USC Foundation Approaches a Milestone

With its seventieth anniversary approaching soon, the USC Foundation for Cross-Connection Control and Hydraulic Research continues to be a frontrunner in the backflow prevention industry. Beginning with its first set of general testing procedures being published in 1948 the USC Foundation has made available training courses, training tools and has developed an approval process for backflow prevention assemblies.

The University of Southern California’s Board of Trustees established the USC Foundation for Cross-Connection Control Research in September of 1944. It was later renamed the USC Foundation for Cross-Connection Control and Hydraulic Research. At the time, funds were donated to the University anonymously to establish the USC Foundation. A laboratory was setup on the University Park Campus with a staff to conduct research on cross-connection control.

Shortly thereafter, the USC Foundation published Paper No. 5: Objectives, General Testing Procedure, Specifications, Results of Tests in April of 1948. Pre-existing backflow preventers of the time were evaluated according to Paper No. 5 and depending on the model being tested between 20% to 75% were failing. Not just providing inadequate results but failing to prevent backflow all together.

So, in addition to field test procedures, sets of standards for backflow prevention assemblies were included in Paper No. 5. The standards included the double check valve assembly and the reduced pressure principle assembly.

continued on page 6
The Foundation’s Membership Program provides many benefits to the Members of the Foundation. These include: a twenty-five percent discount on manuals, twenty percent discount on Foundation Training Courses for any employee of the Member company/organization, the List of Approved Backflow Prevention Assemblies with access to the up-to-the-minute version on the Foundation’s website.

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 and administering their cross-connection control program.

Below is a list of those who have become members of the Foundation since the last Cross Talk:

- A Better Way
- A. Wyman & Associates
- AECOM-Wisconsin
- American Water O&M
- Anthony’s Backflow Testing
- Barlow Backflow
- DC Plumbing
- G. I. Hopkins
- Glendale- Parks Division, City of
- Gridley, City of
- Griffin Plumbing, CA
- HR Green, Inc.
- Kern Plumbing & Backflow Services, Inc.
- Newcastle Plumbing
- Orange County Sanitation Dist.
- Perfection Plumbing and Drain Service
- PHCC Los Angeles
- Raffaele Tarulli P.E.
- Rand Communities Water District
- Suarez Engineering Inc.
- The Coca-Cola Co.
- Timothy Bushnell
- Van Den Eykel Landscape Services
- Wilder System Solutions
With the Tenth Edition of the *Manual of Cross-Connection Control*, the USC Foundation, for the first time, introduced a standard for field test kits. The USC Foundation has never had a list of approved field test kits. However, a list of acceptable gages has been available on the USC Foundation’s website. This list shows gages that have been reviewed by the Foundation and found to comply with the generalized guidelines shown in Section 9 of the Ninth Edition of the Manual, but it is not an Approval.

The Field Test Kit Standard found in Chapter 10 of the Tenth Edition, includes general material and design requirements along with the evaluation of design and performance for the field test kit. Field test kits with a two, three and five needle valves are accepted for evaluation.

The field test kit approval consists of successfully completing a laboratory evaluation conducted at the USC Foundation laboratory.

The laboratory evaluation of the field test kit include:

a. Accuracy test  
b. Hydrostatic test  
c. Accuracy at rated temperature and pressure test  
d. Pressurizing fatigue test  
e. Valving flow test  
f. Pressure dissipation test

Approvals are granted after the field test kit successfully completes the laboratory evaluation. The approved field test kit will then appear on the *List of Approved Field Test Kits*. After a period of three years renewal of the approval is required. Renewal after three years is dependent on the field test kit continuing compliance with the standard, which include field performance. And, approvals may be rescinded if the field test kit has been modified.

No Field Test Kits have been approved according to the Standard in the Tenth Edition, to date.
There has been some confusion as to the differences between a manifold assembly and a parallel installation of backflow prevention assemblies.

A manifold assembly is comprised of backflow prevention assemblies of the same manufacturer, model and size. Manifold adaptor fittings on both the inlet and outlet of the manifold assembly are considered integral components. The size of the manifold is determined by the inlet and outlet connections of the manifold adaptor fittings.

