Cross Talk

USC

UNIVERSITY OF SOUTHERN CALIFORNIA

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH

Volume 12 / Number 2 / July 1994

Testing the RP

An Optional Direction-of-Flow Test for the No. 2 Check Valve

In testing the reduced pressure principle backflow prevention assembly the tester obtains numerical values for the first check and for the relief valve. In some cases certain administrative authorities may ask for a numerical value on the second check based on a direction-of-flow test. The Appendix of the ninth edition of the *Manual of Cross-Connection Control* contains test procedures for obtaining a numerical value for the second check as an optional field test procedure.

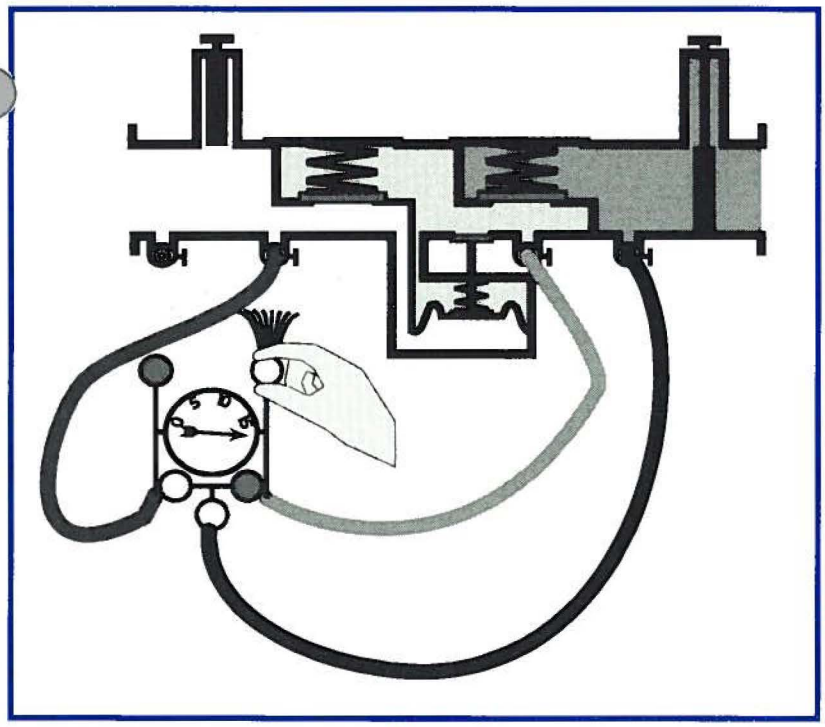

Figure 1

This test can only be completed accurately if no downstream shutoff valve leak is present. To determine if the second shutoff valve is leaking the tester must close the No. 2 test cock when the gage is attached as in Section 9.2.2, Test No. 3, Step A. (See Figure 1.) If the gage reading remains steady, the tester may proceed; the No. 2 shutoff valve is not leaking. From this point the tester follows the instructions as listed here.

· Close test cocks No. 3 and No. 4. Remove test equipment.

· Attach hose from the high side of the differential pressure gage to the No. 3 test cock.

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Failing Assemblies

When an Assembly Fails the Field Test, Does Backflow Occur?

What does a tester mean when he or she states that a backflow preventer failed? Does this mean the assembly failed to prevent backflow and a domestic water supply was contaminated? Does this mean the assembly won't prevent backflow if a backflow condition exists? Or, does this mean the assembly didn't pass the field test but will still prevent backflow?

Any of the above situations may be true, but not necessarily all three. For example, if a tester tests a double check valve assembly in the direction

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Highlights

Membership

The Foundation Membership grew again in this last quarter. The newest Members are listed below. The Foundation encourages Members to take advantage of the many benefits of Foundation Membership. Additional copies of the *Manual of Cross-Connection Control* are available to Members at a 25% discount. Members receive a 20% discount on training courses and 25% discounts on the Training Tools. Members are also encouraged to contact the Foundation office with any questions regarding cross-connection control.

