# Fire Test Report

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

*Performed for*

**ValvTechnologies Inc.**

www.valv.com

2 inch Class 900 Ball Valve
Product Code: N727-RF-FP-B020-001ET

Project Number: 213040
Test Date: January 31, 2013

*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:** | ValvTechnologies Inc. | **Date:** | 1/31/2013 |
| **Specification:** | ANSI/API Standard 607, 5th Edition, June 2005 | | |
| | ISO 10497-5:2004 | | |
| **Product Description:** | 2 inch Class 900 Ball Valve | | |
| **Product Code:** | N727-RF-FP-B020-001ET | | |
| **Project Number:** | PN213040 | | |

| | |
|---|---|
| **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: | 13:40:00 | |
| Average Pressure During Burn: | 1630 | psig |
| Seat Leak Rate During Burn: | 1.0 | ml/min |
| Allowable Seat Leak Rate: | 800 | ml/min |
| External Leak Rate During Burn/Cool Down: | 18 | ml/min |
| Allowable External Leak Rate: | 200 | ml/min |
| Amount of Time of Avg. Cal. Blocks > 650 deg. C: | 21.0 | minutes |
| Were Test Conditions Within Compliance? | Yes | |
| Were the Valve Leakages Below the Allowables? | Yes | |

***Operational Test***

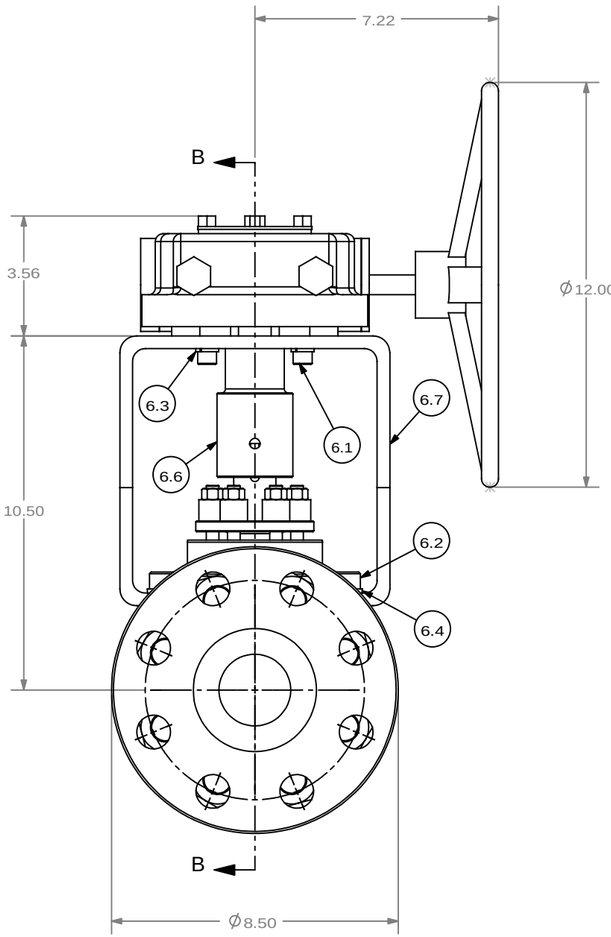
| | | |
|---|---|---|
| Did Valve Unseat and Open Fully?: | Yes | |
| Average Pressure During Test: | 1626 | psig |
| External Leak Rate After Operating: | 0.8 | ml/min |
| Allowable External Leak Rate: | 50 | ml/min |

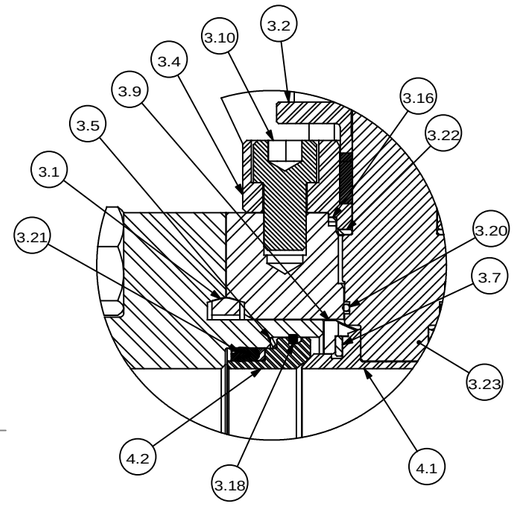
| | |
|---|---|
| Was the Leakage Below the Allowable? | Yes |
| **Valve Pass or Fail the Test Standard?** | **PASS** |

