

Ninth Edition of Manual to Use New Testing Procedure

The Ninth Edition of the *Manual of Cross-Connection Control* is still under revision. However, the Manual Review Committee has completed a major portion of the new

check valve of the pressure vacuum breaker assembly. The high side hose of the differential gage is attached to the upstream testcock of the check being tested. For testing

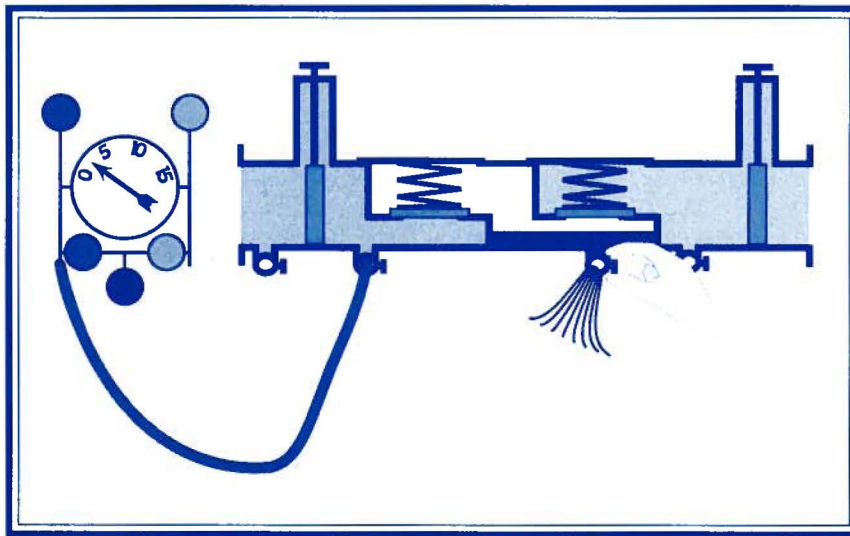


Figure 1

edition. One of the most significant changes is the change in testing methods for the double check valve assembly. The Eighth Edition of the Manual used the duplex gage to test the check valves of the double check valve assembly against a two psi (pounds per square inch) backpressure. In the new Ninth Edition of the Manual, the testing procedure for the double check valve assembly will utilize a differential pressure gage.

The new testing method for the double check valve assembly is very similar to the method used to test the

the first check the hose is attached to testcock #2. With the assembly isolated from system pressure by closing the shut-off valves, testcock #3 is opened until no more water is discharging. (See Figure 1.) The reading on the gage will indicate the amount of pressure the check valve is holding in the direction of flow. This is a simplified explanation of the new procedure. The level of the gage must be correct as related to the level of the testcocks and new means are used to handle leaking shut-off valves. The exact wording of the

continued on page 6


Why the difference AVB vs. PVB

The proper use of pressure vacuum breakers (PVB) and atmospheric vacuum breakers (AVB) requires that they be installed above all downstream piping and outlets. This is to eliminate the potential of backpressure. If the downstream piping or outlets are above the vacuum breaker (AVB or PVB), then the resulting backpressure may flow back through the vacuum breaker, i.e., backflow. As shown in figure 2 on page 4, the air inlet valve of an AVB will remain closed should backpressure be imposed on the unit. This happens because the air inlet valve cannot tell the difference between pressure in the direction of flow and backpressure. Any pressure on the air inlet valve will keep it closed tightly against the air inlet. If this assembly is subject to backpressure, then it simply operates as a

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Highlights

 **Detector Assemblies**

 **CEUs Offered for courses**

 **AVB & PVB Installation Requirements Explained**

Welcome!² ...New Members

Quite a large number of agencies and companies decided to join the Membership program of the Foundation in the first quarter of 1993. With the Memberships continued growth, the Foundation is constantly seeking to serve the Member better. Members should contact the Foundation office with any ideas they may have. The following are those which joined the ranks of the Membership Program in the first quarter of this year.

A B.E.S.T. Service
 Aqua-Tech Backflow Prevention
 Black & Veach
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ECS Company
 El Capitan Mutual Water Company
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 RAB Services, Ltd.
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 Roto-Rooter Plumbing Service
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 Thomas, James J.
 Water Training International
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<i>Tester Course</i>	<i>Program Specialist Course</i>
Las Vegas, NV 12 - 16 April 1993 The Foundation Laboratory 10 - 14 May 1993 12 - 16 July 1993 4 - 8 October 1993 Incline Village, NV 2 - 6 August 1993 Non-Members \$750.00 Members \$600.00	Las Vegas, NV 19 - 23 April 1993 Seattle, WA 21 - 25 June 1993 USC Campus 19 - 23 July 1993 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.

