

## **WATER AGENCIES' STANDARDS**

### **APPENDIX A BUTTERFLY AND RESILIENT WEDGE GATE VALVE TESTING PROCEDURE**

#### **PART 1 GENERAL**

##### **1.01 PURPOSE**

This section describes requirements and procedures for the mil thickness testing, holiday testing and hydrotesting of butterfly valves (BFV) and the hydrotesting of resilient wedge gate valves (RWGV).

##### **1.02 REFERENCE STANDARDS**

The publications listed below form part of this appendix to the extent referenced and are referred to in the text by basic designation only. References shall be made to the latest edition of said standards unless otherwise indicated.

AWWA C210	-	Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
AWWA C504	-	Rubber-Seated Butterfly Valves
AWWA C509	-	Resilient-Seated Gate Valves for Water Supply Service
AWWA C515	-	Reduced-Wall Resilient-Seated Gate Valves for Water Supply Service
AWWA C550	-	Protective Epoxy Coatings for Valves and Hydrants
NACE RPO188	-	Discontinuity (Holiday) Testing of Protective Coatings
SSPC	-	Steel Structures Painting Council

##### **1.03 RELATED WORK SPECIFIED ELSEWHERE**

WAS Standard Specifications 15000, 15100 and 15102.

##### **1.04 MANUFACTURER FACTORY TESTING REQUIREMENTS**

- A. The manufacturer shall test each BFV in accordance with AWWA C504 and each RWGV in accordance with AWWA C509 or AWWA C515, and this Appendix, prior to shipping the valve.
- B. Each BFV and RWGV shall be hydrotested by the manufacturer after the interior and exterior coatings have been applied and cured.
- C. Each BFV shall be hydrotested by the manufacturer after the actuator has been mounted and adjusted.
- D. Each BFV and RWGV shall be dry film thickness tested and holiday detection tested by the manufacturer prior to the valve being shipped.
- E. Each BFV and RWGV shall be operated from the fully closed to fully open to fully closed positions prior to the completed valve being shipped.

- F. Prior to shipment, the manufacturer shall provide notarized certification that each BFV and RWGV supplied has successfully completed the tests required by AWWA, ANSI, ASTM and this Appendix.
- G. Each valve shall be shipped with end seals and shall be wrapped in shipping plastic.

#### **1.05 TESTING REQUIREMENTS PRIOR TO INSTALLATION**

- A. Valve testing shall be provided by either the supplier or the contractor at no cost to the District. Valves failing to pass the testing regimen specified by this Appendix shall be either replaced or repaired at no cost to the District. Replaced or repaired valves shall be tested as specified in this Appendix.
- B. Testing of valves shall not be scheduled until a submittal has been processed and approved by the District.
- C. Valves shall be tested within a 50-mile radius of the District office.
- D. Valves shall be tested in the presence of a District Representative. It is the responsibility of either the supplier or the contractor to schedule the witnessing of the testing with the District Representative assigned to the project. Requests for valve testing shall be made to the District a minimum of five (5) working days in advance of the desired testing date.
- E. All BFV's shall be mil thickness tested, holiday detection tested and hydrotested by either the supplier or the contractor prior to installation in the field. Generally, the valves will be tested at the supplier's facility prior to shipment to the field.
- F. A representative sample of RWGV's on a project may be selected for testing by the District Engineer. The District Engineer shall indicate on the approved submittal when RWGV's have been selected for testing.
- G. The procedures and requirements for the testing of valves shall be as described in Part 3 of this Appendix. Butterfly valves shall be required to pass all the tests described in Part 3 of this Appendix prior to being incorporated into the project. When selected for testing, RWGV's shall be required to pass the hydrotesting phase in accordance with Part 3 of this Appendix.
- H. Valves not passing the tests required shall be replaced or repaired at the discretion of the District Engineer. Replaced valves shall be in accordance with this Appendix. Repaired valves shall repeat the phase of the required testing previously failed in addition to the phases not yet completed. Repaired valves may be rejected and required to be replaced if they repeatedly fail any phase of the testing.

