Cross Talk
University of Southern California
Foundation for Cross-Connection Control and Hydraulic Research
Volume 13 / Number 1 / February 1995

Foundation Published on the World Wide Web

Access the Foundation through the Internet

The Foundation is now tied in to the international network of computers known as the Internet. Although the Internet has been around for some time the Foundation has just begun to take advantage of the ability to spread information over this "Information Superhighway." Recent advances in technology allow for the transfer of information, including graphics, photos, video and sound over the Internet. This is an excellent way for the Foundation to get information regarding cross-connection control to many people quickly.

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The World Wide Web, WWW or the Web is another term used for the Internet. Since there is no central computer, only a collection of thousands of computers networked together, the system is like a web. With Web browsers such as Mosaic, Netscape, Cello, Lynx (text only), etc. one may access the Web. One may contact the "homepage" of an organization to find out information regarding that particular organization or company. Links may be found from one file to another. For example, if you were to access the Foundation's homepage you would find a listing for the *Manual of Cross-Connection Control*, as well as other things. If you clicked on the text, *Manual of Cross-Connection Control*, you would be transferred to another file which explains the Manual and has a photo of the Manual. From there you could click on *Membership Information* and be transferred to another file which explains the Foundation's Membership Program.

The amazing thing about accessing the Web is that one can refer to computer files on different computers even if those computers are on the other side of the world. For example, if one accesses the *World Wide Web Virtual Library on Cross-Connection Control/Backflow Prevention* one may chose to click on a related subject, such as *Irrigation.* The irrigation file, which is located in Germany, would then be accessed as if it was on the local computer.

What does this mean to Foundation Members? Members will be able to gather and release information internationally, immediately. Addi-

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The Approval Program

What is involved in Approving Backflow Prevention Assemblies

The Foundation's Approval process for backflow prevention assemblies is considered by many to be the most stringent approval process for backflow prevention assemblies in the world. What makes the Foundation's Approval Program so well respected? There are several contributing factors. Since the Foundation is operated by the University of Southern California it remains unbiased. This is extremely important in the evaluation of any product. When the Foundation was originally established, the University was chosen to establish the Foundation for this very reason.

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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.

Adam's Plumbing
Arkansas Plumbing Inspector's Assoc.
Barrington Plumbing Co.
Wallace N. Brown
Canyon Country Consulting
Castaic Lake Water Agency
Chevron Petroleum Tech. Co.
David Enzweiler
Fort Scott Community College
Gilmor & Doyle, Ltd.
Lake Mead National Recreation Area
Lee R. Miller
City of Los Angeles-Bldg. & Safety
Lucas Plumbing
Mariposa County Unified School District
Merced Irrigation District
Town of Minden
National Fire Sprinkler Assoc.
Paramount Farms
Plumbers Joint Training Fund-Local #48
Port of Oakland
Prime Mechanical of Calif., Inc.
City of Radford
R.J. Enrico Plumbing
Raintree Lawn & Irrigation
Ram Construction
Rubidoux Community Services District

Cross Talk is published by the University of Southern California's Foundation for Cross-Connection Control and Hydraulic Research for its Members. Additional Copies are available to the Members upon request. (213) 740-2032

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Foundation
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University of Southern California

The Internet

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tionally, members may request information from the Foundation via e-mail, if the member has an e-mail account on the Internet.

If you have access to the Internet, you will want to view the Foundation's home page, the title bar of which is shown above.

There is a WWW Virtual Library maintained by the W3 Consortium. The WWW Virtual Library Homepage has a listing of Web servers by subject. One of the subjects is *Cross-Connection Control/Backflow Prevention.* . The Foundation administers this *WWW Virtual Library on Cross-Connection Control/Backflow Prevention.* So if you have information published on the Internet, please let the Foundation office know the http address (or gopher site). If your information is appropriate for this Library it will be referenced. This will give thousands of people access to the information you publish. It has been said that the Internet is growing at a rate of *one percent per day.* Already this is a great resource, but soon it will be invaluable as more and more information becomes available.

