

## Manual Update

The Manual Review Committee continues to work towards the completion of the Tenth Edition of the Manual of Cross-Connection Control. As mentioned in previous articles the organization of the manual will be slightly different. The Sections will be outlined as follows:

### *Objectives*

1. *Definitions*
2. *History/Introduction*
3. *Hydraulics*
4. *Elements of a Program*
5. *Cross-Connection Control Practice—Surveys*
6. *Facilities*
7. *Equipment*
8. *Sample Letters, Forms, Installation Guidelines, Model Ordinance*
9. *Field Test Procedures*
10. *Specifications for Backflow Preventers*
11. *Summary of Case Histories*

Sections two and three are essentially new to the Manual. A history has not been included in previous editions of the Manual; however, the committee felt that it would be beneficial for end users to have a brief history of cross-connection control, along with an introduction to the topic. The introduction will clarify some of the definitions and bring the reader up to speed on the basics of backflow and cross-connection control. This is one area where the Manual has lacked in previous editions. This combined with the following section on hydraulics will make the Manual a complete source for training courses which cover, not

*continued on page three*

## Testing the Double Check Valve Assembly

When field testing the double check valve assembly, one obtains a reading on the first check valve and then takes a reading on the second check valve. In most cases, the tester may continue on to test the second check valve after testing the first check valve, even if the first check valve holds at a value below the minimum value of 1.0 psi. The exception to this is when the reading on the number one check valve is less than 1.0 psi AND the No. 1 shutoff valve leaks. Under these conditions, repairs must be made before continuing on to test the No. 2 check valve.

The *Ninth Edition of the Manual of Cross-Connection Control*, in Section 9.3.3.2, Test T2, states:

*After adjusting the bleed-off valve so that there is a slight drip at the No. 3 test cock, record the reading on the gage as the static pressure drop across the No. 1 check valve. This reading should be greater than or equal to 1.0 psi...if the reading is less than 1.0 psi, the No. 1 check valve must be repaired and retested before proceeding to test No. 2.*

What many testers don't understand is why the test must be stopped at this point to repair the check valve, when at other times the tester may go on and test the second check valve. One needs to look at the entire test in order to understand the reasoning.

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## Foundation Membership

The Foundation's Membership Program provides many benefits to the Members of the Foundation. These include: twenty percent discounts on Foundation Training courses for any employee of the Member company/organization, the *List of Approved Backflow Prevention Assemblies*, printed quarterly, and access to the up-to-the-minute version of the List for those Members with Internet access.

Members are encouraged to call the Foundation with technical questions. The Foundation's Engineering Staff is available to assist Members with the various aspects of field testing backflow preventers, installing backflow preventers, administering their cross-connection control program.

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# Manual of Cross-Connection Control

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only testing, but general cross-connection control topics as well.

A summary of some of the items discussed for the Tenth Edition of the Manual follows. Some of the items, the Manual Review Committee (MRC) is still considering. Some have been rejected or accepted. Comments and suggestions are welcome and encouraged. It is the goal of the MRC to make the Tenth Edition as useful as possible to the end user, so please submit suggestions to the MRC via the web page at <http://www.usc.edu/fccchr/mrc/> or by sending them to the MRC care of the Foundation office.

One of the first items the MRC looked at was adding a representative of the Backflow Prevention Manufacturer's Association to the Manual Review Committee. This was approved at one of the first meetings. The BPMA representative participates in all the meetings, but is a non-voting member. This action helps the MRC to see the perspectives of the manufacturers when considerations arise for the backflow prevention assembly standards. Historically, a draft of Section 10 has always been sent to the manufacturers for comment, but having a BPMA representative on the MRC enables the manufacturers to have more input during the development process.

