

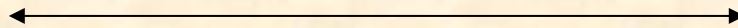
Fire Test Report

ANSI/API Standard 607, 7th Edition, 2016
ISO 10497: 2010

Performed for

Copeland Industries, Inc.

www.copelandvalves.com



2 inch Class 900 Ball Valve (BV Series)
Valve Code: BV02FB0401D410SS01BS

Project Number: 217202

Test Date: June 9, 2017



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

Customer: Copeland Industries, Inc.

Date: 6/9/2017

Specification: ANSI/API Standard 607, Seventh Edition, 2016

ISO 10497: 2010

Product Description: 2 inch Class 900 Ball Valve (BV Series)

Valve Code: BV02FB0401D410SS01BS

Project Number: 217202

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:	14:40:00	
Average Pressure During Burn:	1614	psig
Seat Leak Rate During Burn:	0	ml/min
Allowable Seat Leak Rate:	800	ml/min
External Leak Rate During Burn/Cool Down:	2.9	ml/min
Allowable External Leak Rate:	200	ml/min
Amount of Time of Avg. Cal. Blocks > 650 deg. C:	23.3	minutes
Were Test Conditions Within Compliance?	Yes	
Were the Valve Leakages Below the Allowables?	Yes	

Operational Test

Average Pressure During Test:	1596	psig
External Leak Rate After Operating:	0	ml/min
Allowable External Leak Rate:	50	ml/min
Was the Leakage Below the Allowable?	Yes	
Does Valve Pass or Fail the Test Standard?	PASS	

