

# TEST REPORT

## VALVE FIRE TEST DOWNSTREAM SEALING BALL VALVE

PER API STANDARD 607, FOURTH EDITION

SIZE AND RATING: 2.00" - CLASS 150

VALVE MODEL NO.: B3C4-SW-STD-2

SwRI TEST NO.: 6-901

PREPARED FOR: VALVTECHNOLOGIES, INC.  
5904 BINGLE ROAD  
HOUSTON, TEXAS 77092 USA



**SOUTHWEST RESEARCH INSTITUTE™**

SAN ANTONIO  
DETROIT

HOUSTON  
WASHINGTON, DC



**REVIEW AND APPROVAL**

The contents of this Test Report for SwRI Test Number 6-901 are correct and accurate, and all performance test results and procedures conducted by this laboratory are in compliance with API Standard 607, Fourth Edition.

**Prepared By:**

**Southwest Research Institute™  
Mechanical & Fluids Engineering Department  
P. O. Drawer 28510  
San Antonio, Texas, USA 78228-0510**

**Test Report Reviewed By:**

**Frank Henson  
Technician**

9-24-01

**Date**

**Robert Hart  
Project Manager**

9-24-01

**Date**

**Management Review:**

**J. Christopher Buckingham  
Manager, Multiphase Flow**

9/24/01

**Date**

## **ADVERTISING, CONFIDENTIALITY AND RECORD RETENTION POLICY**

SwRI policies specifically prohibit the use in advertising of its name, logo and results provided by our studies. The following paragraph, extracted verbatim from SwRI contractual documents clarifies this point:

“SwRI shall not publish or make known to others the subject matter or results of the Project or any information obtained in connection therewith which is proprietary and confidential to Client without Clients’ written approval. No advertising or publicity containing any reference to SwRI, or any of their employees, either directly or by implication shall be made use of by Client or on Client’s behalf without SwRI’s written approval. In the event Client distributes any report issued by SwRI on this Project outside its own organization, such report shall be used in its entirety, unless SwRI approves a summary of abridgment for distribution.”

SwRI will retain a record copy of the test report for a period of five (5) years. This permits us to answer questions, which may be raised after a report has been mailed and provides a basis for additional work, if required. The contents of the report and any information, which comes into our possession during the course of a study, are held confidential to the company conducting the study and are not disclosed to anyone without client’s prior permission.



**VALVE FIRE TEST  
PER API STANDARD 607, FOURTH EDITION**

SwRI Test Number:	6-901	Test Date:	9/12/2001
-------------------	-------	------------	-----------

1. Test Conditions:

Test pressure 30 psig nominal ( $\pm 10\%$ ).

Maximum allowable body cavity pressure 9200 psig.

Time from ignition to 1400° F average flame temperature 0.67 minute.

Time from start of test to 1100° F body temperature 4.78 minutes.

Time from start of test to 1200° F bonnet temperature 7.18 minutes.

Duration of burn 30.00 minutes. Duration of cooldown 10.00 minutes.

2. Upstream Water Reservoir Levels:

At beginning of burning period 155,000 ml.

At end of cooldown 155,000 ml.

3. Downstream Container Water Collection:

Collected during 30.00-minute burning period 0 ml.

