

## **Fire Test Report**

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

**ISO 10497: 2010**

*Performed for*

**Cornerstone Valve**

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



1 13/16 inch Full Bore Trunnion Mounted  
Metal Seated Ball Valve API 6A 10,000  
Valve Code: B-018F-10000

Project Number: 214129

Test Date: January 19, 2015



*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:** Cornerstone Valve

**Date:** 1/19/2015

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

ISO 10497: 2010

**Product Description:** 1 13/16 Full Bore Trunnion Mounted Metal Seated Ball Valve API 6A 10000

**Valve Code:** B-018F-10000

**Project Number:** 214129

**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:                                 | 11:08:00 |         |
| Average Pressure During Burn:                    | 7381     | psig    |
| Seat Leak Rate During Burn:                      | 0        | ml/min  |
| Allowable Seat Leak Rate:                        | 725      | ml/min  |
| External Leak Rate During Burn/Cool Down:        | 1        | ml/min  |
| Allowable External Leak Rate:                    | 181      | ml/min  |
| Amount of Time of Avg. Cal. Blocks > 650 deg. C: | 21.8     | minutes |
| Were Test Conditions Within Compliance?          | Yes      |         |
| Were the Valve Leakages Below the Allowables?    | Yes      |         |

***Operational Test***

|   |             |        |
|---|-------------|--------|
| Average Pressure During Test:                     | 7394        | psig   |
| External Leak Rate After Operating:               | 1           | ml/min |
| Allowable External Leak Rate:                     | 45          | ml/min |
| Was the Leakage Below the Allowable?              | Yes         |        |
| <b>Does Valve Pass or Fail the Test Standard?</b> | <b>PASS</b> |        |

