

# **Fire Test Report**

**ANSI/API Standard 607, 6th Edition, 2010**

**ISO 10497: 2010**

*Performed for*

**Valvtechnologies, Inc.**

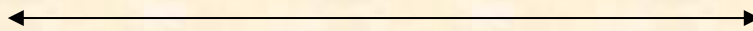
[www.valv.com](http://www.valv.com)



4 inch Class 900 Ball Valve  
V72D-JJ-RP-B040-006EM-001

Project Number: 213199

Test Date: Aug. 16, 2013



*Performed by*

**YARMOUTH RESEARCH AND TECHNOLOGY, LLC**

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

[info@yarmouthresearch.com](mailto:info@yarmouthresearch.com)

[www.yarmouthresearch.com](http://www.yarmouthresearch.com)

# Yarmouth Research and Technology, LLC

**Customer:** Valvtechnologies Inc.

**Date:** 8/16/2013

**Specification:** ANSI/API Standard 607, Sixth Edition, 2010  
ISO 10497:2010

**Product Description:** 4 inch Class 900 Reduced Bore Ball Valve

**Project Number:** PN213199

**Comments:** V72D-JJ-RP-B040-006EM-001

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

**Equipment Confirmed to be in Calibration to NIST Standards:** Yes

***Burn and Cool Down Test***

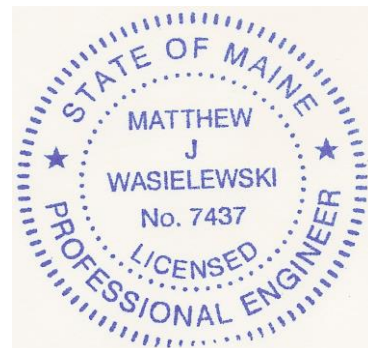
|  |          |         |
|--|----------|---------|
| Burn Start Time:                                 | 13:58:00 |         |
| Average Pressure During Burn:                    | 1623     | psig    |
| Seat Leak Rate During Burn:                      | 6.3      | ml/min  |
| Allowable Seat Leak Rate:                        | 1600     | ml/min  |
| External Leak Rate During Burn/Cool Down:        | 0.8      | ml/min  |
| Allowable External Leak Rate:                    | 400      | ml/min  |
| Amount of Time of Avg. Cal. Blocks > 650 deg. C: | 22.8     | 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:                     | 1603        | psig   |
| External Leak Rate After Operating:               | 4.0         | ml/min |
| Allowable External Leak Rate:                     | 100         | ml/min |
| Was the Leakage Below the Allowable?              | Yes         |        |
| <b>Does Valve Pass or Fail the Test Standard?</b> | <b>PASS</b> |        |

*Witnesses*

*Matthew J. Wasielewski*



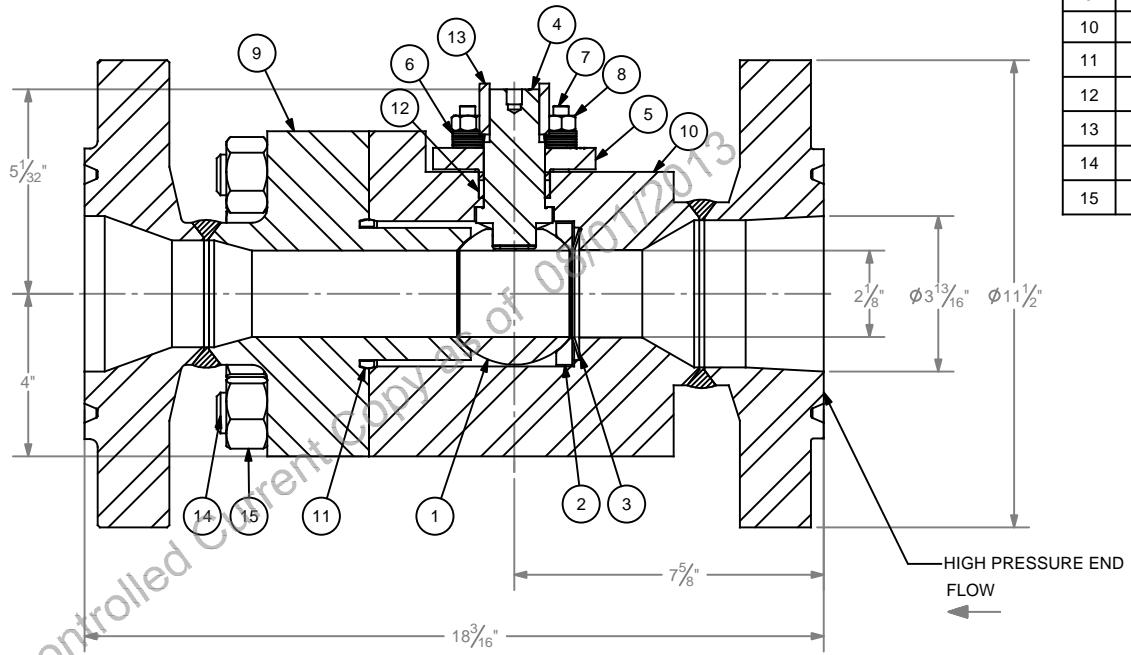
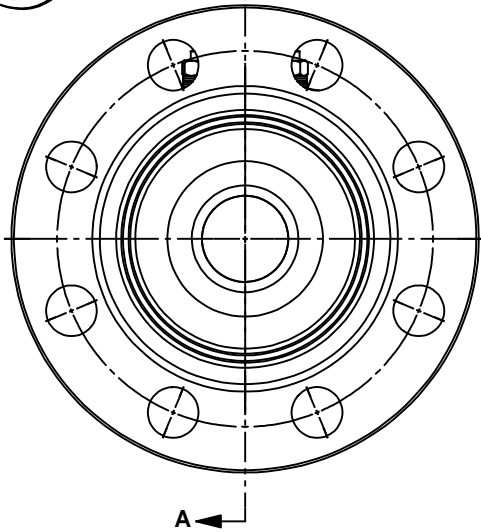
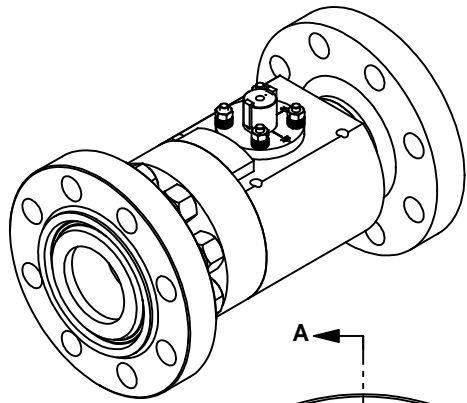
---