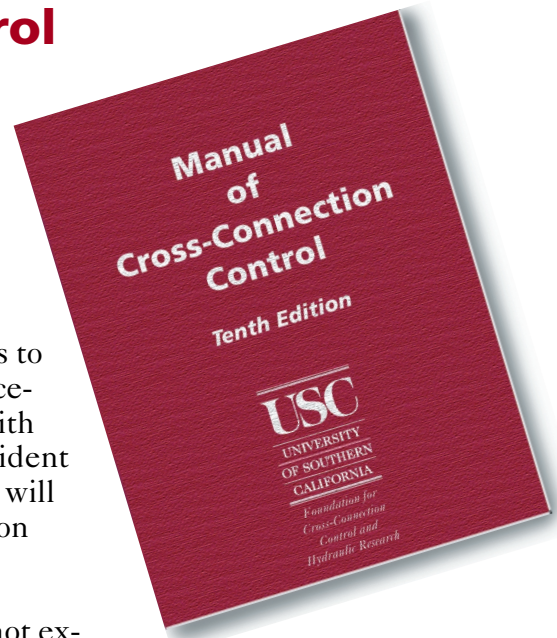
Subcommittees were established to work on revisions to Section six of the Manual, which has to do with the results of non-compliance. This is due to be combined into the current Section three, which is entitled *Responsibilities: Health Agency, Water Purveyor, Plumbing Official, Consumer, and Certified Backflow Prevention Assembly Tester.*

All of this will be incorporated into the "new" section four, *Elements of a Cross-Connection Control Program.*

The MRC continues to collect sample enforcement letters along with sample backflow incident report forms. These will be included in Section Eight.

Although there are not expected to be any substantial changes in the Field Test procedures, there are some changes that are being implemented. One of the most notable of these would be the removal of the three-psi buffer between the relief valve opening point and the point at which the first check holds on the RP. This has always been a confusing issue with many. The current Manual is not dogmatic on whether or not the three-psi buffer is required. It is a "recommended requirement." It was purposely worded this way in order to give flexibility to water utilities and other agencies requiring field tests to have latitude in

*continued on page six*



The new introduction combined with the following section on hydraulics will make the Manual a complete source for training courses which cover, not only testing, but general cross-connection control topics as well.



# Testing the Double Check

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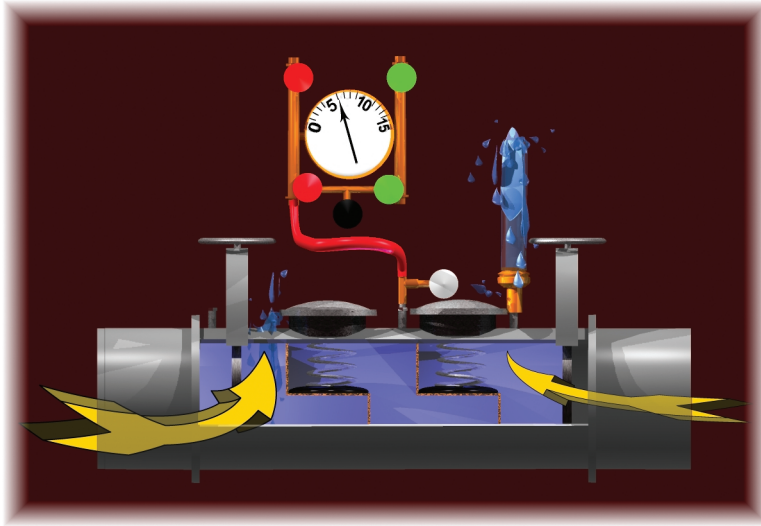


Figure 1

Since the No. 1 check valve is holding tight, all of the water leaking through the No. 1 shutoff valve is discharging through the No. 2 test cock, and none of the pressure held between the two check valves is leaking out through the No. 2 test cock. The gage reading is accurate.

While testing the No. 2 check valve the tester may encounter one of three scenarios. After the first check valve has been tested,

the high-pressure hose of the gage is moved to the No. 3 test cock and the sight tube (if needed) is moved to the No. 4 test cock. The No. 1 shutoff valve is reopened to repressurize the assembly. The sight tube is filled and the air is bled from the gage. Then the No. 1 shutoff valve is closed once again. With the gage at the same level as the water in the sight tube, the No. 4 test cock is opened. At this point one of three things will happen. The water in the sight tube will remain steady, recede or overflow from the sight tube. We are interested in the third scenario, when the water in the sight tube overflows.