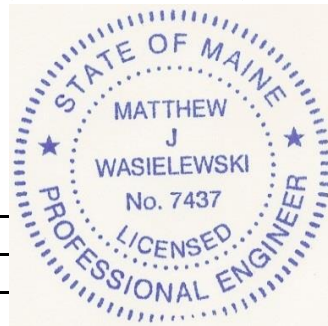
*Certified by*



Matthew J. Wasielewski, PE

President and Manager

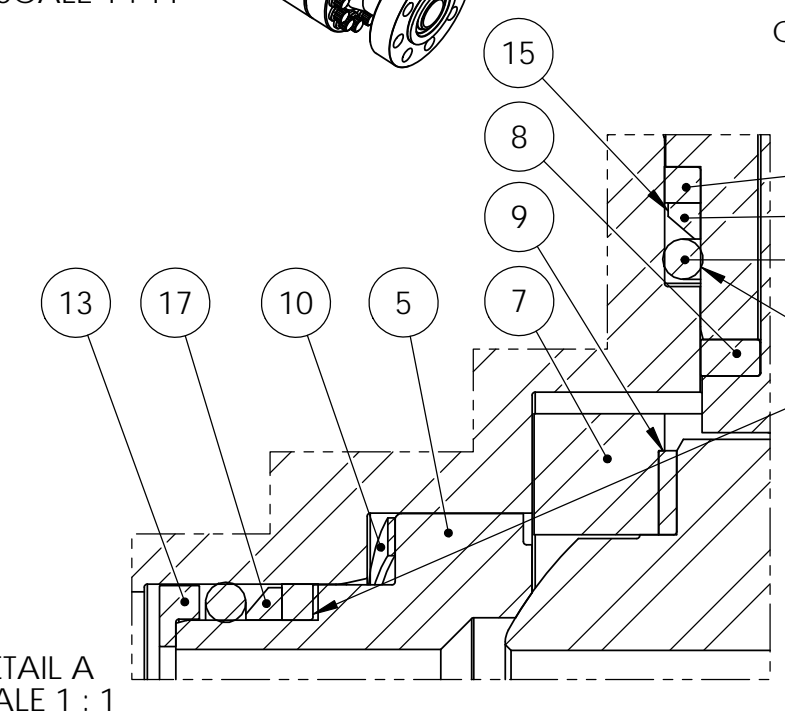
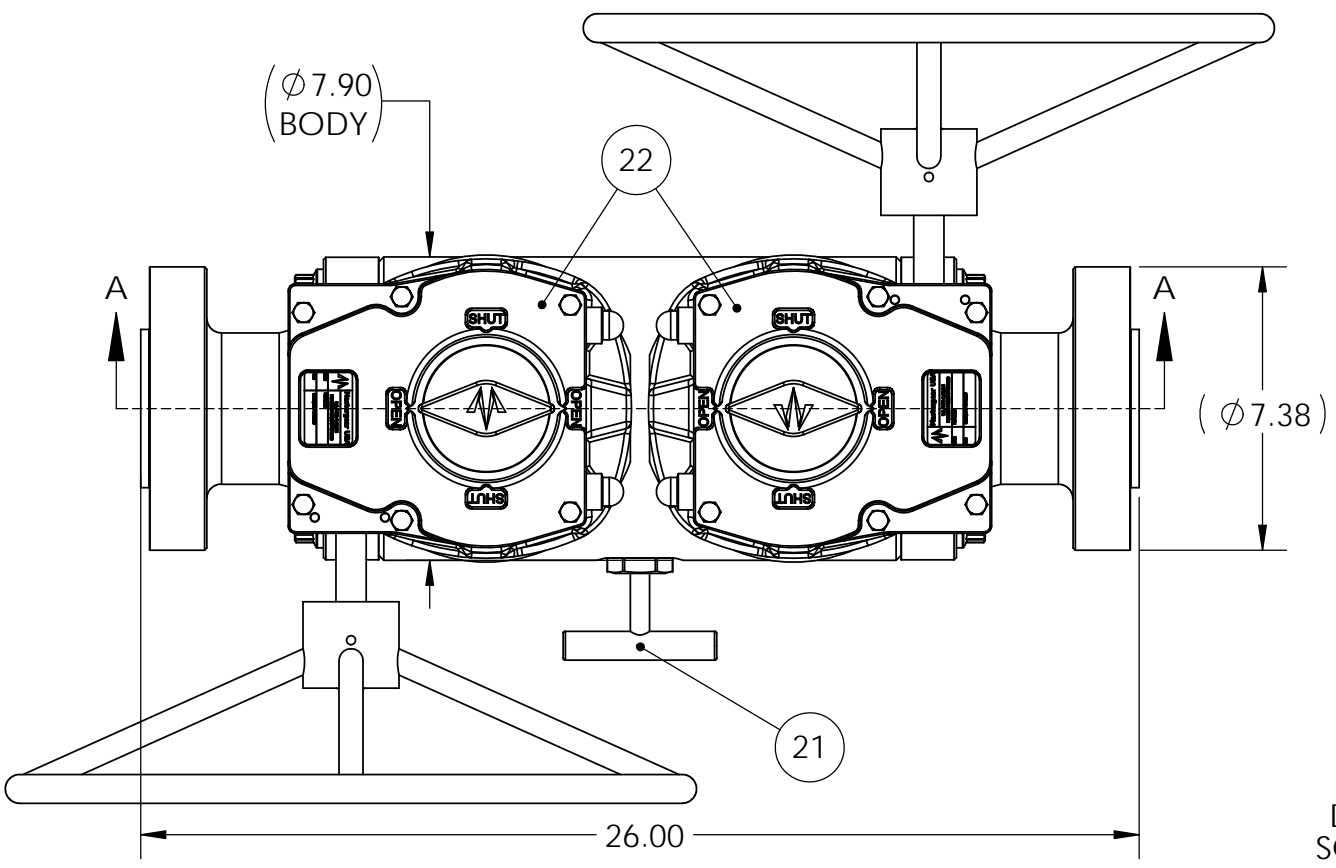
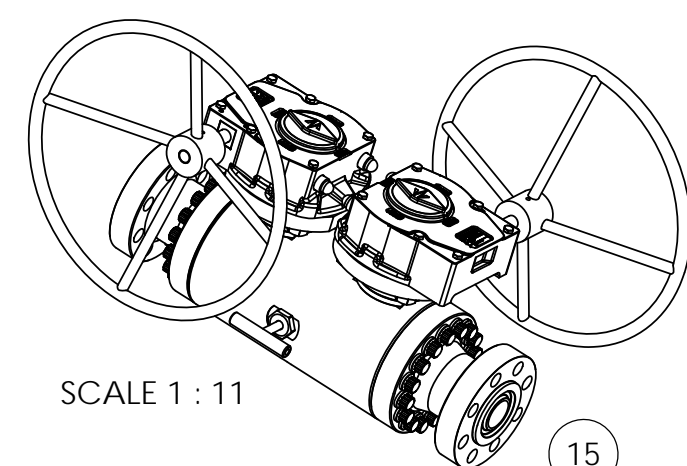
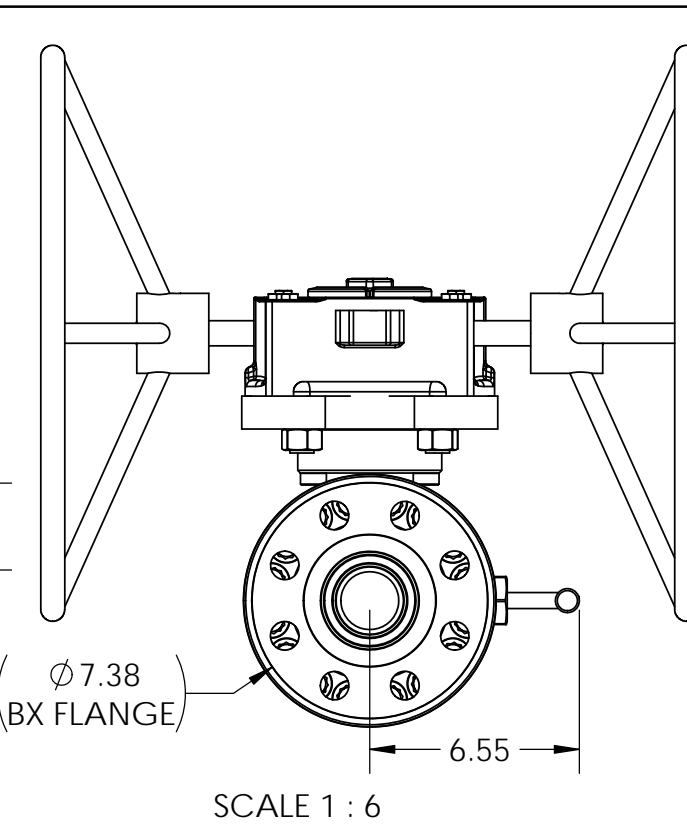
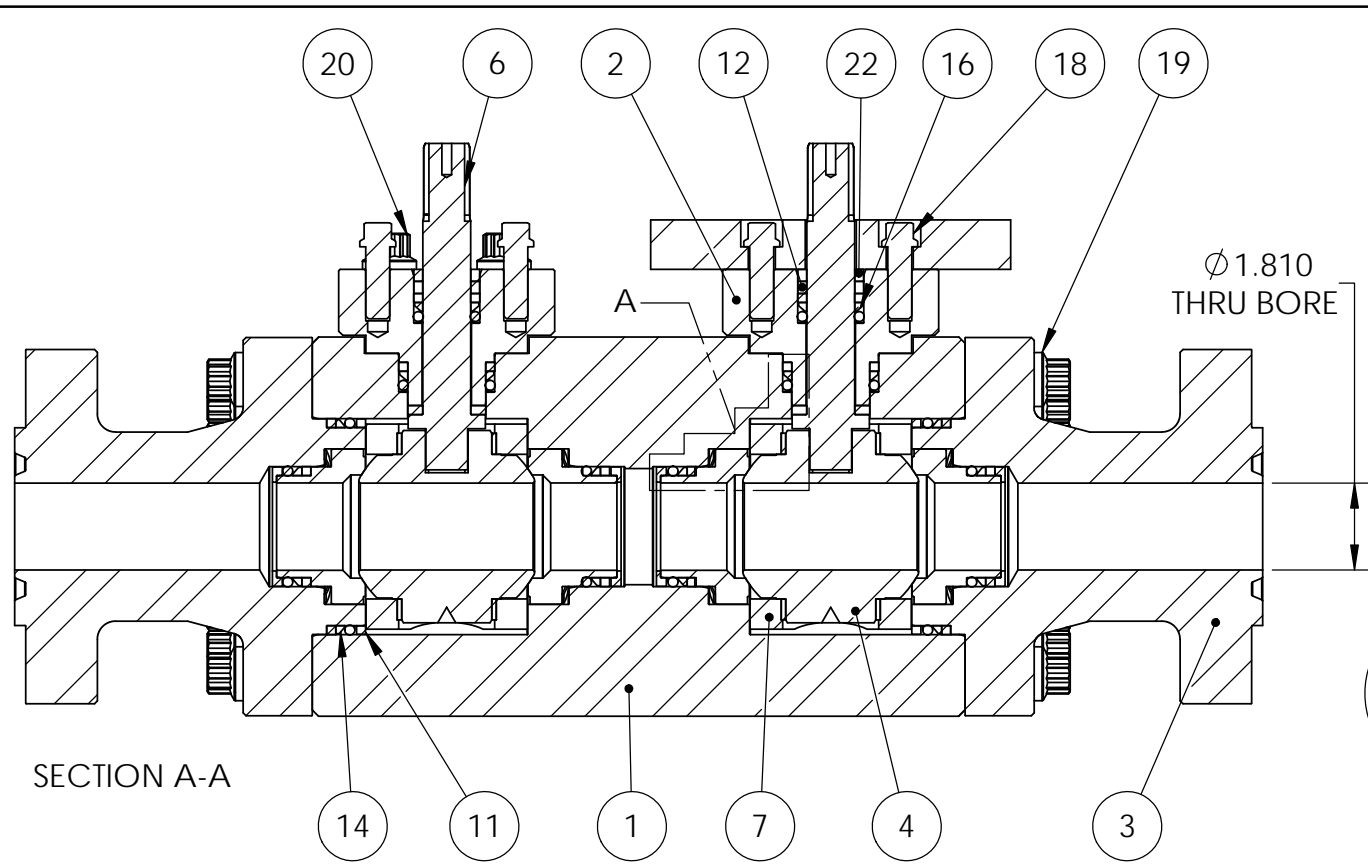
Yarmouth Research & Technology, LLC