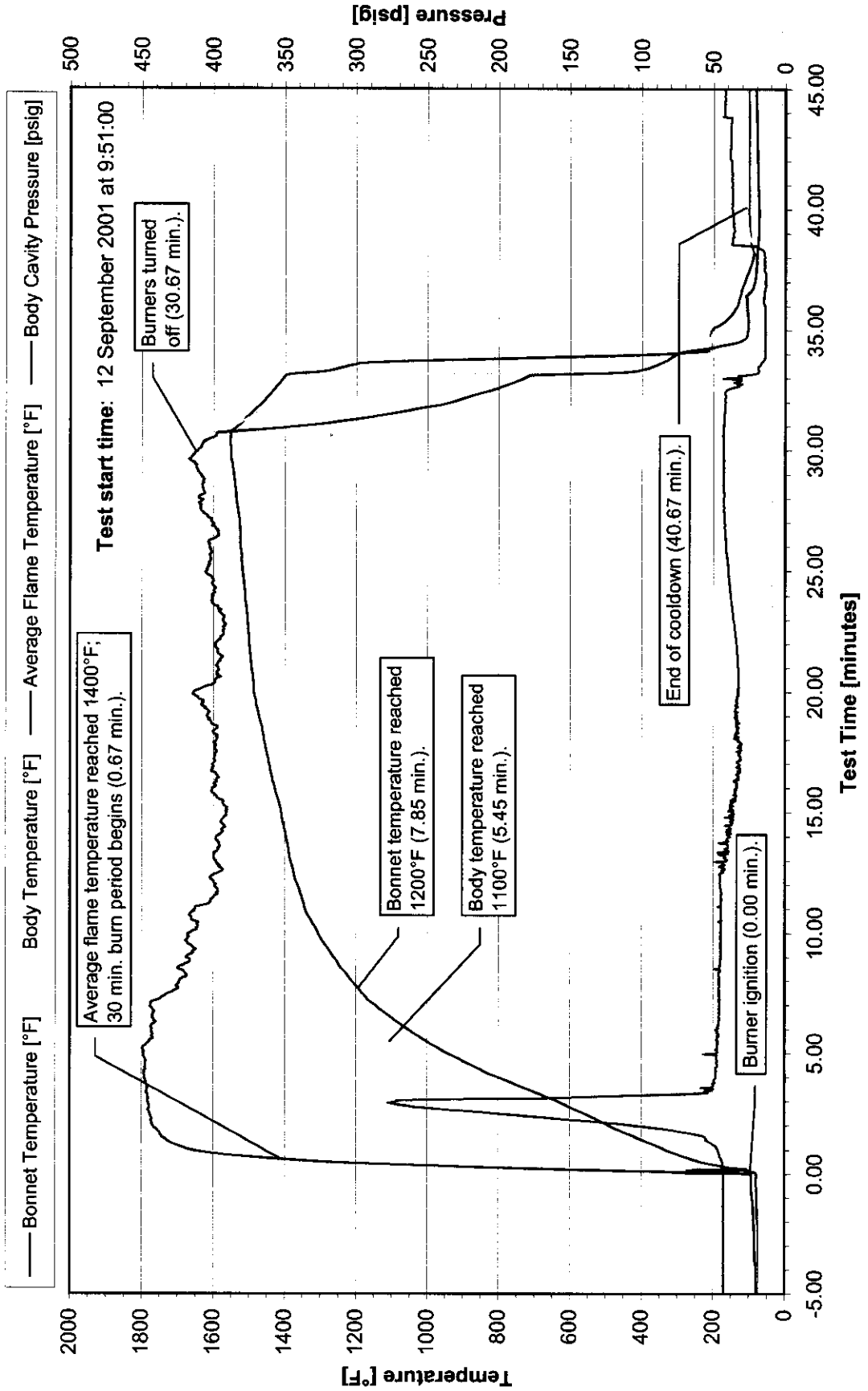
Collected during 10.00-minute cooldown period 0 ml.

Collected during 5.00-minute operational test 10 ml.

