

# USC

UNIVERSITY  
OF SOUTHERN  
CALIFORNIA

Foundation for  
Cross-Connection  
Control and  
Hydraulic Research

## Approved Assemblies Under Various Manual Editions

Many Member administrative authorities have adopted the Foundation's *List of Approved Backflow Prevention Assemblies*. This is not uncommon as it provides the Member with a list of approved assemblies which have successfully completed both a laboratory and field evaluation. When a Member adopts the Foundation's *List of Approved Backflow Prevention Assemblies* as their own, they should be aware of the fact that all assemblies on the List do not meet the same Specifications. One will discover, upon examination, that each item on the List includes the Manual Edition under which the assembly was Approved. There are assemblies Approved under various editions of the Manual. Those assemblies Approved under the Ninth Edition were tested against different specifications than those approved under the Eighth Edition or any previous editions. Following is a brief summary of the major changes which took place in the specifications for backflow preventers each time the Manual was published.

Currently, the laboratory tests assemblies using the Ninth Edition of the Manual. This edition, after several years of Committee work, was published in December of 1993 and differed from the Eighth Edition in some significant areas.

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## Protective Enclosures for Backflow Preventers

During winter months it is always important to make sure backflow preventers are properly "winterized." In some areas, winterizing assemblies may be necessary in seasons other than winter. What can be done to protect backflow preventers from freezing during harsh weather conditions? The best answer seems to be, "it depends."

Some backflow preventers, such as those protecting irrigation systems, may be out of use during the winter months. In this case, the assembly is shut off and the water is drained from the body. There can be a problem with this, however, depending on the type of shutoff valves used with the assembly. When ball valves are used as the shutoff valves for the backflow preventer—or as test cocks—it is wise to leave these valves open at a forty-five degree angle. When the ball valves are either fully opened or fully closed, it is possible to trap water between the ball and the ball valve casing. If this occurs, the trapped water may freeze and damage the ball valve. See the diagram on page three.

This is all very nice for those assemblies that are not being used in the winter months. The real question remains, however: what should be done about the vast majority of

*Continued on page four*

I n s i d e C r o s s T a l k

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Differences in Editions of the Manual • Tenth Edition Update

## 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.

**Backflow Certification  
and Repair of S.C., Inc.**  
**Bakersfield Parks Division, City of**  
**Bath Electric Gas  
and Water Systems**  
**Beale AFB**  
**Big Bend Water District**  
**Bill Collins**  
**Billings, City of**  
**Clark County Health District**  
**Cross Connection  
Technical Training**  
**Dallas County Water Control  
and Improvement District, #6**  
**Dinter Engineering**  
**ECG, Inc.**  
**Environmental Quality  
Management, Inc.**  
**Ferraioli, Richard**  
**Granger Water Specialties**  
**H. E. Lehmann Inc.**  
**Holloman Air Force Base**  
**Irrigation Company**  
**Ken-Caryl Ranch Water  
and Sanitation District**  
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**McCarran International Airport**  
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**Middlebury Water Works**  
**Morrissey Assoc., Inc.**  
**New Carlisle, Town of**  
**P & P Plumbing**  
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**Plumbers & Fitters Local 367**  
**PNM Water Services**  
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**Serda's Plumbing**  
**Skyline Pump & Machine Co., Inc.**

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at Memphis**  
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## Tenth Edition Update

The Manual Review Committee MRC continues to discuss various issues for the upcoming Tenth Edition of the *Manual of Cross-Connection Control*. The latest meeting was held 13 January 1998. This was an open meeting. Open meetings are scheduled periodically. These allow interested parties to present information to the MRC, even though they are not members of the actual committee. There were several things discussed during this latest meeting. Please see the MRC web page at <http://www.usc.edu/dept/fccchr/mrc/> for a complete overview of the latest and all previous meetings. Comments may also be sent to the MRC via the web site.

One item of significance, which was discussed, was the introduction of draft specifications for the differential pressure gage for use in field testing backflow preventers. The specifications introduced were in draft format and the committee will be working on these in upcoming meetings.

At a previous meeting it had been proposed that the minimum requirement of the relief valve opening point be dropped from 2.0 psid to 1.0 psid. After reviewing data submitted by six water agencies the committee rejected the proposal. Still on the table is a proposal regarding the direction of flow test for the double check valve assembly. The proposal was to use a backup test of sorts when the check valves held a positive direction of flow, yet less than the currently required 1.0 psid. Agencies, which have used the direction of flow test for at least two years, are encouraged to submit the specified data to the MRC. The MRC is looking for the differential readings on a check valve, which failed to hold the 1.0 psid requirement. Readings for the year of failure and the preceding year would be needed. It would be more helpful if the previous two years of data could be provided.