If you have access to a Web browser you can always find your way to the USC Homepage from a number of sources. From there click on "USC Information" and then on "Research and Technology Centers." The Foundation is listed as one of these centers. You can also type the URL in directly for the Foundation Home Page.

Foundation Homepage URL:
http://www.usc.edu/dept/fccchr/

WWW Virtual Library on Cross-Connection Control/Backflow Prevention URL:
http://www.usc.edu.dept/fccchr/ccvlib/

You can use the Foundation's E-mail address to get information to us, ask technical questions, or order materials. The Foundation be collecting Members' E-mail addresses for furture notices and information distribution, so please forward your E-mail address to us along with the Member name as shown on this issue of *Cross Talk.*

Foundation E-mail address:
fccchr@usc.edu

Tester Course

Los Angeles, CA
8-12 May 1995
10-14 July 1995
16-20 October 1995

Las Vegas, NV
13-17 March 1995

Incline Village, NV
31 July - 4 Aug. 1995

Charleston, SC
6-10 November 1995

Non-Members $750.00
Members $600.00

Program Specialist Course

USC Campus
17-21 July 1995

Incline Village, NV
13-17 March 1995

Phoenix, AZ
5-9 June 1995

Non-Members $800.00
Members $640.00

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. Call (213) 740-2032 or E-mail fccchr@usc.edu for more information.

The Approval Process

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The Foundation tests against the Specifications which are listed in the ***Manual of Cross-Connection Control.*** The Manual, published by the Foundation, is revised periodically by the Manual Review Committee. This committee is comprised of water agency personnel, health agency representatives, private testers, and Foundation Staff. The Foundation does not permit manufacturers to sit on the Manual Review Committee. This policy was established so that no manufacturer would have the ability to have an undue influence on the formation of Specifications for the backflow prevention assemblies. The manufacturers are permitted to comment on the Specifications while they are in draft form, but they have no vote in the committee's decisions.

Another aspect of the Foundation's Approval program which sets it apart is the Field Evaluation Phase. Every backflow prevention assembly approved by the Foundation is required to successfully pass both a laboratory evaluation process and a field evaluation. Even though the laboratory testing is critical, no laboratory testing can determine the in situ operational characteristics of the backflow prevention assembly as well as the field evaluation.

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The Specifications for the backflow prevention assemblies can be found in Section 10 of the ***Manual of Cross-Connection Control*** - Ninth Edition. Here, however, is a brief summary of the evaluation process. First, the manufacturer of the backflow preventer submits a set of working drawings to the Foundation for review. If the Foundation's Engineering Staff has any recommendations, the manufacturer usually makes changes at that point.

Laboratory Evaluation

Once the drawings seem to be satisfactory, the manufacturer submits a prototype assembly for the laboratory evaluation. This prototype assembly is subjected to the Laboratory Evaluation Phase of the Approval Program as outlined in Section 10 of the ***Manual of Cross-Connection Control*** - Ninth Edition.

During the Laboratory Phase of the Approval Program the assembly is subjected to several tests. First, however, the Foundation Engineering Staff check to confirm that the assembly is in conformance with the general, design, material, and operational requirements. Additionally conformance to the working drawings and materials specifications is confirmed. This includes checking the spring constants, the hardness of

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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 or referencecd in E-Mail. If next day or second day shipping is required, there is an extra fee.

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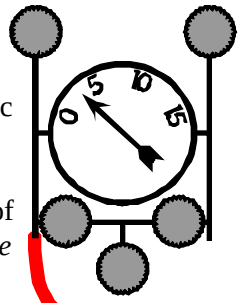
Preparing for Recertification

Many certifying bodies are now requiring the use of the field test procedures from the Ninth Edition of the ***Manual of Cross-Connection Control***. Those needing recertification and those being certified for the first time need to know what type of challenges may be encountered when testing the various backflow prevention assemblies in accordance with the Ninth Edition of the ***Manual of Cross-Connection Control.*** Although the following are not the complete field test procedures. Foundation personnel encounter specific problems when proctoring students at the end of the *Course for the Training of Backflow Prevention Assembly Testers* or when acting as proctors for local certification programs. Presented here are some of the more common problems with which the examinees have trouble.