Foundation for Cross-Connection Control and Hydraulic Research
 University of Southern California
 KAP-200 University Park MC-2531
 Los Angeles, California 90089-2531
 (213) 740-2032

A Purchase Order may also be sent via FAX to the Foundation office at (213) 740-8399

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New Phone Number at the Lab

The Foundation Laboratory has a new phone number. The old phone number is being phased out. When calling the Laboratory, please use the new number (213) 953-8738. The FAX number at the lab will remain the same (213) 665-2055. Most of the time a Member of the Foundation's Engineering Staff can be reached at the Foundation Office. However, with the amount of short courses offered by the Foundation, some of the Engineers may be on the road teaching a class. In these cases a staff member should be at the Laboratory to answer any technical questions Members may have.

When seeking information on Foundation short courses or materials offered by the Foundation (i.e., Slides, Videos, Manuals, etc.) please call the Foundation Office.

Foundation Office
(213) 740-2032
FAX (213) 740-8399

Foundation Lab
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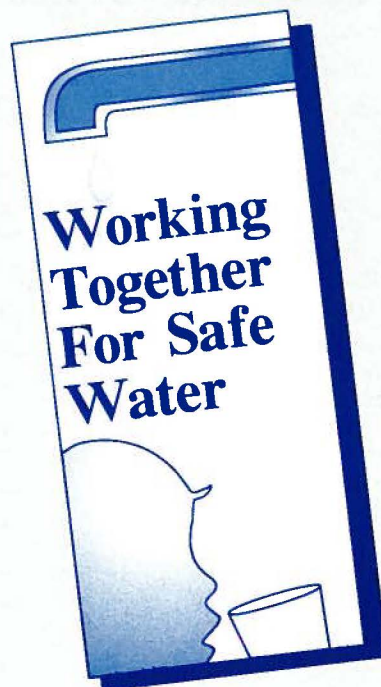
Cross-Connection Control Informational Brochures

The informational brochure entitled *Working Together for Safe Water* is a great complement to the slide presentation *The Essentials of Cross-Connection Control*. 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:

Foundation for Cross-Connection
Control and Hydraulic Research
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(213) 740-2032
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The Essentials of Cross-Connection Control A Graphic Slide Presentation



This set of sixty color graphic slides can be used for any length or type of presentation. The slides come with a three-ring binder which includes explanations of each slide. Your own photographic slides can be added at the appropriate points to help explain certain details or to relate theoretical concepts to specific local situations.

For shorter presentations, slides can be removed so you can cover only the information you want to convey in the time allotted.

Member Price
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AVB vs. PVB, 6-inches vs. 12-inches

continued from page 1

piece of piping with no potential to prevent backflow. The scenario is the same with the pressure vacuum breaker should the check valve become fouled.

The elevation requirement has been confusing to some people since the AVB must be installed six (6) inches above the downstream piping and outlets, while the requirement for the PVB is twelve (12) inches. Many people ask why there is a difference. To explain the basis for this difference, a review of some of the laboratory tests which an AVB or PVB must complete is in order.

In the Foundation's *Manual of Cross-Connection Control-Eighth Edition*, Section 10.2.5.3. the AVB must undergo a test which entails fouling the check seat with a specifically sized wire, then applying a vacuum condition to the inlet of the unit. On the outlet of the AVB is a clear tube which extends down into a vessel of water. See Figure 3. When the vacuum is applied, the water in the clear tube may only rise a maximum of three inches. Should it rise more than three inches, this is cause for rejection. The establishment of the three inch level was experimentally derived many years ago as a

practical level of performance. To provide a safety margin for actual field use, this level was then doubled to six (6) inches. This is the elevation requirement now stated in most codes and regulations for the atmospheric vacuum breaker.

The PVB differs from the AVB in that the PVB can be used under continuous pressure. The AVB is only designed for non-continuous use, (use during twelve of

valve seat inside the unit. If the critical level is not noted on the unit, then it is recommended that the bottom of the unit be used as the reference point. This will assure that the minimum elevation requirements are maintained.