**YARMOUTH RESEARCH AND TECHNOLOGY**

---

**Fire Test Information Sheet**

|   |   |
|---|---|
| Valve Manufacturer's Name:  | VALVTECHNOLOGIES INC.   |
| Valve Manufacturer's Address:   | 5904 BINGLE RD<br>HOUSTON TX 77092  |
| Did valve meet all required hydrostatic, leakage and other production pressure tests?   | YES   |
| Valve Product Code:   |   |
| Valve Description<br>Size:<br>Pressure Rating:<br>Pressure Rating at 100F:<br>Type:<br>Weight:<br>Reduced or Full Bore:<br>Body/Bonnet Material:<br>Trim Material:<br>Seat Material:<br>Stem / Body Seal Material:<br>Bolting Material:<br>Is valve considered "Soft-Seated"? | 4" 900# 2.13" Bore,<br>900#<br>2160 psig<br>Metal seated ball valve<br>34 lbs<br>Reduced Bore<br>SA182-316H<br>Spring/ SB-637 N07718<br>SA182-316H<br>SA-638 660/ SB-637 N07718<br>SA-453 660<br>NO |
| Valve Markings<br>Nameplate Information:<br>Casting Markings:   | Serial #: 13102560  |
| Assembly Drawing Number / Revision / Date of Issue:   | 130141-002/ 07/10/13 Rev 1  |
| Assembly Drawing sent to Yarmouth:  | YES   |
| 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:  |   |
| For double-seated valves, state maximum allowable cavity pressure:  |   |
| Manufacturer's Contact Name /Date:  | Quintin Archie 08/02/13   |

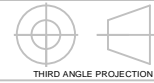


SECTION A-A

| BILL OF MATERIALS |                   |      |
|-------------------|-------------------|------|
| ITEM              | DESCRIPTION       | QTY. |
| 1                 | BALL              | 1    |
| 2                 | UPSTREAM SEAT     | 1    |
| 3                 | BELLEVILLE SPRING | 1    |
| 4                 | STEM              | 1    |
| 5                 | GLAND             | 1    |
| 6                 | GLAND SPRING      | 24   |
| 7                 | GLAND STUD        | 4    |
| 8                 | GLAND NUT         | 4    |
| 9                 | END CAP           | 1    |
| 10                | BODY              | 1    |
| 11                | BODY GASKET       | 1    |
| 12                | GLAND PACKING     | 1    |
| 13                | KEY               | 2    |
| 14                | BODY STUD         | 8    |
| 15                | BODY NUT          | 8    |

CUSTOMER NAME: VALVTECHNOLOGIES INC.  
 CUSTOMER REF.: R&D FOR SO#122097  
 PROJECT NAME: FIRE SAFE CERT. FOR VTI SO#122097

