

SpryBackflow - Tester Guide

Introduction

The Purpose of the Portal

SpryBackflow is intended to assist water utilities in administering and maintaining their cross-connection control program. Its main purpose is to digitize as much of the backflow program management as possible, from maintaining assembly information, scheduling backflow prevention tests, generating scheduled letters and emails to notify customers of upcoming test due dates or overdue tests, to having tests entered by the testers for the utility administrators to review. It also provides oversight into customer and tester information.

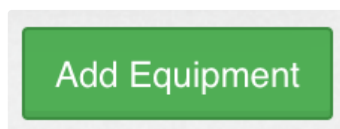
Standard Behaviors

The following behaviors appear in multiple sections of the portal and cover the same functionality for each of them. They will be explained here.

Viewing: On any list, click "View" to view the full item.



Adding New: From a list, "Add ____" will let you create a new item from scratch.



Editing: On any editable page, clicking "Edit" unlocks it to edit the fields.

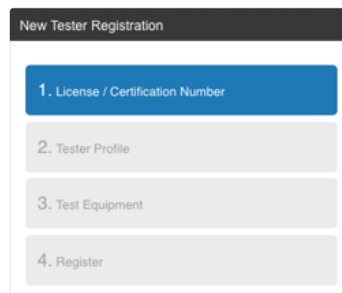


"Save" will save any changes, "Cancel" resets the values and returns the page to the view-only state.

A blue rectangular button with the word "Save" in white text.A red rectangular button with the word "Cancel" in white text.

Registration

From the login page, clicking the button that says "Register as a Backflow Tester" takes the tester to the registration wizard. The tester fills out the required profile information including their certification(s) and at least one piece of certified-calibrated test equipment through a step by step wizard.

A screenshot of a web form titled "New Tester Registration". It features a vertical list of four steps: "1. License / Certification Number" (highlighted in blue), "2. Tester Profile", "3. Test Equipment", and "4. Register". Each step is contained within a rectangular box.

Upon submission, the tester receives an email acknowledging their registration and noting that it is up for review. An admin will then review the tester registration.

If everything is correct, the admin approves the registration and an email is sent to the tester with their approval and a link to go log in for the first time. This link is valid for 7 days. The tester uses the emailed link to set their password and log into the portal.

If something is not correct, the admin denies the registration and an email is sent to the tester regarding the denial. The email includes information on what needs to be updated and a link to update their profile. Once updates are submitted, an admin will review the registration again.

Logging In

When a tester's registration is approved, they receive a registration link to set their password and log in for the first time. After that, they can enter their email and password to log in on any visit following. If they have forgotten their password, they can use the "Forgot Password?" link to provide their email address and receive a password reset link.

Sign In

E-mail

Password

[Forgot password?](#)

Sign In

- Need an Account? -

Register as a Backflow Tester

Register as a Non-Tester User

Dashboard

Menu Path: Home

The dashboard is the homepage of the portal. Its main feature is the Start Test panel. Here the tester can search for the assembly they will be testing. Depending on the settings the backflow program administrators have selected, this will either require a Test PIN that the customer receives in their courtesy notification letter, or a simple search for an assembly.

Start Test

Tests in Progress

Backflow Tester

You must request the **Test PIN** from the customer in order to input your test results in the portal. The Test PIN is based on the courtesy notification letter that was sent to the customer for the current Backflow Test. This letter will also provide you with identifying the backflow device to be tested because it includes the make, model, size, and serial number.

If the customer does not have a Test PIN listed on their courtesy notification letter, please contact your backflow program administrator and they will assist you.

Tests must be entered on or before the expiration date of the previous test and within 15 days of the date of the current test. **Tests of devices that are overdue for annual testing must be submitted immediately** to suspend any further notifications of shut off of the water service for devices in comply.

Use the "Request a Support letter" link in the gray bar at the bottom of the screen if you are unable to input or submit test results.

Enter TEST PIN or Search for Assembly

Test

Backflow Device Test is completed

Backflow Device Test is Due within 60 Days

Backflow Device Test is Overdue or within 15 days of the Due Date

Search for an Assembly Location to Start a Test

Assembly

Find

Backflow Device Test is completed

Backflow Device Test is Due within 60 Days

Backflow Device Test is Overdue or within 15 days of the Due Date

There is also a tab to view tests that the tester has started but not yet submitted. Tests can be resumed from the Tests in Progress panel, or by entering the Test PIN/search information again on the Start Test panel.