It is also important to note that the elevation requirement is above *all* downstream piping. In older codes wording was used requiring the vacuum breaker to be above the last sprinkler head or outlet. In some cases the requirement was for installation to be above a *sufficient number* of sprinkler heads. Most current codes use the wording "above all downstream piping and outlets" or a statement to the same effect. This is critical because of the backpressure which can build up due to the elevation of piping downstream of the assembly.

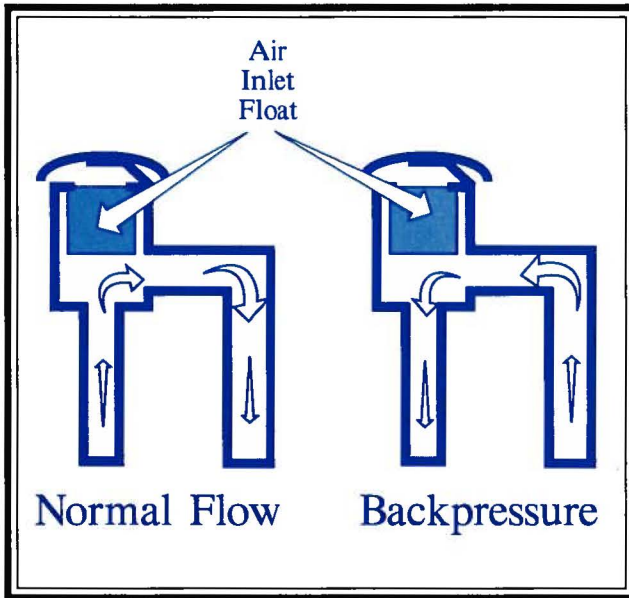


Figure 2 any twenty-four hour period). Due to the PVB being under continuous pressure, the safety factor was increased by requiring the field installation height of twelve (12) inches above all downstream piping and outlets. The PVB must undergo the same suction-rise test as noted above for the AVB.

In considering the six inch and twelve inch elevations, it is also important to know where the measurements are taken from. The critical level of an AVB or PVB may be shown on the outside of the unit. The critical level normally is at the level of the check