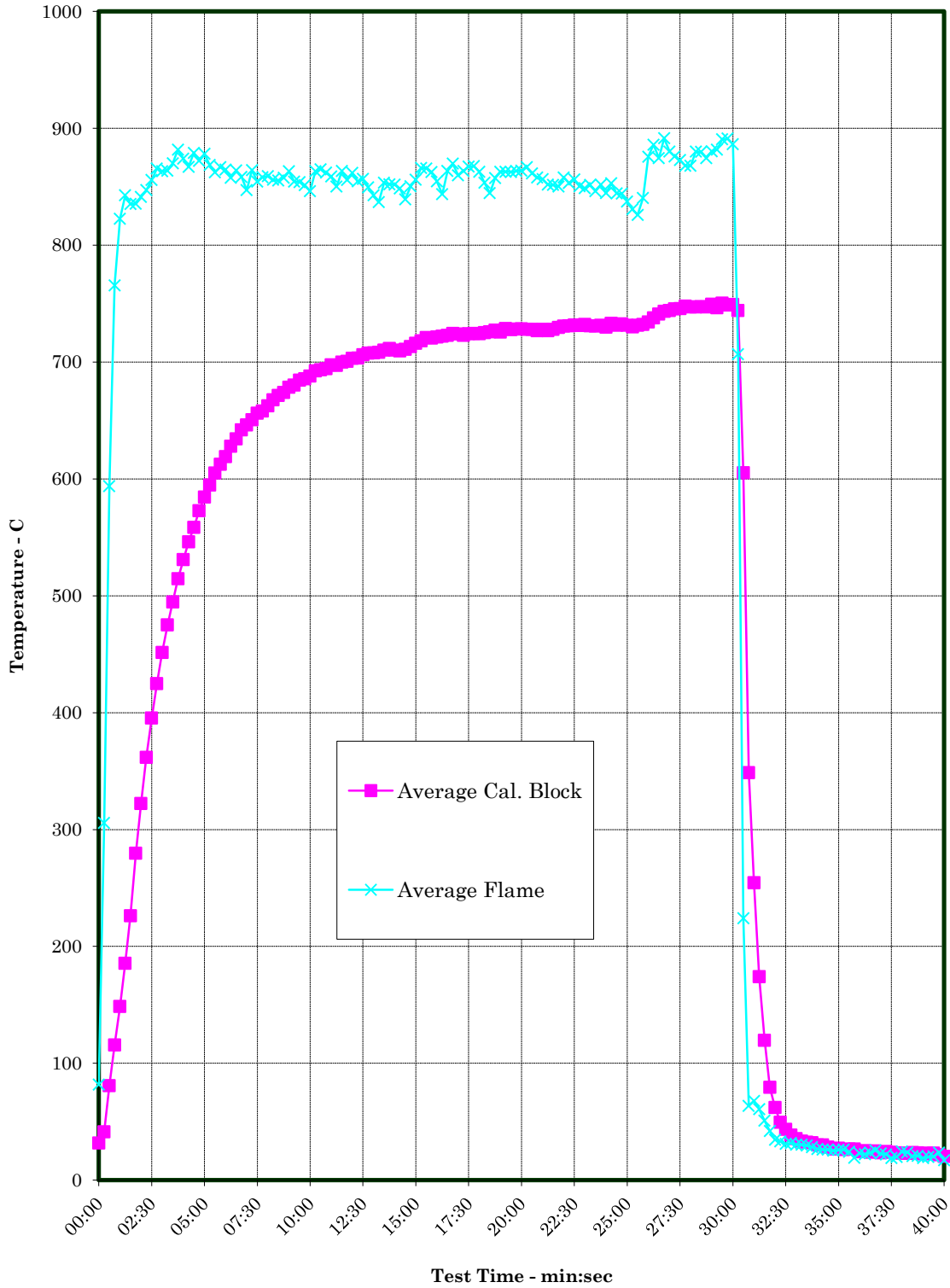
| REV. | DATE | DESCRIPTION | ECN | BY | APR |
|------|------|-------------|-----|----|-----|
|      |      |             |     |    |     |
|      |      |             |     |    |     |
|      |      |             |     |    |     |



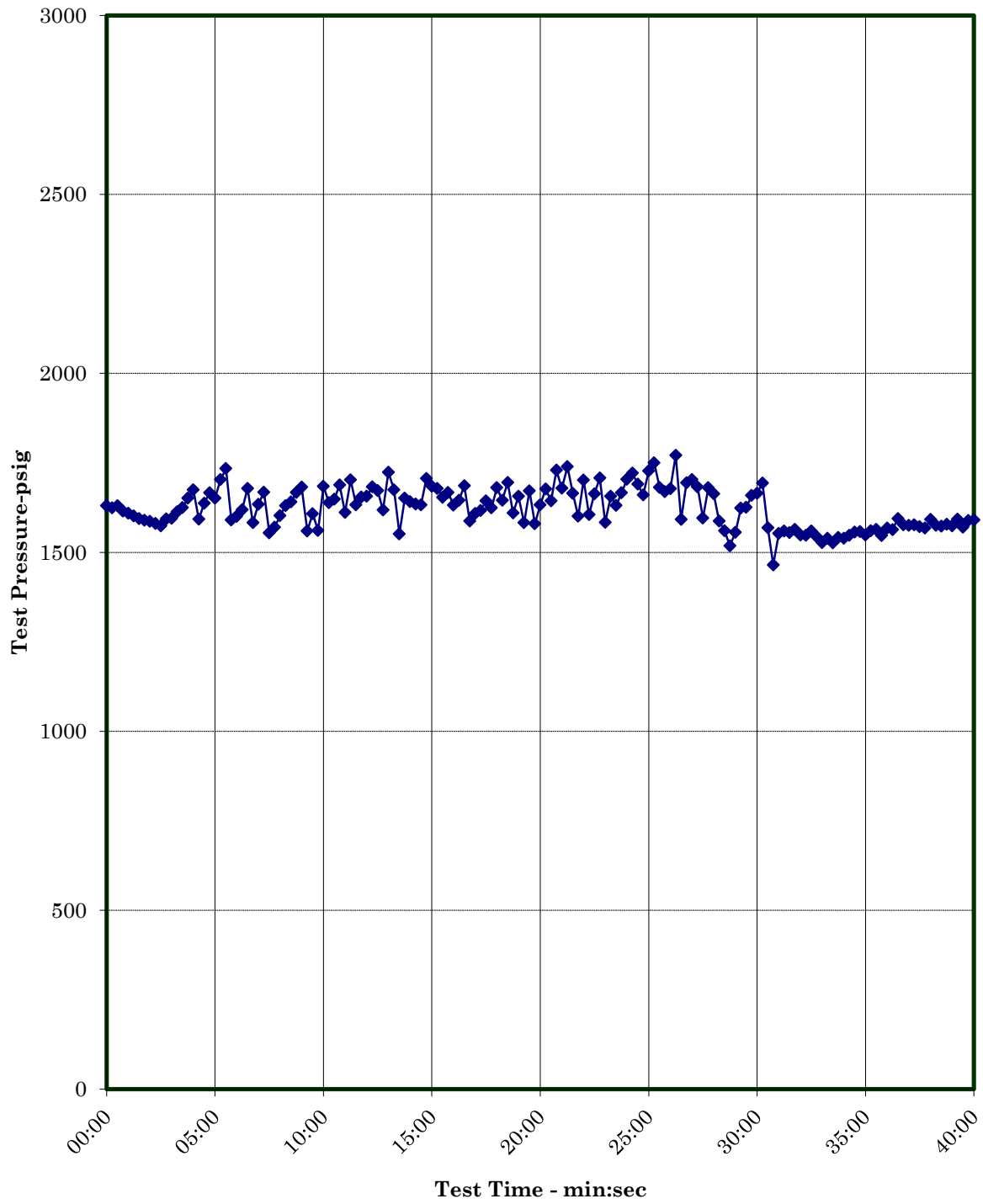
THIRD ANGLE PROJECTION  
 THIS DRAWING AND THE INFORMATION CONTAINED WITHIN IS CONSIDERED TO BE CONFIDENTIAL AND THE SOLE PROPERTY OF VALVTECHNOLOGIES. THE CONTENTS OF THIS DRAWING MAY NOT BE REPRODUCED OR DISCLOSED VERBALLY OR OTHERWISE OUTSIDE THE HOLDERS OFFICE WITHOUT THE WRITTEN APPROVAL OF VALVTECHNOLOGIES.

