8	976.1	898.3	937.2
16:17:15	566	21850	427.8	496.7	462.2	977.8	906.1	941.9
16:17:30	567	21883	448.9	516.7	482.8	978.9	932.2	955.6
16:17:45	567	21900	468.9	535.0	501.9	991.7	943.3	967.5
16:18:00	567	21909	486.7	552.2	519.4	997.8	950.6	974.2
16:18:15	567	21919	503.9	568.3	536.1	988.9	940.6	964.7
16:18:30	567	21919	520.0	583.3	551.7	1001.7	949.4	975.6
16:18:45	567	21939	534.4	597.2	565.8	1002.2	953.9	978.1
16:19:00	567	21931	547.8	610.0	578.9	1000.6	943.9	972.2
16:19:15	567	21927	560.6	621.7	591.1	997.8	943.3	970.6
16:19:30	567	22003	572.8	632.8	602.8	985.6	953.9	969.7
16:19:45	567	21990	583.3	642.8	613.1	973.3	932.2	952.8
16:20:00	567	22025	593.3	652.2	622.8	1005.6	940.0	972.8
16:20:15	567	22068	602.8	661.1	631.9	987.2	945.6	966.4
16:20:30	568	22017	611.7	669.4	640.6	990.0	943.3	966.7
16:20:45	568	22021	620.0	676.7	648.3	1014.4	936.7	975.6
16:21:00	568	22050	627.2	683.9	655.6	1009.4	937.8	973.6
16:21:15	568	22069	634.4	690.6	662.5	1009.4	926.7	968.1
16:21:30	568	22080	642.2	696.1	669.2	957.2	888.3	922.8
16:21:45	568	22099	649.4	701.1	675.3	890.6	892.2	891.4
16:22:00	568	21758	656.1	706.1	681.1	870.6	874.4	872.5

Fire Test Data - continued

16:22:15	568	21777	661.7	710.6	686.1	911.1	871.7	891.4
16:22:30	568	21811	667.8	715.0	691.4	910.0	891.1	900.6
16:22:45	568	21845	673.3	718.9	696.1	893.3	873.3	883.3
16:23:00	568	21784	678.3	722.8	700.6	916.1	866.7	891.4
16:23:15	564	21619	683.3	726.1	704.7	882.2	870.0	876.1
16:23:30	559	21387	687.2	728.9	708.1	872.2	883.9	878.1
16:23:45	556	21320	691.1	732.2	711.7	917.2	882.8	900.0
16:24:00	558	21466	695.0	734.4	714.7	873.9	873.3	873.6
16:24:15	559	21544	697.8	736.7	717.2	871.1	881.1	876.1
16:24:30	560	21609	701.1	738.3	719.7	852.2	862.2	857.2
16:24:45	560	21658	703.9	740.0	721.9	875.0	873.3	874.2
16:25:00	561	21690	707.2	741.1	724.2	922.2	862.8	892.5
16:25:15	562	21731	710.0	742.8	726.4	913.3	888.9	901.1
16:25:30	562	21790	712.8	744.4	728.6	895.6	863.9	879.7
16:25:45	562	21843	715.0	745.6	730.3	843.3	849.4	846.4
16:26:00	563	21796	717.2	747.2	732.2	830.6	856.7	843.6
16:26:15	563	21854	718.3	748.9	733.6	883.3	856.1	869.7
16:26:30	563	21888	719.4	750.6	735.0	877.8	866.7	872.2
16:26:45	564	21915	721.1	752.2	736.7	904.4	852.2	878.3
16:27:00	564	21937	722.8	753.9	738.3	921.7	858.3	890.0
16:27:15	564	21981	724.4	755.6	740.0	830.6	875.0	852.8
16:27:30	565	22003	725.0	756.1	740.6	807.2	838.3	822.8
16:27:45	565	22026	724.4	757.2	740.8	792.8	828.3	810.6
16:28:00	565	22046	724.4	758.3	741.4	778.9	856.7	817.8
16:28:15	565	22073	724.4	758.9	741.7	819.4	834.4	826.9
16:28:30	565	22088	725.0	759.4	742.2	801.7	848.9	825.3
16:28:45	565	22115	726.1	760.0	743.1	801.1	826.7	813.9
16:29:00	566	22145	726.7	761.1	743.9	800.6	822.8	811.7
16:29:15	566	22159	727.8	762.2	745.0	805.6	846.1	825.8
16:29:30	566	22192	728.3	763.3	745.8	815.0	817.8	816.4
16:29:45	566	22190	728.9	763.9	746.4	805.0	816.7	810.8
16:30:00	566	22290	728.9	765.0	746.9	812.2	836.7	824.4
16:30:15	566	22235	728.9	765.6	747.2	777.8	846.7	812.2
16:30:30	566	22259	729.4	766.1	747.8	783.3	833.9	808.6
16:30:45	567	22320	729.4	767.2	748.3	800.0	841.7	820.8
16:31:00	567	22330	730.0	767.8	748.9	809.4	836.1	822.8
16:31:15	567	22370	730.6	768.9	749.7	801.1	830.0	815.6
16:31:30	567	22391	731.1	769.4	750.3	823.3	832.2	827.8
16:31:45	567	22414	731.7	770.0	750.8	806.7	806.7	806.7
16:32:00	567	22453	732.2	770.6	751.4	802.8	817.8	810.3
16:32:15	567	22476	732.2	770.6	751.4	786.1	821.1	803.6
16:32:30	567	22498	732.2	771.1	751.7	802.8	818.9	810.8
16:32:45	568	22538	732.2	771.1	751.7	777.8	842.8	810.3