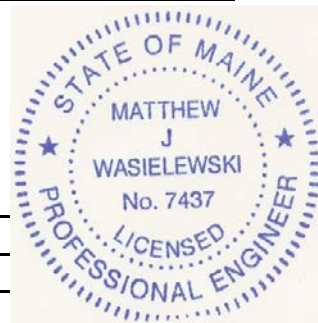
Certified by



Matthew J. Wasielewski, PE

President and Manager

Yarmouth Research & Technology, LLC

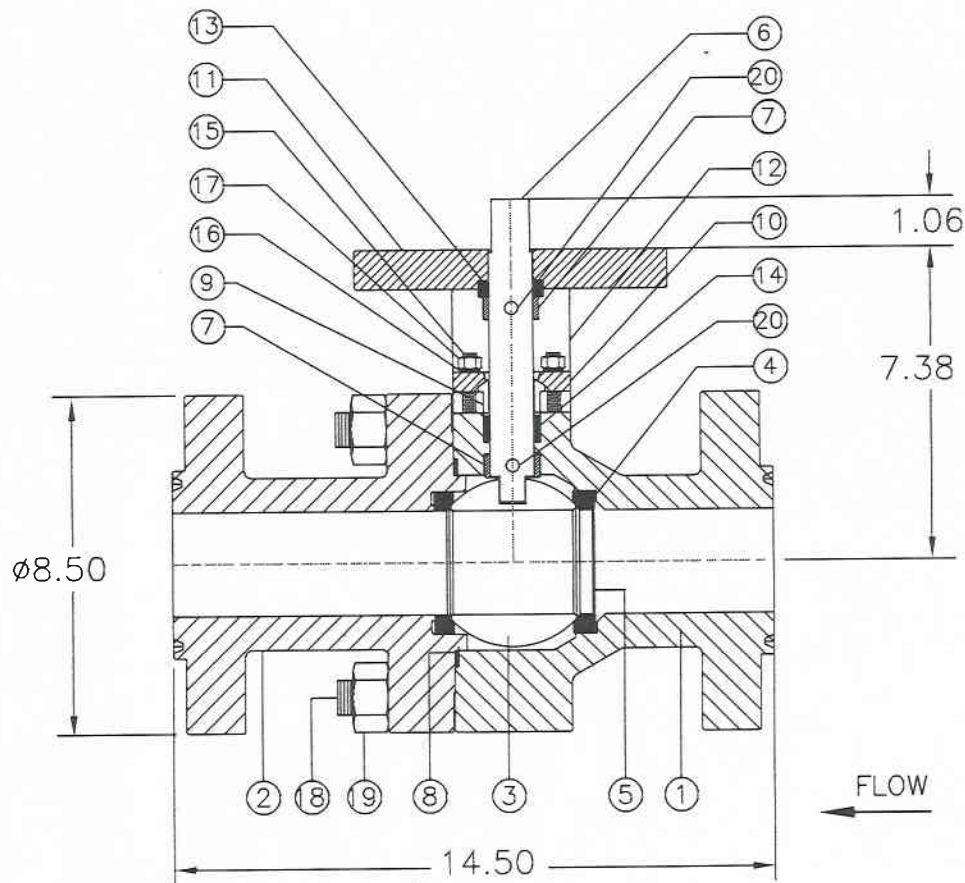


YARMOUTH RESEARCH AND TECHNOLOGY, LLC

Fire Test Information Sheet

Fire Test Specification and Revision: (ie. API 607 6th, API 6FA 3rd, etc)	API 607 7th
Yarmouth Proposal/Quote Number:	217202A
Customer Purchase Order Number:	11853-V
Customer's Contact Name:	AJ House
Valve Manufacturer's Name (used in test report as specified):	Copeland Industries, Inc.
Company Web Address for Report Cover:	www.copelandvalves.com
Valve Manufacturer's Address:	6841 Avenue U Houston, TX 77011 USA
Did valve meet all required hydrostatic, leakage and other production pressure tests?	Yes.
Valve Description for Report Cover:	2 inch Class 900 Ball Valve (BV series)
Valve Product Code:	BV02FB0401D410SS01BS
Valve Description	
Size:	2 inch
Pressure Rating/Class:	ANSI Class 900
Pressure Rating at 100F:	2160 (psig)
Type:	Ball Valve (BV series)
Weight:	145 lbs
Reduced or Full Bore:	Full Bore
Body/Bonnet Material:	316 SS
Trim Material:	410 SS
Seat Material:	410 SS
Stem Seal Material:	316 SS
Body Seal Material:	304 SS / Grafoil
Bolting Material:	A193
Is valve considered "Soft-Seated"?	No. Valve considered "Metal-Seated"
Valve Markings	
Nameplate Information:	COPELAND 2" 900# S.N. 1972
Casting Markings:	
Assembly Drawing Number / Revision / Date of Issue:	1024000-BV
Emailed (PDF) to Yarmouth: Date:	6/2/2017
If valve is fitted with gearbox, state gearbox manufacturer, model number and mechanical advantage:	N.A.
If valve is non-symmetric, state direction of flow for test:	Flow is from right-to-left
For double-seated valves, state maximum allowable cavity pressure:	N.A.
Form Submission Date:	6/2/2017

PLEASE RETURN AS AN EXCEL DOCUMENT



JOB NO.
 JOB TRIM NO.
 JOB NAME:
 DATE:
 TAG:

ASSEMBLY
 2" 900# CLASS RF BALL VALVE
 FOR YARMOUTH API 607 TEST

BILL OF MATERIAL

NO.	DESCRIPTION	MATERIAL
01	BODY	316 SS
02	END CONNECT	316 SS
03	BALL CFS-131	410 SS
04	SEAT CFS-131	410 SS
05	SPRING	17-4 PH
06	STEM	316 SS
07	THRUST COLLAR	431 SS
08	BODY SEAL	304 SS/GRAPHOIL
09	PACKING FOLLOWER	431 SS
10	GILAND FLANGE	431 SS
11	MOUNTING FLANGE	316 SS
12	MOUNTING LEG	316 SS
13	GUIDE BEARING	NITRONIC
14	PACKING	GRAFOIL
15	PACKING BOLT	A-193' B8
16	LOAD SPRING	17-7 PH
17	PACKING NUT	A-194 B8
18	BODY BOLT	A-193 B8
19	BODY NUT	A-194 B8
20	LOAD PIN	INCONEL718