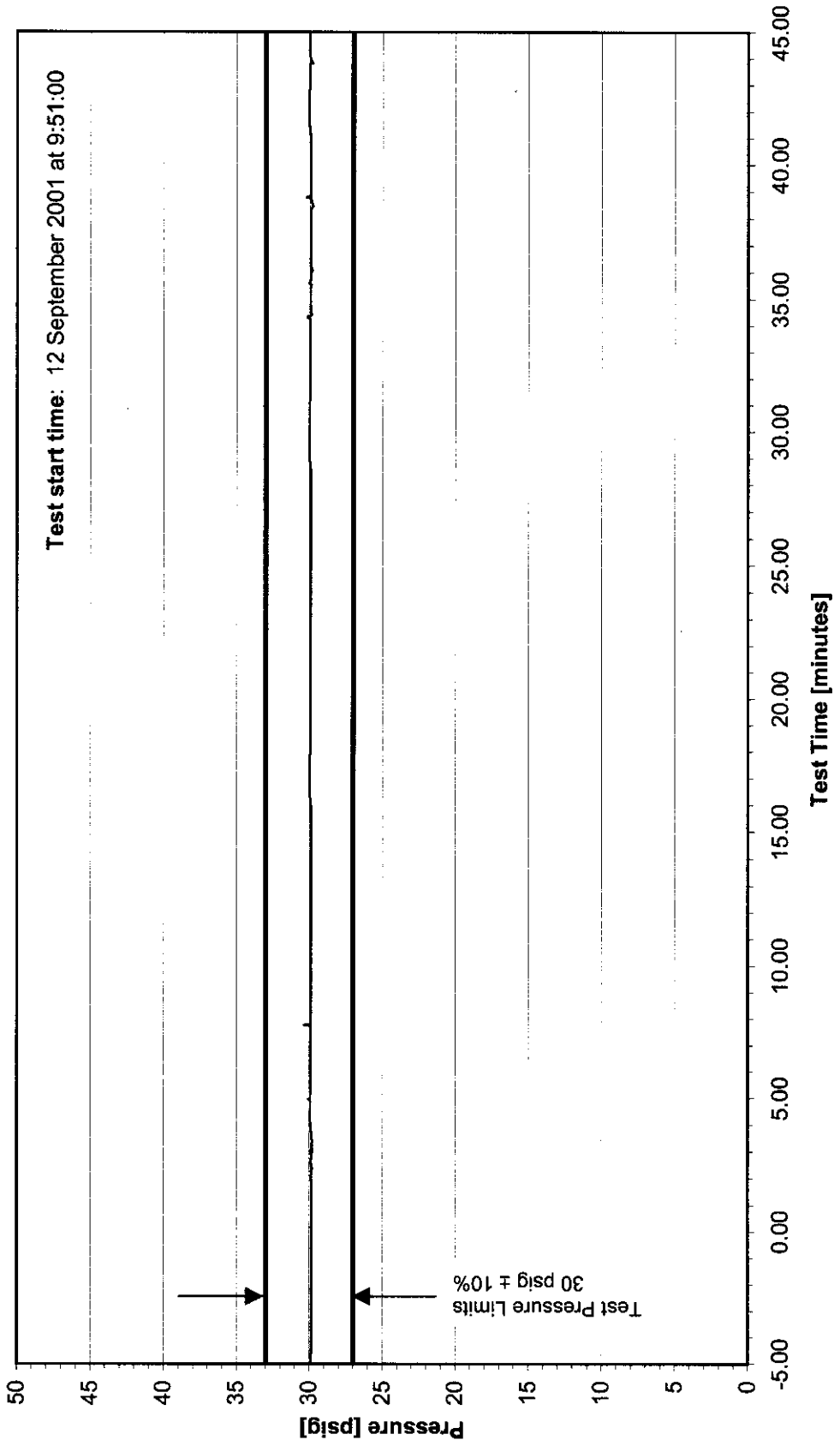
4. Total Measured External Leakage:

Collected during 5.00-minute operational test 53 ml.

# SwRI Fire Test Number 6-901 Pressure and Temperature History



# SwRI Fire Test Number 6-901 Test Pressure History



**APPENDIX B**  
**SWRI FACILITY DESCRIPTION**

## APPENDIX B

### 1. Test Chamber Description

**1.1 Enclosure.** The test chamber is located under a 34-foot high roof supported on columns, and is surrounded on three sides by 8-foot high concrete walls. Portable insulated screens placed on the four sides form a closed enclosure, as shown in Figure 1. Stainless steel flame baffles are suspended from the side screens to minimize the effect of wind gusts and to provide a "chimney" effect to direct the burner flames over the top of the test item.

**1.2 Test Item Support.** The piping attached to the test item is supported in vises mounted on pedestals, as shown in the elevation view of Figure 1. The upstream pedestal is fixed. The downstream pedestal can be adjusted laterally if needed to accommodate a range of sizes.

**1.3 Burners.** Four 3-inch self-aspirating burners are individually mounted on portable stands, with adjustable tilt angles. The stands are positioned to provide optimum envelopment of the test item by the burner flames.

### 2. Test Item Installation

**2.1 Preparation.** Upon request, all materials needed for preparation of the valve for testing will be supplied by SwRI. Assembly will be performed by SwRI personnel per the manufacturer's instructions.

**2.2 Installation.** The test item is installed in the test chamber as shown in Figure 1.

### 3. System Plumbing

**3.1 Pressurization System.** For low-test pressures (<50 psig), a pressurized reservoir is used. For higher test pressures, a triplex pump is used with an atmospheric reservoir. A back-pressure regulator is used to control the pump output pressure. Either system can be used while the other is isolated.