***Witnesses***

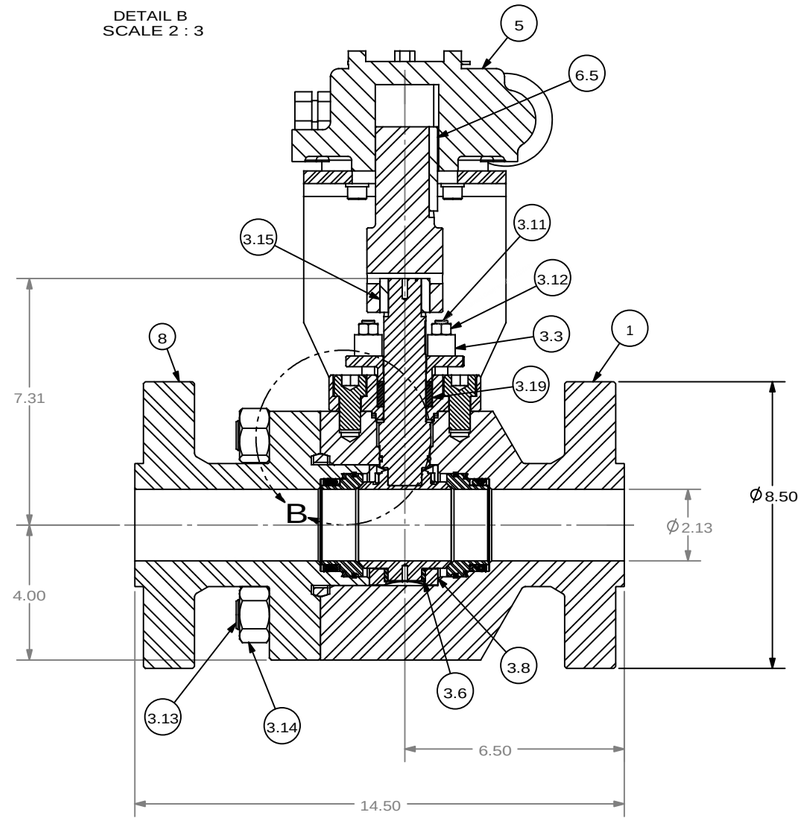
## Fire Test Information Sheet

| | |
|---|---|
| Valve Manufacturer's Name: | Valvtechnologies |
| Valve Manufacturer's Address: | 5904 Bingle<br>Houston Tx.,77092 |
| Did valve meet all required hydrostatic, leakage and other production pressure tests? | Yes |
| Valve Product Code: | N727-RF-FP-B020-001ET |
| Valve Description Size: | 2" |
| Pressure Rating: | 900# |
| Pressure Rating at 100F: | 2250 psig |
| Type: | Trunnion Valve |
| Weight: | |
| Reduced or Full Bore: | Full bore |
| Body/Bonnet Material: | F51 |
| Trim Material: | F51 |
| Seat Material: | F51/ Ram 21 |
| Stem / Body Seal Material: | F51/Graphite |
| Bolting Material: | B8M |
| Is valve considered "Soft-Seated"? | No |
| Valve Markings | |
| Nameplate Information: | Size Pressure class |
| Casting Markings: | |
| Assembly Drawing Number / Revision / Date of Issue: | 111377-001/ Rev 5 |
| Assembly Drawing sent to Yarmouth: | Yes |
| If valve is fitted with gearbox, state gearbox manufacturer, model number and mechanical advantage: | Exceeco IW3/40<br>Mechanical Advantage 15 |
| If valve is non-symmetric, state direction of flow for test: | N/A |
| For double-seated valves, state maximum allowable cavity pressure: | 3575 psig |
| Manufacturer's Contact Name /Date: | |

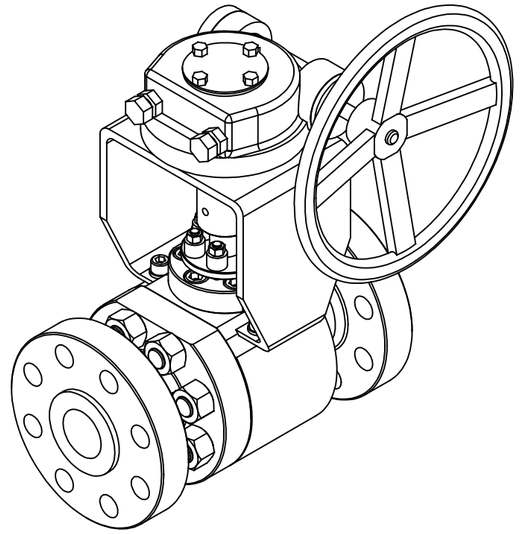



DETAIL B
SCALE 2 : 3




SECTION B-B



| ITEM NO | DESCRIPTION | QTY. |
|---|---|---|
| 1 | BODY | 1 |
| 2 | ENDCAP | 1 |
| 3 | INTERAL KIT | – |
| 3.1 | BODY SEAL | 1 |
| 3.2 | GLAND | 1 |
| 3.3 | GLAND SPRING | 4 |
| 3.4 | BONNET | 1 |
| 3.5 | BELLEVILLE SPRING | 2 |
| 3.6 | BEARING SLEEVE LOWER | 1 |
| 3.7 | BEARING SLEEVE UPPER | 1 |
| 3.8 | TRUNION BEARING LOWER | 1 |
| 3.9 | TRUNION BEARING UPPER | 1 |
| 3.10 | BONET SOCKET SCREW | 6 |
| 3.11 | GLAND STUD | 6 |
| 3.12 | GLAND NUT | 6 |
| 3.13 | BODY STUD | 8 |
| 3.14 | BODY NUT | 8 |
| 3.15 | STEM KEY | 2 |
| 3.16 | FLEXIBLE GRAPHITE ROPE | 2 |
| 3.17 | BONNET GASKET | 1 |
| 3.18 | GASKET | 2 |
| 3.19 | PACKING | 1 |
| 3.20 | ORING # 2-214 | 1 |
| 3.21 | SEAL ASSEMBLY | 1 |
| 3.22 | STEM BEARING | 1 |
| 3.23 | STEM | 1 |
| 4 | SEAT & BALL | – |
| 4.1 | BALL | 1 |
| 4.2 | SEAT | 2 |
| 5 | EXEECO IW-3 | 1 |
| 6 | MOUNTING KIT | – |
| 6.1 | ACTUATOR SOCKET SREW | 4 |
| 6.2 | BODY SOCKET SREW | 4 |
| 6.3 | ACT. LOCK WASHER | 4 |
| 6.4 | BODY LOCK WASHER | 4 |
| 6.5 | DRIVE SLEEVE KEY | 1 |
| 6.6 | DRIVE SLEEVE | 1 |
| 6.7 | BRACKET | 1 |

THIRD ANGLE PROJECTION



| REV | DATE | DESCRIPTION | ECN | BY | CHK | APR |
|---|---|---|---|---|---|---|
| – | – | – | – | – | – | – |
| – | – | – | – | – | – | – |
| – | – | – | – | – | – | – |
| – | – | – | – | – | – | – |
| – | – | – | – | – | – | – |