COPELAND
 INDUSTRIES INC.
 HOUSTON, TX. 77011

ASSEMBLY
 2" 900# CLASS RF BALL VALVE
 FOR YARMOUTH API 607 TEST

UNLESS OTHERWISE SPEC.
 ALL DIMS. IN MILIMETER

.XX _____ ±.794
 .XXX _____ ±.3
 FRACTIONAL _____ ±.0397
 CONCENTRICITY _____ .3 T.I.R.
 ANGULARITY _____ ±0'30"
 BREAK SHARP EDGES _____ .3-.397

THIS DRAWING AND THE INFORMATION
 DISCLOSED HEREIN ARE THE PROPERTY
 OF COPELAND INDUSTRIES, INC. AND
 ARE NOT TO BE CONVEYED, USED, OR
 REPRODUCED UNLESS SPECIFICALLY
 AUTHORIZED IN WRITING BY
 COPELAND INDUSTRIES, INC.

MATERIAL

HEAT TREAT



DWN.
L.T.N.

CHK.
DATE

APPR.
DATE

SCALE
N/A

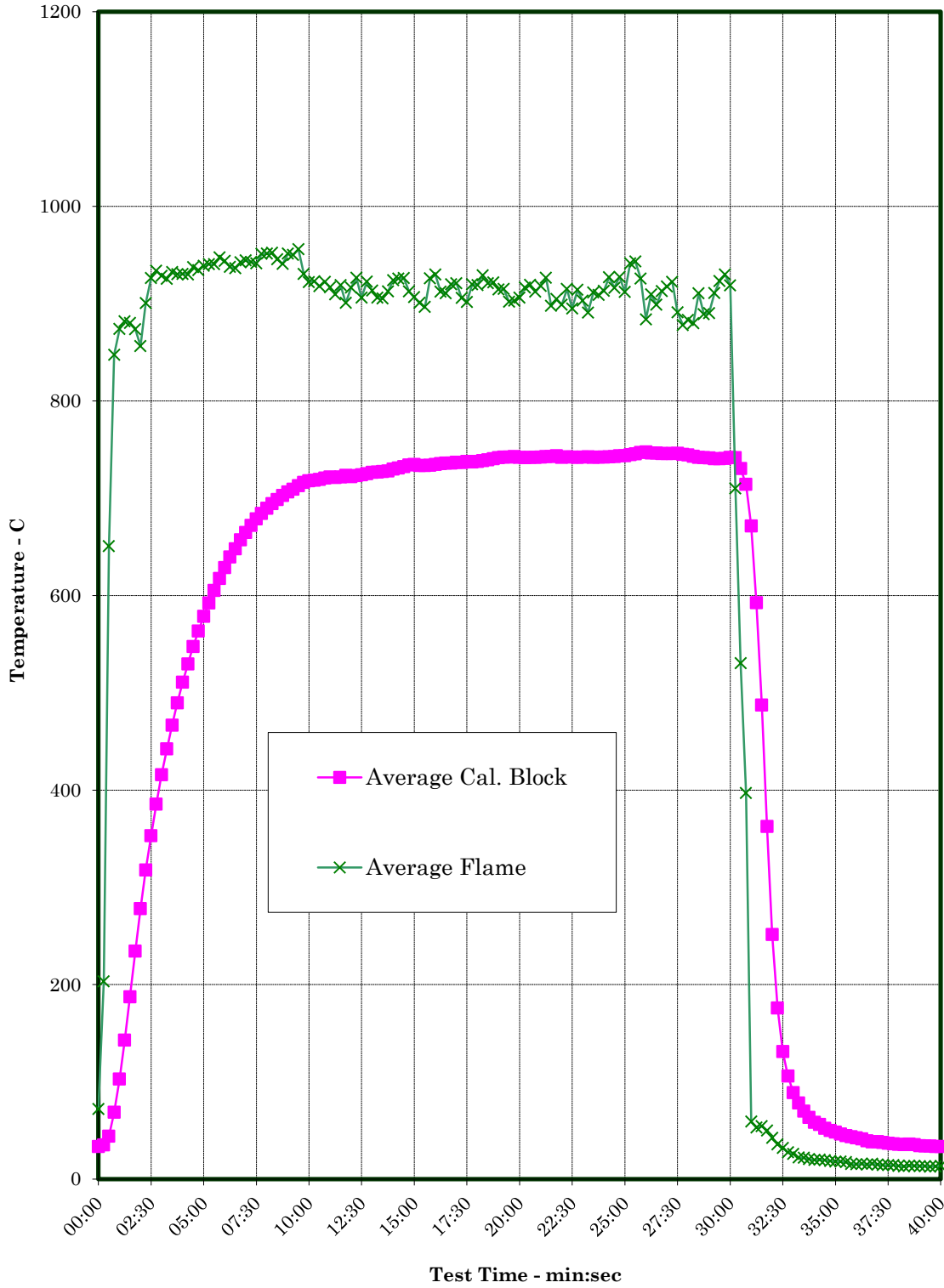
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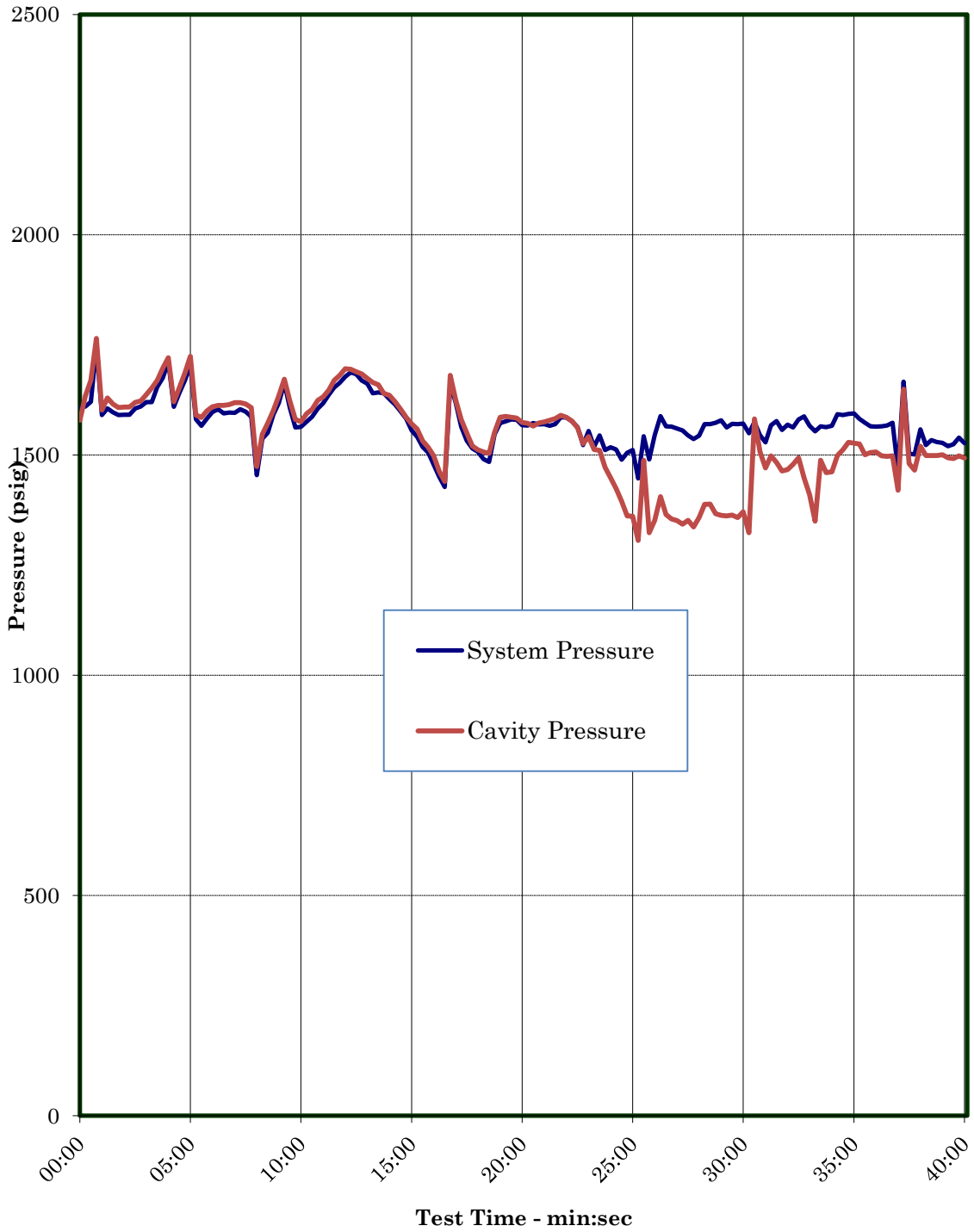
2" 900# CLASS RF