**3.2 Downstream System.** Piping from the downstream end of the test valve is routed through a condenser consisting of a copper coil in a running water bath. The discharge from the condenser is mounted on a swinging arm whose position is set from the control room via the data acquisition/control system. The first position is over the container in which any discharge during the burning period is collected. The second position is over another container for collection of any discharge during the cooldown. The third position is away from both containers.

**3.3 Body Cavity Vent and Relief System.** The manufacturer will have provided a tapped port in the topmost part of the test valve body for connection of the body cavity relief system, when required. The relief system consists of a relief valve, which is actuated at the manufacturer's recommended maximum body cavity pressure, and a pressure transducer for recording the cavity pressure, as shown in Figure 1. This system is required for all dual-seated valves, which may trap liquid in the body cavity when the valve is in the closed position.

**3.4 Water Quenching System.** API Standard 607, 4th Edition, requires the test valve to be quenched with water after burner shutoff. A swinging arm, containing six nozzles on a manifold, is positioned over the test valve for quenching. The swing arm and water flow are controlled remotely from the control room via the data acquisition/control system.

## 4. Instrumentation

**4.1 Test Pressure.** The upstream test pressure is measured with an electrical transducer of appropriate range tapped into the pressurization line about 20 feet upstream of the test connection, and at about the same elevation as the test connection.

**4.2 Temperature.** All temperatures are measured with Type K (Chromel/Alumel) thermocouples (T/Cs). The flame temperature T/Cs are 1/4" diameter rigid probes with stainless or inconel sheaths. The thermocouples for sensing body and bonnet temperatures are 1/8" diameter probes similar to the flame thermocouples. The calorimeters (if required) consist of 1/16" diameter probe embedded in 1-1/2" carbon steel cubes. If calorimeters are used, a bare wire thermocouple with braided ceramic insulation is spot-welded to the test item body, to obtain the body temperature.

**4.3 Data Acquisition.** A HP 34970A Data Acquisition/Switch Unit is used to log data during the test and to remotely operate the test equipment. Data is acquired from all sensors every two (2) seconds. The data acquisition/switch unit is connected to a personal computer in the control room, which runs software that allows the operator to record and visualize all data and control the test.

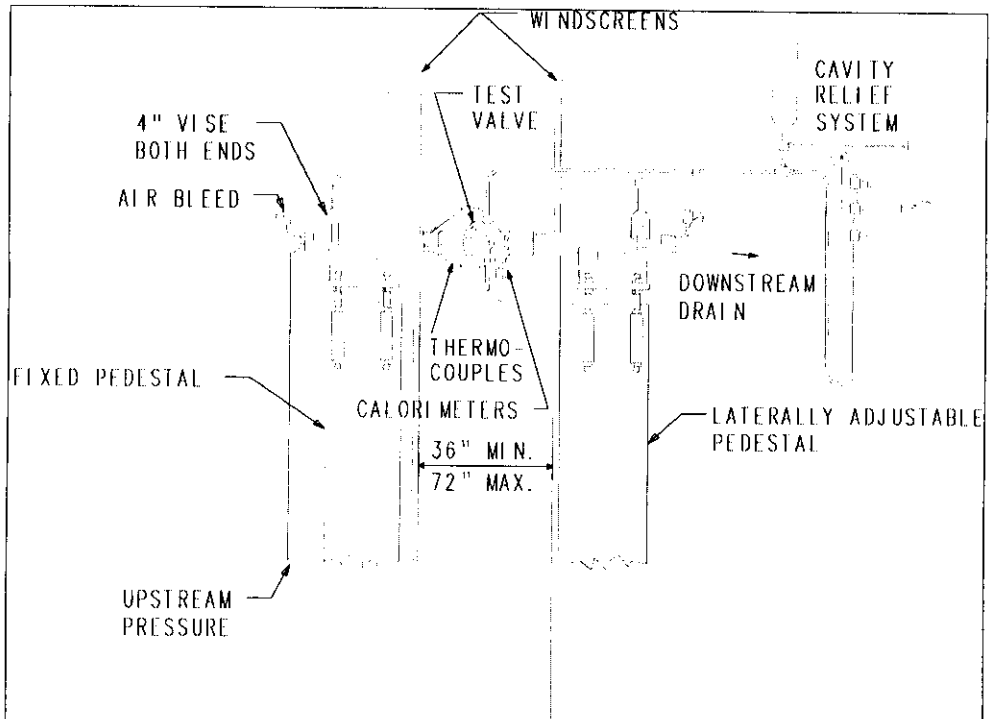
At the end of the test, the data is processed to obtain a plot of the temperatures and pressures during the burn and cooldown.