DIMENSIONS ARE IN INCHES
REMOVE BURRS AND BREAK EDGES
UNLESS OTHERWISE SPECIFIED

CORNER RADII .03 MAX
.X= ±.030
.XX= ±.015
.XXX= ±.005
CONCENTRICITY .010 T.I.R.
ANGULAR= ±1/2°
SURFACE TEXTURE 125 RMS
MIN. INTERNAL FILLETS .015

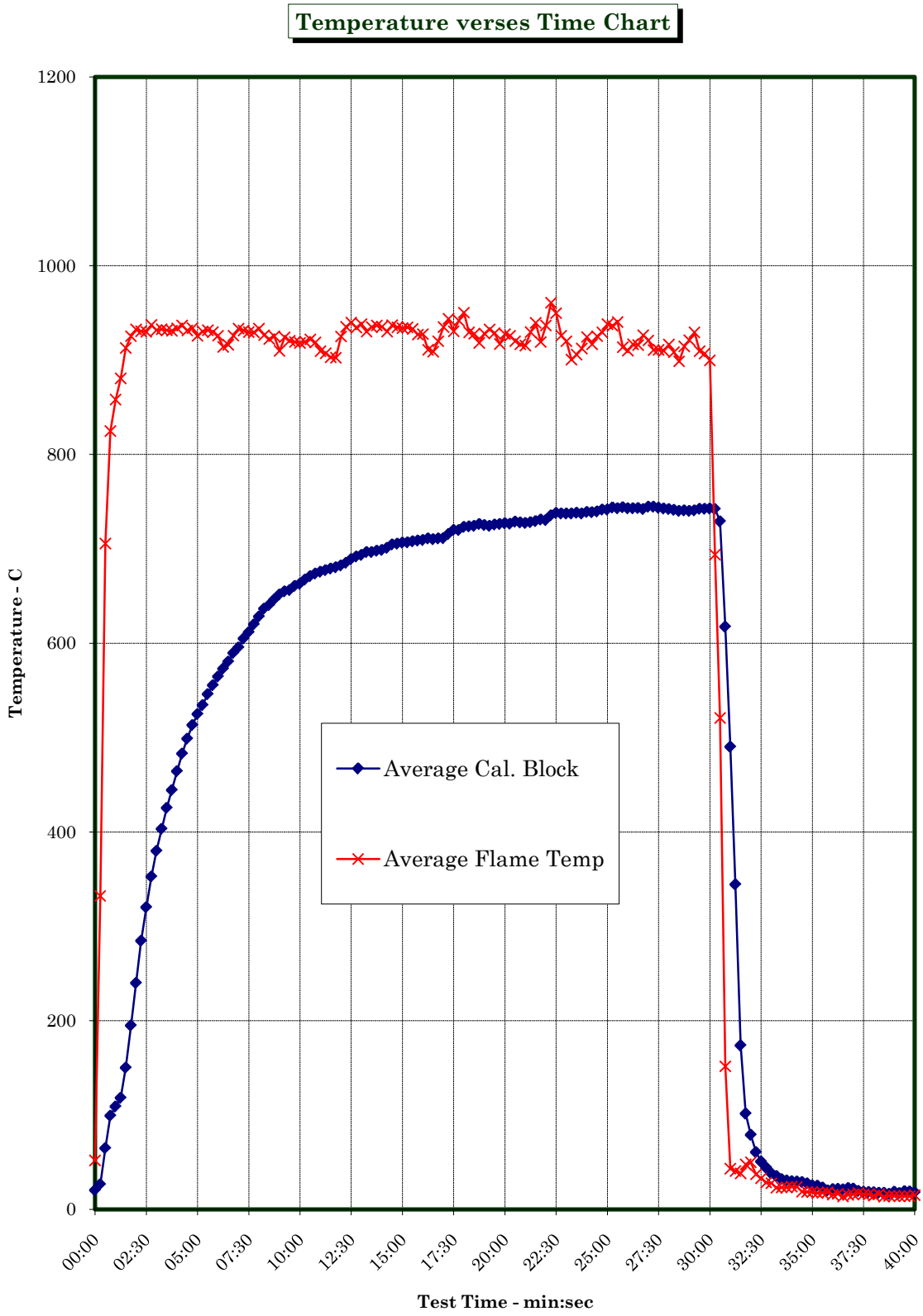
SCALE 1:3 | MODEL FILE 111377-001 | SIZE C
MATERIAL –
COATING –
DRAWN BY NN DATE 10/07/11
CHECKED BY RSL DATE 10/11/11
ENGINEER JDJ DATE 10/11/11
APPROVED BY JDJ DATE 10/11/11