A.R. Amable Plumb. & Htg. Co.
ABC Trailer Park
Absolute Backflow Control
Advance Testing & Service
Advantage Backflow Testing
Ambitec
Anheuser-Busch, Inc.
Arizona Certified Backflow Testers
Arizona Pub. Serv. Co.,
Palo Verde N.G.S
Arnold Linné
Backflow Certification Inc.
Backflow Eliminator
Bermuda Water Company, Inc.
Big Park Water Company
Bob's Plumbing Inc.
City of Bozeman
Bryan Brigham
Bud Veach
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City of Chappell
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Erie Waterworks
City of Eureka Springs
Florida Rural Water Assoc.
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City of Gallup, Joint Util. Div.
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Johnson Controls World Services
Joint Apprenticeship & Train. Comm.
Karsten Manufacturing Corporation
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City of Las Vegas
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Long Beach Dept. of Health
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USC RECYCLED PAPER

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Testing the RP

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· Attach hose from the low side of the differential pressure gage to the No. 4 test cock.

· Open test cocks No. 3 and No. 4, and bleed all air from the hoses and gage by opening the high side bleed needle valve and the low side bleed needle valve.

· Close the high side bleed needle valve, then slowly close the low side bleed needle valve.

· After the gage reading stabilizes, the steady state differential pressure reading indicated on the gage is the static pressure drop across check valve No. 2 and is to be recorded as such. This reading must be 1.0 psi or greater.

· Close all test cocks, slowly open shutoff valve No. 2, and remove all test equipment.

This brief optional test allows the tester to determine the static pressure drop across the No. 2 check valve of the reduced pressure principle backflow prevention assembly. By design, the No. 2 check valve of the reduced pressure principle backflow prevention assembly must hold a static differential of at least 1.0 psid.

In many cases testers who do not use the direction-of-flow test, as noted above, on the reduced pressure principle backflow prevention assembly still record a numerical value for the No. 2 check valve. This comes from a misunderstanding of the test. One of the first items noted during the test is the *apparent reading* across the No. 1 check valve. This reading is only noted and should never be recorded. This is simply used to compare against the *actual reading* across the No. 1 check valve which is recorded in Test No. 3. These readings may vary slightly due to a small downstream shutoff valve leak. Test No. 3 compensates for this slight leak, thus giving the actual No. 1 check valve reading. If the optional direction-of-flow test is not used on the No. 2 check valve, the check valve may only be recorded as either leaking or closed tight. However, some testers have mistakenly recorded the *apparent* reading as the *actual* reading across the No. 1 check valve and the *actual* reading as the No. 2 check valve reading.

This brief optional test allows the tester to determine the static pressure drop across the No. 2 check valve of the reduced pressure principle backflow prevention assembly

If the tester used the direction-of-flow test on the No. 2 check valve of the reduced pressure principle backflow prevention assembly, then a numerical value should be recorded. This number will, however, not be similar to the No. 1 check valve. The No. 2 check valve reading must be at least 1.0 psid in the direction of flow. In most cases the reading will be between 1.0 and 3.0 psid.

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Tester Course

The Foundation Laboratory
11 - 15 July 1994
3 - 7 October 1994
23-27 January 1995
Incline Village, NV
1 - 5 August 1994
Redding, CA
22-26 August 1994

Non-Members $750.00
Members $600.00

Program Specialist Course

USC Campus
18 - 22 July 1994
30 January -
3 February 1995
Monterey, CA
12 - 16 September 1994

Non-Members $800.00
Members $640.00

Courses may be added throughout the year. Please contact the Foundation office for information on courses in your area or for an application for the next USC Training Course. You may also send a hard copy of a purchase order or a check to the Foundation office to reserve a space. Please be advised that some of these courses fill six to eight weeks in advance.

A Purchase Order may be sent via FAX to the Foundation office at (213) 740-8399 or call (213) 740-2032 for more information.

Failing the Field Test

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of flow and finds the first check to be holding a differential of 1.2 psid and the second check to be holding a differential of 0.8 psid, the tester may state "the assembly fails." In this case, the tester means the assembly fails to meet the test criteria for a field test as stated in Section 9.3.2 of the *Manual of Cross-Connection Control*. In fact, the No. 1 check valve is within the design criteria but the No. 2 check valve is not operating at its full design potential, as required. Therefore, the assembly fails the field test. The No. 2 check valve

Since the assembly is not operating at its full design potential, as required, the assembly fails the field test

is holding in the direction of flow. However, the No. 2 check valve is not holding the required 1.0 psid. Should a backflow condition exist, would backflow occur through this double check valve assembly? No. Since the check valves are still holding, backflow would not occur. However, since the assembly is not operating at its full design potential, as required, the assembly fails the field test. The tester is now aware of the condition and should repair the assembly to get it back to its full design potential.