YARMOUTH RESEARCH AND TECHNOLOGY, LLC

**Fire Test Information Sheet**

|   |  |
|---|--|
| Fire Test Specification and Revision: (ie. API 607 6th, API 6FA 3rd, etc)                           | API 607 6th  |
| Yarmouth Proposal Number:   | 214129A  |
| Customer Purchase Order Number:   | P1906  |
| Customer's Contact Name:  | Ashish Agrawal   |
| Valve Manufacturer's Name (used in test report as specified):                                       | Cornerstone Valve  |
| Company Web Address for Report Cover:   | Cornerstonevalve.com   |
| Valve Manufacturer's Address:   | 13124 Trinity Drive, Stafford TX, 77477                                  |
| Did valve meet all required hydrostatic, leakage and other production pressure tests?               | Yes  |
| Valve Description for Report Cover:   | 1-13/16 Full Bore Trunnion Mounted Metal Seated Ball Valve API 6A 10,000 |
| Valve Product Code:   | B-018F-10000   |
| <b>Valve Description</b>  |  |
| Size:   | 1-13/16"   |
| Pressure Rating/Class:  | API 6A 10,000  |
| Pressure Rating at 100F (psig):   | 10,000 psi   |
| Type:   | Ball Valve   |
| Weight:   | 400 lbs  |
| Reduced or Full Bore:   | Full   |
| Body/Bonnet Material:   | Stainless Steel  |
| Trim Material:  | Stainless Steel  |
| Seat Material:  | HVOF carbide   |
| Stem Seal Material:   | Graphite/PTFE/FKM (Viton)  |
| Body Seal Material:   | Graphite/PTFE/FKM (Viton)  |
| Bolting Material:   | B7M  |
| Is valve considered "Soft-Seated"?  | No   |
| <b>Valve Markings</b>   |  |
| Nameplate Information:  | 1-13/16" FB TRUNNION MOUNTED METAL SEATED BALL VALVE API 6A 10,000       |
| Casting Markings:   |  |
| Assembly Drawing Number / Revision / Date of Issue:   | P102147/Revision A/8-08-14   |
| Emailed (PDF) to Yarmouth: Date:  | 8/11/2014  |
| If valve is fitted with gearbox, state gearbox manufacturer, model number and mechanical advantage: | MASTERGEAR, M14, 16.2 MECHANICAL ADVANTAGE                               |
| If valve is non-symmetric, state direction of flow for test:  | SYMMETRIC DESIGN   |
| For double-seated valves, state maximum allowable cavity pressure:                                  | 15,000 PSI   |
| Form Submission Date:   | 8/8/2014   |