JUNE 02 17

Temperature verses Time Chart



Pressure verses Time Chart



Yarmouth Research and Technology, LLC



Valve Markings



Test Setup

Yarmouth Research and Technology, LLC



Test Valve During Burn

Yarmouth Research and Technology, LLC

Fire Test Information

Customer: Copeland Industries, Inc.

Date: 6/9/2017

Product Code: 2 inch Class 900 Ball Valve (BV Series)

Project Number: 217202

Fire Test Raw Data

Time	Pressure (psig)	Water Volume (mls)	Cavity Pressure (psig)	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
14:40:00	1607	38169	1579	35	32	34	100	44	72
14:40:15	1610	38175	1634	37	34	35	116	291	203
14:40:30	1621	38148	1670	46	42	44	551	751	651
14:40:45	1747	38188	1765	72	66	69	867	828	848
14:41:00	1591	38223	1602	108	97	103	949	798	874
14:41:15	1606	38111	1630	148	137	143	977	787	882
14:41:30	1597	38146	1616	195	180	188	978	783	880
14:41:45	1591	38095	1608	243	226	234	988	759	874
14:42:00	1591	38231	1609	291	265	278	987	726	856
14:42:15	1592	38121	1609	335	301	318	991	810	901
14:42:30	1606	38125	1620	374	332	353	996	857	926
14:42:45	1610	38161	1623	408	363	386	996	872	934
14:43:00	1620	38181	1637	439	392	416	1000	857	929
14:43:15	1620	38108	1652	467	418	442	1001	851	926
14:43:30	1655	38126	1670	492	442	467	1001	864	933
14:43:45	1675	38145	1697	515	464	489	1002	858	930
14:44:00	1712	38150	1721	536	486	511	1006	856	931
14:44:15	1610	38134	1621	556	503	529	1007	853	930
14:44:30	1641	38253	1653	573	522	548	1008	867	938
14:44:45	1669	38174	1686	589	537	563	1004	865	934
14:45:00	1704	38151	1724	605	552	579	1003	874	939
14:45:15	1582	38241	1591	619	566	592	1012	869	941
14:45:30	1567	38119	1585	632	578	605	1016	865	941
14:45:45	1583	38152	1600	644	591	618	1019	876	948
14:46:00	1598	38113	1610	655	602	629	1017	871	944
14:46:15	1604	38168	1613	666	613	639	1001	874	938
14:46:30	1594	38165	1613	674	622	648	1003	869	936
14:46:45	1596	38176	1615	682	632	657	1001	884	943
14:47:00	1596	38116	1619	689	640	665	1001	888	944
14:47:15	1604	38144	1619	696	648	672	990	896	943
14:47:30	1598	38109	1616	702	655	679	986	897	941
14:47:45	1587	38080	1608	707	661	684	999	903	951
14:48:00	1455	38082	1474	712	667	690	998	904	951