**The MRC decides the minimum requirement for the differential pressure relief valve will remain at 2.0 psid**

### Is you're e-mail address valid?

About twenty percent of the Foundation Members have requested electronic access to the List of Approved Backflow Prevention Assemblies via the World Wide Web. If you have an account on the Internet and want access to the List, please fill out the form on the web (<http://www.usc.edu/dept/fccchr/list/>). If you have signed up for Internet access to the List, yet haven't received a notice of changes to the List via e-mail lately, your e-mail address may be invalid. Each time a notice is sent notifying Members of an updated list, several of the e-mail messages are returned. In many cases, the server returning the mail does not include the name of the original recipient, since we suppress the recipient list when we send out the original message. Therefore, we know some of the messages are being kicked back, but don't know who is not getting the messages. So, if you haven't received an e-mail message notifying you of List changes recently (most recent change was 19 February 1998), please check your e-mail address and let us know you haven't received the notification.

**fccchr@usc.edu**

# Protective Enclosures for Backflow Preventers

*continued from page one*

majority of continuous use throughout the year?

The importance of controlling the assembly's environment cannot be overstated. There have been several documented cases of assemblies freezing. When water freezes it actually expands. When water in a closed system—such as a piping system—freezes, something must give such as the pipes. This is exactly what happens when a backflow preventer freezes. The water inside of the assembly freezes, expands and can damage components, such as disc retainers. In many cases the body of the assembly itself cracks, as seen in the photo below.

**Freeze Protection, Strength and drainage capabilities are of prime importance for Protective enclosures**

tion Engineering staff used a huge specially insulated freezer compart-

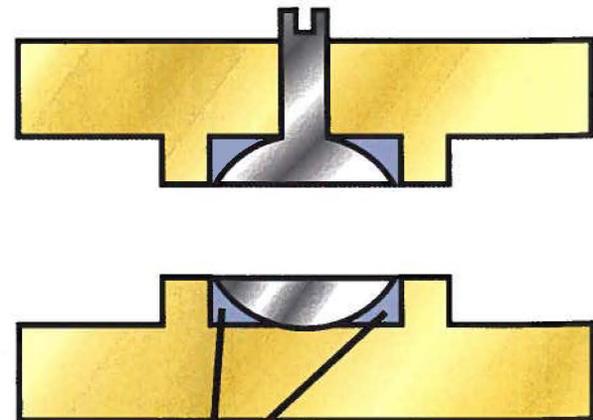


There are several weather protection systems for backflow preventers on the market. The Foundation has tested some of these to see if they comply with ASSE

(American Society of Sanitary Engineering) 1060. This standard includes tests for many specific areas of compliance. The system is subjected to an external temperature of  $-30^{\circ}\text{F}$  for twenty-four hours. The water temperature inside the piping within the enclosure must not drop below freezing and have an average temperature recorded hourly of at least  $40^{\circ}\text{F}$  above freezing. This is not a simple task considering the enclosure is designed to hold up to a ten-inch backflow prevention assembly. The Founda-

