



# Accuracy Testing of Gauges Used for Testing Backflow-Prevention Assemblies

## Who Should Read This Guide?

This publication is for public water system personnel, licensed backflow-prevention-assembly testers, and individuals or companies that test the accuracy of gauges used for testing backflow-prevention assemblies. It discusses proper methods of testing gauges for accuracy, testing requirements, and responsibilities. In the text, “gauge” refers to a differential-pressure gauge used for testing backflow-prevention assemblies.

This publication is for general guidance only and does not take the place of any rules or regulations governing cross-connection control and backflow prevention.

## About Gauge Accuracy Testing

### ***What is the difference between testing for accuracy and calibration?***

Testing a gauge for accuracy is the process of *comparing* the reading on the field-test-kit gauge to a standard gauge in order to determine the indication error at specified points of the scale.

Calibrating a gauge is the process of *adjusting* the gauge mechanism so that the gauge indicates within specified accuracy limits at specific points on the scale.

### ***Applicable rule***

Title 30 of the Texas Administrative Code, Subparagraph 290.44(h)(4)(B), requires gauges used in the testing of backflow-prevention assemblies to be tested for accuracy annually in accordance with the University of Southern California’s *Manual of Cross-Connection Control* or the American Water Works Association (AWWA) Recommended Practice for Backflow Prevention and Cross-Connection Control (Manual M14).

### ***Responsibility for annual testing***

Public water systems must ensure that licensed backflow-prevention-assembly testers use gauges that have been tested for accuracy at least annually. Water-system personnel usually ensure gauges have been tested for accuracy during

their review of Backflow Prevention Assembly Test and Maintenance Report forms submitted to the water system.

## ***USC Manual of Cross-Connection Control and gauge accuracy testing***

### **Requirements**

The 10th edition of this manual addresses the importance of regular calibration to data accuracy:

Field test kits should be checked for accuracy at least once a year, and re-calibrated when inaccuracy exceeds the current error tolerance,  $\pm 0.2$  pressure differential in pounds per square inch (psid).

### **Method**

The manual sets forth an approved testing method:

Field test kits should maintain an accuracy of  $\pm 0.2$  psid for decreasing differential pressure readings at each of the test points using either water or air/gas as the test medium. The field test kit should be verified against a reference source that has a calibration traceable to the National Institute of Standards and Technology (NIST). The verification reference source should have a maximum permissible error of  $\pm 0.05$  pound-force per square inch gauge (psig).

With the field test kit maintained in the vertical orientation, the verification reference source and the high side hose of the field test kit should be attached to a common pressure source. The low side of the field test kit gauge should be maintained at atmospheric pressure. The common pressure source should be increased to approximately 15 psig. The common pressure source should be decreased until the verification reference source reads 12.0 psid and the field test kit reading should be recorded. This should be repeated at values of 8.0 psid, 5.0 psid, 2.0 psid and 1.0 psid. Exceeding the accuracy of  $\pm 0.2$  psid should be cause for rejection.

## ***Manual M14 and accuracy testing***

The third edition of Manual M14 gives similar requirements for gauge accuracy testing:

To ensure the ability of the field test equipment to provide accurate data, the accuracy of the field-test equipment should be verified at least annually. If the accuracy of the field test equipment is not within accepted standards recognized by the local administrative authority, the field test equipment shall be calibrated and brought into acceptable accuracy tolerances.

### ***Who can test a gauge for accuracy and calibrate it if necessary?***

Gauges can be tested for accuracy by any individual or company using a standard gauge traceable to NIST that is at least four times more accurate than the required accuracy of the gauge being tested. The current error tolerance of gauges used for testing backflow-prevention assemblies is  $\pm 0.2$  psid.

Gauges can only be calibrated by a company listed as a service center by a backflow gauge manufacturer.

Gauge accuracy tests may not be performed on one's own gauge or a gauge registered to the company employing the technician performing the test.

### ***Testing schedule for field gauges***

All new gauges must be tested for accuracy before being placed into service, and annually thereafter.

### ***Testing schedule for standard gauges (used to test field test gauges)***

A standard gauge must be tested annually and meet the specifications stated in the latest edition of the *USC Manual of Cross-Connection Control* (the 10th edition at the time of publication of this document):

Verification reference sources shall have a maximum permissible error of  $\pm 0.05$  psig (0.344 KPa). Verification reference sources shall have their calibration traceable to the National Institute of Standards and Technology (NIST).

For the purpose of this guide, *verification reference sources* are the standard gauges used to test field test gauges.

## **Testing Backflow-Prevention Assemblies on Non-Potable Water Lines**

### ***Separate gauges required for testing potable and non-potable water lines***

Due to concerns about contamination, the same gauge *cannot* be used to test backflow-prevention assemblies on potable and non-potable water lines. The most common type of non-potable water line carries reclaimed water—wastewater-treatment-plant effluent that has been treated.

Licensed backflow-prevention-assembly testers that test assemblies on both potable and non-potable water lines must use two gauges. The gauge used to test assemblies on non-potable water lines must have a purple decal—affixed to the dial inside the lens cover—with “NON-POTABLE USE ONLY” printed in white lettering. This gauge must not be used to test backflow preventers on lines for potable water.

## Where to Find More Information

### *To contact the TCEQ*

#### **By phone:**

Public Drinking Water Section	512-239-4691
Operator Certification Section	512-239-6135
Publications	512-239-0028

#### **By mail:**

Water Supply Division, MC 159  
TCEQ  
PO Box 13087  
Austin TX 78711-3087

#### **On the Web:**

Go to <[www.tceq.texas.gov](http://www.tceq.texas.gov)>, click on “Index,” and choose “Public Drinking Water.” Click on “Publications” to find *Rules and Regulations for Public Water Systems*, RG-195. Or, click on “Rules” and follow the link to 30 TAC 290D.

Information about the TCEQ’s Cross-Connection Control Program is available at <[www.tceq.texas.gov/goto/ccc/](http://www.tceq.texas.gov/goto/ccc/)>.

### ***Other Sources of Information***

#### **American Water Works Association**

6666 West Quincy Ave.  
Denver, CO 80235-3098  
800-366-0107

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

University of Southern California  
KAP-200 University Park MC-2531  
Los Angeles, CA 90089-2531  
866-545-6340

#### **National Institute of Standards and Technology**

100 Bureau Drive, Stop 1070  
Gaithersburg, MD 20899-1070  
301-975-6478