Start Test

Tests in Progress

Backflow Tester

Tests in Progress

List of recently entered test results that have not been submitted for Review

Show 10

CSV

Print

Search:

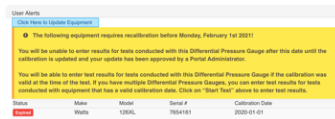
Options	Location ID	ID	Equipment	Test Type	Test Date	Device Type	Facility Name	Service Address	Review Status
None	408450022	47157	Not Available	2000	02-02	RPICA	ACCESS ENTERPRISES INC	115-15 107 AVENUE	UNSUBMITTED

Showing 1 of 1 entries

Previous

Next

If the tester has expired or expiring tester certification or test equipment calibrations, the dashboard will display the User Alerts panel, which shows a warning message about what needs to be updated and the deadline for updating it.



Note that this doesn't prevent the tester from entering tests so long as the test date is before the expiry date. To start a test when the User Alerts panel is showing, click the tab above the panel that says "Start Test".

Assembly Tests

Test Submission

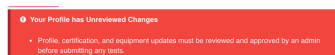
After locating the assembly to test, the tester begins their test from the dashboard.



The tester is then presented with a step by step wizard to fill out the test.



Note that if a tester has an outstanding profile update review, they will not be able to complete their test. A warning will display on the Begin Test panel.



If test procedure selection is enabled by the backflow program administrator, the tester is prompted to select which test procedure they're using for the initial test (i.e. ASSE, ABPA, etc). A backflow program with this enabled will only have a primary and a secondary test procedure. The tester must have a valid certification for the selected test procedure.

If device type selection is enabled by the backflow program administrator and the device type is not air gap or method, the tester is prompted to select what device type the assembly is. When they proceed to the next step, they will receive a pop-up confirmation warning them that they cannot change the device type after this point. Once they hit okay on the confirmation window, the device type is locked in.

If the device type is different from what is in the system, it will need to be confirmed by the reviewing admin at the time of review.

The tester is prompted to check that they have selected the correct assembly for testing. They have the option to replace the assembly at this point. They will also have a similar option during the retest.

Assembly Information				Replace Assembly
Equipment ID:	42187	Size:	2.5"	
Service:	DOMESTIC	Serial Number:	125009	
Make:	PIRELLA	Installation Date:	2019-05-01	
Model:	LF008	New Assembly:	No	
Device Type:	RPA	Requires SRN:		
Alt. Description:		Test Date:	2020-05-01	
Last Test:	2019-05-01			

If replacing the assembly, it is a like for like change (RPA to RPA, DC to DC, etc). For unlike changes, the tester must contact an admin. After filling out the fields in the replace assembly modal, they can continue with the regular test/retest workflow. This option is not available for air gap or method device types at this time.

Replace Assembly

New Assembly Information

Device Type

Reduced Pressure Detector

Make

Assembly

Model

Service

Position

Protection

Size

Replaces Serial Number

125009

Save Assembly

Cancel

The tester selects the test equipment from the list of the test equipment they added to their profile. They must select one with a valid calibration to proceed.

The tester fills out the initial assembly test. They are provided with validation to know if the initial test has failed or not. If the initial test fails, they will receive a prompt to complete a retest after repairs. Like the device type selection, there is a confirmation window for the initial test results. Once this is okayed, the initial test results can no longer be changed.

Initial Test Result Confirmation:

Please confirm that Initial Test Results are accurate.
NOTE: Initial Test Results will automatically be saved, and will NOT be available for editing after this confirmation.

Cancel

OK

The tester fills out a retest if applicable, including repair materials and comments. If test procedure selection is enabled, they will be able to change whether the test procedure they're performing for the retest is for the primary or secondary certifying body. By default, it will be the same procedure as for the initial test. The retest must pass.

The tester checks the signoff confirmation and submits the test. After submission, they have the option of emailing the location contact. Although they can attach a copy of the completed test, this is the unreviewed test. The customer will not be marked as compliant until the test is approved.

☐ I hereby certify that the below data is correct and that the backflow prevention device is in proper working condition.
Your Test Result is a Legal Document and submission constitutes your Digital Signature.