The manifold assembly referenced in the Manual of Cross-Connection Control, Tenth Edition (Chapter 8.3.4) addresses a specifically designed product. This product is not the same as two individual assemblies installed in parallel. The Foundation previously evaluated and Approved several manifold assemblies, 25 years ago, and they were designed with two of the same make, model and size individual assemblies.

Assemblies in parallel do not have to be the same make, model and size. In many applications one of the assemblies in parallel will be opening and closing to satisfy the low flow demands and the larger assembly will only open when the customer uses more water. Parallel installations are a common occurrence in the backflow prevention industry.

Parallel installations of backflow prevention assemblies are used to provide uninterrupted water service to the water user, typically known as a critical service. The installation of units in parallel is referenced in Chapter 8.3 of the Tenth Edition manual. The hydraulic sizing of two (or more) assemblies in parallel is based upon the total flow rate to the customer. For example, two 3-inch RPs in parallel, have a maximum rated flow of 320 gpm each. So if the customer is using water...

The USC Foundation at the BIPF 2012

The 10th Annual Backflow Industry Product Fair put on by the Southern California chapter of the American Backflow Prevention Association was held in June at Friendship Auditorium in Los Angeles.

Sessions at the fair covered everything from repair and lead-free issues to certification program updates. Additionally, USC Foundation staff demonstrated field-testing procedures for backflow prevention assemblies according to the Tenth Edition manual. Attendees also had an opportunity to watch portions of the new Field Testing Backflow Preventers DVD playing at the USC Foundation’s exhibition booth.

Meanwhile other attendees took a tour of the Foundation’s laboratory where Foundation staff demonstrated the laboratory’s ability to test assemblies at elevated temperatures using the Foundation’s thermal loop system. Attendees watched as Foundation staff demonstrated measuring the hardness of elastomers using a durometer. And, the Foundation’s small and large cycle systems were on display to demonstrate how the Foundation simulates specific sets of operating conditions such as pressurization, depressurization, backpressure, re-pressurization and others.

The Foundation would like to thank all who came by the booth in the auditorium and visited the laboratory.
Cross-Connections in Household Plumbing Brochure

Cross-Connections are not limited to restaurants, factories or other large establishments; they may be prevalent in the home as well. The USC Foundation has put together an illustrated brochure highlighting possible cross-connections that may be found in the home.

Our Homes...
Have you ever considered all of the places that you use water in your home? You may be surprised by how many different ways water can be used, and possibly misused.

This brochure discusses a few of the uses of water that you might want to pay more attention to in order to protect the purity of the water you drink, cook with, or bath in. Let's look at a few examples:

Sinks, Tubs, Tanks
These fixtures in your bathroom or kitchen must be located so that the end of the faucet is above the surface level of any tub. This will help prevent the contents of the fixture from reversing back into the water supply system. For example, a toilet needs water to flush the waste material into the sewer system. The water that flushes the toilet enters the toilet tank from the small hose or pipe connected to the bottom of the toilet tank. It is essential that the float-valve (ballcock) inside of the toilet tank is the correct type so that the contents of the toilet tank do not get back into the drinking water system in the home. Other items illustrated in the brochure include boilers, hose bibs and irrigation systems.

The Cross-Connections in Household Plumbing illustrated brochure uses illustrations of common plumbing fixtures like a toilet and sink to explain where cross-connections may be found and how to protect them from possibly contaminating the water supply.

The illustrated brochure is ideal to create awareness among communities about cross-connections found in the home.

The USC Foundation imprints the name and address of the ordering agency or company on the brochure so that the reader can contact the agency or company directly for more information. A sample of this brochure may be viewed online, or a physical copy will be sent upon request.

The 10th Annual Backflow Industry Product Fair put on by the Southern California chapter of the American Backflow Prevention Association was held at Friendship Auditorium in Los Angeles in June. Sessions at the fair covered everything from repair and lead-free issues to certification program updates and illustrated field-testing procedures for backflow prevention assemblies. Attendees also had an opportunity to watch the laboratory’s ability to test assemblies at elevated temperature and the hardness of elastomers using a durometer. And, the laboratory’s ability to test assemblies at elevated temperature and hardness of elastomers using a durometer.