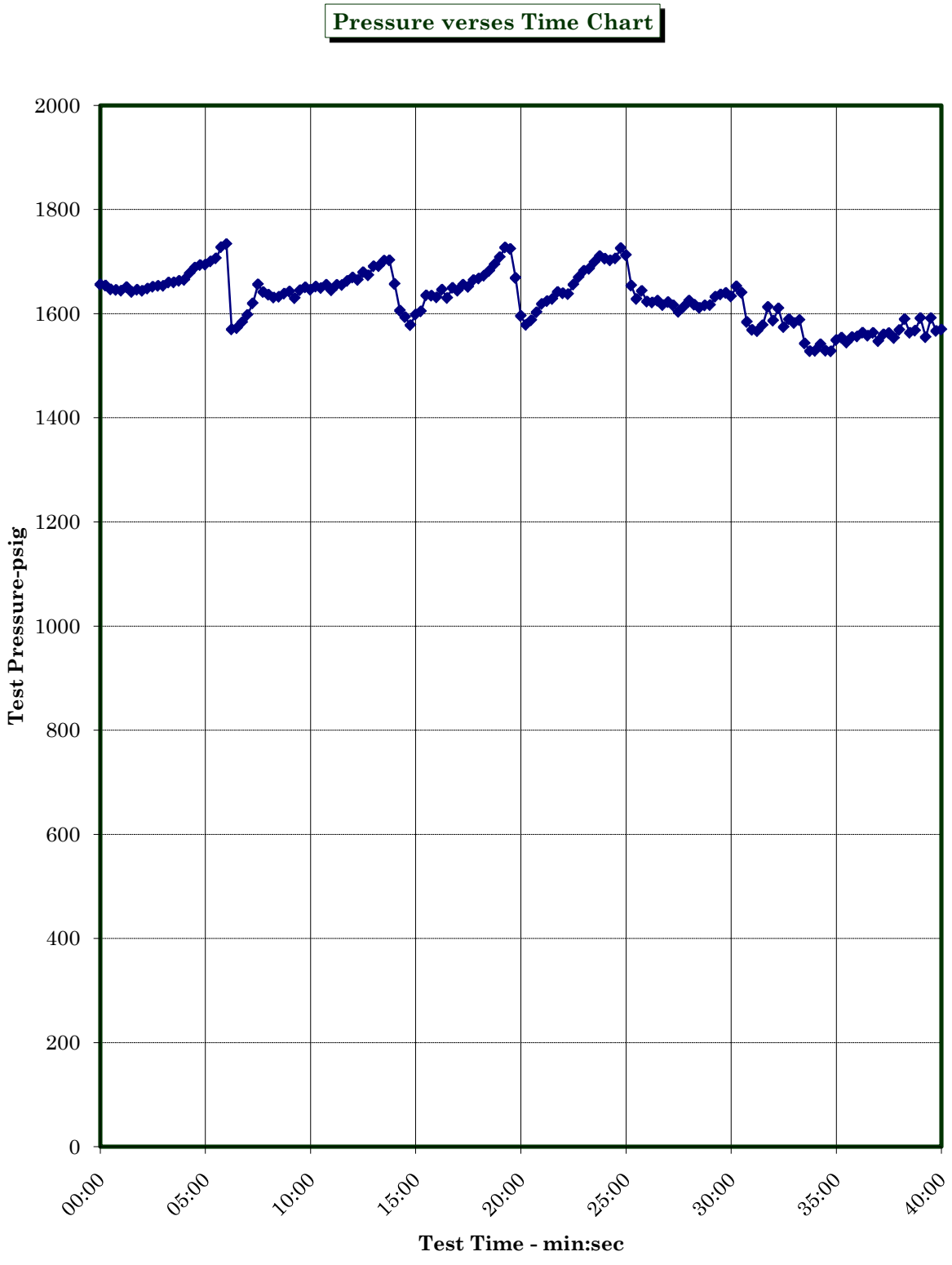
VALVTECHNOLOGIES
5904 BINGLE ROAD, HOUSTON TEXAS 77092
PH: (713) 860-0400 FAX: (713) 860-0499

TITLE
N727-RF-FP-B020-001ET-001, ANSI 900# WITH MOUNTING KIT AND EXEECO IW-3

111377-001 REV. 1

SH 1 OF 1


Temperature verses Time Chart
1200
1000
800
600
400
200
0
Temperature - C
Average Cal. Block
Average Flame Temp
00:00
02:30
05:00
07:30
10:00
12:30
15:00
17:30
20:00
22:30
25:00
27:30
30:00
32:30
35:00
37:30
40:00
Test Time - min:sec


Pressure verses Time Chart
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Test Pressure-psig
00:00
05:00
10:00
15:00
20:00
25:00
30:00
35:00
40:00
Test Time - min:sec