In another example, the tester may be testing a reduced pressure principle backflow prevention assembly. In the remote case that the relief valve fails to open and both check valves leak, the potential for backflow to occur through the assembly now exists. This means that the assembly fails the field test, but also it means that the assembly is failing to prevent backflow. This type of failure presents a more immediate danger to the potable water supply. Hydraulics could change in the system at any time causing backflow to occur

Although the assembly does not meet the design requirements, the assembly will still prevent backflow

through the assembly. When the tester states "the assembly fails," in this case, the tester means the assembly fails to prevent backflow, as well as fails to pass the field test requirements.

A tester may test a reduced pressure principle backflow prevention assembly and find the differential pressure relief valve opening point to be 2.4 psid and the actual reading across the No. 1 check valve to be 5.0 psid. When this occurs there is a buffer between the readings of 2.6 psid. The buffer should, however, be 3.0 psid. Although the assembly does not meet the design requirements, the assembly will still prevent backflow. Some administrative authorities do not require backflow preventers under their jurisdiction to meet this 3.0 psid buffer requirement. In this case, the field test would be acceptable. However, it should noted that an administrative authority should have a minimum buffer requirement. If there is no buffer requirement, then it would not

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Manual Available

The Ninth Edition of the Manual of Cross-Connection Control is available for purchase. Foundation Members receive a 25% discount from the list price of the Manual. Manual Pricing is as follows:

Members	**$36.00**
Non-Members	**$48.00**

Manuals are typically shipped each Friday. To order Manuals a purchase order or check may be sent to the Foundation office. To expidite the order a purchase order may be sent via FAX. If next day or second day shipping is required, there is an extra fee.

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Failing the Field Test

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be possible to determine if the No. 1 check valve is operating properly. The No. 1 check valve could hold a pressure differential of 1.0 psid while the relief valve opens at 3.0 psid. When this occurs it is not possible to determine if the No. 1 check is holding at all because the relief valve will discharge whenever there is a no-flow condition. Backflow will still be prevented if, in fact, the No. 1 check is holding. If, however, the No. 1 check valve is leaking, the assembly would react in the same manner. This is why the first check valve must have a requirement of holding at a specific value above the relief valve opening point. The Foundation encourages the 3 psid requirement as this is the design requirement from Section 10.2.2.3.5 of the *Manual of Cross-Connection Control*. Any value less than this is an indication that the assembly is not performing to its full design potential and it may need repair.

The failure of a field test does not directly correlate to the occurence of backflow

Failure rate statistics are commonly used when discussing the use of backflow prevention assemblies. The failure rates are somewhat taken out of context since it is assumed that a "failure" means backflow can occur through the assembly. However, the failure of an assembly to meet the field test criteria does not imply this at all. For backflow to occur through an assembly, the check valves must be physically fouled or damaged (0.0 psid). Therefore, a critical review of failure rate data must be made to determine what constitutes a "failure." The failure of a field test does not directly correlate to the occurence of backflow.

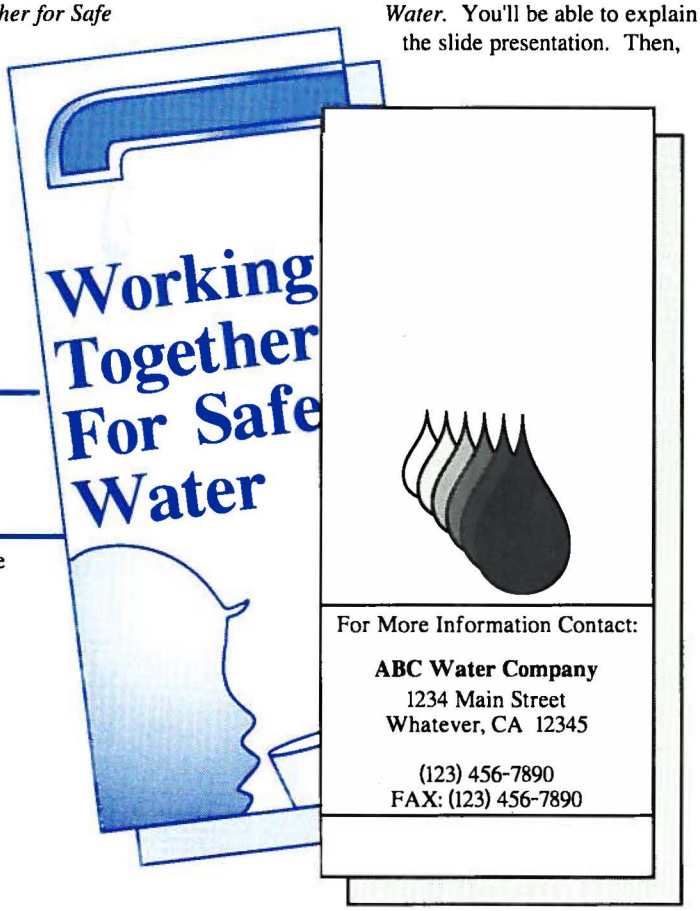
Cross-Connection Control Informational Brochures