#### **1.06 SUBMITTALS**

- A. Submittals for BFV's and RWGV's are to be made in accordance with the requirements of Section 15000, 15102 and 15108. Submittals for District-funded capital improvement projects (CIP) should be directed to the Project Manager (PM) of the project. Submittals for developer-funded projects should be directed to the Q/C Division or the District Representative for that particular project.
- B. Submittals for District-funded CIP's shall be reviewed and approved by the Project Manager or the designee, and provided to the Q/C Division.

- C. Submittals for developer-funded projects shall be reviewed and approved by the District Representative.

## **PART 2 MATERIALS**

### **2.01 TESTING MEDIA**

The testing media for hydrostatic testing shall be an approved source of potable water. Testing with a gaseous media is prohibited.

### **2.02 TESTING EQUIPMENT FURNISHED BY THE SUPPLIER OR CONTRACTOR**

The supplier or the contractor shall furnish all necessary personnel and hydrotesting equipment, including test pump, hoses, gages, blind flanges and a safe means of turning the valves over. Insufficient personnel or substandard or unsafe equipment shall be grounds for the District Representative to cancel the testing until adequate personnel and acceptable equipment have been provided.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

The following paragraphs provide clarification of specific tasks and procedures involved in the testing of valves.

- A. Testing of valves shall be in the following order:

1. Pre-Testing Inspection
2. Hydrostatic Test
3. Dry Film Thickness Test
4. Holiday Detection Test

### **3.02 PRE-TESTING INSPECTION**

- A. On the date and time agreed the District Representative shall travel to the testing site. The testing site must be within a 50-mile radius of the District Office.
- B. The District Representative responsible for the project will receive one copy of the approved valve submittal. The District Representative shall take the submittal to the testing site to verify the valves to be tested correspond to those on the approved submittal.
- C. Upon arrival at the testing site, the District Representative shall assess the readiness of the tester's personnel and equipment to perform the testing. If there is not sufficient personnel and equipment present to perform the tests in a timely manner, the District Representative will cancel the testing scheduled for that day. The District Representative

will inform the tester of the reason(s) for canceling the test and instruct the tester to reschedule the testing.

- D. When the testing is being performed in conjunction with a CIP Project, the District Representative shall notify the PM when either testing has been cancelled or there are testing failures. The PM may back charge the Contractor for the time the District Representative has spent.
- E. District Representative will visually inspect each valve (class and configuration), operation of valve, and actuator for compliance with the submittal. Valves not in compliance with the approved submittal shall be rejected.
- F. District Representative will visually inspect each valve for obvious damage or substandard construction. Valves found to be damaged or of substandard construction shall be rejected.
- G. District Representative will record the model and serial number of each valve and its actuator on the Valve Test Sheet (Exhibit A).

### **3.03 HYDROSTATIC TESTING PROCEDURES**

- A. Each valve shall be tested on both sides at its rated pressure. During the hydrostatic test, there shall be no leakage through the valve body, end joints, or shaft seals, nor shall any part of the valve be permanently deformed.
- B. The testing medium shall be water. Under no circumstances is a gas to be used as the test medium.
- C. The test duration on each side of the valve is 15 minutes. The test equipment will be disconnected during this time.
- D. Valves require careful handling when turning them over. The District Representative shall stop the testing activity if the manner used by the tester to handle the valves is unsafe or will result in damage to the valve. The flange faces are especially susceptible to damage if the valve is not properly handled.
- E. Valves exhibiting no visible leakage, no decrease in the initial test pressure or no deformation shall be considered passed.
- F. Valves exhibiting visible leakage, a decrease in the initial test pressure, or deformation shall be considered rejected. Valves which fail the hydrostatic test shall be repaired or replaced at the District's discretion.
- G. Only personnel authorized by the valve manufacturer shall repair valves when repairs are permitted by the District Engineer. Unless the valve manufacturer has provided authorization, supplier or contractor personnel shall not perform repairs.
- H. Indicate the results of the hydrostatic test on the Valve Test Sheet (Exhibit A).