Test Valve Prior to Burn



Test Valve During Burn

# Yarmouth Research and Technology, LLC

## Fire Test Information

**Customer:** ValvTechnologies Inc. **Date:** 1/31/2013

**Product Code:** 2 inch Class 900 Ball Valve

**Project Number:** PN213040

***Fire Test Raw Data***

| Time (EST) | Pressure (psig) | Water Volume (mls) | Bonnet Temp-C | Body Temp-C | 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:40:00 | 1656 | 40627 | 14 | 16 | 21 | 21 | 21 | 75 | 29 | 52 |
| 13:40:15 | 1654 | 40453 | 14 | 16 | 31 | 22 | 27 | 467 | 198 | 332 |
| 13:40:30 | 1646 | 40415 | 14 | 15 | 76 | 54 | 65 | 863 | 548 | 706 |
| 13:40:45 | 1645 | 40393 | 14 | 16 | 106 | 93 | 99 | 963 | 687 | 825 |
| 13:41:00 | 1644 | 40589 | 14 | 15 | 109 | 109 | 109 | 988 | 728 | 858 |
| 13:41:15 | 1651 | 40664 | 14 | 15 | 128 | 109 | 118 | 1000 | 761 | 881 |
| 13:41:30 | 1641 | 40422 | 14 | 15 | 170 | 131 | 150 | 988 | 838 | 913 |
| 13:41:45 | 1646 | 40551 | 14 | 16 | 221 | 169 | 195 | 994 | 857 | 925 |
| 13:42:00 | 1644 | 40578 | 14 | 15 | 267 | 213 | 240 | 1006 | 859 | 933 |
| 13:42:15 | 1648 | 40520 | 14 | 16 | 316 | 254 | 285 | 1000 | 861 | 931 |
| 13:42:30 | 1651 | 40599 | 14 | 16 | 351 | 290 | 320 | 996 | 864 | 930 |
| 13:42:45 | 1653 | 40663 | 14 | 16 | 385 | 321 | 353 | 1010 | 864 | 937 |
| 13:43:00 | 1653 | 40630 | 14 | 16 | 413 | 347 | 380 | 1005 | 858 | 932 |
| 13:43:15 | 1660 | 40539 | 14 | 15 | 436 | 371 | 403 | 1007 | 858 | 933 |
| 13:43:30 | 1660 | 40542 | 14 | 16 | 457 | 394 | 426 | 1009 | 854 | 932 |
| 13:43:45 | 1663 | 40505 | 14 | 16 | 474 | 415 | 444 | 1003 | 859 | 931 |
| 13:44:00 | 1665 | 40546 | 14 | 15 | 495 | 434 | 464 | 1013 | 854 | 934 |
| 13:44:15 | 1677 | 40490 | 14 | 16 | 514 | 452 | 483 | 1012 | 861 | 937 |
| 13:44:30 | 1688 | 40519 | 14 | 15 | 529 | 469 | 499 | 1004 | 859 | 931 |
| 13:44:45 | 1693 | 40512 | 14 | 14 | 543 | 484 | 513 | 1007 | 861 | 934 |
| 13:45:00 | 1694 | 40509 | 14 | 16 | 552 | 498 | 525 | 1000 | 851 | 926 |
| 13:45:15 | 1700 | 40488 | 14 | 14 | 558 | 511 | 534 | 1002 | 858 | 930 |
| 13:45:30 | 1706 | 40514 | 14 | 15 | 569 | 523 | 546 | 1003 | 860 | 932 |
| 13:45:45 | 1727 | 40515 | 14 | 16 | 577 | 534 | 556 | 1002 | 858 | 930 |
| 13:46:00 | 1733 | 40548 | 14 | 16 | 584 | 545 | 565 | 997 | 855 | 926 |
| 13:46:15 | 1570 | 40472 | 14 | 16 | 591 | 555 | 573 | 982 | 846 | 914 |
| 13:46:30 | 1572 | 40541 | 14 | 16 | 597 | 564 | 581 | 994 | 838 | 916 |
| 13:46:45 | 1583 | 40578 | 14 | 16 | 606 | 574 | 590 | 997 | 855 | 926 |
| 13:47:00 | 1597 | 40536 | 15 | 16 | 609 | 582 | 596 | 998 | 869 | 933 |
| 13:47:15 | 1620 | 40525 | 14 | 16 | 619 | 591 | 605 | 994 | 868 | 931 |
| 13:47:30 | 1656 | 40456 | 15 | 16 | 625 | 598 | 612 | 1007 | 852 | 930 |
| 13:47:45 | 1641 | 40565 | 15 | 16 | 634 | 606 | 620 | 1007 | 852 | 929 |
| 13:48:00 | 1636 | 40515 | 14 | 16 | 644 | 613 | 628 | 1026 | 841 | 933 |

***Fire Test Data - continued***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:48:15 | 1631 | 40539 | 15 | 16 | 653 | 620 | 637 | 1019 | 834 | 926 |
| 13:48:30 | 1632 | 40521 | 15 | 16 | 655 | 626 | 641 | 1007 | 837 | 922 |
| 13:48:45 | 1638 | 40520 | 15 | 16 | 662 | 631 | 646 | 1007 | 844 | 925 |
| 13:49:00 | 1642 | 40537 | 15 | 16 | 667 | 637 | 652 | 974 | 845 | 910 |
| 13:49:15 | 1630 | 40502 | 15 | 16 | 668 | 642 | 655 | 993 | 856 | 924 |
| 13:49:30 | 1645 | 40527 | 14 | 16 | 666 | 647 | 656 | 979 | 862 | 921 |
| 13:49:45 | 1650 | 40462 | 14 | 15 | 671 | 651 | 661 | 971 | 868 | 919 |
| 13:50:00 | 1646 | 40492 | 14 | 15 | 671 | 656 | 663 | 968 | 868 | 918 |
| 13:50:15 | 1652 | 40472 | 14 | 15 | 676 | 659 | 668 | 972 | 867 | 919 |
| 13:50:30 | 1649 | 40515 | 14 | 15 | 679 | 663 | 671 | 994 | 849 | 922 |
| 13:50:45 | 1655 | 40535 | 14 | 15 | 681 | 667 | 674 | 987 | 851 | 919 |
| 13:51:00 | 1645 | 40635 | 14 | 15 | 681 | 671 | 676 | 959 | 859 | 909 |
| 13:51:15 | 1655 | 40531 | 14 | 14 | 682 | 673 | 678 | 948 | 867 | 907 |
| 13:51:30 | 1655 | 40495 | 14 | 15 | 682 | 677 | 679 | 943 | 863 | 903 |
| 13:51:45 | 1663 | 40557 | 14 | 15 | 682 | 679 | 681 | 938 | 867 | 903 |
| 13:52:00 | 1669 | 40472 | 14 | 14 | 683 | 682 | 683 | 983 | 867 | 925 |
| 13:52:15 | 1664 | 40573 | 14 | 14 | 685 | 686 | 685 | 1002 | 869 | 935 |
| 13:52:30 | 1679 | 40495 | 14 | 14 | 690 | 688 | 689 | 1012 | 867 | 940 |
| 13:52:45 | 1673 | 40508 | 14 | 14 | 693 | 691 | 692 | 1002 | 867 | 934 |
| 13:53:00 | 1691 | 40538 | 14 | 14 | 694 | 693 | 694 | 1004 | 872 | 938 |
| 13:53:15 | 1691 | 40495 | 14 | 14 | 697 | 696 | 697 | 993 | 868 | 930 |
| 13:53:30 | 1702 | 40464 | 14 | 14 | 694 | 699 | 697 | 999 | 871 | 935 |
| 13:53:45 | 1702 | 40549 | 14 | 14 | 696 | 701 | 698 | 995 | 878 | 937 |
| 13:54:00 | 1657 | 40502 | 14 | 14 | 695 | 703 | 699 | 1008 | 863 | 935 |
| 13:54:15 | 1606 | 40602 | 14 | 14 | 697 | 706 | 701 | 1004 | 857 | 930 |
| 13:54:30 | 1593 | 40520 | 14 | 14 | 702 | 707 | 705 | 998 | 876 | 937 |
| 13:54:45 | 1578 | 40528 | 15 | 14 | 702 | 709 | 706 | 988 | 882 | 935 |
| 13:55:00 | 1598 | 40555 | 14 | 14 | 703 | 711 | 707 | 985 | 883 | 934 |
| 13:55:15 | 1604 | 40511 | 14 | 14 | 702 | 712 | 707 | 985 | 884 | 935 |
| 13:55:30 | 1635 | 40539 | 14 | 14 | 702 | 714 | 708 | 984 | 882 | 933 |
| 13:55:45 | 1634 | 40533 | 14 | 14 | 702 | 716 | 709 | 974 | 879 | 927 |
| 13:56:00 | 1631 | 40555 | 14 | 14 | 702 | 717 | 709 | 977 | 878 | 928 |
| 13:56:15 | 1646 | 40504 | 14 | 14 | 704 | 718 | 711 | 957 | 864 | 911 |
| 13:56:30 | 1630 | 40642 | 14 | 14 | 701 | 719 | 710 | 963 | 854 | 909 |
| 13:56:45 | 1649 | 40575 | 14 | 14 | 701 | 722 | 711 | 973 | 867 | 920 |
| 13:57:00 | 1644 | 40477 | 14 | 14 | 699 | 723 | 711 | 1000 | 870 | 935 |
| 13:57:15 | 1655 | 40550 | 14 | 14 | 707 | 724 | 716 | 1026 | 861 | 944 |
| 13:57:30 | 1651 | 40542 | 14 | 14 | 714 | 726 | 720 | 994 | 867 | 931 |
| 13:57:45 | 1664 | 40515 | 15 | 15 | 713 | 727 | 720 | 1005 | 878 | 942 |
| 13:58:00 | 1667 | 40526 | 14 | 15 | 719 | 727 | 723 | 1010 | 891 | 950 |
| 13:58:15 | 1673 | 40512 | 14 | 14 | 719 | 728 | 724 | 976 | 883 | 929 |
| 13:58:30 | 1682 | 40530 | 14 | 14 | 721 | 728 | 724 | 970 | 886 | 928 |
| 13:58:45 | 1694 | 40526 | 14 | 14 | 724 | 729 | 726 | 952 | 884 | 918 |