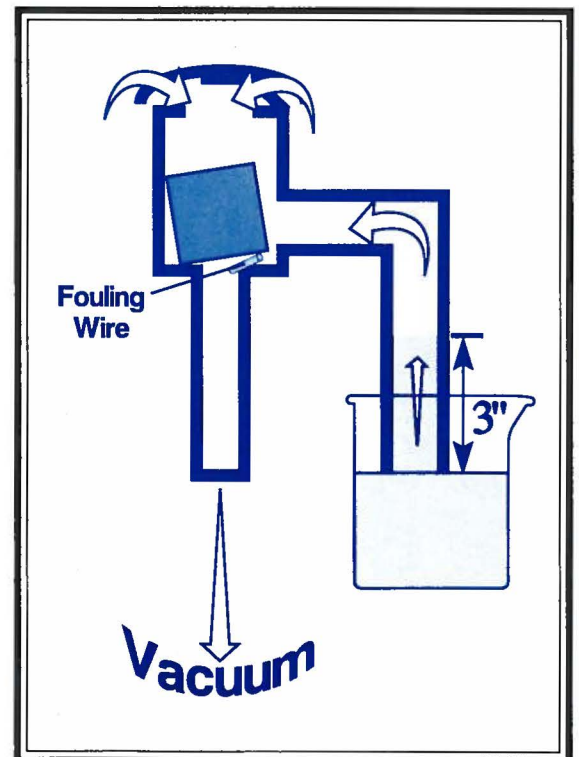


Figure 3

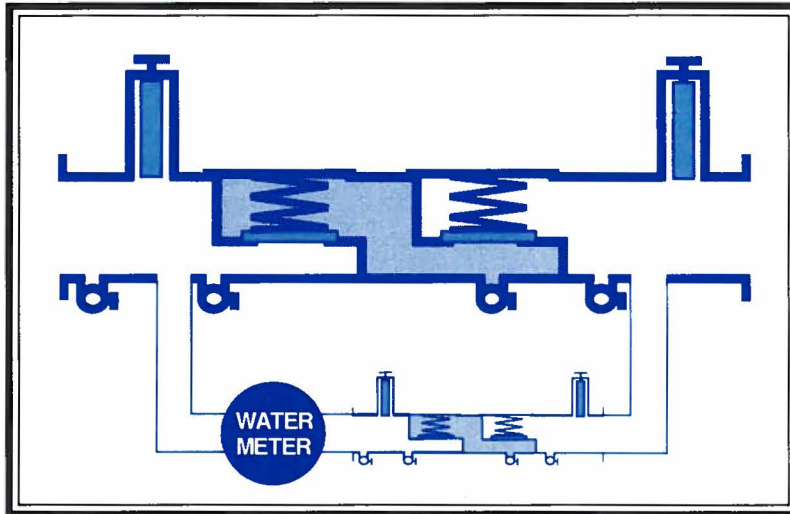
Detector Assemblies

The double check detector assembly (DCDA) and the reduced pressure principle detector assembly (RPDA) are used in situations where the degree of hazard calls for either a double check valve assembly (DC) or a reduced pressure principle assembly (RP) with the additional requirement of detecting leaks or unauthorized use of water. These are normally found on fire sprinkler lines where the line is not metered for firefighting purposes.

The detector assemblies contain a line sized backflow preventer along with a bypass which includes another backflow preventer of the same type (DC or RP). A common mistake is to change a DC or RP into a DCDA or RPDA, respectively, in the field by simply adding a by-pass line which includes a water meter along with a backflow preventer. This is not an acceptable practice for one simple reason; in the vast majority of cases, it will not work. The detector assemblies Approved by the Foundation must be carefully matched to allow all of the water at low flows (up to at least three gallons per minute) to flow through the bypass arrangement. This means that the pressure loss through the mainline assembly must be greater than the pressure loss through the bypass arrangement at these flow levels. The manufacturer carefully selects the proper components to allow the correct hydraulic conditions to exist. In most cases if a stock mainline double check valve assembly is fitted with a bypass arrangement including a stock double check valve assembly and a water meter, the water meter will not register at any flow rate. The same is

true for the RPDA's.

One problem many agencies encounter is the fact that the meters on the bypass line are never read. If the meters are not to be read, then



Double Check Detector Assembly

there is no real reason to require a detector assembly on the fire sprinkler line. An appropriate backflow preventer for the degree of hazard at hand would be adequate. Many agencies in order to make it easier for the meter reader to read the meter on the detector assemblies have the meter piped up or over to a more convenient location. However, this additional piping can very easily increase the pressure loss through the bypass arrangement. This upsets the carefully designed balance of the complete assembly and may cause the water to flow exclusively through the main line at all flow rates, thus rendering the bypass arrangement useless.

If an agency has such modified assemblies in the field, a simple way to determine if the meter on the bypass arrangement is operating is to open the #4 testcock of the mainline backflow preventer. If the meter registers, it does not prove that the

detector is working properly since it has not been determined that the meter is registering accurately. However, it does show that the meter will register when low flows are used

and alert the agency to determine the purpose of the unmetered water being used. If, when the #4 testcock is opened, the meter does not register at all, this is a clear indication that the modifications made have rendered the detector assembly useless for the purposes of detecting leaks and unauthorized uses of water. It does not, however, mean that the assembly will not

prevent backflow. As long as both the mainline backflow preventer and the bypass backflow preventer are in good working order, the detector assembly will prevent backflow.

In the situation where backflow protection is needed as well as detector capabilities it is strongly recommended that the agency require an Approved double check detector assembly or reduced pressure principle detector assembly. The Foundation's *List of Approved Backflow Prevention Assemblies* not only lists several of each of these assemblies which are Approved, but it also shows which assemblies shall be included in the bypass arrangement. This gives the agency the ability to determine if the assembly was possibly "field assembled." Additionally, the Foundation's List shows all of the various water meters which may be used with each of the detector assemblies without affecting the operational characteristics of the assembly.

Changes in the Ninth Edition of the Manual

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testing and troubleshooting is still being finalized.

One other major change in Section 9 of the *Manual of Cross-Connection Control* is the inclusion of drawings to simplify the understanding of the testing procedures.