Section 9.3.3.2 of the Ninth Edition at T5 states:

*If at Test No. 2 step d water continues to flow from the No. 4 test cock, one of the shutoff valves is leaking. Observe the reading on the gage, but do not record it at this time. Open the bleed-off valve.*

*If it is not possible to adjust the bleed-off valve to allow a slight drip at the No. 4 test cock, the*

*No. 1 shutoff valve should be checked to make sure it is closed tight. Then proceed to step T8.*

Skipping to T8 we find:

*If, after checking the tightness of the No. 1 shutoff valve, it is possible to adjust the bleed-off valve so there is a slight drip from the No. 4 test cock, record the reading on the gage as the static pressure drop across the No. 2 check valve and return to test No. 2 step f. If it is not possible to adjust the bleed-off valve so that the water flowing from the No. 4 test cock is a slight drip, proceed to step T9.*

Moving on to T9:

*If it is not possible to adjust the bleed-off valve so that the water flowing from the No. 4 test cock is a slight drip, and if check valve No. 1 was holding less than 1.0 psi in Test No. 1, the No. 1 check valve must be repaired before testing the No. 2 check valve. Then, return to Test No. 1 step a. Otherwise go to step T10.*

Finally at step T10:

*If check valve No. 1 was holding 1.0 psi or more in Test No. 1, close the bleed-off valve and open the No. 2 test cock. Record the reading on the gage as the static pressure drop across the No. 2 check valve and return to Test No. 2 step f.*

The important point to note is that the tester is not able to complete the test under the above circumstances if the first check held below 1 psi and there was a leaking No. 1 shutoff valve. To understand the reasoning behind this requirement, let's look at what being done in step T10.

Water is flowing from the sight tube at the No. 4 test cock. After observing the reading, opening the bleed-off valve arrangement does not compensate for an upstream leak. Then the bleed-off valve arrangement is closed and the No. 2 test cock opened. This is done in an attempt to get an accurate reading on the No. 2 check valve, even though water is flowing from the sight tube. If the water was flowing from an upstream shutoff valve leak, one should have been able to compensate for it, during the test of the No. 1 check valve. So, water must be coming from the downstream shutoff valve with backpressure. However, to make sure that no water is flowing through the second check valve while we take a reading we open the No. 2 test cock fully. This bypasses any water from a leaking No. 1 shutoff valve to atmosphere at the No. 2 test cock. By doing this, leakage from both shutoff valves will be diverted so that check valve No. 2 may be tested.

From Test No. 1 we know the Number one check valve holds at least 1 psi, the No. 1 check valve must be closed, since just upstream of the check valve is open to atmospheric pressure. With the No. 4 test cock, just downstream of the second check valve also open to atmosphere, the reading on the gage (while held at the level of the water in the sight tube) gives us the differential pressure across the No. 2 check valve, as shown in Figure 1.

If, in the above scenario, the No. 1 check valve was not holding the water trapped between the two check valves may leak backwards and out through the open No. 2 test cock. Once this pressure leaks away, the remaining gage reading will falsely indicate the condition of the No. 2 check. This is shown in Figure 2.

From a pure technical sense, the 2<sup>nd</sup> check may be evaluated accurately providing the 1<sup>st</sup> check holds any value above 0.0, even a failing value of 0.1 to 0.9 psid. But now, the absolute accuracy of a tester's gage at the low end of the scale would be critical. So that the accuracy of a gage near 0.0 would not impact the field test procedure, the MRC decided to require that the cut off point must be 1.0 or

With a leaking No. 1. shutoff valve, pressure from between the two check valves leaks back through the No. 2 check valve, thus dropping the reading on the gage.

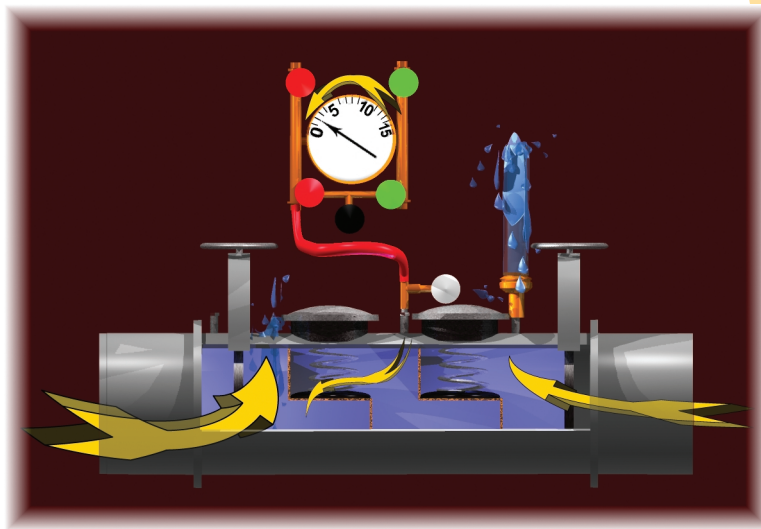


Figure 2

greater. This would provide a reasonable safety factor so that the tester would accurately assess the condition of both check valves, even if both shutoff valves leak.