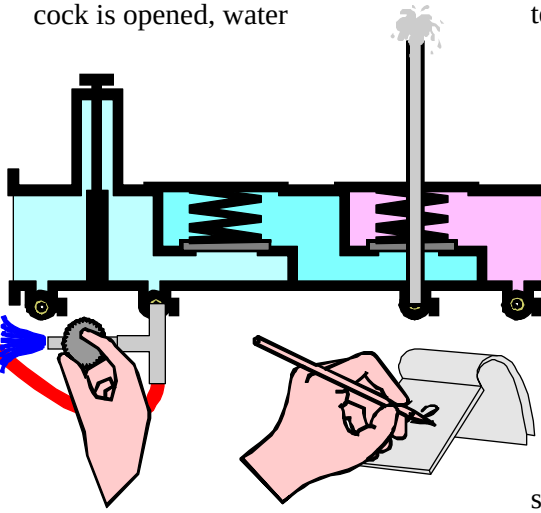


The Double Check

Several things could happen while testing the double check valve assembly. Ideally, the tester has the high side hose of the differential gage attached to the No. 2 test cock, with the tube on the No. 3 test cock full and the shutoff valves closed during test No. 1 step G (Section 9.3.2 in the Manual). At this point the No. 3 test cock is opened and a few things could occur. First the water level may remain steady. If this happens, the tester simply takes a reading on the gage with the gage at the same level as the water level in the tube. It is important at this point that the tester also keep the other hoses of the gage at the same level or detach them.

If, when the No. 3 test cock is opened, water continues to flow from the tube attached to the No. 3 test cock, the No 1 shut off valve is leaking and the tester attempts to compensate for the leak by adjusting the bleed-off valve attached to the No. 2 test cock. If the water level at the tube can be adjusted to a slight drip, then a reading can be taken, making sure to keep the gage and the hoses at the proper elevation.

If, when the No. 3 test cock is opened, water



recedes in the tube the tester learns several pieces of information. The water in the tube receding indicates there is a downstream shutoff valve leak. The water draining from the tube is flowing through the No. 2 check valve and out the No. 2 shutoff valve. The tester also learns that the No. 2 check valve is leaking. If the check valve were to hold the required 1.0 psi (pound per square inch), then the water in the tube would maintain a level of at least 27 3/4 inches. However, with the water receding, the check valve is obviously not holding the required 1.0 psi. In fact, if the water level falls to the centerline of the assembly, the No. 2 check valve is leaking. The tester can, at this point, get a reading for the No. 1 check valve. The tester must drop the level of the gage to the centerline of the assembly (since this is were the water level stabilizes) and take a reading. If the reading is 1.0 psi or greater the check valve is holding at an acceptable value. If, however, the reading is below 1.0 psi, the check valve is not holding at an acceptable value. If the reading on the gage drops to zero, the check valve should be recorded as leaking.

There is another scenario which the tester should be aware of while testing the double check valve assembly. Testing the No. 2 check valve is very similar to testing the No. 1 check valve, except the gage equipment is in a different location. The high side hose of the differential gage is attached to the No. 3 test cock and the sight tube is attached to the No. 4 test cock. Once the gage has been bled and the shutoff valves closed, with the sight tube full of water, the tester opens the No. 4 test cock. We have the same three scenarios which may occur: the water level may stabilize; the water level may recede; or the water level may rise and flow out of the tube. If the water level stabilizes, the tester simply takes a reading with the gage at the proper elevation. If the water level recedes, the tester drops the gage elevation to the centerline of the assembly and takes a reading. If, however, the water rises and continues to flow out of the tube, the tester does not follow the same steps as when testing the No. 2 check valve. There are two possible causes for the water level rising. Water may be flowing through a leaking No. 1 shutoff valve, or water may be

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The Approval Process

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the elastomer materials and types of metals used. If everything is satisfactory the assembly moves on to various tests. Some of the tests are as follows:

HYDROSTATIC TESTS: This test is designed to determine the capability of the assembly to withstand the required hydrostatic test pressure. This test requires that all components of the assembly withstand a hydrostatic pressure of twice the maximum working water pressure for a period of ten minutes.