Almost every step of the procedures for the double check valve assembly, reduced pressure principle assembly and the pressure vacuum breaker assembly will have an image indicating exactly which hose is to be attached to which testcock and which valve should be

turned for each step. This will help those using the test procedures to understand the exact mechanics of the test which is presented. The insert on this page is taken from the test procedures for the reduced pressure principle assembly. These are the steps the tester uses to determine the relief valve opening point. The drawings show exactly

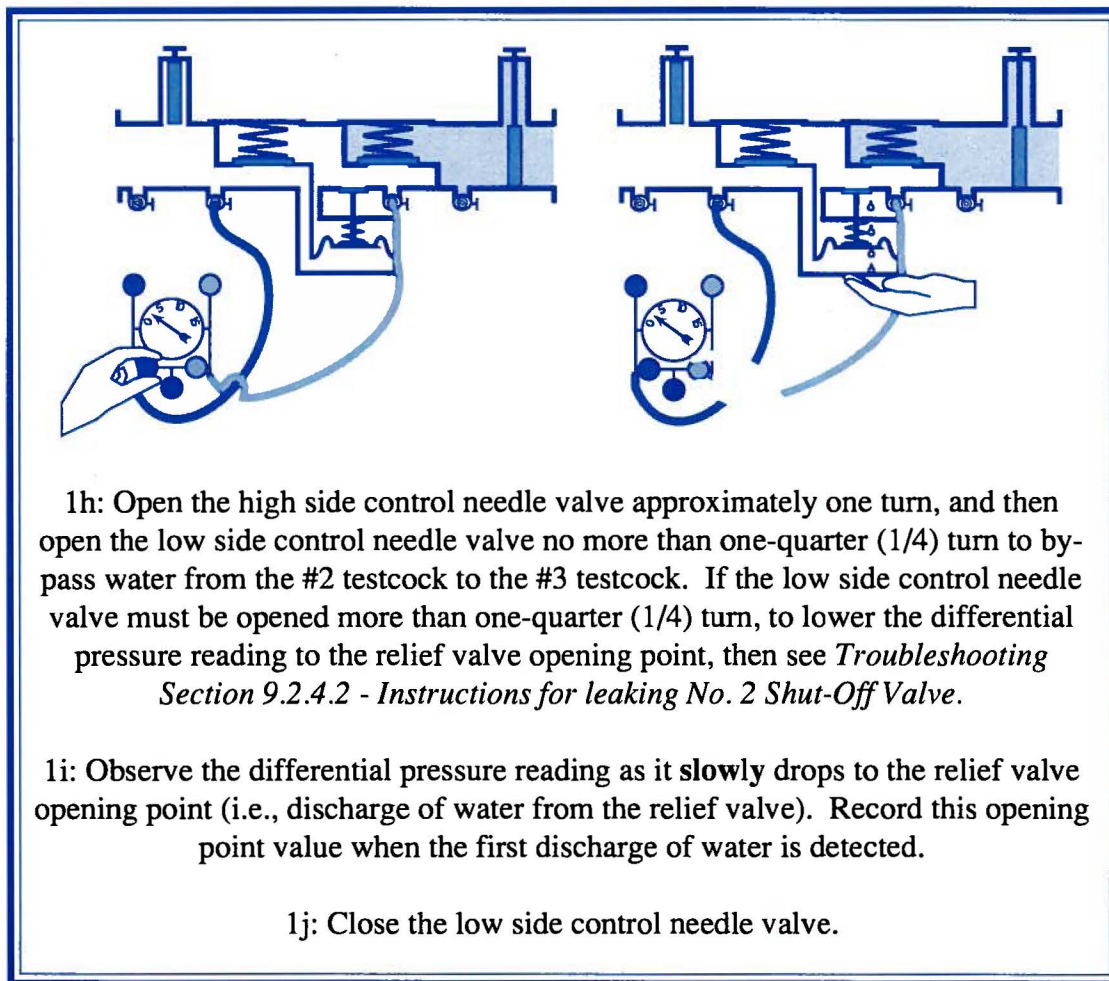
how the gage should be attached and which valves are used in each procedure. Additionally, the test has been clarified somewhat to remove any misunderstandings which may be encountered by the tester.

Manual. The Manual Review Committee has accepted the proposal and the integration of the drawings with the updated test procedures of Section 9 is now underway.

Section 10 of the Manual covers the specifications for backflow

prevention assemblies. It is the policy of the Manual Review Committee to allow the manufacturers of the backflow prevention assemblies to comment on this Section before the Manual goes to print. The purpose of this is to assure that it will be technologically possible to

comply with the new specifications in a timely manner. In some cases, the requirements for specific items may be delayed for a year or so in order to allow the manufacturers to implement. This was the case with the publication of the Seventh Edition of the Manual in 1985. Included in the Seventh Edition was the requirement for resilient seated shut-off valves



The Foundation has been using illustrated testing procedures along with the *Manual of Cross-Connection Control* in its tester courses offered over the last year. Feedback from the students has been very positive and, thus, resulted in the recommendation to the Manual Review Committee that these illustrations be included in Section 9 of the Ninth Edition of the

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CEUs Offered for Training Courses

Continuing Education Units are now available for the Foundation's Training Courses. The *Short Course for the Training of Backflow Prevention Assembly Testers* provides 2.4 Continuing Education Units (CEUs). The *Short Course for the Training of Cross-Connection Control Program Specialists* provides 3.5 CEUs. After participating in one of these courses, the student need only notify the Foundation to obtain a CEU certificate or a transcript detailing the CEUs earned.