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Fire Test Data - continued

14:48:15	1537	38120	1547	717	672	694	999	905	952
14:48:30	1551	38104	1573	721	676	699	983	908	946
14:48:45	1592	38099	1601	725	681	703	981	901	941
14:49:00	1618	38094	1635	729	683	706	991	912	951
14:49:15	1664	38098	1672	732	686	709	991	909	950
14:49:30	1607	38096	1623	736	690	713	1007	905	956
14:49:45	1563	38114	1581	739	693	716	987	874	931
14:50:00	1564	38120	1576	742	694	718	983	862	922
14:50:15	1576	38109	1594	743	693	718	955	891	923
14:50:30	1587	38110	1604	745	693	719	957	879	918
14:50:45	1605	38123	1624	747	694	721	961	884	923
14:51:00	1618	38103	1632	748	695	722	961	873	917
14:51:15	1637	38112	1647	749	693	721	974	845	909
14:51:30	1654	38123	1670	751	693	722	972	867	919
14:51:45	1664	38088	1681	753	694	723	968	834	901
14:52:00	1678	38110	1696	754	690	722	969	864	917
14:52:15	1688	38118	1695	756	691	723	964	889	927
14:52:30	1684	38104	1689	757	691	724	961	851	906
14:52:45	1669	38112	1684	759	692	725	962	883	923
14:53:00	1663	38103	1674	761	693	727	973	854	913
14:53:15	1641	38090	1665	762	692	727	957	856	906
14:53:30	1642	38147	1660	764	691	728	953	857	905
14:53:45	1641	38136	1640	765	691	728	947	878	913
14:54:00	1627	38111	1636	767	693	730	952	897	924
14:54:15	1615	38120	1621	768	694	731	949	903	926
14:54:30	1599	38085	1604	768	697	733	961	892	926
14:54:45	1583	38096	1586	769	699	734	967	858	913
14:55:00	1556	38108	1571	771	698	735	967	847	907
14:55:15	1542	38120	1559	772	696	734	963	838	901
14:55:30	1518	38100	1532	773	694	734	943	851	897
14:55:45	1506	38112	1518	773	694	734	974	878	926
14:56:00	1478	38151	1498	774	695	735	977	883	930
14:56:15	1451	38141	1463	776	695	736	967	858	912
14:56:30	1427	38269	1440	777	695	736	974	847	911
14:56:45	1663	38119	1681	778	694	736	974	866	920
14:57:00	1618	38071	1625	779	694	737	962	880	921
14:57:15	1564	38092	1580	780	693	737	952	860	906
14:57:30	1533	38161	1550	781	694	738	965	838	902
14:57:45	1515	38051	1521	782	692	737	956	884	920
14:58:00	1508	38261	1512	782	693	738	956	882	919
14:58:15	1491	38055	1507	783	694	739	961	897	929
14:58:30	1485	38296	1504	784	695	739	947	895	921
14:58:45	1547	38067	1552	784	697	741	959	884	922