For example, a toilet needs water to flush the waste material into the sewer system, therefore, it is important that the fill-valve (ballcock) inside of the toilet tank is the correct type so that the contents of the toilet do not get back into the drinking water system in the home.

Other items illustrated in the brochure include boilers, hose bibs and irrigation systems.
From the beginning, the USC Standards have required a field evaluation as part of the approval process. The initial requirement stated that three assemblies would be tested in the field for six months. If the assemblies passed, it was granted provisional approval, and three more of the same assemblies, which were granted provisional approval, were installed in the field for a three-year field evaluation. If the three assemblies were determined at the end of the three years to pass the field evaluation that particular model and size of backflow preventer was granted full approval and included in the USC Foundation’s listing of approved assemblies.

Records indicate that full approval was granted to two models of reduced pressure principle assemblies and one model of double check valve assembly in October of 1948. Today, the List of Approved Backflow Prevention Assemblies includes close to 3000 assemblies. Although many of those may be of the of the same model and size, but listed twice or more for various orientations.

The current approval process includes, not only the rigorous laboratory evaluation detailed in Chapter 10 of the Tenth Edition, but also a required one year field evaluation in which three assemblies of each size and model are field tested monthly for a year. At the end of the year the assemblies are disassembled to determine if the assembly is still operating properly. It is not until these conditions are met that the assembly is granted Approval and included in the List. There is no provisional Approval.

Following Paper No. 5, the University published USCEC Report 48-101 in January of 1959. The paper included updated standards for the double check valve assembly, the reduced pressure principle assembly as well as some policy recommendations for a cross-connection control program, recommendations on which facilities should have backflow preventers and a list of definitions.

In August of 1960, twenty months after the publication of USCEC Report 48-101, the Manual of Cross-Connection Control Recommended Practice was published. The Manual included information on Objectives, Policies, Responsibilities, Definitions, Typical Facilities needing backflow protection, Cross-Connection Control Practices, Sample letters and forms, field test procedures, standards for the backflow preventers and a section listing documented backflow incidents.

The Manual of Cross-Connection Control Recommended Practice would later become what is known today as the Manual of Cross-Connection Control.

Currently in its Tenth Edition, the manual has become an essential tool for anyone involved in backflow prevention and cross-connection control with its wealth of information. Detailed chapters like Hydraulics, Facilities and Elements of a Program continue to make the manual a valuable resource. The manual also includes the field test procedures and the Standards to which backflow prevention assemblies are evaluated for inclusion in the List of Approved Backflow Prevention Assemblies.
**Manifold vs. Parallel Assemblies**: continued

continued from page 4

and 320 gallons per minute through the individual assemblies is not exceeded, then they are being used within their rated capacity.

Even if two units in parallel are the same exact make, model and size, this does not mean they will work in unison (i.e., open/close simultaneously). There tends to be a primary and secondary assembly. The spring loads are not exactly the same between the two units in parallel, so the water will tend to flow through the assembly with the lower pressure loss (i.e., primary). The secondary assembly will begin to open as the flow rate increases.

If members have any more questions regarding the difference between a manifold and parallel installation please contact the Foundation office.
**Training Courses**

**Tester Course**

Los Angeles, CA  
15-19 October 2012

Los Angeles, CA  
14-18 January 2013

Los Angeles, CA  
22-26 April 2013

**Specialist Course**

Los Angeles, CA  
7-11 January 2013

---

**Upcoming Events**

**ABPA Western Regional Backflow Conference**

Las Vegas, NV  
24-26 September 2012

**CA/NV AWWA Annual Fall Conference**

San Diego, CA  
8-11 October 2012

**Tennessee Backflow Prevention Association**

Jackson, TN  
25-26 October 2012

---

**Contact Information**

**Phone:** 866-545-6340  
**Fax:** 213-740-8399  
**E-mail:** fccchr@usc.edu  
**Website:** fccchr.usc.edu

---

**Foundation for Cross-Connection Control and Hydraulic Research**

University of Southern California  
Kaprielian Hall 200  
3620 South Vermont Avenue  
Los Angeles, California 90089-2531

---

**USC University of Southern California**