***Fire Test Data - continued***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:59:00 | 1708 | 40579 | 14 | 14 | 722 | 729 | 725 | 970 | 886 | 928 |
| 13:59:15 | 1727 | 40559 | 14 | 14 | 718 | 731 | 724 | 976 | 889 | 933 |
| 13:59:30 | 1724 | 40566 | 14 | 14 | 721 | 731 | 726 | 976 | 882 | 929 |
| 13:59:45 | 1668 | 40532 | 14 | 14 | 721 | 732 | 726 | 963 | 871 | 917 |
| 14:00:00 | 1595 | 40585 | 14 | 14 | 722 | 733 | 727 | 972 | 883 | 928 |
| 14:00:15 | 1578 | 40561 | 14 | 14 | 720 | 733 | 727 | 972 | 880 | 926 |
| 14:00:30 | 1587 | 40532 | 14 | 14 | 723 | 735 | 729 | 969 | 871 | 920 |
| 14:00:45 | 1603 | 40610 | 14 | 14 | 721 | 735 | 728 | 963 | 871 | 917 |
| 14:01:00 | 1619 | 40582 | 14 | 14 | 719 | 736 | 728 | 956 | 875 | 915 |
| 14:01:15 | 1624 | 40555 | 14 | 14 | 720 | 737 | 728 | 984 | 876 | 930 |
| 14:01:30 | 1628 | 40612 | 14 | 14 | 722 | 737 | 729 | 1004 | 874 | 939 |
| 14:01:45 | 1641 | 40613 | 14 | 14 | 724 | 738 | 731 | 954 | 884 | 919 |
| 14:02:00 | 1639 | 40660 | 14 | 14 | 722 | 739 | 731 | 984 | 889 | 937 |
| 14:02:15 | 1637 | 40680 | 14 | 14 | 732 | 739 | 736 | 1028 | 893 | 961 |
| 14:02:30 | 1656 | 40554 | 14 | 14 | 736 | 740 | 738 | 1009 | 891 | 950 |
| 14:02:45 | 1670 | 40612 | 14 | 14 | 734 | 741 | 738 | 967 | 885 | 926 |
| 14:03:00 | 1682 | 40549 | 14 | 14 | 735 | 740 | 738 | 960 | 880 | 920 |
| 14:03:15 | 1686 | 40559 | 14 | 14 | 734 | 741 | 738 | 916 | 886 | 901 |
| 14:03:30 | 1699 | 40594 | 14 | 14 | 736 | 741 | 738 | 928 | 883 | 906 |
| 14:03:45 | 1710 | 40568 | 14 | 14 | 735 | 740 | 738 | 944 | 881 | 912 |
| 14:04:00 | 1705 | 40602 | 14 | 14 | 738 | 740 | 739 | 973 | 876 | 924 |
| 14:04:15 | 1702 | 40631 | 14 | 14 | 738 | 739 | 739 | 957 | 877 | 917 |
| 14:04:30 | 1706 | 40610 | 14 | 14 | 741 | 739 | 740 | 976 | 874 | 925 |
| 14:04:45 | 1726 | 40611 | 14 | 14 | 744 | 739 | 742 | 989 | 869 | 929 |
| 14:05:00 | 1712 | 40620 | 14 | 14 | 745 | 738 | 742 | 994 | 882 | 938 |
| 14:05:15 | 1654 | 40600 | 14 | 14 | 749 | 738 | 744 | 1000 | 873 | 936 |
| 14:05:30 | 1628 | 40621 | 14 | 14 | 748 | 738 | 743 | 1003 | 877 | 940 |
| 14:05:45 | 1643 | 40558 | 14 | 14 | 751 | 738 | 744 | 954 | 873 | 914 |
| 14:06:00 | 1623 | 40594 | 14 | 14 | 749 | 737 | 743 | 956 | 864 | 910 |
| 14:06:15 | 1621 | 40610 | 14 | 14 | 749 | 737 | 743 | 966 | 868 | 917 |
| 14:06:30 | 1625 | 40563 | 14 | 14 | 751 | 736 | 743 | 961 | 871 | 916 |
| 14:06:45 | 1616 | 40632 | 15 | 14 | 749 | 735 | 742 | 964 | 888 | 926 |
| 14:07:00 | 1622 | 40620 | 14 | 14 | 754 | 736 | 745 | 959 | 882 | 921 |
| 14:07:15 | 1616 | 40640 | 14 | 14 | 754 | 736 | 745 | 936 | 885 | 911 |
| 14:07:30 | 1603 | 40606 | 14 | 14 | 752 | 736 | 744 | 938 | 884 | 911 |
| 14:07:45 | 1613 | 40627 | 14 | 14 | 751 | 735 | 743 | 932 | 887 | 910 |
| 14:08:00 | 1625 | 40626 | 14 | 14 | 750 | 734 | 742 | 952 | 881 | 916 |
| 14:08:15 | 1617 | 40601 | 14 | 14 | 749 | 734 | 741 | 928 | 888 | 908 |
| 14:08:30 | 1611 | 40609 | 14 | 14 | 747 | 733 | 740 | 904 | 893 | 899 |
| 14:08:45 | 1616 | 40645 | 14 | 14 | 748 | 733 | 741 | 933 | 896 | 914 |
| 14:09:00 | 1616 | 40561 | 14 | 14 | 747 | 733 | 740 | 940 | 902 | 921 |
| 14:09:15 | 1632 | 40639 | 14 | 14 | 748 | 733 | 741 | 958 | 901 | 929 |
| 14:09:30 | 1637 | 40661 | 14 | 14 | 751 | 734 | 743 | 927 | 892 | 909 |