| DIMENSIONS ARE IN INCHES  |  | MODEL FILE |          | VALVTECHNOLOGIES          |        |
|---|--|------------|----------|---------------------------|--------|
| OVERALL DIMENSIONS (L) x (W) x (H)  |  | SCALE      | WEIGHT   | SHEET                     | SIZE   |
| GENERAL ASSEMBLY  |  | 1:3        | 224 LBS  | 1 OF 1                    | B      |
| ACTUATOR ORIENTATION IS FOR ILLUSTRATION PURPOSES ONLY. ACCESSORIES MAY NOT BE INCLUDED IN DRAWING. |  | DRAWN BY   | DATE     | TITLE                     |        |
|   |  | SC         | 06/13/13 | V72D-JJ-RP-B040-006EM-001 |        |
|   |  | ENGINEER   | DATE     | 2.13" BORE JJ 4" 900#     |        |
|   |  | QA         | 07/10/13 | WITH BARE STEM            |        |
|   |  |            |          | 130141-002                | REV: 1 |

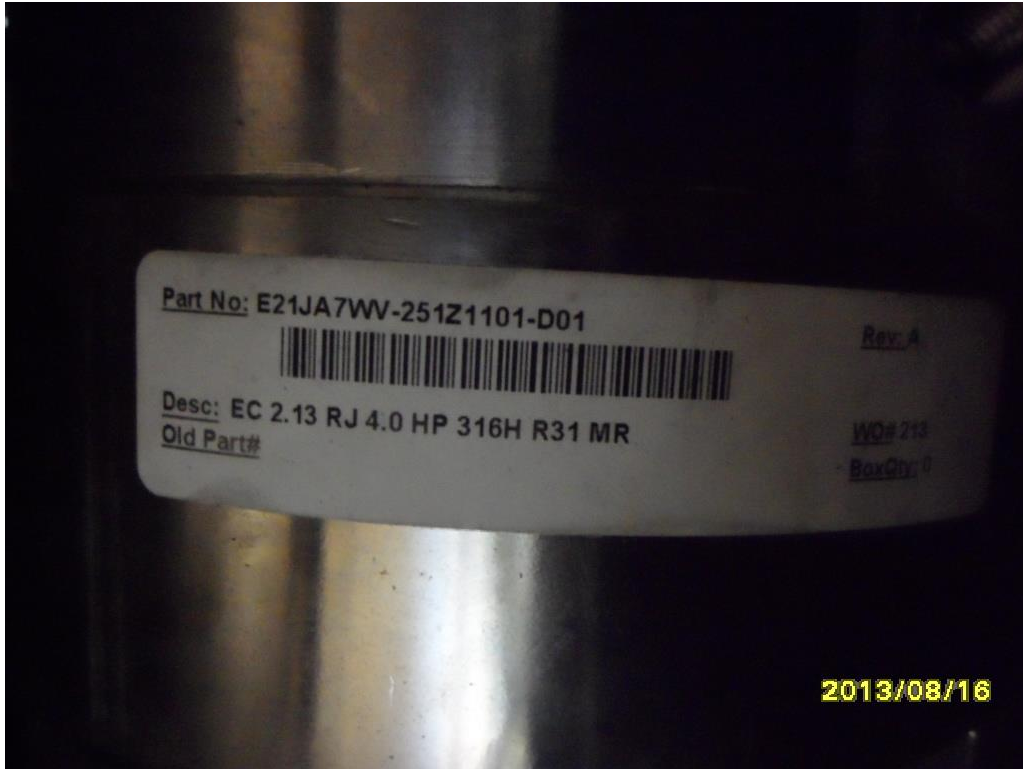
**Temperature verses Time Chart**



**Pressure verses Time Chart**



Yarmouth Research and Technology, LLC



Test Valve Prior to Burn

Yarmouth Research and Technology, LLC



Test Valve During Burn



# Yarmouth Research and Technology, LLC

## Fire Test Information

Customer: Valvtechnologies Inc.