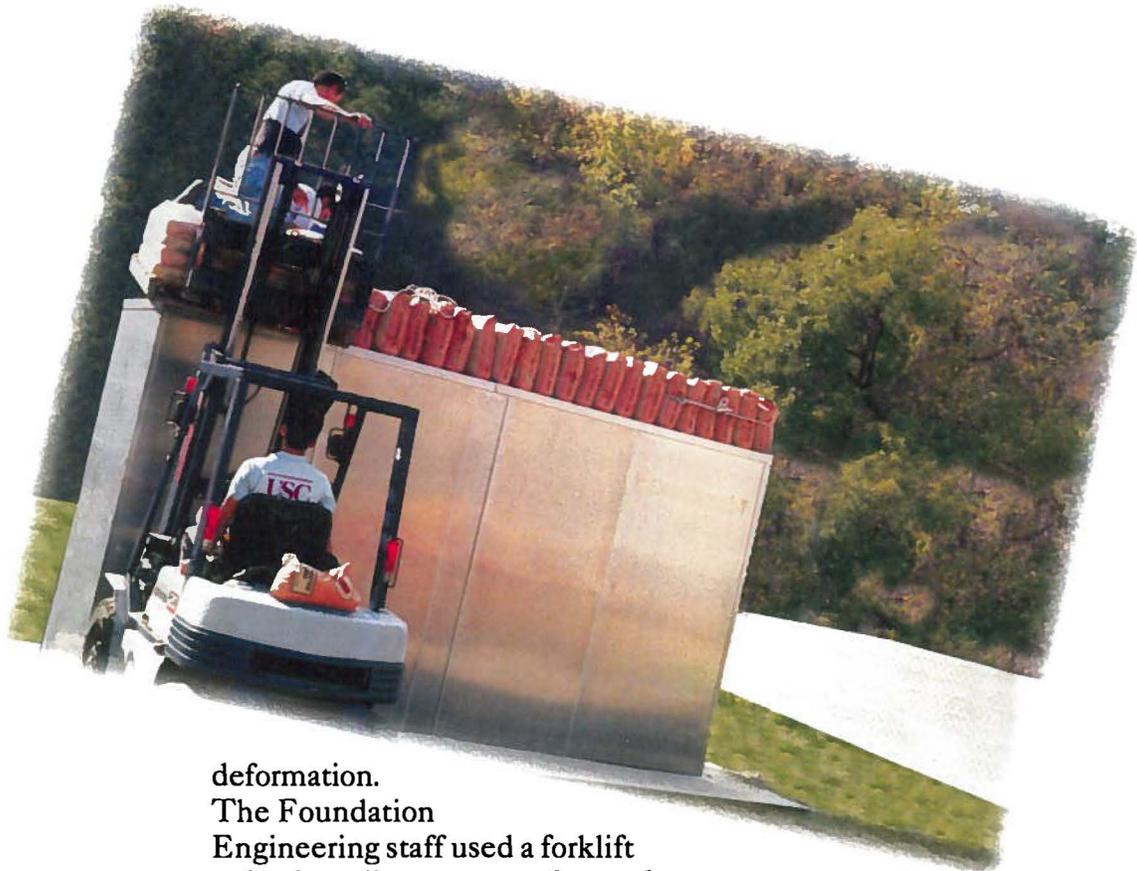
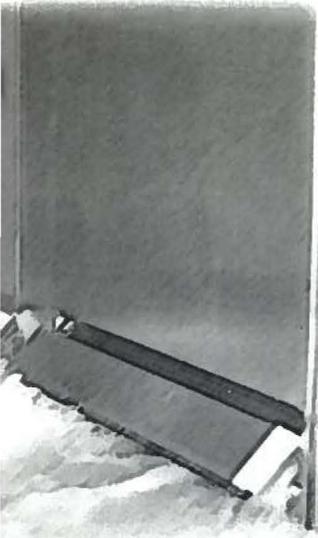
ment in which we placed the test apparatus for the required twenty-four hour test. During the entire time monitoring temperatures inside and outside of the enclosure.

A concern of these enclosures is their ability to drain adequately. Should the enclosure, which is designed to protect the assembly from inclement weather and/or vandalism, become filled with



**Trapped Water**

water, the assembly would encounter the same prob-

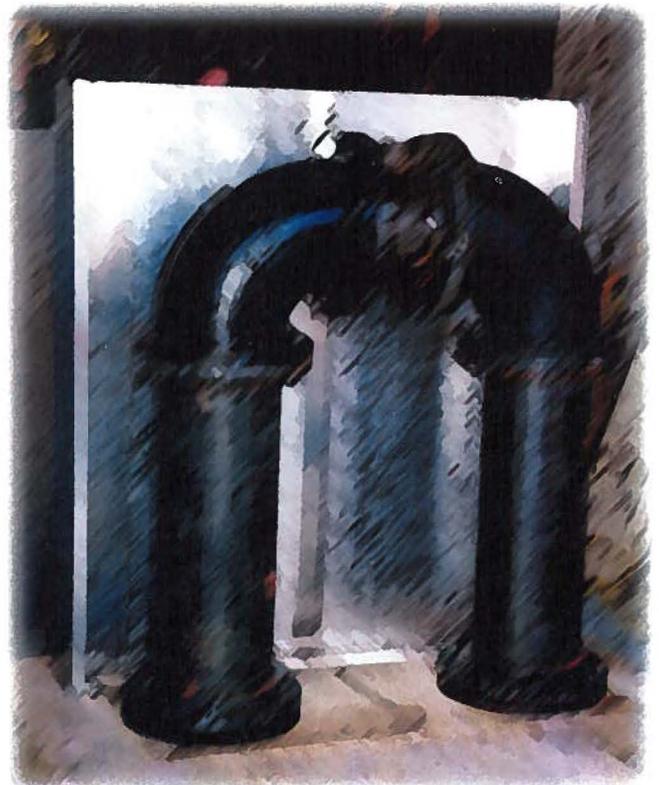


deformation. The Foundation Engineering staff used a forklift to load sandbags on top of one of these enclosures as shown above.