Fire Test Data - continued

16:33:00	568	22560	732.8	771.1	751.9	774.4	833.3	803.9
16:33:15	568	22561	733.3	771.7	752.5	777.2	846.7	811.9
16:33:30	568	22606	733.9	771.7	752.8	762.2	845.0	803.6
16:33:45	568	22661	733.9	772.2	753.1	803.3	812.2	807.8
16:34:00	569	22679	733.9	772.8	753.3	803.3	838.9	821.1
16:34:15	569	22715	734.4	773.3	753.9	792.2	828.9	810.6
16:34:30	569	22756	735.0	773.3	754.2	800.0	821.1	810.6
16:34:45	569	22794	735.0	773.9	754.4	821.1	790.0	805.6
16:35:00	570	22843	735.0	774.4	754.7	811.7	840.0	825.8
16:35:15	570	22884	735.6	775.0	755.3	803.3	832.2	817.8
16:35:30	570	22927	735.6	775.6	755.6	792.2	840.0	816.1
16:35:45	570	22967	736.1	775.6	755.8	806.7	832.8	819.7
16:36:00	570	23019	737.2	775.6	756.4	777.2	819.4	798.3
16:36:15	571	23086	737.2	775.6	756.4	792.2	831.1	811.7
16:36:30	571	23135	737.8	776.1	756.9	792.2	825.0	808.6
16:36:45	571	23230	737.8	776.7	757.2	803.9	827.2	815.6
16:37:00	572	23267	737.8	776.7	757.2	782.8	828.3	805.6
16:37:15	572	23362	737.2	776.7	756.9	811.1	871.1	841.1
16:37:30	573	23442	737.2	776.7	756.9	816.1	807.8	811.9
16:37:45	573	23539	737.8	776.7	757.2	813.3	817.8	815.6
16:38:00	574	23637	737.2	776.7	756.9	781.1	861.7	821.4
16:38:15	574	23712	737.8	776.7	757.2	751.7	836.7	794.2
16:38:30	575	23875	737.8	776.7	757.2	771.1	820.6	795.8
16:38:45	575	23997	738.3	777.2	757.8	761.7	840.0	800.8
16:39:00	576	24022	738.3	776.7	757.5	786.7	819.4	803.1
16:39:15	577	23957	738.3	777.2	757.8	799.4	830.6	815.0
16:39:30	578	24107	738.9	777.2	758.1	805.6	832.8	819.2
16:39:45	579	24358	738.9	777.2	758.1	840.6	831.7	836.1
16:40:00	581	24620	738.9	777.2	758.1	823.3	842.2	832.8
16:40:15	583	24894	738.9	777.2	758.1	822.8	833.3	828.1
16:40:30	585	25195	739.4	777.2	758.3	828.3	810.6	819.4
16:40:45	587	25295	739.4	777.2	758.3	822.8	804.4	813.6
16:41:00	590	25714	739.4	777.8	758.6	803.9	796.7	800.3
16:41:15	592	26093	739.4	778.3	758.9	813.9	831.1	822.5
16:41:30	595	26154	740.0	778.3	759.2	820.0	831.7	825.8
16:41:45	596	26005	740.6	778.3	759.4	778.9	831.1	805.0
16:42:00	597	27297	741.1	778.9	760.0	804.4	866.7	835.6
16:42:15	597	27340	741.7	778.9	760.3	819.4	812.8	816.1
16:42:30	596	25659	741.7	778.9	760.3	796.1	819.4	807.8
16:42:45	596	26915	742.2	778.9	760.6	805.6	810.6	808.1
16:43:00	598	27706	742.2	778.9	760.6	776.1	820.6	798.3
16:43:15	598	27768	742.2	779.4	760.8	793.3	794.4	793.9
16:43:30	599	27758	742.2	780.0	761.1	816.1	836.1	826.1