Date: 8/16/2013

Product Code: 4 inch Class 900 Reduced Bore Ball Valve

Project Number: PN213199

### 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 |
|------------|-----------------|--------------------|---------------------|---------------------|-----------------------|---------------------|-------------------|----------------------|
| 13:58:00   | 1630            | 44379              | 35                  | 28                  | 32                    | 104                 | 59                | 82                   |
| 13:58:15   | 1624            | 44399              | 49                  | 33                  | 41                    | 361                 | 251               | 306                  |
| 13:58:30   | 1631            | 44399              | 98                  | 64                  | 81                    | 678                 | 509               | 594                  |
| 13:58:45   | 1615            | 44355              | 130                 | 101                 | 116                   | 869                 | 662               | 766                  |
| 13:59:00   | 1609            | 44338              | 196                 | 102                 | 149                   | 925                 | 720               | 823                  |
| 13:59:15   | 1602            | 44423              | 269                 | 102                 | 186                   | 909                 | 776               | 843                  |
| 13:59:30   | 1594            | 44390              | 330                 | 122                 | 226                   | 840                 | 830               | 835                  |
| 13:59:45   | 1589            | 44370              | 374                 | 185                 | 280                   | 834                 | 836               | 835                  |
| 14:00:00   | 1586            | 44375              | 404                 | 241                 | 322                   | 839                 | 843               | 841                  |
| 14:00:15   | 1580            | 44303              | 431                 | 292                 | 362                   | 851                 | 843               | 847                  |
| 14:00:30   | 1574            | 44224              | 456                 | 334                 | 395                   | 864                 | 847               | 856                  |
| 14:00:45   | 1593            | 44310              | 481                 | 369                 | 425                   | 886                 | 846               | 866                  |
| 14:01:00   | 1595            | 44353              | 504                 | 399                 | 451                   | 881                 | 846               | 863                  |
| 14:01:15   | 1613            | 44230              | 525                 | 425                 | 475                   | 881                 | 846               | 864                  |
| 14:01:30   | 1625            | 44239              | 540                 | 449                 | 495                   | 891                 | 849               | 870                  |
| 14:01:45   | 1651            | 44452              | 557                 | 472                 | 514                   | 913                 | 850               | 882                  |
| 14:02:00   | 1675            | 44507              | 569                 | 492                 | 531                   | 898                 | 850               | 874                  |
| 14:02:15   | 1592            | 44316              | 579                 | 513                 | 546                   | 884                 | 849               | 867                  |
| 14:02:30   | 1637            | 44441              | 591                 | 526                 | 558                   | 907                 | 851               | 879                  |
| 14:02:45   | 1667            | 44514              | 601                 | 545                 | 573                   | 891                 | 853               | 872                  |
| 14:03:00   | 1652            | 44412              | 611                 | 558                 | 584                   | 901                 | 856               | 878                  |
| 14:03:15   | 1703            | 44456              | 619                 | 570                 | 595                   | 894                 | 843               | 869                  |
| 14:03:30   | 1734            | 44519              | 627                 | 583                 | 605                   | 877                 | 848               | 862                  |
| 14:03:45   | 1590            | 44481              | 634                 | 591                 | 613                   | 877                 | 857               | 867                  |
| 14:04:00   | 1600            | 44263              | 638                 | 599                 | 619                   | 881                 | 848               | 864                  |
| 14:04:15   | 1619            | 44520              | 643                 | 612                 | 628                   | 864                 | 851               | 858                  |
| 14:04:30   | 1679            | 44430              | 649                 | 619                 | 634                   | 872                 | 856               | 864                  |
| 14:04:45   | 1583            | 44469              | 654                 | 630                 | 642                   | 862                 | 855               | 858                  |
| 14:05:00   | 1634            | 44341              | 655                 | 637                 | 646                   | 844                 | 849               | 847                  |
| 14:05:15   | 1668            | 44294              | 660                 | 641                 | 651                   | 871                 | 857               | 864                  |
| 14:05:30   | 1554            | 44455              | 664                 | 648                 | 656                   | 852                 | 857               | 854                  |
| 14:05:45   | 1570            | 44519              | 666                 | 651                 | 658                   | 860                 | 856               | 858                  |
| 14:06:00   | 1603            | 44556              | 667                 | 658                 | 663                   | 866                 | 852               | 859                  |