[Previous Step](#) [Submit Results](#)

Once the test is submitted, it must be reviewed by an administrator. If the test is approved, the tester receives an email that the test was approved, including a PDF copy of the test results. The customer will also receive this email if they have an email address on file. If the test is denied, the tester gets an email stating that the test was denied with comments on what to correct. The tester must submit a new test (using the same Test PIN if Test PINs are being used), with corrections, after which it will go through the review process again.

Test History

Menu Path: Tests

The test history shows all past assembly tests submitted by the tester, including a view link for each test's details.

My Test History
List of all historic completed tests.
Show 10 [Page](#) Search

Test ID	Location ID	Equipment	Test Date	Test Type	Service Type	Facility Name	Service Address	Review Status
View	400000000	1000000000	10/01/2020	REDUCED PRESSURE	FAUCETS	FLATLANDS 8 STREET	APPROVED	
View	400000000	1000000000	10/01/2020	REDUCED PRESSURE	FAUCETS	FLATLANDS 8 STREET	APPROVED	
View	400000000	1000000000	10/01/2020	REDUCED PRESSURE	FAUCETS	FLATLANDS 8 STREET	APPROVED	

Showing 1 to 3 of 3 entries [Previous](#) [Next](#)

Thank you for your Test Submission!
Test Submit Date: 10/01/2020

Review
Test ID: 400000000
Review Date: 10/01/2020
Comments: Test results approved.

Assembly Information
Equipment ID: 1000000000
Location: 400000000
Name: Flatlands 8 Street
Address: 1000000000
Service Type: REDUCED PRESSURE
Facility Name: FAUCETS

Test Details
Date: 10/01/2020
Time: 10:00 AM
Status: APPROVED
Test Type: REDUCED PRESSURE
Service Address: 1000000000
Facility Name: FAUCETS
Tester Name: 1000000000
Tester Email: 1000000000
Tester Phone: 1000000000
Tester Comments: Test results approved.

Test Equipment Used
Equipment ID: 1000000000
Location: 400000000
Name: Flatlands 8 Street
Address: 1000000000
Service Type: REDUCED PRESSURE
Facility Name: FAUCETS

A submitted test cannot be altered, only viewed.

Profile

Menu Path: Profile

In the main profile the following actions are presented, depending on the backflow program administrator's selected settings:

Edit: standard behavior.

Renew [Certifying Body] Certificate: This allows the tester to renew their tester certification for a given certifying body. Upon clicking, the tester is presented with a window to enter their new certification expiry date and upload a copy of the certificate file. Note that if the backflow program administrator has two certifying bodies enabled, a tester can have one or the other or both. To add a second certification type, first enter the certification number via “Edit” and then use Renew Certificate to enter the expiry date and upload the certificate file.

The tester can view and edit their profile, including their company information, name, and contact information. Note that although the tester can change their email address, this email address must be unique and not used for any other tester or other user in the system.

When a tester updates their profile information, renews their certificate, or updates their equipment, the updates have to be reviewed by an administrator before the tester can submit any tests. When tester profile updates have been approved, the tester will receive an email.

Testing Equipment

Menu Path: Equipment

The equipment page shows all active equipment currently attached to the tester’s account. From here, the tester can add new equipment, edit existing equipment, update an equipment’s calibration, or remove equipment from their profile.

HOME > MY EQUIPMENT							Add Equipment	
My Equipment								
Status	Make	Model	Serial #	Calibration Date	Certificate	Options		
View	Watts	120XL	7854161	2021-06-27	View	Calibrate Device	Delete	

Add equipment: standard behavior.

Equipment: ✕

Make *

Model *

Serial Number *

Calibration Date *

Calibration Certificate File *

Select File

Close

Save Equipment

Edit equipment allows the tester to update the make, model, and serial number of the equipment in case of mistakes. Note: this should not be used to completely change the make, model, and serial number for a new piece of equipment.

Equipment: ✕

Make *

Model *

Serial Number *

Calibration Certificate File *

Select File

Close

Save Equipment

Calibrate Device: allows the tester to update their equipment calibration information, similar to how they update their tester certification.

Test Equipment Calibration: ✕

Please enter your new equipment calibration certificate information.

Calibration Date *

Calibration Certificate File *

Close

Update Calibration

Optional Features

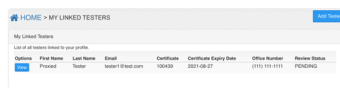
These features may or may not be available through the portal, depending on the backflow program administration's preferences. If a tester cannot see or access these features, they are turned off.