**4.4 Calibration.** Pressure transducers are calibrated periodically against traceable voltage references. The data logger input calibrations are also calibrated periodically against traceable voltage references. Thermocouple calibrations are assumed to be within standard commercial tolerances.

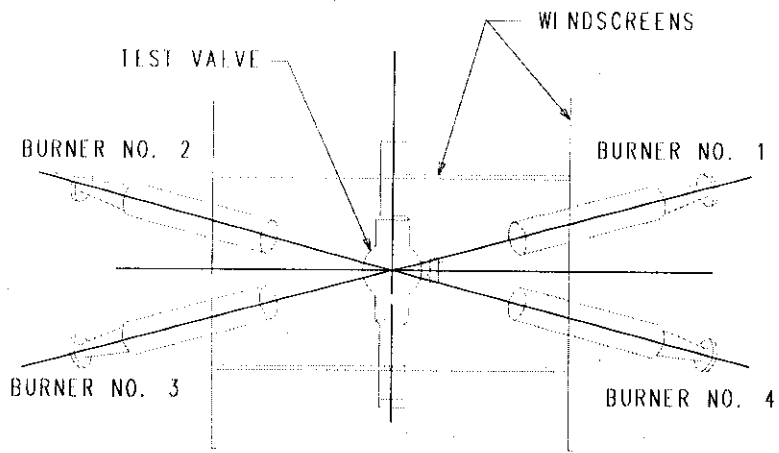
**4.5 Video.** Two video cameras are used to record the tests. One, mounted under the facility roof, provides an overhead view of the test chamber. It has pan, tilt and zoom controls to enable any desired view of the test in progress. The other camera is mounted on a pan/tilt mount, at floor level, for close-up viewing of the collection containers. This camera is also used to observe the valve during the post-cooldown operational and hydrostatic tests.

A split-screen video system in the control room allow simultaneous viewing from both camera angles. The output from both cameras is recorded on a VCR to provide a visual record of the test. The VCR format is VHS.

ELEVATION  
SHOWING  
TEST VALVE  
INSTALLATION



PLAN VIEW OF  
TEST CHAMBER



SECTION THROUGH  
TEST CHAMBER

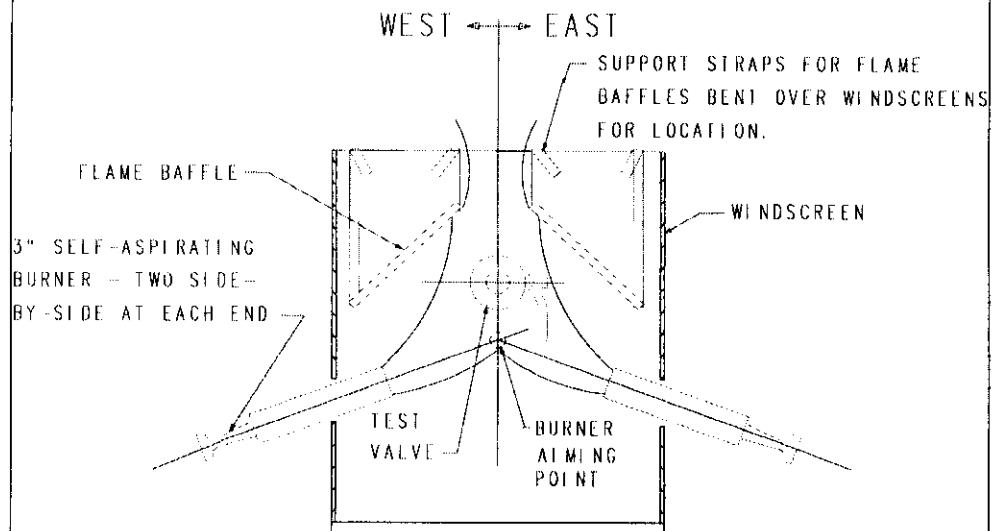


Figure 1