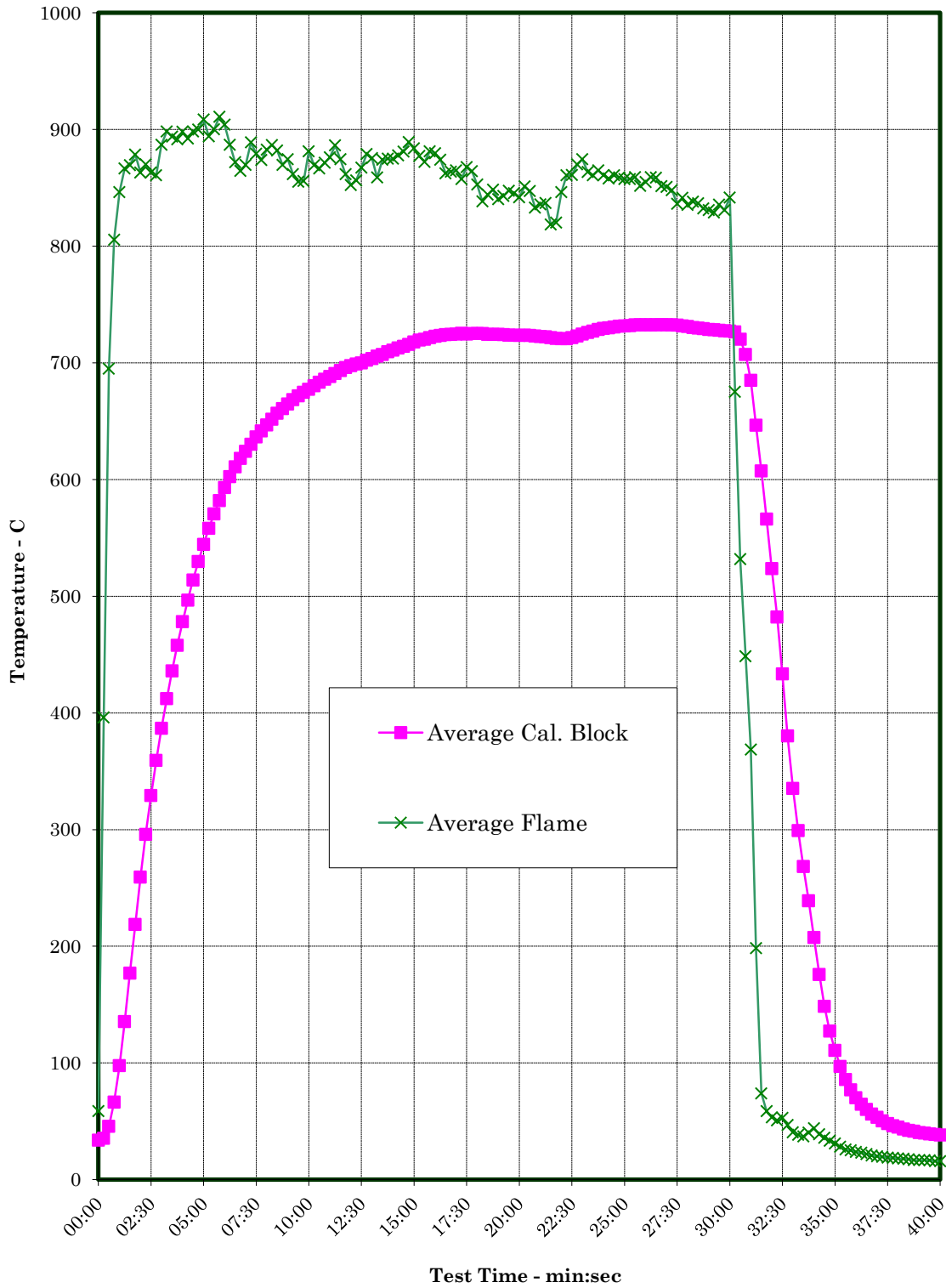
| ITEM NO. | DESCRIPTION                           | MATERIAL            | QTY. |
|----------|---------------------------------------|---------------------|------|
| 1        | BODY                                  | STAINLESS STEEL     | 1    |
| 2        | STEM HOUSING                          | STAINLESS STEEL     | 2    |
| 3        | TAIL PIECE                            | STAINLESS STEEL     | 2    |
| 4        | **BALL                                | STAINLESS STEEL/WC  | 2    |
| 5        | **METAL SEAT                          | STAINLESS STEEL/WC  | 4    |
| 6        | STEM                                  | STAINLESS STEEL     | 2    |
| 7        | TRUNNION BLOCK                        | STAINLESS STEEL     | 4    |
| 8        | *THURST WASHER                        | STAINLESS STEEL     | 2    |
| 9        | *BUSHING                              | SS/PTFE             | 4    |
| 10       | **WAVE SPRING                         | INCONEL X750        | 4    |
| 11       | TAIL PIECE DELTA SEAL<br>PUSHER RING  | STAINLESS STEEL     | 2    |
| 12       | STEM DELTA SEAL<br>PUSHER RING        | STAINLESS STEEL     | 2    |
| 13       | SEAT DELTA SEAL<br>PUSHER RING        | STAINLESS STEEL     | 4    |
| 14       | *TAIL PIECE DELTA FIRE<br>SEAL        | VITON/PTFE/GRAPHOIL | 2    |
| 15       | *BONNET DELTA FIRE<br>SEAL            | VITON/PTFE/GRAPHOIL | 2    |
| 16       | *STEM DELTA FIRE SEAL                 | VITON/PTFE/GRAPHOIL | 2    |
| 17       | *SEAT DELTA FIRE SEAL                 | VITON/PTFE/GRAPHOIL | 4    |
| 18       | 12 PT CAPSCREW 1/2"-<br>13 X 1.5" LG  | B7M XYLAN           | 8    |
| 19       | 12 PT CAPSCREW 3/4"-<br>10 X 2.25" LG | B7M XYLAN           | 32   |
| 20       | 12 PT CAPSCREW 5/8"-<br>11 X 2.5" LG  | B7M XYLAN           | 8    |
| 21       | NEEDLE VALVE                          | STAINLESS STEEL     | 1    |
| 22       | GEAR/MOUNTING KIT                     | CARBON STEEL        | 2    |

\* RECOMMENDED SPARES  
 \*\* RECOMMENDED SPARES FOR APPLICATIONS CONTAINING  
 CORROSIVE, HIGH VELOCITY OR SERVICE CONTRIBUTING TO  
 EMBRITTEMENT

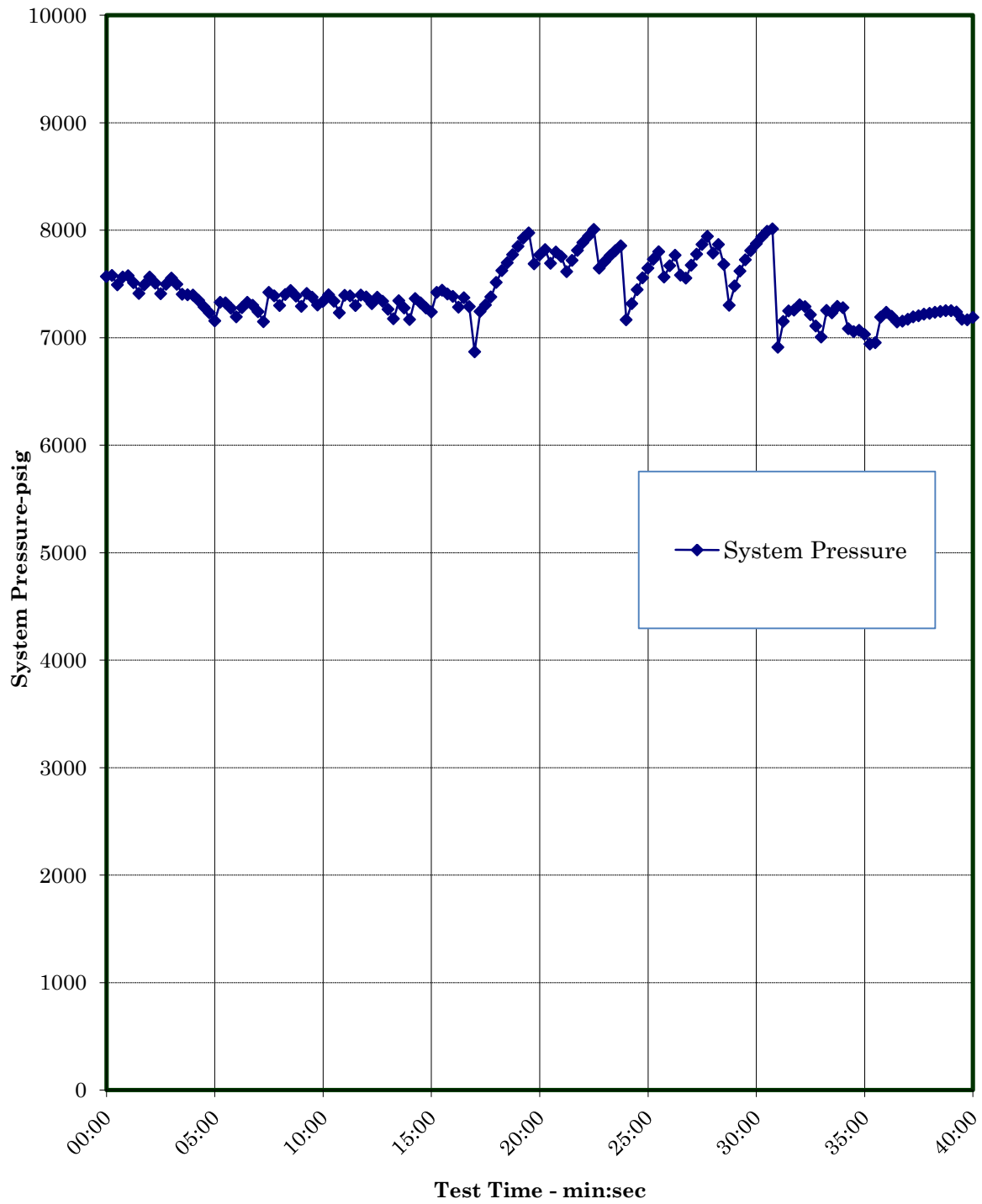
GRAPHOIL  
 PTFE  
 VITON  
 FIRE SAFE DELTA PISTON SEAL  
 ASSEMBLY TYP.