### **3.04 DRY FILM THICKNESS TESTING PROCEDURE**

- A. The dry film thickness gage shall be calibrated prior to beginning the taking of the mil readings and periodically during the testing. Use plastic shims or standardized plates and follow the instructions provided with the instrument.

- B. A minimum of four readings should be taken on each side of the disc and a minimum of three readings should be taken on each side of the interior of the valve body. Additional readings should be taken near edges and around intricate assemblies and where the coating is likely to be thin.
- C. Mark the spot and mil reading at each location where the reading were taken with a felt tip pen. More readings may be taken at the discretion of the District Representative.
- D. The minimum dry film thickness of any reading shall be a minimum 8 mils. Mark with felt pen any location where the coating thickness is less than minimum dry film thickness required.
- E. Valves with adequate coating thickness shall be considered passed and the results shall be indicated on the Valve Test Sheet (Exhibit A).
- F. Valves with inadequate coating thickness in any location shall be rejected. Qualified personnel approved by the valve manufacturer shall repair valves with unacceptable coating thickness at a qualified facility in accordance with the valve manufacturer's recommendations.

### **3.05 HOLIDAY DETECTION TESTING PROCEDURE**

- A. The interior surface of each valve shall be tested in accordance with the most current revisions of NACE Standard RPO188, except as modified below.
- B. Assure the instruments to be used are properly calibrated, with batteries charged, and in proper working order prior to use.
- C. High-Voltage Holiday Detector set-up:
  1. Select output voltage (on the detector) to the desired setting. Use 100 volts per mil thickness. The 8-mil thickness specified requires a setting of 800 volts.
  2. Connect the ground wire to the valve to be tested. Assure a sound metallic contact is achieved. Plug the ground wire into the detector.
  3. Select the appropriate powerpack, wand length, and electrode (stainless brush or rubber paddle) to be used. Assemble the powerpack, wand electrode and plug the assembly into the high voltage port on the detector.
  4. Turn the detector switch on. An audible tone will be heard if the instrument is ready to use. Verify the working of the instrument by running wand across the ground bare metallic surface of the valve. A buzz tone will be heard.
- D. The surface to be detected should be dry. A wet surface will "carry over" a holiday in an area.
- E. Cover all surface area with the electrode in a slow thorough motion, testing all interior coated surfaces. Most holidays are found on or around casting numbers, nuts, bolts, and sharp edges. When a holiday is detected, circle area with a black permanent felt pen.
- F. Valves with no holidays in the coating shall be considered passed and the results indicated on the Valve Testing Sheet (Exhibit A). Proceed to the Hydrotesting phase of the testing.

- G. Valves with holiday(s) in the coating in any location shall be rejected. Qualified personnel approved by the valve manufacturer shall repair valves with unacceptable coating at a qualified facility in accordance with the valve manufacturer's recommendations. Indicate on the Valve Test Sheet (Exhibit A) that the valve failed this portion of the test.

### **3.06 REPORTING AND MARKING**

- A. The District Representative shall record the results of each phase of the testing of each valve on the Valve Test Sheet (Exhibit A).
- B. The District Representative shall mark the flange of each side of the valve to indicate the results of the test. The required marking convention is shown in Exhibit B.
  - 1. Marking shall be made using a white metal marker.
  - 2. The markings should be made on the portion of the valve flange that will be readily visible in the field. For valves to be used in buried service, the markings should be oriented toward the top of the trench.
- C. The District Representative shall visually check each valve in the field for proper markings prior to installation. Any valve not displaying the proper markings shall be immediately rejected and the contractor shall be instructed to remove it from the site.

END OF SECTION