Hopefully, this explanation helps explain why it is necessary to stop the test and repair the No. 1 check valve when the No. 1 check valve reading is less than one and there is a leaking No. 1 shutoff valve.

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their requirements. The three psi buffer does not affect the ability of the assembly to prevent backflow but is there to minimize the nuisance of water discharging intermittently when the line pressure fluctuates. The MRC has discussed this issue much over the last several years. In the Tenth Edition, one can expect to see the “recommended requirement” of the three-psi buffer to be dropped. The minimum acceptable value for the relief opening point will remain 2.0 psid and the minimum acceptable value for the first check valve will be 5.0 psid.

The spill-resistant vacuum breaker will likely be modified such that the order of tests is reversed. Field

procedures as similar as possible. However, the proposed SVB procedure will make it easier for the tester.

There was much discussion about the direction of flow test on the second check of the RP. Some thought that, the optional test should be removed from the appendix because of its limitations. It was ultimately decided to leave this test in the appendix of the Manual with a note highlighting its limitations. Although there are limitations to this test the MRC wanted the test to be available to those agencies, which require a direction of flow test on the second check of the RP.

There are several items that have been brought to the MRC for consideration. Some of these have been considered and will be incorporated into the Tenth Edition. Some items have been rejected and some are currently under consideration. Listed below are some of these items.

One of the backflow prevention assembly manufacturers recommended that the Tenth Edition include the requirement for a follow-up inspection of the facilities producing backflow prevention assemblies in order to renew the approval of any backflow preventers. The staff has had discussions with some other organizations, which do such audits. This consideration is still under review.

A backflow prevention assembly manufacturer made a presentation at one of the Manual Review Committees recommending the addition of a new type of backflow preventer which would be an

experience has demonstrated that the check valve reading may be accurately recorded before the air inlet value. The current Ninth Edition SVB procedure was based more on the PVB procedure. The attempt in the Ninth Edition was to make the SVB and PVB field test