The informational brochure entitled *Working Together for Safe Water* is a great complement to the slide presentation *The Essentials of Cross-Connection Control* or the film *Working Together for Safe Water*. You'll be able to explain all the concepts of cross-connection control to your audience using the slide presentation. Then, you can hand out the brochure. This gives those in attendance something to take with them which will help them to comprehend fully the topics discussed.

The brochures come with the name, address and telephone number of the ordering agency, so those who desire more information or have questions, can call you directly.

This brochure can be used to explain the basic concepts of cross-connection control, helping water users understand why they may need to install a backflow preventer or comply with periodic testing requirements. To request a sample of the brochure with an order form, contact the Foundation office at:

Your Name, Address and Phone Number Printed on the Back



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Historical Highlights - 1967

The Membership Program Established

This year the Foundation is celebrating it's fiftieth anni versary. An open house is being tentatively planned for September 30th at the Foundation Laboratory. All Members of the Foundation will receive an invitation with the details once the plans are finalized.

The Foundation has had many exciting events occur throughout its half century history. The Membership Program, for example, was founded in 1967. Originally the Southern California Water Utilities Association (SCWUA) organized the Foundation's Membership program by asking its Members to donate funds for the Foundation's work. Most of the Foundation's original support was inspired by Mr. Walter Weight. Mr. Weight worked tirelessly visiting various water agencies in the region, encouraging them to participate in the Foundation's Membership Program. For years the SCWUA actually managed the Foundation's Membership fees. The SCWUA collected the Foundation's Membership fees from its Members which chose to participate in the Foundation's Membership Program, transferring funds to the Foundation when they were collected.

In the photo from 1967 the original check for $10,000 establishing the Foundation Membership Program is handed to Dr. Norman Topping, President of the University of Southern California from Walter Weight, Chariman of the SCWUA. Next to Walter Weight is Professor E. Kent Springer (left), Director of the Foundation (now Director Emeritus) and A. C. Ingersoll (right), Dean of the School of Engineering is standing next to President Topping.

The Charter Members of the Foundation were:

Azusa Valley Water Company
Baldwin Park County Water District
City of Burbank
California Cities Water Cop.
California Domestic Water Service
Central Basin Municipal Water District
City of Compton
City of Covina
Diamond Bar Water Company
City of Downey
City of El Monte
City of El Segundo
City of Inglewood
Irvine Ranch Water District
La Habra Heights Mutual Water Company
Las Virgenes Municipal Water District
City of Long Beach
City of Los Angeles
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Malibu Water Company
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City of Oxnard
Palos Verdes Water Company
Palmdale Irrigation District
Park Water Company
City of Pasadena
City of Pomona
City of Redlands
Rowland Area County Water District
City of San Bernardino
City of San Diego
San Diego County Water Authority
San Gabriel County Water District
San Gabriel Valley Water Comapny
City of Signal Hill
City of South Pasadena
City of Torrance
Upper San Gabriel Valley Municipal Water District
Vallecito Water Company
City of Ventura
City of Vernon
Walnut Valley Water District
West Basin Municipal Water District
City of Whittier
Yorba Linda County Water District
Yucca Valley County Water District