***Fire Test Data - continued***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:09:45 | 1640 | 40646 | 14 | 14 | 751 | 734 | 743 | 922 | 892 | 907 |
| 14:10:00 | 1633 | 40577 | 14 | 14 | 751 | 735 | 743 | 916 | 884 | 900 |
| 14:10:15 | 1652 | 40590 | 14 | 13 | 748 | 736 | 742 | 699 | 688 | 694 |
| 14:10:30 | 1640 | 40660 | 14 | 14 | 727 | 731 | 729 | 523 | 518 | 521 |
| 14:10:45 | 1584 | 40726 | 14 | 14 | 521 | 714 | 618 | 153 | 151 | 152 |
| 14:11:00 | 1569 | 40553 | 14 | 14 | 338 | 642 | 490 | 46 | 41 | 43 |
| 14:11:15 | 1566 | 40507 | 14 | 14 | 220 | 469 | 344 | 39 | 43 | 41 |
| 14:11:30 | 1578 | 40481 | 15 | 13 | 142 | 206 | 174 | 38 | 39 | 38 |
| 14:11:45 | 1613 | 40459 | 14 | 14 | 95 | 108 | 102 | 58 | 38 | 48 |
| 14:12:00 | 1586 | 40500 | 14 | 13 | 68 | 91 | 79 | 53 | 47 | 50 |
| 14:12:15 | 1610 | 40441 | 14 | 13 | 53 | 69 | 61 | 35 | 39 | 37 |
| 14:12:30 | 1574 | 40487 | 14 | 13 | 42 | 59 | 51 | 31 | 35 | 33 |
| 14:12:45 | 1589 | 40494 | 13 | 13 | 38 | 51 | 44 | 27 | 31 | 29 |
| 14:13:00 | 1582 | 40460 | 13 | 13 | 34 | 43 | 38 | 28 | 28 | 28 |
| 14:13:15 | 1588 | 40528 | 13 | 13 | 33 | 38 | 36 | 22 | 24 | 23 |
| 14:13:30 | 1543 | 40448 | 13 | 12 | 29 | 36 | 32 | 23 | 24 | 23 |
| 14:13:45 | 1528 | 40523 | 13 | 13 | 26 | 36 | 31 | 25 | 22 | 23 |
| 14:14:00 | 1529 | 40257 | 13 | 13 | 24 | 36 | 30 | 24 | 24 | 24 |
| 14:14:15 | 1541 | 40126 | 12 | 12 | 24 | 35 | 30 | 23 | 25 | 24 |
| 14:14:30 | 1529 | 40217 | 12 | 12 | 22 | 36 | 29 | 21 | 17 | 19 |
| 14:14:45 | 1528 | 39774 | 11 | 11 | 21 | 35 | 28 | 17 | 21 | 19 |
| 14:15:00 | 1549 | 39853 | 11 | 10 | 21 | 31 | 26 | 18 | 19 | 19 |
| 14:15:15 | 1554 | 40022 | 12 | 12 | 21 | 30 | 25 | 17 | 18 | 18 |
| 14:15:30 | 1544 | 39911 | 11 | 11 | 21 | 26 | 23 | 17 | 19 | 18 |
| 14:15:45 | 1555 | 40023 | 11 | 11 | 18 | 23 | 20 | 18 | 19 | 18 |
| 14:16:00 | 1556 | 39624 | 11 | 11 | 20 | 23 | 22 | 16 | 16 | 16 |
| 14:16:15 | 1563 | 39948 | 11 | 11 | 19 | 24 | 22 | 16 | 18 | 17 |
| 14:16:30 | 1558 | 39652 | 11 | 11 | 18 | 24 | 21 | 13 | 15 | 14 |
| 14:16:45 | 1563 | 39793 | 11 | 11 | 18 | 27 | 23 | 16 | 16 | 16 |
| 14:17:00 | 1547 | 39605 | 11 | 11 | 18 | 27 | 22 | 16 | 16 | 16 |
| 14:17:15 | 1560 | 39590 | 11 | 11 | 17 | 22 | 20 | 17 | 18 | 18 |
| 14:17:30 | 1563 | 39589 | 11 | 11 | 17 | 21 | 19 | 16 | 16 | 16 |
| 14:17:45 | 1553 | 39668 | 11 | 11 | 17 | 20 | 19 | 15 | 17 | 16 |
| 14:18:00 | 1569 | 39504 | 11 | 11 | 18 | 19 | 18 | 14 | 15 | 15 |
| 14:18:15 | 1589 | 39589 | 12 | 11 | 17 | 18 | 18 | 17 | 16 | 16 |
| 14:18:30 | 1563 | 39546 | 12 | 11 | 16 | 19 | 18 | 13 | 14 | 14 |
| 14:18:45 | 1567 | 39542 | 13 | 11 | 16 | 17 | 17 | 14 | 15 | 14 |
| 14:19:00 | 1591 | 39672 | 13 | 11 | 15 | 23 | 19 | 14 | 14 | 14 |
| 14:19:15 | 1555 | 39511 | 13 | 11 | 13 | 22 | 18 | 12 | 16 | 14 |
| 14:19:30 | 1591 | 39482 | 14 | 11 | 17 | 22 | 19 | 13 | 15 | 14 |
| 14:19:45 | 1567 | 39502 | 13 | 11 | 17 | 21 | 19 | 14 | 14 | 14 |
| 14:20:00 | 1569 | 39483 | 13 | 11 | 17 | 19 | 18 | 16 | 15 | 15 |