Proxy Testers

Proxy testers are users who register as a tester user in order to enter tests for a tester or group of testers. They may be a certified tester, or someone serving in an administrative role for their company.

Proxy testers use the same tester registration process as normal testers, with a few exceptions. First, they need to check a box in the License/Certification Number section of the wizard that reads “Can Enter Tests for Other Testers”. When this is checked, they are not required to enter their certification number/upload a certificate file, and they do not need to enter a piece of test equipment. They are still able to add certification information in case they are also a certified tester. They may also add test equipment which may be theirs or may be shared amongst multiple testers.

The review process for a proxy tester’s registration is the same. After approval, they can log in and will have the ability to link testers to their account via the “Linked Testers” menu item.



Options	First Name	Last Name	Email	Certificate	Certificate Expiry Date	Office Number	Review Status
Add	Tester		tester@blaze.com	100439	2021-08-27	(919) 555-0100	PENDING

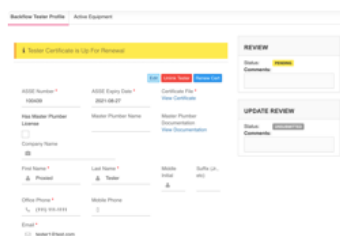
View: Standard behavior.

Add Tester: Standard behavior.

When adding a tester to link to their account, a proxy tester has the ability to search for existing registered testers (who have an account of their own that they can log into the portal with) or add a new tester.

☐ Search for Registered Tester ☐ Create New Tester

A proxy can add a tester that has already registered by searching by name or certification number. They can also create a new tester by filling out profile information for the tester and saving. New testers created by a proxy tester this way will be flagged as “proxy use only testers” and not have a login of their own. They are managed with a similar profile page to the regular tester profile:



Each time a registered tester is linked to a proxy tester's profile, it will trigger the normal tester profile update review process. A new tester will trigger the normal tester review process.

Tests completed by the proxy tester on behalf of another tester will be tagged with the proxy tester's name in the test log, in addition to the tester's name. A proxy tester's test log will display all tests completed by them, either for themselves or on behalf of another tester. Other profile changes the proxy makes on behalf of a linked tester will also be tagged with the proxy tester's name in the tester's change log.

Proxy testers can list test equipment on their profile like other testers. As long as the equipment has valid calibration, it can be used on any test that the proxy fills out, in addition to the linked tester's equipment. In this way, they can maintain test equipment kits that may be shared between multiple testers in their company.

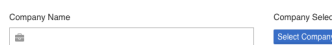
Companies

Companies can register in SpryBackflow in order to manage their testers and view historic activities performed by their testers. A tester can search for and select their company during registration if the company has already registered, or they can be linked to a company/removed from a company after registration as necessary, either by the tester, by the company, or by an admin.



A screenshot of a web form showing a dropdown menu for company selection. The label "Company" is followed by a question mark icon. The dropdown menu is open, showing a search bar with a magnifying glass icon and a list of suggestions. The first suggestion is "EcoPro Plumbing & Drains" in a blue box.

If the tester has no company, the option to select a company is available.



A screenshot of a web form showing a "Company Name" input field and a "Company Select" button. The input field contains a magnifying glass icon. The "Company Select" button is blue and labeled "Select Company".

A dialog box titled "Company Search" with a close button in the top right corner. Below the title bar, it says "Search for a company to link with your profile." There is a text input field labeled "Company:" with a placeholder "Find company by company name". At the bottom, there are two buttons: "Close" and "Confirm Company Selection".

Once the tester is linked to a company, the options to either update which company they're linked to or remove them from their current company without linking them to a new company are available.

A user interface element showing the company name "EcoPro Plumbing & Drains" followed by two buttons: "Update" (blue) and "Remove" (red).

While a tester is connected to a company, the company contact can view and update the tester's profile and equipment. They also can view any assembly tests or prevention surveys submitted while the tester was connected to the company, but not those submitted when the tester wasn't connected to the company.

When a tester is added to a company or removed from a company by someone other than themselves, they will receive an email notification. As well, when a tester is removed from a company, the company contact can no longer view or edit the tester's profile and equipment, but they can still view the tests and surveys that were submitted while the tester was with the company.