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Fire Test Data - continued

14:59:00	1573	38211	1586	784	699	742	952	877	914
14:59:15	1576	38223	1588	784	700	742	949	881	915
14:59:30	1581	38124	1586	785	699	742	954	850	902
14:59:45	1580	37934	1584	786	700	743	959	847	903
15:00:00	1568	38318	1574	786	698	742	968	844	906
15:00:15	1567	38269	1572	787	697	742	952	882	917
15:00:30	1573	38325	1566	787	697	742	958	881	919
15:00:45	1569	38038	1573	787	697	742	971	854	912
15:01:00	1570	38030	1575	787	697	742	953	883	918
15:01:15	1567	38100	1579	788	698	743	963	890	927
15:01:30	1570	38076	1583	787	698	743	955	841	898
15:01:45	1586	38059	1590	788	699	744	957	852	905
15:02:00	1585	38042	1586	788	696	742	968	830	899
15:02:15	1577	38112	1577	789	696	743	963	867	915
15:02:30	1563	38027	1562	789	695	742	954	836	895
15:02:45	1523	38150	1526	790	694	742	966	863	914
15:03:00	1555	38122	1542	791	694	742	974	832	903
15:03:15	1519	38155	1513	792	693	743	954	827	891
15:03:30	1544	38148	1511	792	692	742	963	859	911
15:03:45	1511	38112	1472	792	692	742	955	863	909
15:04:00	1518	38100	1448	792	692	742	964	862	913
15:04:15	1513	37942	1424	792	693	743	982	873	927
15:04:30	1490	38115	1395	793	693	743	979	854	916
15:04:45	1505	38015	1362	794	693	744	978	877	928
15:05:00	1511	38103	1361	794	693	744	968	856	912
15:05:15	1447	38155	1306	795	694	745	994	889	941
15:05:30	1543	38106	1488	796	696	746	992	894	943
15:05:45	1490	37878	1324	797	697	747	969	882	926
15:06:00	1545	37920	1352	796	699	748	946	822	884
15:06:15	1588	38115	1406	796	697	746	946	873	909
15:06:30	1566	37925	1365	794	698	746	949	849	899
15:06:45	1565	38111	1355	794	697	746	969	856	913
15:07:00	1560	37911	1351	795	697	746	975	861	918
15:07:15	1556	37868	1343	796	696	746	973	872	923
15:07:30	1544	38015	1352	796	697	746	951	831	891
15:07:45	1537	38021	1337	796	694	745	968	788	878
15:08:00	1544	38080	1358	796	693	744	974	792	883
15:08:15	1570	37874	1388	796	690	743	972	788	880
15:08:30	1570	37775	1389	797	687	742	968	853	911
15:08:45	1573	37887	1367	797	687	742	964	814	889
15:09:00	1579	38028	1363	797	686	741	962	818	890
15:09:15	1563	37787	1362	797	684	741	981	841	911
15:09:30	1571	38031	1364	797	684	741	988	858	923

Yarmouth Research and Technology, LLC

Fire Test Data - continued

15:09:45	1570	37831	1358	798	684	741	982	878	930
15:10:00	1572	37723	1371	798	686	742	979	858	919
15:10:15	1550	37823	1324	797	686	742	752	668	710
15:10:30	1576	37626	1582	785	676	731	564	497	530
15:10:45	1545	37907	1508	768	661	714	424	370	397
15:11:00	1529	37666	1471	726	617	671	50	68	59
15:11:15	1567	37639	1498	667	518	593	48	58	53
15:11:30	1577	37752	1483	591	383	487	53	56	54
15:11:45	1557	37688	1464	447	278	363	46	54	50
15:12:00	1569	37783	1467	291	212	251	36	49	43
15:12:15	1563	37708	1479	182	169	176	29	42	36
15:12:30	1581	37565	1494	122	140	131	27	37	32
15:12:45	1588	37721	1448	91	121	106	24	31	28
15:13:00	1567	37539	1410	72	106	89	22	29	26
15:13:15	1554	37510	1350	61	96	78	20	24	22
15:13:30	1565	37645	1488	52	88	70	19	24	22
15:13:45	1563	37591	1460	47	80	63	18	23	21
15:14:00	1567	37642	1462	43	74	58	18	22	20
15:14:15	1593	37394	1499	41	72	56	17	23	20
15:14:30	1591	37439	1512	38	66	52	17	22	19
15:14:45	1593	37555	1529	37	63	50	16	21	19
15:15:00	1595	37394	1527	36	61	48	16	21	18
15:15:15	1582	37391	1525	34	58	46	16	21	18
15:15:30	1574	37611	1501	33	56	45	15	20	18
15:15:45	1565	37541	1506	32	55	44	14	17	16
15:16:00	1565	37351	1507	32	53	43	14	16	15
15:16:15	1565	37651	1498	31	52	41	14	18	16
15:16:30	1567	37308	1497	30	49	39	14	16	15
15:16:45	1573	37269	1498	30	47	38	14	18	16
15:17:00	1466	37431	1420	29	48	39	13	17	15
15:17:15	1667	37227	1650	29	46	38	13	16	14
15:17:30	1503	37397	1481	29	45	37	13	16	14
15:17:45	1501	37487	1466	29	44	36	13	16	14
15:18:00	1558	37351	1520	29	43	36	13	14	14
15:18:15	1523	37321	1499	29	42	36	12	14	13
15:18:30	1534	37285	1499	28	44	36	13	15	14
15:18:45	1530	37327	1499	28	43	36	13	14	14
15:19:00	1527	37356	1501	28	41	34	12	14	13
15:19:15	1520	37245	1494	28	41	34	12	14	13
15:19:30	1525	37207	1492	28	41	34	12	13	13
15:19:45	1539	37431	1498	28	39	34	12	14	13
15:20:00	1527	37528	1493	28	39	33	12	16	14