As can be seen by the training schedule on page two, the Foundation is offering several short courses this year. If you wish to participate in one of these courses, please contact the Foundation office for an application form. Should you be interested in hosting a course in your area, an outline of what is necessary can be obtained from the Foundation office. The hosting agency is permitted two registrants at no cost for their help in arranging the course location.

Some Members have asked if it is possible to present a USC training course themselves, using Foundation training material. It should be noted that there are no "USC Certified Instructors." Only those courses presented by University Staff Members are considered USC courses and no others. The Foundation does not offer a course for instructors nor does it License or Certify others to teach any course.

Currently, the Foundation offers two five day training courses. The *Short Course for the Training of Backflow Prevention Assembly Testers* is designed to train those attending in the intricacies of testing

the double check valve assembly, the reduced pressure principle assembly, and the pressure vacuum breaker assembly. Almost all of the course time is spent in learning these procedures. However, some time is spent on general hydraulics and the concepts of backflow and cross-connection control. The *Short Course for the Training of Cross-Connection Control Program Specialists* is designed to train those attending in the various aspects of administering a cross-connection control program. This course is usually for those who are in charge of a cross-connection control program for a water agency, health department, or even a large private facility.

The Program Specialist course includes information on policies and procedures for carrying out a cross-connection control program, Federal, State and Local regulations, record keeping, public relations, along with preparing for and conducting site surveys. Although this course may be beneficial to instructors, it is not the intent of the course to prepare those attending to teach any type of course. It does not make the attendee a "specialist in testing backflow preventers." This course only includes a cursory review of the backflow prevention assemblies, and mainly concentrates on the administrative duties of those involved in cross-connection control.

At the successful conclusion of either of these courses the student is offered a "Certificate of Completion" from the Foundation, which simply states that they have successfully completed the specified training course. Certification allowing one to practice as a tester or a specialist is

governed by the local administrative authority. (local health or water agency). Many administrative authorities require the individual to demonstrate their competency through the means of a test. On the other hand some administrative authorities will accept certification from a third party. For information on what is required to practice as a tester or a specialist, the Member should contact their local administrative authority. If it is unclear as to whom should be contacted, it is usually best to start with the local health agency or the state health authority.

Ninth Edition

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and testcocks. However, because manufacturers often purchase shut-off valves and testcocks in bulk quantities, the requirement was that all Approved assemblies utilize resilient seated shut-off valves and testcocks one year after the publication of the Seventh Edition.

With most of the major work of the Ninth Edition being completed, a final schedule has been produced which calls for the publication of the Ninth Edition in August of this year. Although the process has been long and complicated, the new Ninth Edition promises to be well worth the wait. Members of the Foundation will automatically be sent a complimentary copy of the Manual as soon as it is received from the printer. Additional copies will be available to the Members at a 25% discount.

Calendar of Events

This calendar lists activities which the Foundation plans on participating in over the next few months. For more information contact the Foundation office.

12 - 16 April 1993 - Tester Short Course, Las Vegas, NV

14 - 16 April 1993 - CA/NV Section American Water Works Association Spring Conference, Burbank, CA

19 - 23 April 1993 - Program Specialist Course, Las Vegas, NV

25 -28 April 1993 - Annual American Backflow Prevention Association Conference, Phoenix, AZ

10 - 14 May 1993 - Tester Short Course, Foundation Laboratory, Los Angeles, CA

26 May 1993 - New Mexico Backflow Prevention Society Seminar, Albuquerque, NM

6 - 10 June 1993 - AWWA Annual Conference and Exposition, San Antonio, TX

21 - 25 June 1993 - Program Specialist Course, Seattle, WA

12 - 16 July 1993 - Tester Short Course, Foundation Laboratory, Los Angeles, CA

19 - 23 July 1993 - Program Specialist Course, USC Campus, Los Angeles, CA



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