PRESSURE LOSS: This test determines the overall pressure loss across the assembly from static flow up to and including rated flow. The pressure loss is, at no time, permitted to exceed the maximum allowable pressure loss.

PRESSURE DROP ACROSS CHECK VALVE: The closing point of the check valves must also be determined to confirm that the check valves hold the minimum required pressure in the direction of flow.

THERMAL LOOP: The assembly must be run at its rated temperature for at least 100 hours with no damage or permanent deformation. Assemblies rated at 200ºF must be tested at 200ºF while at the rated pressure of the assembly.

LIFE CYCLE TEST: The assembly is subjected to the specified cycle (i.e., pressurize, depressurize, subject to backpressure, repressurize, flow through the assembly) The assembly must cycle through 5000 cycles at various flow rates. The Life Cycle test is valuable in determining which problems may be exposed by the field evaluation. This gives the manufacturer the opportunity to make any design changes before beginning the field evaluation.

If there are any problems found in the Laboratory Evaluation Phase of the Approval Program, changes need to be made to the assembly and the evaluation process begins again.

The Field Evaluation

The Field Evaluation Phase of the Approval Program is most critical. This is the only way the Foundation's Engineering Staff can determine if the assembly will work properly under actual operating conditions, with varying water conditions and long-term exposure.

Each Model and size of backflow prevention assembly under evaluation must have at least three backflow preventers installed in different water systems. The manufacturer may install more that three assemblies as a contingency to unexpected problems such as assemblies being hit by cars or freezing temperatures. In this case, similar problems arising in two or more of the assemblies is cause for halting the field evaluation.

Each Model and size of backflow prevention assembly under evaluation must have at least three backflow preventers installed in different water systems...each of these assemblies must provide twelve months of trouble-free service

Each of these assemblies must provide twelve months of trouble-free service simultaneously. The assemblies are tested on a nominal thirty day schedule during this field evaluation period. If there are no problems during the year the assemblies are disassembled at the end of the twelve month field evaluation to determine if there has been any deterioration of parts, undue wear, or any problems which may affect the assembly's ability to prevent backflow or meet all of the evaluation requirements. If, at any time in the field evaluation process, the foundation's Engineering Staff encounters a problem, the field evaluation is stopped. When a problem is discovered, the manufacturer must make modifications and resubmit the assembly for the Laboratory and Field Evaluation. This is one of the reasons, the Foundation staff does not release Approval dates in advance. In reality, the Approval date is not known until the Approval is actually granted.

Approval

Once an assembly successfully completes the Laboratory and Field Evaluation of the Approval Program. It is granted Approval for a period of three years. After three years the Foundation may grant a renewal with varying amounts of reevaluation required. If the Foundation has received several complaints about an assembly, extensive reevaluation may be necessary. If, however, there have never been any complaints recorded regarding a particular assembly, no reevaluation may be required.

Rescinding the Approval

If, during the reevaluation process or at any time, the Foundation becomes aware of problems with an Approved backflow prevention assembly, the assembly's Approval may be rescinded. If for some reason, the assembly does not pass the laboratory testing during reevaluation the Approval may be rescinded.