|   |            |  |                     |
|---|------------|--|---------------------|
| COPYRIGHTED CAD<br>GENERATED DRAWING.<br>DO NOT MANUALLY UPDATE |            | <br>13124 Trinity Drive<br>Stafford, TX, 77477<br>281-880-8188<br>www.cornerstonevalve.com |                     |
| APPROVALS   | DATE       | TITLE  |                     |
| DRAWN GC  | 08/08/2014 | 1-13/16" API 10K<br>METAL SEATED   |                     |
| CHECKED BC  | 08/08/2014 |  |                     |
| W.O. NUMBER   |            | SIZE<br>B  | DWG. NO.<br>P102147 |
|   |            | SCALE: NTS   | REV. A              |
|   |            | SHEET 1 OF 1   |                     |

**Temperature verses Time Chart**



**Pressure verses Time Chart**



Yarmouth Research and Technology, LLC



Test Setup Prior to Burn



Test Valve During Burn

Yarmouth Research and Technology, LLC



Test Valve during Burn



## Yarmouth Research and Technology, LLC

### Fire Test Information

Customer: Cornerstone Valve

Date: 1/19/2015

Product Code: 1 13/16 Full Bore Trunnion Mounted Metal Seated Ball Valve API 6A 10000

Project Number: 214129

### *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 |
|----------|-----------------|--------------------|---------------------|---------------------|-----------------------|---------------------|-------------------|----------------------|
| 11:08:00 | 7569            | 34479              | 34                  | 33                  | 34                    | 64                  | 53                | 59                   |
| 11:08:15 | 7580            | 34482              | 36                  | 35                  | 35                    | 364                 | 428               | 396                  |
| 11:08:30 | 7492            | 34481              | 45                  | 46                  | 46                    | 662                 | 728               | 695                  |
| 11:08:45 | 7563            | 34476              | 66                  | 67                  | 66                    | 780                 | 831               | 806                  |
| 11:09:00 | 7576            | 34464              | 97                  | 98                  | 98                    | 830                 | 863               | 846                  |
| 11:09:15 | 7511            | 34472              | 136                 | 135                 | 135                   | 867                 | 866               | 867                  |
| 11:09:30 | 7411            | 34458              | 180                 | 174                 | 177                   | 884                 | 854               | 869                  |
| 11:09:45 | 7492            | 34477              | 225                 | 212                 | 219                   | 897                 | 860               | 879                  |
| 11:10:00 | 7564            | 34451              | 268                 | 250                 | 259                   | 895                 | 831               | 863                  |
| 11:10:15 | 7507            | 34492              | 308                 | 283                 | 296                   | 884                 | 856               | 870                  |
| 11:10:30 | 7408            | 34460              | 344                 | 314                 | 329                   | 883                 | 843               | 863                  |
| 11:10:45 | 7495            | 34441              | 375                 | 343                 | 359                   | 880                 | 842               | 861                  |
| 11:11:00 | 7555            | 34451              | 403                 | 370                 | 387                   | 892                 | 882               | 887                  |
| 11:11:15 | 7496            | 34453              | 429                 | 396                 | 412                   | 891                 | 906               | 898                  |
| 11:11:30 | 7403            | 34468              | 452                 | 420                 | 436                   | 891                 | 897               | 894                  |
| 11:11:45 | 7398            | 34480              | 472                 | 443                 | 458                   | 887                 | 897               | 892                  |
| 11:12:00 | 7397            | 34461              | 492                 | 464                 | 478                   | 894                 | 902               | 898                  |
| 11:12:15 | 7346            | 34449              | 509                 | 484                 | 497                   | 887                 | 897               | 892                  |
| 11:12:30 | 7287            | 34461              | 525                 | 503                 | 514                   | 881                 | 916               | 898                  |
| 11:12:45 | 7231            | 34445              | 539                 | 520                 | 530                   | 882                 | 918               | 900                  |
| 11:13:00 | 7155            | 34461              | 553                 | 536                 | 544                   | 891                 | 927               | 909                  |
| 11:13:15 | 7329            | 34444              | 565                 | 551                 | 558                   | 888                 | 901               | 894                  |
| 11:13:30 | 7323            | 34453              | 577                 | 564                 | 571                   | 894                 | 907               | 900                  |
| 11:13:45 | 7274            | 34438              | 588                 | 576                 | 582                   | 907                 | 914               | 911                  |
| 11:14:00 | 7193            | 34454              | 599                 | 587                 | 593                   | 899                 | 909               | 904                  |
| 11:14:15 | 7279            | 34445              | 608                 | 597                 | 603                   | 888                 | 886               | 887                  |
| 11:14:30 | 7328            | 34449              | 617                 | 605                 | 611                   | 882                 | 862               | 872                  |
| 11:14:45 | 7301            | 34446              | 624                 | 612                 | 618                   | 879                 | 849               | 864                  |
| 11:15:00 | 7241            | 34462              | 631                 | 617                 | 624                   | 882                 | 857               | 870                  |
| 11:15:15 | 7149            | 34467              | 638                 | 623                 | 630                   | 881                 | 897               | 889                  |
| 11:15:30 | 7421            | 34446              | 644                 | 629                 | 636                   | 880                 | 878               | 879                  |
| 11:15:45 | 7390            | 34444              | 649                 | 634                 | 642                   | 880                 | 868               | 874                  |
| 11:16:00 | 7300            | 34463              | 654                 | 639                 | 647                   | 881                 | 884               | 883                  |

