



# ***California-Nevada Section***

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## **American Water Works Association**

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## **BACKFLOW PREVENTION ASSEMBLY TESTER NEED-TO-KNOW CRITERIA**

(Approved 8/12/2003)

**NOTE:** This Need-To-Know Criteria is intended to provide a comprehensive outline of topics a prospective Backflow Prevention Assembly Tester should know and understand. Each topic should be presented as they relate to the responsibility of a Backflow Prevention Assembly Tester.

#### I. Introduction

- A. History of Water Distribution Systems
- B. History of Cross-connections
- C. Incidents and case histories
- D. History of Backflow Prevention Assemblies and Methods

#### II. Hydraulics and Theory of Backflow

- A. Definitions – Hydraulics
  - 1. Absolute Pressure
  - 2. Atmospheric Pressure
  - 3. Gage Pressure
  - 4. Gradient
  - 5. Negative Pressure - Vacuum
  - 6. Pressure – Head loss
  - 7. Static Pressure
  - 8. Thermal Expansion
  - 9. Water Hammer
- B. Definitions – Backflow
  - 1. Backflow
  - 2. Backsiphonage
  - 3. Backpressure
  - 4. Cross-connections
    - a. Direct
    - b. Indirect

5. Degree of Hazard
  6. System Protection (containment)
  7. Internal Protection (isolation)
- C. Theory of Backflow Prevention/Cross-connection Control
1. Degree of Hazard
  2. Types of Cross-connection
- D. Responsibility for Backflow Prevention and Cross-connection Control. Respective jurisdictions.
1. Health Agencies – State and Local
  2. Water Supplier
  3. Cross-Connection Control Specialist
  4. Plumbing Inspection Branch
  5. Backflow Prevention Assembly Tester
  6. Consumer
- E. Regulations and Codes
1. Federal – Safe Drinking Water Act
  2. State Regulations
    - a. Nevada
    - b. California
  3. Local Regulations
  4. Plumbing Code(s)
- F. Methods and Assemblies to Prevent Backflow;  
Design, Operation and Installation Requirements
1. Air Gap
  2. Barometric Loop
  3. Reduced Pressure Principle Backflow Prevention Assembly (RP)
  4. Double Check Valve Backflow Prevention Assembly (DC)
  5. Spill Resistant Vacuum Breaker Backsiphonage Prevention Assembly (SVB)
  6. Pressure Vacuum Breaker Backsiphonage Prevention Assembly (PVB)
  7. Atmospheric Vacuum Breaker Backsiphonage Prevention Assembly (AVB)
  8. Double Check Detector Backflow Prevention Assembly (DCDA)
  9. Reduced Pressure Principle Detector Backflow Prevention Assembly (RPDA)
- G. Cross-connections and unapproved devices
1. Swing Connections
  2. Spools
  3. Three/four Way Connections
  4. Single Check Valve
  5. Other Assemblies/Devices

III. Cross-Connection Control Programs

- A. Law –Legal Ordinance, Rule, or Regulation
- B. Approved Backflow Prevention Assemblies
  - 1. Approval/Listing agencies
- C. Certified Personnel
  - 1. Backflow Prevention Assembly Tester
  - 2. Cross-Connection Control Program Specialist
- D. Record Keeping / Reporting
  - 1. Backflow Prevention Assembly Test Forms
    - a. Air Gap
    - b. RP, RPDA
    - c. DC, DCDA
    - d. PVB, SVB
  - 2. Improper installations
- E. Continued Education
  - 1. Industry Standard/Specifications
  - 2. Recommended Practice Manuals
  - 3. Organizations

IV. Product Performance

- A. Major Components and Operating Principles of Backflow Prevention Assemblies
  - 1. Check Valve(s)
  - 2. Shutoff Valves
  - 3. Test Cocks/Vent Valves
  - 4. Relief Valves
  - 5. Air inlet valve
- B. Proper Installation of Backflow Prevention Assemblies
  - 1. Physical location
    - a. Accessibility (Above/Below Grade, etc.)
  - 2. Clearances
  - 3. Orientation (Horizontal/Vertical)
  - 4. Internal Protection
  - 5. Thermal Expansion
- C. Weather Protection / Security
  - 1. Freezing
  - 2. Excessive Pressure from Heat Buildup
  - 3. Cage, Box, Covers, Enclosures, etc.

D. Critical Service or a Continuous Water Requirement

1. Parallel Backflow Prevention Assemblies
2. Multiple Water Services – Looped

V. Field Testing and Trouble Shooting of Backflow Prevention Assemblies

A. Field Testing Procedures

1. Air Gap (Inspection) (AG)
2. Reduced Pressure Principle Backflow Prevention Assembly (RP)
3. Double Check Valve Backflow Prevention Assembly (DC)
4. Pressure Vacuum Breaker Backsiphonage Prevention Assembly (PVB)
5. Spill Resistant Vacuum Breaker Backsiphonage Prevention Assembly (SVB)
  
6. Atmospheric Vacuum Breaker Backsiphonage Prevention Assembly (Inspection)(AVB)
7. Double Check Detector Backflow Prevention Assembly (DCDA)
8. Reduced Pressure Principle Detector Backflow Prevention Assembly (RPDA)

B. Gage and Equipment

1. Differential Pressure Gage (Periodic check of accuracy)
2. Multi-purpose Transducer Type (Periodic check of accuracy)
3. Sight Tube
4. Bleed-off Valve Arrangement

C. Documentation/Report Procedures

1. Field Test Form(s)
  - a. Required data
    1. Check valve(s)
    2. Differential Pressure Relief Valve
    3. Air Inlet Valve
    4. Repair/Maintenance Performed
  - b. Distribution
  - c. Tester Identification
  - d. Physical Identification of Backflow Prevention Assembly
    1. Manufacturer/Make
    2. Model
    3. Size
    4. Serial Numbers
    5. Type
    6. Location
  - e. Safety Precautions
    1. Confined Space
    2. Tool Usage

VI. Backflow Prevention Assembly Maintenance

- A. Major Components of RP
  - 1. Check Valves
  - 2. Differential Pressure Relief Valve
  - 3. Shutoff Valves
  - 4. Test Cocks
  
- B. Major Components of DC
  - 1. Check Valves
  - 2. Shutoff Valves
  - 3. Test Cocks
  
- C. Major Components of PVB
  - 1. Check Valve
  - 2. Air Inlet Valve
  - 3. Shutoff Valves
  - 4. Test Cocks
  
- D. Major Components of SVB
  - 1. Check Valve
  - 2. Air Inlet Valve
  - 3. Shutoff Valves
  - 4. Test Cock
  - 5. Vent Valve
  
- E. Major Components AVB
  - 1. Check Valves
  - 2. Air Inlet Valve
  
- F. Removal of Access Ports or Covers
  - 1. Retention of Spring Loads
  
- G. Tools
  - 1. Wrenches
  - 2. Screwdrivers
  - 3. Special Tools (Manufacturer Specific)