Yarmouth Research and Technology, LLC

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 Through Seat Leakage Collected Over 30 Minute Duration:	0	mls
Average Leak Rate Over 30 Minute Duration:	0	ml/min
Allowable Leak Rate:	800	ml/min
Total Through Seat Leakage Collected Over 10 Minute Cool Down:	0	mls
Total Water Volume Lost Over 40 Minute Burn and Cool Down:	641	mls
Water Collected in System Relief Valve:	525	mls
Calculated External Leakage During 40 Minute Duration:	116	mls
Average Leak Rate Over 40 Minute Duration:	2.9	ml/min
Allowable Leak Rate:	200	ml/min
Were the Valve Leakages Below the Allowables?	Yes	

Yarmouth Research and Technology, LLC

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:	1747	psig
Average Pressure During Burn/Cool Down:	1575	psig
Minimum Pressure During Burn/Cool Down:	1427	psig
Amount of Time of Avg. Cal Block > 650 deg.C:	23.3	minutes
Minimum Allowable Time at Temperature:	15.0	minutes
Maximum Avg Cal Block Temperature:	748	deg. C
Average Cal Block Temperature:	531	deg. C
Lowest Avg Cal. Block Temperature:	33.3	deg. C
Maximum Body Flame Temperature During Burn:	912	deg. C
Average Body Flame Temperature During Burn:	851	deg. C
Maximum Bonnet Flame Temperature During Burn:	1019	deg. C
Average Bonnet Flame Temperature During Burn:	958	deg. C
Average of Both Flame Temperatures During Burn:	904	deg. C

Notes

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

Post-Burn Seat Test Information

Customer: Copeland Industries, Inc.

Date: 6/9/2017

Product Code: 2 inch Class 900 Ball Valve (BV Series)

Project Number: 217202

This test is not required for this pressure class.

Yarmouth Research and Technology, LLC

Operational Test Information

Customer: Copeland Industries, Inc.

Date: 6/9/2017

Product Code: 2 inch Class 900 Ball Valve (BV Series)

Project Number: 217202

Test Data

Time	Pressure (psig)	Cal Block Temp - C
15:27:11	1639	33
15:27:26	1633	33
15:27:41	1617	33
15:27:56	1601	32
15:28:11	1604	32
15:28:26	1607	33
15:28:41	1604	33
15:28:56	1613	34
15:29:11	1613	33
15:29:26	1559	33
15:29:41	1526	33
15:29:56	1587	33
15:30:11	1556	34
15:30:26	1616	32
15:30:41	1597	34
15:30:56	1563	34
15:31:11	1634	34
15:31:26	1604	34
15:31:41	1579	34
15:31:56	1549	34
15:32:11	1625	34

Leakages were collected manually.

Total External Leakage Collected Over 5 Minute Duration:	0	mls
Average Leak Rate Over 5 Minute Duration:	0	ml/min
Allowable Leak Rate:	50	ml/min

Was the Valve Leakage Below the Allowable?	Yes
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