**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: | 30 | mls |
| Average Leak Rate Over 30 Minute Duration: | 1.0 | ml/min |
| Allowable Leak Rate: | 800 | ml/min |

| | | |
|---|---|---|
| Total Through Seat Leakage Collected Over 10 Minute Cool Down: | 400 | mls |

| | | |
|---|---|---|
| Total Water Volume Lost Over 40 Minute Burn and Cool Down: | 1144 | mls |
| Water Collected in System Relief Valve: | 0 | mls |
| Calculated External Leakage During 40 Minute Duration: | 714 | mls |
| Average Leak Rate Over 40 Minute Duration: | 18 | 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: | 1733.2 | psig |
| Average Pressure During Burn/Cool Down: | 1629.8 | psig |
| Minimum Pressure During Burn/Cool Down: | 1527.7 | psig |
| | | |
| Amount of Time of Avg. Cal Block > 650 deg.C: | 21.0 | minutes |
| Minimum Allowable Time at Temperature: | 15.0 | minutes |
| Maximum Avg Cal Block Temperature: | 15 | deg. C |
| Average Cal Block Temperature: | 14 | deg. C |
| Lowest Avg Cal. Block Temperature: | 11 | deg. C |
| | | |
| Maximum Body Flame Temperature During Burn: | 902 | deg. C |
| Average Body Flame Temperature During Burn: | 854 | deg. C |
| | | |
| Maximum Bonnet Flame Temperature During Burn: | 1028 | deg. C |
| Average Bonnet Flame Temperature During Burn: | 969 | deg. C |
| | | |
| Average of Both Flame Temperatures During Burn: | 911 | deg. C |

***Note***

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

## Post-Burn Seat Test Information

| | |
|---|---|
| **Customer:** ValvTechnologies Inc. | **Date:** 1/31/2013 |
| **Product Code:** 2 inch Class 900 Ball Valve | |
| **Project Number:** PN213040 | |

***Test not required***

# Yarmouth Research and Technology, LLC

## Operational Test Information

**Customer:** ValvTechnologies Inc. **Date:** 1/31/2013

**Product Code:** 2 inch Class 900 Ball Valve

**Project Number:** PN213040

***Test Data***

| Time | Pressure (psig) | Cal Block Temp - C |
|---|---|---|
| 14:33:12 | 1641 | 20 |
| 14:33:27 | 1640 | 20 |
| 14:33:42 | 1649 | 19 |
| 14:33:57 | 1644 | 20 |
| 14:34:12 | 1649 | 20 |
| 14:34:27 | 1638 | 20 |
| 14:34:42 | 1632 | 21 |
| 14:34:57 | 1638 | 21 |
| 14:35:12 | 1639 | 20 |
| 14:35:27 | 1633 | 19 |
| 14:35:42 | 1621 | 19 |
| 14:36:12 | 1622 | 20 |
| 14:36:27 | 1612 | 20 |
| 14:36:42 | 1607 | 20 |
| 14:36:57 | 1614 | 21 |
| 14:37:12 | 1610 | 22 |
| 14:37:27 | 1603 | 20 |
| 14:37:42 | 1612 | 20 |
| 14:37:57 | 1609 | 21 |
| 14:38:12 | 1612 | 21 |

*Leakages were collected manually.*

| | | |
|---|---|---|
| Total External Leakage Collected Over 5 Minute Duration: | 4 | mls |
| Average Leak Rate Over 5 Minute Duration: | 0.8 | ml/min |
| Allowable Leak Rate: | 50 | ml/min |

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