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Preparing for Recertification

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leaking though the No. 2 shutoff valve with backpressure condition present. It is very important for the tester to first take a reading with the gage at the level of the overflowing tube before trying to compensate for the leak through the bleed-off valve at the No. 3 test cock. The reading taken while water is flowing out of the tube is noted, but not yet recorded. Then the tester tries to compensate for the leak by opening the bleed-off valve at the No. 3 test cock. If the tester can compensate for the leak and get the water level in the tube at the No. 4 test cock to level off to a slight drip, the tester takes a reading with the gage at the same level as the top of the tube. If, however, when the bleed-off valve is opened, water continues to flow from the tube, but does not continue to flow from the bleed-off valve, the value which was noted earlier is then recorded as the value for the No. 2 check valve. It is very important that this reading be noted before opening the bleed-off valve, since opening the bleed-off valve opens the high side of the gage to atmosphere and the reading on the gage drops to zero. So, if the tester did not take the reading before opening the bleed-off valve it is to late to take a reading once the gage has dropped to zero. Since water is still flowing from the tube at the No. 4 test cock, the No. 2 shutoff valve may be noted as leaking with backpressure.

This is not the entire field test procedure for the double check valve assembly. These are points, however, that testers often overlook during the certification or recertification process. It is therefore, highly recommended that the tester review these points in detail as explained in the ***Manual of Cross-Connection Control*** - Ninth Edition.

Reduced Pressure Principle Backflow Prevention Assembly

Testers normally find testing the reduced pressure principle backflow prevention assembly to be fairly straight forward. One problem which often causes confusion for the tester is a leaking No. 2 shutoff valve. Since a large leak may not be encountered frequently, it is not a common sight to some testers. During the test of the reduced pressure principle backflow prevention assembly, the tester attaches the gage to the assembly, bleeds the air out of the gage and hoses and then shuts off the No. 2 shutoff valve to obtain the apparent reading across the No. 1 check valve. After this the tester attempts to obtain the relief valve opening point by bypassing water from the No. 2 test cock to the No. 3 test cock through the gage. (Section 9.2.2, Test 1, Step j, of the Manual) During this process the tester should not open the low side control needle valve more than a quarter turn (with the high side control needle valve being opened a full turn). If the needle on the gage does not drop, this indicates there is a downstream shutoff valve leak. The water being passed from the No. 2 test cock to the No. 3 test cock is passing downstream through the No. 2 shutoff valve instead of increasing the pressure in the zone between the two check valves which would cause the differential on the gage to drop, opening the relief valve. Although, to the experienced tester, it may be easy to assess the problem, many new testers often have trouble with this scenario.

Again, testers are encouraged to study Section 9 of the Manual if they feel uncomfortable with any of the test procedures.

The Approval Process

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If the Foundation discovers that materials have changed or parts have been modified since the original Approval, the Approval will be rescinded. The Foundation can not maintain an Approval on an assembly which has been modified since the approval process took place. Assemblies can maintain their Approval, only if they are exactly the same as when they underwent the evaluation process. When Approvals are granted or rescinded, this is shown on the current *List of Approved Backflow Prevention Assemblies*, this is the most effective means the Foundation has to notify Members of the Approval status. Should parts or materials change, the assembly may not change in appearance, and it may be difficult for a Member to determine if anything has been changed. This is why the publication of the *List of Approved Backflow Prevention Assemblies* provides the most effective means of distributing the Approval status of any assembly.

The Foundation can not maintain an Approval on an assembly which has been modified since the approval process took place. Assemblies can maintain their Approval, only if they are exactly the same as when they underwent the evaluation process.

With the intense Laboratory Phase of the Approval Program, the Field Evaluation Phase, and renewal on a three year basis, the Foundation has an extremely effective means of Approving backflow prevention assemblies.

Calendar of Events

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

14-17 February 1995 - California Rural Water Association Annual Technical Conference, Modesto, CA

3 March 1995 - Opening of "Indiana Jones and the Temple of the Forbidden Eye" ride at Disneyland.

13-17 March 1995 - Tester Training Course, Las Vegas, NV

13-17 March 1995 - Program Specialist Course, Incline Village, NV

11-12 April 1995 - CA/NV AWWA Section Meeting, Fresno, CA

24-26 April 1995 - American Backflow Prevention Association International Conference, Spokane, WA

8-12 May 1995 - Tester Training Course, Los Angeles, CA

17 May 1995 - Western States Symposium Association meeting, Phoenix, AZ