lems as it would if installed in a pit. Because of this the enclosures must be designed to adequately drain water. The ASSE Standard 1060 requires the enclosure to discharge enough water so that the enclosure will not have a depth of water of more than six inches when a specified flow of water is continuously introduced into the enclosure for a period of ten minutes. A sample of the discharge from one of these containers may be seen in the image above.

Another area of concern is the strength of these enclosures. The ASSE Standard requires the enclosure to support a minimum vertical load of 100 pounds per square foot. So an enclosure which has a foot area of three feet by ten feet, for example, would be required to withstand a load of 3000 pounds on top of the enclosure for twenty-four hours without any permanent

Some other areas of concern covered in the ASSE Standard are security and access to the assembly within the enclosure. These enclosures have been used broadly in many parts of the country. They solve the dilemma in which many find themselves: wanting to install an assembly above grade and also wanting to keep the assembly from being exposed to freezing temperatures and vandalism.



# Assemblies Approved under Various Editions of the Manual

*continued from page one*

The Most significant changes to the specifications in the Ninth Edition include the following:

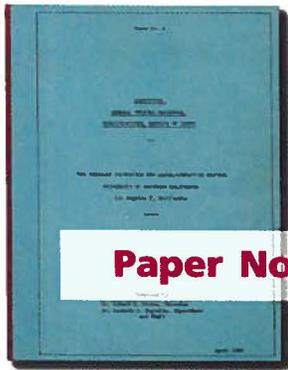
- The endurance cycle test was introduced in the Foundation's Laboratory testing phase of the evaluation program. The requirement is for a 5000 cycle test, necessary to understand an assembly's ability to perform its functions repetitively without damage or permanent deformation.
- Also required were replaceable seats in all assemblies. This eliminates the need to replace the entire body should the seat become damaged.
- The SAE fitting on the test cocks were allowed—no longer does the tester need male plugs to attach the hoses from the gage to the test cocks.
- All assemblies are required to perform optimally at 140°F.
- The Ninth Edition laboratory testing procedures provide testing for the optional relief valve drain funnels on the reduced pressure principle assembly. If a manufacturer wishes to provide this drain funnel, it may be included as part of an Approved assembly, providing the assembly passes this test. This test assures that there is no backsiphonage from the drain funnel into the relief valve port under backsiphonage conditions.
- A new standard size was added primarily for residential use: the 5/8" X 3/4" size, or the typical meter size, able to sustain a lower rated flow. This size has connections in the standard 3/4" pipe thread size, however, the internal diameter of the connection is only 5/8".

The **Eighth Edition** was published in June of 1988.

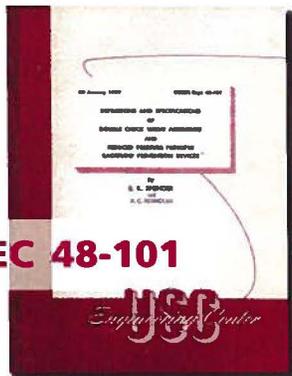
- A significant change from the Seventh Edition was the lowering of the rated flow in the 1/4", 3/8", and 1/2 sized assemblies. These sizes are used primarily on low flow systems, and therefore do not require the high rate of flow larger supply lines require.
- Design and performance requirements for the resilient seated shutoff valves and test cocks were included in this edition of the Manual.

The **Seventh Edition** was published in June of 1985. This edition saw major changes in the both the requirements for backflow prevention assemblies and in the testing of the assemblies.

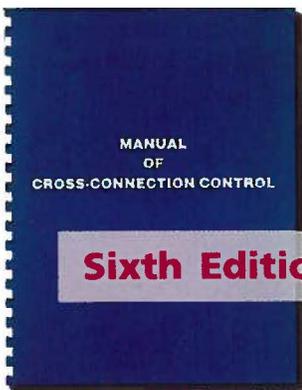
- Resilient seated shutoff valves, which help ensure a tighter fitting closure for testing and maintenance of assemblies, were made necessary on all USC Approved assemblies.
- A period of one year was given to all manufacturers to produce assemblies with resilient seated shutoff valves and test cocks. This included assemblies which had been Approved under previous editions of the Manual.
- Evaluation for effectiveness when simultaneous backsiphonage and backpressure conditions were applied to reduced pressure principle assemblies began with this edition.
- Assemblies were evaluated at the rated working temperature through a thermal test. This required the construction of the Foundation's Thermal Loop System.