## Yarmouth Research and Technology, LLC

### *Fire Test Data - continued*

|          |      |       |     |     |     |     |     |     |
|----------|------|-------|-----|-----|-----|-----|-----|-----|
| 11:16:15 | 7401 | 34452 | 659 | 644 | 652 | 888 | 886 | 887 |
| 11:16:30 | 7439 | 34440 | 664 | 649 | 657 | 883 | 881 | 882 |
| 11:16:45 | 7387 | 34428 | 668 | 653 | 661 | 870 | 869 | 870 |
| 11:17:00 | 7292 | 34440 | 672 | 657 | 665 | 876 | 873 | 874 |
| 11:17:15 | 7411 | 34445 | 676 | 661 | 668 | 868 | 856 | 862 |
| 11:17:30 | 7377 | 34451 | 679 | 664 | 672 | 868 | 843 | 855 |
| 11:17:45 | 7304 | 34441 | 682 | 667 | 675 | 870 | 842 | 856 |
| 11:18:00 | 7336 | 34441 | 685 | 669 | 677 | 887 | 876 | 881 |
| 11:18:15 | 7399 | 34442 | 688 | 672 | 680 | 873 | 866 | 869 |
| 11:18:30 | 7340 | 34430 | 691 | 676 | 683 | 873 | 860 | 867 |
| 11:18:45 | 7232 | 34441 | 693 | 678 | 686 | 874 | 869 | 871 |
| 11:19:00 | 7394 | 34437 | 696 | 681 | 688 | 874 | 878 | 876 |
| 11:19:15 | 7388 | 34436 | 698 | 683 | 691 | 879 | 894 | 886 |
| 11:19:30 | 7299 | 34439 | 701 | 686 | 693 | 875 | 874 | 874 |
| 11:19:45 | 7395 | 34430 | 702 | 689 | 696 | 861 | 863 | 862 |
| 11:20:00 | 7379 | 34435 | 704 | 691 | 698 | 860 | 845 | 853 |
| 11:20:15 | 7317 | 34430 | 705 | 693 | 699 | 866 | 847 | 856 |
| 11:20:30 | 7376 | 34426 | 706 | 694 | 700 | 862 | 872 | 867 |
| 11:20:45 | 7339 | 34443 | 708 | 696 | 702 | 876 | 882 | 879 |
| 11:21:00 | 7264 | 34429 | 709 | 698 | 704 | 863 | 888 | 876 |
| 11:21:15 | 7175 | 34440 | 711 | 701 | 706 | 853 | 864 | 859 |
| 11:21:30 | 7343 | 34444 | 712 | 702 | 707 | 870 | 878 | 874 |
| 11:21:45 | 7276 | 34429 | 714 | 705 | 709 | 863 | 887 | 875 |
| 11:22:00 | 7167 | 34451 | 714 | 707 | 711 | 869 | 881 | 875 |
| 11:22:15 | 7363 | 34413 | 716 | 710 | 713 | 869 | 886 | 878 |
| 11:22:30 | 7324 | 34436 | 717 | 712 | 714 | 883 | 879 | 881 |
| 11:22:45 | 7275 | 34440 | 718 | 713 | 716 | 890 | 888 | 889 |
| 11:23:00 | 7239 | 34471 | 720 | 716 | 718 | 877 | 891 | 884 |
| 11:23:15 | 7422 | 34436 | 721 | 718 | 719 | 864 | 891 | 877 |
| 11:23:30 | 7440 | 34445 | 721 | 719 | 720 | 861 | 884 | 872 |
| 11:23:45 | 7407 | 34421 | 722 | 721 | 722 | 869 | 894 | 881 |
| 11:24:00 | 7384 | 34446 | 723 | 723 | 723 | 869 | 891 | 880 |
| 11:24:15 | 7283 | 34448 | 723 | 723 | 723 | 860 | 888 | 874 |
| 11:24:30 | 7370 | 34450 | 724 | 724 | 724 | 853 | 872 | 863 |
| 11:24:45 | 7289 | 34437 | 724 | 724 | 724 | 856 | 872 | 864 |
| 11:25:00 | 6869 | 34457 | 725 | 724 | 725 | 873 | 857 | 865 |
| 11:25:15 | 7245 | 34435 | 726 | 724 | 725 | 862 | 853 | 858 |
| 11:25:30 | 7304 | 34449 | 726 | 723 | 725 | 870 | 866 | 868 |
| 11:25:45 | 7378 | 34470 | 727 | 723 | 725 | 861 | 867 | 864 |
| 11:26:00 | 7513 | 34423 | 727 | 723 | 725 | 846 | 859 | 853 |
| 11:26:15 | 7624 | 34451 | 727 | 723 | 725 | 843 | 834 | 838 |
| 11:26:30 | 7695 | 34459 | 727 | 722 | 724 | 837 | 851 | 844 |
| 11:26:45 | 7772 | 34481 | 727 | 722 | 724 | 853 | 843 | 848 |