## Yarmouth Research and Technology, LLC

### *Fire Test Data - continued*

|          |      |       |     |     |     |     |     |     |
|----------|------|-------|-----|-----|-----|-----|-----|-----|
| 14:06:15 | 1630 | 44332 | 673 | 662 | 668 | 858 | 853 | 856 |
| 14:06:30 | 1641 | 44303 | 676 | 667 | 671 | 844 | 866 | 855 |
| 14:06:45 | 1667 | 44360 | 679 | 668 | 674 | 857 | 858 | 858 |
| 14:07:00 | 1682 | 44295 | 682 | 674 | 678 | 864 | 862 | 863 |
| 14:07:15 | 1560 | 44267 | 682 | 679 | 680 | 851 | 857 | 854 |
| 14:07:30 | 1608 | 44217 | 685 | 684 | 684 | 852 | 856 | 854 |
| 14:07:45 | 1561 | 44255 | 684 | 687 | 686 | 843 | 859 | 851 |
| 14:08:00 | 1685 | 44652 | 689 | 687 | 688 | 831 | 862 | 846 |
| 14:08:15 | 1639 | 44435 | 689 | 696 | 692 | 864 | 862 | 863 |
| 14:08:30 | 1649 | 44506 | 693 | 694 | 693 | 858 | 872 | 865 |
| 14:08:45 | 1688 | 44357 | 691 | 697 | 694 | 862 | 862 | 862 |
| 14:09:00 | 1611 | 44316 | 695 | 700 | 698 | 847 | 871 | 859 |
| 14:09:15 | 1702 | 44619 | 696 | 698 | 697 | 836 | 864 | 850 |
| 14:09:30 | 1632 | 44432 | 698 | 702 | 700 | 862 | 864 | 863 |
| 14:09:45 | 1654 | 44381 | 698 | 703 | 701 | 846 | 865 | 856 |
| 14:10:00 | 1656 | 44488 | 698 | 708 | 703 | 860 | 863 | 862 |
| 14:10:15 | 1683 | 44276 | 703 | 704 | 703 | 850 | 859 | 854 |
| 14:10:30 | 1673 | 44578 | 703 | 709 | 706 | 848 | 866 | 857 |
| 14:10:45 | 1618 | 44439 | 706 | 709 | 708 | 833 | 866 | 849 |
| 14:11:00 | 1724 | 44630 | 705 | 711 | 708 | 821 | 864 | 843 |
| 14:11:15 | 1675 | 44282 | 702 | 715 | 708 | 812 | 861 | 837 |
| 14:11:30 | 1551 | 44414 | 706 | 714 | 710 | 842 | 864 | 853 |
| 14:11:45 | 1651 | 44289 | 707 | 716 | 711 | 841 | 863 | 852 |
| 14:12:00 | 1641 | 44388 | 706 | 714 | 710 | 835 | 868 | 852 |
| 14:12:15 | 1635 | 44536 | 704 | 714 | 709 | 827 | 869 | 848 |
| 14:12:30 | 1632 | 44519 | 701 | 721 | 711 | 810 | 868 | 839 |
| 14:12:45 | 1706 | 44360 | 708 | 718 | 713 | 837 | 864 | 850 |
| 14:13:00 | 1684 | 44542 | 711 | 721 | 716 | 851 | 861 | 856 |
| 14:13:15 | 1678 | 44274 | 720 | 716 | 718 | 868 | 864 | 866 |
| 14:13:30 | 1654 | 44246 | 722 | 720 | 721 | 864 | 867 | 866 |
| 14:13:45 | 1667 | 44423 | 721 | 719 | 720 | 866 | 859 | 863 |
| 14:14:00 | 1632 | 44524 | 722 | 721 | 721 | 848 | 861 | 854 |
| 14:14:15 | 1646 | 44474 | 722 | 722 | 722 | 826 | 862 | 844 |
| 14:14:30 | 1686 | 44625 | 723 | 722 | 723 | 868 | 859 | 863 |
| 14:14:45 | 1587 | 44573 | 727 | 722 | 724 | 878 | 862 | 870 |
| 14:15:00 | 1609 | 44227 | 725 | 723 | 724 | 862 | 858 | 860 |
| 14:15:15 | 1617 | 44333 | 724 | 721 | 723 | 870 | 857 | 863 |
| 14:15:30 | 1644 | 44298 | 723 | 725 | 724 | 872 | 863 | 867 |
| 14:15:45 | 1625 | 44585 | 723 | 726 | 724 | 876 | 859 | 868 |
| 14:16:00 | 1681 | 44528 | 726 | 723 | 724 | 863 | 862 | 863 |
| 14:16:15 | 1646 | 44517 | 724 | 726 | 725 | 850 | 857 | 853 |
| 14:16:30 | 1695 | 44261 | 727 | 725 | 726 | 832 | 857 | 844 |
| 14:16:45 | 1610 | 44618 | 729 | 725 | 727 | 846 | 868 | 857 |

## Yarmouth Research and Technology, LLC

### *Fire Test Data - continued*

|          |      |       |     |     |     |     |     |     |
|----------|------|-------|-----|-----|-----|-----|-----|-----|
| 14:17:00 | 1656 | 44612 | 726 | 726 | 726 | 864 | 861 | 863 |
| 14:17:15 | 1583 | 44310 | 729 | 728 | 729 | 864 | 862 | 863 |
| 14:17:30 | 1672 | 44361 | 726 | 729 | 728 | 864 | 861 | 863 |
| 14:17:45 | 1580 | 44254 | 728 | 728 | 728 | 863 | 863 | 863 |
| 14:18:00 | 1632 | 44591 | 727 | 729 | 728 | 864 | 863 | 864 |
| 14:18:15 | 1677 | 44394 | 729 | 727 | 728 | 862 | 872 | 867 |
| 14:18:30 | 1643 | 44328 | 724 | 731 | 728 | 857 | 866 | 861 |
| 14:18:45 | 1729 | 44435 | 726 | 727 | 727 | 847 | 868 | 858 |
| 14:19:00 | 1679 | 44366 | 728 | 727 | 728 | 843 | 869 | 856 |
| 14:19:15 | 1739 | 44336 | 723 | 730 | 727 | 839 | 864 | 852 |
| 14:19:30 | 1665 | 44562 | 722 | 733 | 728 | 838 | 864 | 851 |
| 14:19:45 | 1601 | 44367 | 727 | 732 | 729 | 832 | 868 | 850 |
| 14:20:00 | 1702 | 44360 | 727 | 734 | 731 | 849 | 866 | 858 |
| 14:20:15 | 1605 | 44277 | 730 | 732 | 731 | 841 | 866 | 853 |
| 14:20:30 | 1664 | 44291 | 731 | 732 | 732 | 846 | 866 | 856 |
| 14:20:45 | 1708 | 44265 | 731 | 731 | 731 | 838 | 863 | 850 |
| 14:21:00 | 1584 | 44269 | 728 | 736 | 732 | 829 | 868 | 849 |
| 14:21:15 | 1656 | 44233 | 727 | 734 | 731 | 837 | 866 | 851 |
| 14:21:30 | 1631 | 44539 | 727 | 734 | 731 | 830 | 862 | 846 |
| 14:21:45 | 1666 | 44565 | 728 | 734 | 731 | 831 | 873 | 852 |
| 14:22:00 | 1704 | 44342 | 726 | 733 | 730 | 824 | 865 | 844 |
| 14:22:15 | 1721 | 44397 | 729 | 737 | 733 | 837 | 868 | 853 |
| 14:22:30 | 1690 | 44401 | 729 | 734 | 731 | 821 | 868 | 844 |
| 14:22:45 | 1660 | 44324 | 728 | 737 | 733 | 819 | 869 | 844 |
| 14:23:00 | 1728 | 44412 | 729 | 734 | 731 | 802 | 872 | 837 |
| 14:23:15 | 1750 | 44298 | 723 | 737 | 730 | 788 | 873 | 831 |
| 14:23:30 | 1681 | 44326 | 723 | 739 | 731 | 782 | 870 | 826 |
| 14:23:45 | 1669 | 44277 | 724 | 740 | 732 | 814 | 866 | 840 |
| 14:24:00 | 1678 | 44576 | 732 | 736 | 734 | 890 | 861 | 876 |
| 14:24:15 | 1771 | 44431 | 737 | 739 | 738 | 914 | 858 | 886 |
| 14:24:30 | 1592 | 44552 | 741 | 741 | 741 | 885 | 864 | 874 |
| 14:24:45 | 1694 | 44429 | 746 | 741 | 743 | 919 | 863 | 891 |
| 14:25:00 | 1703 | 44260 | 746 | 742 | 744 | 901 | 859 | 880 |
| 14:25:15 | 1683 | 44320 | 751 | 740 | 745 | 896 | 856 | 876 |
| 14:25:30 | 1596 | 44508 | 753 | 738 | 746 | 889 | 857 | 873 |
| 14:25:45 | 1680 | 44462 | 753 | 743 | 748 | 883 | 852 | 868 |
| 14:26:00 | 1663 | 44279 | 754 | 740 | 747 | 881 | 855 | 868 |
| 14:26:15 | 1587 | 44463 | 754 | 739 | 747 | 901 | 859 | 880 |
| 14:26:30 | 1560 | 44440 | 753 | 741 | 747 | 902 | 858 | 880 |
| 14:26:45 | 1518 | 44407 | 753 | 741 | 747 | 896 | 853 | 874 |
| 14:27:00 | 1556 | 44469 | 753 | 746 | 749 | 897 | 863 | 880 |
| 14:27:15 | 1623 | 44266 | 752 | 741 | 746 | 904 | 859 | 882 |
| 14:27:30 | 1626 | 44423 | 758 | 743 | 750 | 919 | 862 | 891 |