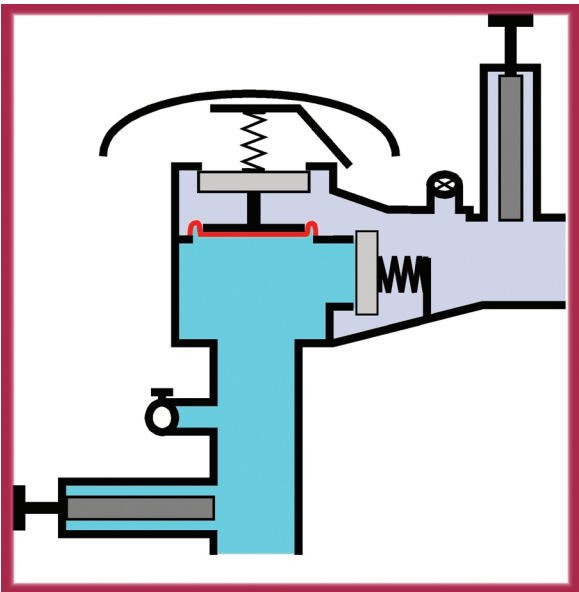
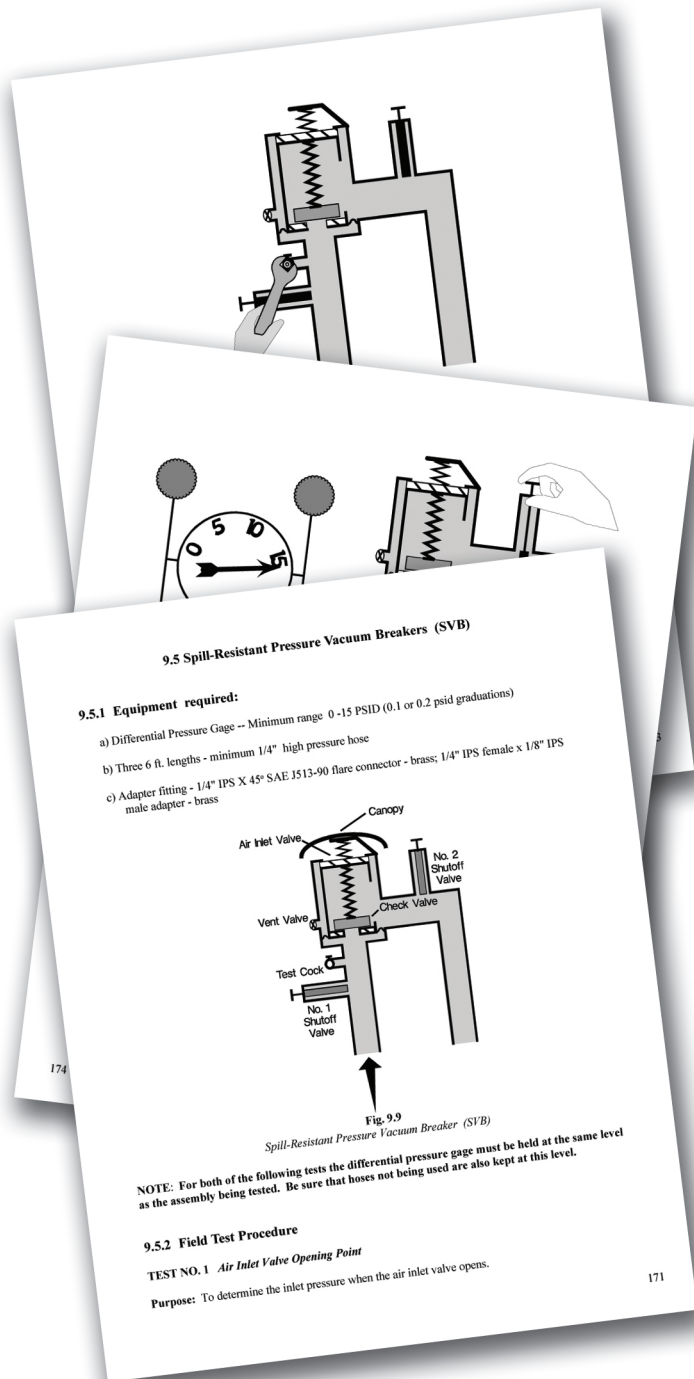
Sample incident forms, and details to help the specialist in cross-connection control surveys are coming together for the Tenth Edition.

# Manual of Cross-Connection Control

integral double check valve assembly and water meter. The committee considered this concept and rejected it after discussion.

A backflow prevention assembly manufacturer recommended the MRC look into some alternate laboratory tests such as cycle tests, aging tests, adhesion tests, etc., which could be used in lieu of the field evaluation. Although some of the tests have been discussed to enhance the lab evaluations the MRC believes that the field evaluation still necessary. Approximately 30% of the backflow preventers passing the Foundation's laboratory evaluation do not pass the field evaluation the first time. This indicates the field evaluation is still the best way to determine the in situ operational characteristics of the backflow prevention assembly.

The Manual Review Committee continues to discuss and make progress on the Tenth Edition of the Manual of Cross-Connection Control. To make recommendations, or keep up-to-date with the current issues visit the MRC web site at <http://www.usc.edu/fcchr/mrc/>.



The spill-resistant vacuum breaker will likely be modified such that the order of tests is reversed. Field experience has demonstrated that the check valve reading may be accurately recorded before the air inlet valve.

## Training Courses

### **Tester Course** ***Now Teaching the SVB!***

Los Angeles, CA  
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Incline Village, NV  
13-17 August 2001

### **Specialist Course**

Los Angeles, CA  
23-27 July 2001

El Paso, TX  
17-21 September 2001

Sandusky, OH  
15-19 October 2001

## Upcoming Events

American Backflow Prevention Association, International Conference

•Kansas City, MO  
22-25 March 2001

California/Nevada Section  
American Water Works Association  
Spring Conference

•Garden Grove, CA  
23-25 March 2001

American Water Works Association  
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•Washington, DC  
17-21 June 2001

American Water Works Association  
Distribution Systems Symposium

•San Diego, CA  
23-25 September 2001

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•Laughlin, NV  
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•Las Vegas, NV  
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