## Yarmouth Research and Technology, LLC

### *Fire Test Data - continued*

|          |      |       |     |     |     |     |     |     |
|----------|------|-------|-----|-----|-----|-----|-----|-----|
| 11:27:00 | 7848 | 34461 | 728 | 721 | 724 | 846 | 834 | 840 |
| 11:27:15 | 7927 | 34468 | 728 | 721 | 724 | 853 | 833 | 843 |
| 11:27:30 | 7973 | 34445 | 728 | 719 | 724 | 854 | 841 | 848 |
| 11:27:45 | 7686 | 34449 | 728 | 719 | 724 | 854 | 836 | 845 |
| 11:28:00 | 7769 | 34451 | 728 | 718 | 723 | 848 | 836 | 842 |
| 11:28:15 | 7820 | 34452 | 729 | 718 | 724 | 846 | 856 | 851 |
| 11:28:30 | 7692 | 34442 | 729 | 718 | 723 | 843 | 851 | 847 |
| 11:28:45 | 7797 | 34469 | 729 | 717 | 723 | 840 | 826 | 833 |
| 11:29:00 | 7755 | 34477 | 728 | 717 | 723 | 844 | 827 | 836 |
| 11:29:15 | 7615 | 34451 | 728 | 716 | 722 | 851 | 823 | 837 |
| 11:29:30 | 7720 | 34478 | 729 | 714 | 722 | 836 | 802 | 819 |
| 11:29:45 | 7812 | 34458 | 728 | 713 | 721 | 832 | 809 | 820 |
| 11:30:00 | 7883 | 34462 | 728 | 713 | 721 | 866 | 827 | 846 |
| 11:30:15 | 7943 | 34461 | 729 | 712 | 721 | 882 | 839 | 861 |
| 11:30:30 | 8006 | 34467 | 731 | 713 | 722 | 878 | 844 | 861 |
| 11:30:45 | 7646 | 34473 | 733 | 713 | 723 | 872 | 868 | 870 |
| 11:31:00 | 7707 | 34452 | 734 | 715 | 725 | 873 | 876 | 874 |
| 11:31:15 | 7762 | 34458 | 736 | 717 | 726 | 859 | 868 | 864 |
| 11:31:30 | 7809 | 34478 | 737 | 718 | 727 | 861 | 861 | 861 |
| 11:31:45 | 7855 | 34454 | 738 | 719 | 729 | 860 | 870 | 865 |
| 11:32:00 | 7165 | 34462 | 738 | 721 | 729 | 852 | 869 | 861 |
| 11:32:15 | 7316 | 34490 | 738 | 722 | 730 | 845 | 871 | 858 |
| 11:32:30 | 7445 | 34488 | 738 | 723 | 731 | 848 | 874 | 861 |
| 11:32:45 | 7556 | 34478 | 739 | 724 | 731 | 853 | 864 | 859 |
| 11:33:00 | 7647 | 34477 | 739 | 724 | 732 | 848 | 867 | 858 |
| 11:33:15 | 7728 | 34475 | 739 | 725 | 732 | 847 | 868 | 858 |
| 11:33:30 | 7798 | 34483 | 739 | 726 | 733 | 843 | 875 | 859 |
| 11:33:45 | 7565 | 34480 | 739 | 726 | 733 | 844 | 859 | 852 |
| 11:34:00 | 7669 | 34499 | 739 | 726 | 733 | 845 | 865 | 855 |
| 11:34:15 | 7768 | 34468 | 738 | 727 | 733 | 843 | 875 | 859 |
| 11:34:30 | 7582 | 34492 | 738 | 727 | 733 | 851 | 867 | 859 |
| 11:34:45 | 7555 | 34468 | 739 | 727 | 733 | 838 | 865 | 851 |
| 11:35:00 | 7675 | 34478 | 738 | 727 | 733 | 835 | 867 | 851 |
| 11:35:15 | 7777 | 34492 | 738 | 727 | 733 | 829 | 867 | 848 |
| 11:35:30 | 7867 | 34483 | 738 | 727 | 732 | 827 | 846 | 836 |
| 11:35:45 | 7942 | 34469 | 737 | 726 | 732 | 833 | 850 | 841 |
| 11:36:00 | 7786 | 34474 | 737 | 725 | 731 | 836 | 835 | 835 |
| 11:36:15 | 7867 | 34497 | 737 | 724 | 730 | 837 | 839 | 838 |
| 11:36:30 | 7682 | 34494 | 737 | 723 | 730 | 830 | 843 | 837 |
| 11:36:45 | 7302 | 34498 | 737 | 722 | 729 | 827 | 837 | 832 |
| 11:37:00 | 7481 | 34476 | 736 | 721 | 729 | 821 | 841 | 831 |
| 11:37:15 | 7620 | 34485 | 736 | 721 | 728 | 820 | 838 | 829 |
| 11:37:30 | 7725 | 34503 | 736 | 720 | 728 | 824 | 847 | 836 |