## Yarmouth Research and Technology, LLC

### *Fire Test Data - continued*

|          |      |       |     |     |     |     |     |     |
|----------|------|-------|-----|-----|-----|-----|-----|-----|
| 14:27:45 | 1659 | 44421 | 753 | 744 | 749 | 915 | 867 | 891 |
| 14:28:00 | 1665 | 44370 | 755 | 743 | 749 | 904 | 869 | 886 |
| 14:28:15 | 1694 | 44329 | 746 | 742 | 744 | 690 | 723 | 707 |
| 14:28:30 | 1568 | 44406 | 493 | 718 | 605 | 344 | 104 | 224 |
| 14:28:45 | 1465 | 44445 | 104 | 593 | 349 | 42  | 85  | 64  |
| 14:29:00 | 1553 | 44361 | 102 | 407 | 254 | 40  | 96  | 68  |
| 14:29:15 | 1560 | 44393 | 98  | 250 | 174 | 35  | 87  | 61  |
| 14:29:30 | 1555 | 44276 | 78  | 162 | 120 | 37  | 65  | 51  |
| 14:29:45 | 1564 | 44247 | 49  | 110 | 79  | 34  | 50  | 42  |
| 14:30:00 | 1548 | 44377 | 42  | 82  | 62  | 28  | 41  | 34  |
| 14:30:15 | 1547 | 44330 | 35  | 64  | 49  | 28  | 38  | 33  |
| 14:30:30 | 1559 | 44252 | 33  | 54  | 43  | 27  | 36  | 31  |
| 14:30:45 | 1543 | 44231 | 30  | 47  | 39  | 26  | 37  | 32  |
| 14:31:00 | 1527 | 44259 | 28  | 43  | 36  | 26  | 35  | 30  |
| 14:31:15 | 1539 | 44287 | 27  | 40  | 33  | 27  | 33  | 30  |
| 14:31:30 | 1526 | 44098 | 28  | 37  | 33  | 26  | 33  | 30  |
| 14:31:45 | 1542 | 44051 | 27  | 37  | 32  | 24  | 33  | 28  |
| 14:32:00 | 1539 | 44075 | 26  | 34  | 30  | 23  | 30  | 27  |
| 14:32:15 | 1547 | 44027 | 26  | 34  | 30  | 22  | 30  | 26  |
| 14:32:30 | 1556 | 44014 | 25  | 32  | 28  | 22  | 30  | 26  |
| 14:32:45 | 1558 | 43965 | 23  | 31  | 27  | 22  | 29  | 25  |
| 14:33:00 | 1548 | 43994 | 24  | 31  | 27  | 23  | 29  | 26  |
| 14:33:15 | 1560 | 43939 | 23  | 29  | 26  | 22  | 30  | 26  |
| 14:33:30 | 1564 | 43980 | 26  | 27  | 27  | 22  | 26  | 24  |
| 14:33:45 | 1547 | 43632 | 26  | 28  | 27  | 14  | 24  | 19  |
| 14:34:00 | 1568 | 43908 | 22  | 27  | 24  | 21  | 26  | 23  |
| 14:34:15 | 1564 | 43848 | 23  | 28  | 25  | 19  | 25  | 22  |
| 14:34:30 | 1594 | 43910 | 22  | 26  | 24  | 21  | 26  | 24  |
| 14:34:45 | 1577 | 43937 | 24  | 26  | 25  | 23  | 28  | 26  |
| 14:35:00 | 1575 | 43824 | 22  | 25  | 23  | 24  | 21  | 23  |
| 14:35:15 | 1577 | 43962 | 23  | 26  | 24  | 21  | 23  | 22  |
| 14:35:30 | 1571 | 43795 | 22  | 26  | 24  | 17  | 21  | 19  |
| 14:35:45 | 1567 | 43921 | 22  | 25  | 23  | 13  | 27  | 20  |
| 14:36:00 | 1592 | 43745 | 22  | 24  | 23  | 23  | 26  | 24  |
| 14:36:15 | 1575 | 43798 | 22  | 24  | 23  | 23  | 24  | 24  |
| 14:36:30 | 1573 | 43787 | 21  | 27  | 24  | 18  | 23  | 21  |
| 14:36:45 | 1578 | 43811 | 21  | 26  | 23  | 17  | 25  | 21  |
| 14:37:00 | 1574 | 43708 | 21  | 24  | 23  | 17  | 21  | 19  |
| 14:37:15 | 1593 | 43840 | 22  | 24  | 23  | 19  | 20  | 20  |
| 14:37:30 | 1570 | 43853 | 22  | 24  | 23  | 19  | 22  | 20  |
| 14:37:45 | 1589 | 43765 | 21  | 22  | 22  | 21  | 26  | 24  |
| 14:38:00 | 1590 | 43757 | 19  | 22  | 20  | 15  | 19  | 17  |