Fire Test Data - continued

16:43:45	599	27952	742.2	780.0	761.1	812.2	802.8	807.5
16:44:00	599	27932	742.2	779.4	760.8	825.0	818.9	821.9
16:44:15	599	27610	739.4	777.2	758.3	590.6	573.9	582.2
16:44:30	599	26409	730.0	766.1	748.1	456.7	411.7	434.2
16:44:45	597	26103	715.6	751.7	733.6	378.9	326.1	352.5
16:45:00	598	27183	700.6	738.3	719.4	327.2	271.7	299.4
16:45:15	599	27438	685.6	725.0	705.3	287.2	236.7	261.9
16:45:30	598	26650	671.1	711.1	691.1	234.4	142.8	188.6
16:45:45	598	26447	656.7	695.6	676.1	223.3	146.7	185.0
16:46:00	598	26966	643.9	680.6	662.2	128.3	93.3	110.8
16:46:15	596	26549	621.1	662.8	641.9	67.2	78.3	72.8
16:46:30	594	26135	544.4	632.8	588.6	52.8	54.4	53.6
16:46:45	590	25570	511.7	611.1	561.4	51.1	47.2	49.2
16:47:00	588	25116	499.4	596.7	548.1	50.0	45.0	47.5
16:47:15	584	24411	471.7	574.4	523.1	41.7	57.8	49.7
16:47:30	578	23080	367.8	458.9	413.3	55.0	42.2	48.6
16:47:45	570	21473	265.0	303.9	284.4	51.7	37.2	44.4
16:48:00	567	21105	191.7	184.4	188.1	55.0	48.3	51.7
16:48:15	567	21019	145.0	100.0	122.5	48.9	27.2	38.1
16:48:30	567	20979	112.2	63.9	88.1	43.3	28.9	36.1
16:48:45	568	20916	88.9	49.4	69.2	28.9	24.4	26.7
16:49:00	568	20887	71.1	33.9	52.5	33.9	30.0	31.9
16:49:15	568	20872	58.3	32.8	45.6	33.9	33.9	33.9
16:49:30	568	20871	50.0	31.1	40.6	22.2	33.9	28.1
16:49:45	568	20824	42.8	28.3	35.6	34.4	37.2	35.8
16:50:00	568	20769	37.8	29.4	33.6	41.7	39.4	40.6
16:50:15	568	20739	35.6	30.6	33.1	37.8	32.8	35.3
16:50:30	568	20705	33.9	31.1	32.5	37.8	31.7	34.7
16:50:45	568	20652	32.8	31.1	31.9	33.3	28.3	30.8
16:51:00	568	20652	31.7	30.6	31.1	30.0	27.2	28.6
16:51:15	568	20626	30.6	31.1	30.8	32.2	30.6	31.4
16:51:30	568	20613	30.0	31.1	30.6	29.4	28.9	29.2
16:51:45	568	20594	29.4	31.7	30.6	28.9	27.2	28.1
16:52:00	568	20590	29.4	30.6	30.0	26.7	26.1	26.4
16:52:15	568	20581	30.0	31.1	30.6	26.1	25.6	25.8
16:52:30	568	20566	29.4	31.1	30.3	25.6	25.6	25.6
16:52:45	568	20568	29.4	31.1	30.3	26.1	25.0	25.6
16:53:00	568	20555	29.4	30.6	30.0	26.1	25.0	25.6
16:53:15	568	20566	29.4	30.6	30.0	25.0	24.4	24.7
16:53:30	568	20574	29.4	30.6	30.0	23.3	23.3	23.3
16:53:45	568	20560	28.9	30.0	29.4	22.8	22.8	22.8
16:54:00	568	20536	28.9	30.0	29.4	21.7	22.2	21.9