Prevention Surveys

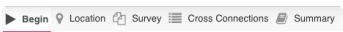
If the backflow program administrator has enabled it, testers can submit prevention surveys for a location. Prevention surveys fulfill the need to regularly inspect locations to ensure all cross connections have sufficient backflow protection where needed.

When a tester starts a survey, they must first search for the location from the 'Prevention Surveys' page.

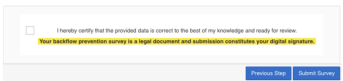
A screenshot of the "Prevention Surveys" page. It features a search bar with a dropdown menu showing "Search" and "Filter". Below the search bar, there are three status indicators: "Surveys completed", "Surveys due within 30 days", and "Surveys in Progress or within 30 days of the Due Date".

Once the tester has selected a location to survey, they're presented with a step by step wizard to fill out the survey, much like with assembly tests. These steps guide the tester to provide all of

the required survey information regarding the location, customer, and cross connections present.

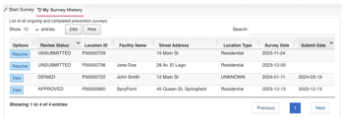


When all of the sections are complete, the tester checks the signoff confirmation and submits the survey.

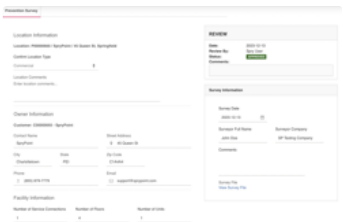


Once submitted, an administrator must review the survey, following a similar process to assembly tests. If the survey is approved, the tester receives an email that the survey was approved, including a copy of the uploaded survey file. The customer will also receive this email if they have an email address on file. If the survey is denied, the tester gets an email stating that the survey was denied with comments on what to correct. The tester must submit a new survey with corrections, after which it will go through the review process again.

Testers can view their in-progress and submitted surveys from the “My Survey History” tab. Unsubmitted surveys can also be resumed from here.



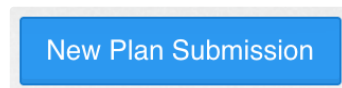
Submitted surveys cannot be altered, only viewed.



Plan Submission and Review

If the backflow program administrator has enabled it, testers can submit plans for new backflow prevention assemblies. The flow runs as follows:

The tester begins a new plan submission, by clicking “New Plan Submission” on their plan submissions list page.



They are presented with a step-by-step wizard similar to the assembly test wizard, to go through all parts of the plan submission.



There, they fill out information on the location, customer, and at least one device. They're also prompted to upload any supporting documents that might be required, including diagrams, licensing documents, images, etc. Once all of the information is filled out, they check the signoff confirmation and submit the plan.



The tester can go into the plan and edit it both before and after submitting the plan. After the plan is submitted, an administrator must review the plan submission. If the plan is approved, the tester and the customer contact(s) (if different) get an email saying the submission is approved. This email includes a prompt for them to fill in device-specific information (such as serial number if applicable) and create the finalized devices. Once the devices are created, the tester will receive an email with the test PIN for the initial test if test PINs are enabled, or a prompt to have the initial test performed if test PINs are not enabled.

If the plan is denied, the tester receives an email notification of the denial with the admin's review comments so they know what to correct. After updating the submission, they can save their changes so the admin can review it again.

Search for Test PIN by Serial Number

If the organization's method of finding assemblies for testing is set to Test PIN, there is an option to enable “Search for Test PIN by Serial Number”. In this case, an additional section will

appear below the test PIN entry to search by serial number.

Enter TEST PIN to Start a Test

XXXXXXXXXX

Start

OR if PIN is Missing:

Search for TEST PIN by Serial Number

XXXXXXXXXX

Find Test PIN

If the search finds a test PIN, it will automatically fill in the test PIN field and prompt the tester to start the test.

Enter TEST PIN to Start a Test

PA3374ZQ

Start

OR if PIN is Missing:

Search for TEST PIN by Serial Number

CMC_0010

Find Test PIN

Test PIN found! Click "Start" to begin test.

If no test PIN is found for the serial number entered, it will display a message indicating this result.

No Test PIN found for the entered serial number. Please contact your benchtop program administrator for more information.

Additional Documentation

During registration, a tester will be prompted to provide any additional documents or credentials defined by the administrators as being required. If none appear, no additional documents have been defined by the administrators. Documents that are required for registration will be indicated with red asterisks.