## 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: | 190  | mls    |
| Average Leak Rate Over 30 Minute Duration:                    | 6    | ml/min |
| Allowable Leak Rate:  | 1600 | 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: | 622 | mls    |
| Water Collected in System Relief Valve:                    | 400 | mls    |
| Calculated External Leakage During 40 Minute Duration:     | 32  | mls    |
| Average Leak Rate Over 40 Minute Duration:                 | 0.8 | ml/min |
| Allowable Leak Rate:                                       | 400 | ml/min |

|  |            |
|--|------------|
| <b>Were the Valve Leakages Below the Allowables?</b> | <b>Yes</b> |
|--|------------|

## 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:         | 1771 | psig    |
| Average Pressure During Burn/Cool Down:         | 1623 | psig    |
| Minimum Pressure During Burn/Cool Down:         | 1465 | psig    |
|   |      |         |
| Amount of Time of Avg. Cal Block > 650 deg.C:   | 22.8 | minutes |
| Minimum Allowable Time at Temperature:          | 15.0 | minutes |
| Maximum Avg Cal Block Temperature:              | 750  | deg. C  |
| Average Cal Block Temperature:                  | 507  | deg. C  |
| Lowest Avg Cal. Block Temperature:              | 20   | deg. C  |
|   |      |         |
| Maximum Body Flame Temperature During Burn:     | 873  | deg. C  |
| Average Body Flame Temperature During Burn:     | 841  | deg. C  |
|   |      |         |
| Maximum Bonnet Flame Temperature During Burn:   | 925  | deg. C  |
| Average Bonnet Flame Temperature During Burn:   | 849  | deg. C  |
|   |      |         |
| Average of Both Flame Temperatures During Burn: | 845  | deg. C  |

*Note*

|  |  |  |
|--|--|--|
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|   |     |
|---|-----|
| Were Test Conditions Within Compliance? | Yes |
|---|-----|

**Yarmouth Research and Technology, LLC**

**Post-Burn Seat Test Information**

**Customer:** Valvtechnologies Inc.

**Date:** 8/16/2013

---

**Product Code:** 4 inch Class 900 Reduced Bore Ball Valve

---

**Project Number:** PN213199

---

*This test not required for this pressure class valve.*

# Yarmouth Research and Technology, LLC

## Operational Test Information

Customer: Valvtechnologies Inc.

Date: 8/16/2013

Product Code: 4 inch Class 900 Reduced Bore Ball Valve

Project Number: PN213199

### Test Data

| Time     | Pressure (psig) | Cal Block Temp - C |
|----------|-----------------|--------------------|
| 14:49:06 | 1614            | 26                 |
| 14:49:21 | 1625            | 26                 |
| 14:49:36 | 1608            | 26                 |
| 14:49:51 | 1594            | 26                 |
| 14:50:06 | 1586            | 26                 |
| 14:50:21 | 1583            | 25                 |
| 14:50:36 | 1570            | 25                 |
| 14:50:51 | 1559            | 24                 |
| 14:51:06 | 1730            | 26                 |
| 14:51:21 | 1679            | 26                 |
| 14:51:36 | 1661            | 26                 |
| 14:51:51 | 1658            | 25                 |
| 14:52:06 | 1645            | 26                 |
| 14:52:21 | 1624            | 25                 |
| 14:52:36 | 1612            | 26                 |
| 14:52:51 | 1613            | 24                 |
| 14:53:06 | 1581            | 26                 |
| 14:53:21 | 1394            | 24                 |
| 14:53:36 | 1487            | 26                 |
| 14:53:51 | 1637            | 24                 |
| 14:54:06 | 1598            | 26                 |

*Leakages were collected manually.*

|  |     |        |
|--|-----|--------|
| Total External Leakage Collected Over 5 Minute Duration: | 20  | mls    |
| Average Leak Rate Over 5 Minute Duration:                | 4.0 | ml/min |
| Allowable Leak Rate:                                     | 100 | ml/min |

|  |     |
|--|-----|
| Was the Valve Leakage Below the Allowable? | Yes |
|--|-----|