## Yarmouth Research and Technology, LLC

### *Fire Test Data - continued*

|          |      |       |     |     |     |     |     |     |
|----------|------|-------|-----|-----|-----|-----|-----|-----|
| 11:37:45 | 7809 | 34496 | 736 | 719 | 728 | 822 | 839 | 831 |
| 11:38:00 | 7874 | 34494 | 735 | 719 | 727 | 823 | 861 | 842 |
| 11:38:15 | 7936 | 34500 | 734 | 718 | 726 | 667 | 683 | 675 |
| 11:38:30 | 7990 | 34484 | 728 | 713 | 720 | 524 | 539 | 532 |
| 11:38:45 | 8012 | 34492 | 714 | 700 | 707 | 438 | 459 | 449 |
| 11:39:00 | 6911 | 34479 | 686 | 684 | 685 | 349 | 388 | 369 |
| 11:39:15 | 7150 | 34492 | 631 | 662 | 646 | 69  | 327 | 198 |
| 11:39:30 | 7248 | 34496 | 579 | 635 | 607 | 62  | 86  | 74  |
| 11:39:45 | 7257 | 34485 | 532 | 600 | 566 | 52  | 65  | 59  |
| 11:40:00 | 7307 | 34481 | 482 | 565 | 524 | 47  | 59  | 53  |
| 11:40:15 | 7289 | 34490 | 432 | 533 | 482 | 46  | 56  | 51  |
| 11:40:30 | 7213 | 34475 | 364 | 502 | 433 | 53  | 52  | 53  |
| 11:40:45 | 7109 | 34488 | 286 | 474 | 380 | 46  | 48  | 47  |
| 11:41:00 | 7006 | 34492 | 223 | 447 | 335 | 36  | 46  | 41  |
| 11:41:15 | 7253 | 34479 | 179 | 419 | 299 | 34  | 43  | 38  |
| 11:41:30 | 7232 | 34467 | 147 | 389 | 268 | 31  | 43  | 37  |
| 11:41:45 | 7291 | 34487 | 124 | 354 | 239 | 29  | 52  | 40  |
| 11:42:00 | 7277 | 34483 | 108 | 307 | 208 | 28  | 59  | 44  |
| 11:42:15 | 7082 | 34472 | 96  | 256 | 176 | 27  | 51  | 39  |
| 11:42:30 | 7055 | 34474 | 86  | 211 | 148 | 26  | 46  | 36  |
| 11:42:45 | 7068 | 34476 | 79  | 176 | 127 | 25  | 42  | 33  |
| 11:43:00 | 7032 | 34454 | 73  | 148 | 111 | 24  | 37  | 31  |
| 11:43:15 | 6942 | 34471 | 68  | 126 | 97  | 23  | 33  | 28  |
| 11:43:30 | 6953 | 34456 | 63  | 108 | 86  | 22  | 29  | 26  |
| 11:43:45 | 7192 | 34454 | 60  | 94  | 77  | 22  | 28  | 25  |
| 11:44:00 | 7236 | 34435 | 57  | 83  | 70  | 21  | 26  | 24  |
| 11:44:15 | 7200 | 34457 | 55  | 74  | 64  | 21  | 26  | 23  |
| 11:44:30 | 7146 | 34460 | 53  | 67  | 60  | 19  | 24  | 22  |
| 11:44:45 | 7154 | 34430 | 51  | 61  | 56  | 19  | 22  | 21  |
| 11:45:00 | 7172 | 34430 | 49  | 57  | 53  | 18  | 22  | 20  |
| 11:45:15 | 7192 | 34428 | 48  | 53  | 50  | 18  | 21  | 19  |
| 11:45:30 | 7203 | 34423 | 47  | 49  | 48  | 18  | 20  | 19  |
| 11:45:45 | 7219 | 34419 | 46  | 47  | 46  | 17  | 20  | 19  |
| 11:46:00 | 7227 | 34389 | 45  | 45  | 45  | 17  | 19  | 18  |
| 11:46:15 | 7236 | 34401 | 44  | 43  | 43  | 17  | 19  | 18  |
| 11:46:30 | 7243 | 34406 | 43  | 42  | 42  | 16  | 19  | 18  |
| 11:46:45 | 7251 | 34383 | 42  | 41  | 41  | 16  | 18  | 17  |
| 11:47:00 | 7251 | 34402 | 41  | 39  | 40  | 16  | 18  | 17  |
| 11:47:15 | 7238 | 34391 | 41  | 39  | 40  | 16  | 18  | 17  |
| 11:47:30 | 7172 | 34397 | 40  | 38  | 39  | 16  | 17  | 16  |
| 11:47:45 | 7165 | 34395 | 39  | 38  | 39  | 15  | 17  | 16  |
| 11:48:00 | 7190 | 34399 | 38  | 38  | 38  | 15  | 17  | 16  |

## 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:   | 725        | 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:     | 80         | mls    |
| Water Collected in System Relief Valve:                        | 50         | mls    |
| Calculated External Leakage During 40 Minute Duration:         | 30         | mls    |
| Average Leak Rate Over 40 Minute Duration:                     | 1          | ml/min |
| Allowable Leak Rate:   | 181        | 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:         | 8012 | psig    |
| Average Pressure During Burn/Cool Down:         | 7433 | psig    |
| Minimum Pressure During Burn/Cool Down:         | 6869 | psig    |
|   |      |         |
| Amount of Time of Avg. Cal Block > 650 deg.C:   | 21.8 | minutes |
| Minimum Allowable Time at Temperature:          | 15.0 | minutes |
| Maximum Avg Cal Block Temperature:              | 733  | deg. C  |
| Average Cal Block Temperature:                  | 534  | deg. C  |
| Lowest Avg Cal. Block Temperature:              | 33.6 | deg. C  |
|   |      |         |
| Maximum Body Flame Temperature During Burn:     | 927  | deg. C  |
| Average Body Flame Temperature During Burn:     | 856  | deg. C  |
|   |      |         |
| Maximum Bonnet Flame Temperature During Burn:   | 907  | deg. C  |
| Average Bonnet Flame Temperature During Burn:   | 852  | deg. C  |
|   |      |         |
| Average of Both Flame Temperatures During Burn: | 854  | deg. C  |

**Notes**

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

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

**Yarmouth Research and Technology, LLC**

**Post-Burn Seat Test Information**

**Customer:** Cornerstone Valve

**Date:** 1/19/2015

---

**Product Code:** 1 13/16 Full Bore Trunnion Mounted Metal Seated Ball Valve API 6A

---

**Project Number:** 214129

---

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

# Yarmouth Research and Technology, LLC

## Operational Test Information

**Customer:** Cornerstone Valve

**Date:** 1/19/2015

**Product Code:** 1 13/16 Full Bore Trunnion Mounted Metal Seated Ball Valve API 6A 10000

**Project Number:** 214129

| Time     | Pressure (psig) | Cal Block Temp - C |
|----------|-----------------|--------------------|
| 12:00:41 | 7505            | 40                 |
| 12:00:56 | 7587            | 40                 |
| 12:01:11 | 7480            | 40                 |
| 12:01:26 | 7395            | 40                 |
| 12:01:41 | 7314            | 40                 |
| 12:01:56 | 7246            | 40                 |
| 12:02:11 | 7182            | 41                 |
| 12:02:26 | 7140            | 40                 |
| 12:02:41 | 7109            | 40                 |
| 12:02:56 | 7353            | 40                 |
| 12:03:11 | 7393            | 40                 |
| 12:03:26 | 7468            | 40                 |
| 12:03:41 | 7493            | 40                 |
| 12:03:56 | 7471            | 40                 |
| 12:04:11 | 7442            | 40                 |
| 12:04:26 | 7448            | 40                 |
| 12:04:41 | 7481            | 40                 |
| 12:04:56 | 7485            | 40                 |
| 12:05:11 | 7461            | 39                 |
| 12:05:26 | 7426            | 40                 |
| 12:05:41 | 7387            | 40                 |

*Leakages were collected manually.*

|  |    |        |
|--|----|--------|
| Total External Leakage Collected Over 5 Minute Duration: | 5  | mls    |
| Average Leak Rate Over 5 Minute Duration:                | 1  | ml/min |
| Allowable Leak Rate:                                     | 45 | ml/min |

|   |            |
|---|------------|
| <b>Was the Valve Leakage Below the Allowable?</b> | <b>Yes</b> |
|---|------------|