**Paper No. 5**



**USCEC 48-101**



**Sixth Edition**



**Ninth Edition**

The **Sixth Edition** was published in August of 1979.

- This edition first stated that the relief valve on the RP had to be at the lowest position between the two check valves of the reduced pressure principle assembly. This was to ensure there would be no pooling of non-potable water between the two check valves, which could be backsiphoned through a leaking No. 1 check valve.
- The selection of a location for the field evaluation of an assembly was detailed and quite specific, whereas in earlier editions, a location was simply suggested by the manufacturer. This gave the Foundation more management over the environment in which the assembly operated, helping to guarantee an impartial evaluation for all assemblies.
- The Sixth Edition stated that the Foundation can rescind a previous Approval when and if spare parts become commercially unavailable.

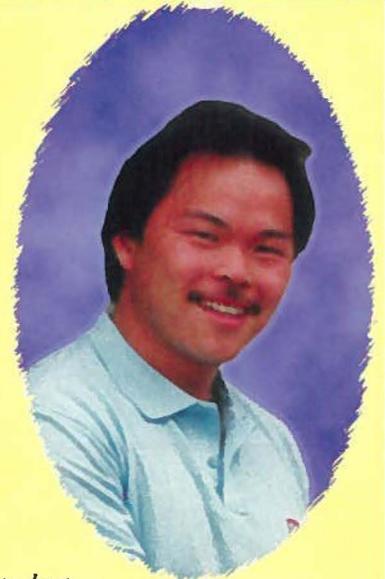
The **Fifth Edition** (1974), the **Fourth Edition** (1969), **Third Edition** (1966), **Second Edition** (1965), and the **First Edition** (1960) were all preceded by the **USCEC Report 48-101**, an early version of the much more in-depth First Edition. But the true collector's item is the **Paper No. 5 – Objectives, General Testing Procedure, Specifications, Results of Tests** which first appeared in April of 1948, a few years after the birth of the Foundation. The title, **Paper No. 5**, is indicative of the fact that this was the fifth paper published by the University's School of Engineering that year, of which the

Foundation was (and is) a part. This was a forty page document that simply stated that to which the title refers. While this was a fine piece of literature, if you or your organization still refer to this Paper, we recommend updating to the Ninth Edition soon. An interesting note: there is still one assembly that is fully approved under **Paper No. 5** on the Foundation's **List of Approved Backflow Prevention Assemblies!** In contrast, the longest standing approval beyond that is approved under the Fourth Edition. Be one of the first five persons to locate the assembly approved under **Paper No. 5** and receive a free Foundation baseball cap. Just give us a call at the Foundation Office with the model number.

## Staff Profile

### Mr. Henry Chang

*The Foundation has been blessed with individuals dedicated to serve the backflow prevention industry. One of those important individuals is Henry Chang, a long time employee of the Foundation, who is essential to the work that goes on in the Foundation Laboratory. It is hard to imagine where we might be without Henry's many years of commitment to USC.*



*His employment with the Foundation started nearly fifteen years ago in 1983, as an undergraduate student here at USC. Both his Bachelor of Science Degree in Mechanical Engineering and Master of Science Degree in Materials Science were earned from the University of Southern California. Henry now serves as the Program Manager/Mechanical Engineer for the Foundation. His responsibilities include overseeing and coordinating the Laboratory and Field Evaluation programs of the Foundation's Approval Program for the Backflow Prevention Assemblies. This in itself demands his full attention, yet is able to aid the Foundation as an instructor in the ten to twelve Tester and Program Specialist Courses offered throughout the year.*

*His involvement in this industry extends far beyond the Foundation. He is a member of pertinent organizations such as the ABPA, AWWA, ASME, and the SME. He serves in several committees for organizations such as the ASSE and IAPMO.*

# Training Courses

## Tester Course

Las Vegas, NV  
Los Angeles, CA  
30 March-3 April 1998

Los Angeles, CA  
4-8 May 1998

Los Angeles, CA  
13-17 July 1998

Incline Village, NV  
17-21 August 1998

Charleston, SC  
14-18 September 1998

Las Vegas, NV  
2-6 November 1998

## Specialist Course

Incline Village, NV  
9-13 March 1998

Los Angeles, CA  
20-24 July 1998



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