Testing the RP

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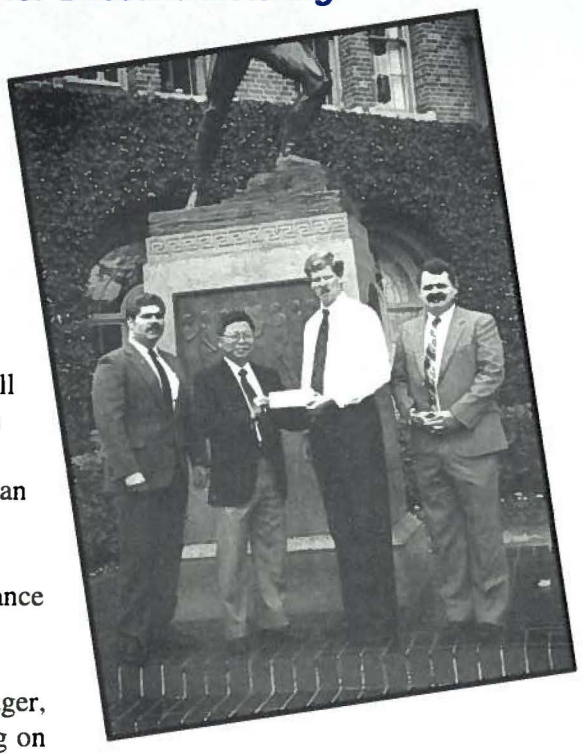
Should the No. 2 check valve hold a differential less than 1 psid, the check valve is still holding and it is preventing backflow. However, the check valve is not operating at its full design potential as it is designed to operate. The Foundation's perspective on this is the check valve fails. It is important to understand that the check valve fails the field test criteria, thus failing the field test of the assembly even though it is not possible for backflow to occur through the assembly.

A similar situation occurs with the 3.0 psi buffer between the actual reading of the No. 1 check valve and the opening point of the relief valve. The No. 1 check valve should have a reading of at least 3.0 psi greater than the relief valve opening point. This is a design criteria to limit the amount of relief valve discharge due to line pressure fluctuation. If the buffer is less than 3.0 psi, the assembly will still prevent backflow. However, the assembly is not operating at its full design potential; this indicates there is a problem of sorts. The Foundation's perspective, in this situation, is the assembly fails. The actual reading of the No. 1 check valve must be at least 3.0 psi above the relief valve opening point in order for the assembly to pass.

Some administrative authorities do not make the 3.0 psi buffer a requirement. In these jurisdictions, it is important for the tester to know what is considered acceptable. Some value must be set as the limit. If no buffer is required the actual reading of the No. 1 check valve could be less than the relief valve opening point. If this were the case, there would be no way of determining if, in fact, the No. 1 check valve was holding at all since the reading is no longer accurate once water is passing through the No. 1 check valve to the relief valve.

Research Contract for Effective Metering Awarded to the Foundation

The Foundation has recently received a research contract from the Southern California Water Company to develop a computer program for effective metering of large water meters. The program will analyze the consumptive use pattern of the meter account and incorporate an economic analysis to determine the optimum strategy for the maintenance of water meters.



In the photo: Larry Metzger, graduate student working on the project, Dr. J. J. Lee, Director of the Foundation; John Nelson and John Spitler, representatives of the Southern California Water Company.

Walter Weight

As mentioned in the last issue of Cross-Talk, the Ninth Edition of the Manual of Cross-Connection Control was dedicated to Mr. Walter Weight and the late Mr. William Whiteside. Since the last issue of *Cross Talk*, we are sad to report, Mr. Walter Weight passed away. Walter Weight was ninety-eight years old. He was instrumental in the growth of the Foundation, particularly in the area of the Foundation's Membership Program. It was through him that the Membership Program of the Foundation was initiated. As shown on the opposite page Mr. Weight raised support for the Foundation from Members of the Southern California Water Utilities Association (SCWUA), thus begining the Foundation's Membership Program.

Mr. Weight was also extremely active in the water works industry contributing greatly to the safe distribution of water nationwide. Many friends and relatives have made contributions to a scholarship fund at the Foundation in hohoring these cross-connection control pioneers. If you are interested in making a scholarship fund contribution, you can do so through the Foundation office.

Calendar of Events

This calendar shows some of the activities which the Foundation is currently planning on participating in. For more information contact the Foundation office.

11-15 July 1994 - Tester Course, Foundation Laboratory, Los Angeles, CA

18-22 July 1994 - Program Specialist Course, USC Campus, Los Angeles, CA

1-5 August 1994 - Tester Course, Incline Village, NV

17 August 1994 - Joint Instrumentation Conference, Santa Ana, CA

22-26 August 1994 - Tester Course, Redding, CA

31 August 1994 - Northern California Backflow Prevention Association, CA

11-13 September 1994 - American Water Works Association Distribution Systems Symposium, Omaha, NE

12-16 September 1994 - Program Specialist Course, Monterey, CA

21 September 1994 - Inland Counties Cross-Connection Control Group

26 September 1994 - California-Nevada Section American Water Works Association Seminar, Sacramento, CA

30 September 1994 - Foundation Open House, Foundation Laboratory, Los Angeles, CA (Tentative)

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