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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:	1265	mls
Water Collected in System Relief Valve:	0	mls
Calculated External Leakage During 40 Minute Duration:	1265	mls
Average Leak Rate Over 40 Minute Duration:	31.6	ml/min
Allowable Leak Rate:	400	ml/min

Were the Valve Leakages Below the Allowables?	**Yes**

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:	599.5	psig
Average Pressure During Burn/Cool Down:	572.4	psig
Minimum Pressure During Burn/Cool Down:	556.3	psig
Amount of Time of Avg. Cal Block > 650 deg.C:	23.0	minutes
Minimum Allowable Time at Temperature:	15.0	minutes
Maximum Avg Cal Block Temperature:	742.2	deg. C
Average Cal Block Temperature:	548.5	deg. C
Lowest Avg Cal. Block Temperature:	28.9	deg. C
Maximum Body Flame Temperature During Burn:	953.9	deg. C
Average Body Flame Temperature During Burn:	854.3	deg. C
Maximum Bonnet Flame Temperature During Burn:	1014.4	deg. C
Average Bonnet Flame Temperature During Burn:	850.9	deg. C
Average of Both Flame Temperatures During Burn:	852.6	deg. C

Note

Were Test Conditions Within Compliance?	**Yes**

Yarmouth Research and Technology

Operational Test Information

Customer: Teadit North America **Date:** 9/15/2009

Product Code: Style 2202 packing in a 4 inch Cl300 Gate Valve

Project Number: PN209119

Valve cycled 1 time prior to leakage reading.

Test Data

Time	Pressure (psig)	Cal Block Temp - C
17:00:06	567	76
17:00:21	567	76
17:00:36	567	77
17:00:51	567	76
17:01:06	567	76
17:01:21	567	76
17:01:36	567	76
17:01:51	567	76
17:02:06	567	75
17:02:21	567	75
17:02:36	567	75
17:02:51	567	75
17:03:06	567	75
17:03:21	567	75
17:03:36	567	75
17:03:51	567	74
17:04:06	567	75
17:04:21	567	74
17:04:36	567	74
17:04:51	567	74
17:05:06	567	74

Leakages were collected manually.

Total External Leakage Collected Over 5 Minute Duration:	0.0	mls
Average Leak Rate Over 5 Minute Duration:	0.0	ml/min
Allowable Leak Rate:	100	ml/min

Was the Valve Leakage Below the Allowable?	**Yes**