1. Location / Credentials Information

2. Name Profile

3. Test Equipment

4. Register

Lab Certificate #

Expiration Date

Laboratory

Certificate File

Insurance Number *

Expiration Date *

Insurance Company *

Insurance Policy *

Pilotator Name *

Expiration date *

License File *

Submit

Once the tester is registered, these documents also can be viewed, added, renewed, or edited in their profile.

Additional Documents

Status	Type	Number	Expiration Date	File	Issuing Company	Balance
✓	Laboratory Accreditation Certificate	87485564	2025-01-31	View	ISA	Add Document
✓	Quality Assurance	404552	2025-01-31	View	Metals	Add Document
✓	Product Testing	444552	2025-01-31	View	ISA	Add Document

Add/Renew Document:

Document Number * Issuing Company *

Expiration Date * Document *
[Select File](#)

[Close](#) [Save](#)

Field Create Assemblies

If field creation of assemblies is available, an 'Add Assembly' tab will appear on the tester's dashboard. From there, a tester can search for the location they want to add an assembly to by location number, name, or street address. Locations that match the search term appear in a list below the search section.

Add Assembly

Search for a location to add an assembly to

[Search](#)

Show 10

Add Assembly	Location ID	Facility Name	Street Address	City
Add Assembly	300000000	210 MAIN STREET LLC	4715 BRIDGE PLAZA	New York - NY
Add Assembly	300000000	SAL VAL REALTY CORPORATION	40 MAIN STREET	New York - NY
Add Assembly	400000000	KABC HOLDING CORP	36-02 MAIN STREET	New York - NY

The tester can then click 'Add Assembly' to fill out information about an assembly found in the field that is not currently in the system. Required fields are marked with a red asterisk.

New Assembly

Location: 300000000 (dropdown)

Device: Device Type: Installation Date: Assembly Type:

Name: Model: Size: Serial Number:

Position: Position:

[Save](#)

New Number: Date: Date: Physical Location:

Required User:

Once the tester saves the new assembly's information, a pop-up window appears to confirm that the assembly has been created. Once this window is closed, the tester will be automatically redirected to the assembly test page to fill out an initial test for the field-created assembly. The tester will also receive an automated email (with the test PIN if applicable) when the device is created in case they are testing it at a later point.

Assembly Created

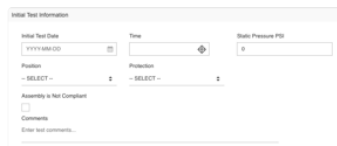
You will receive a confirmation email for the submitted assembly.
Upon clicking okay, you will be taken to the test for this assembly.

OK

A tester can search for a field created assembly to start its assembly test the same way as they would for a normal assembly.

Mark Initial Tests Failed/Not Compliant

If enabled, testers will be given the ability to mark an initial assembly test as failed even if the assembly test values pass or if the test can't be performed at all. A new option for "Assembly is Not Compliant" appears in the initial test. A tester would check the "Assembly is Not Compliant" box, and indicate in the comments why the assembly is not compliant and the test therefore fails before proceeding to the retest.



Initial Test Information

Initial Test Date: 1/11/2020 12:00 PM

Time: 12:00 PM

Static Pressure (PSI): 0

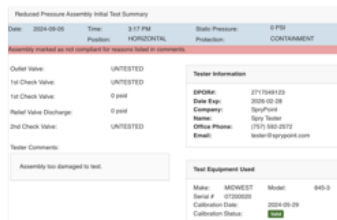
Position: --SELECT--

Protection: --SELECT--

Assembly is Not Compliant: ☐

Comments: Enter test comments...

After submitting the initial test, all of the initial test review panels will indicate that the assembly has been marked not compliant for reasons listed in the comments.



Reduced Pressure Assembly Initial Test Summary

Date	Time	Static Pressure	PSI
2024-09-29	3:17 PM	HORIZONTAL	CONTAMINANT

Assembly marked as not compliant for reasons listed in comments.

Outer Valve	Inner Valve
UNTESTED	UNTESTED
1st Check Valve	0 psi
2nd Check Valve	0 psi
3rd Check Valve	UNTESTED

Tester Comments: Assembly too damaged to test.

Tester Information

Tester: 2711048123

Date Exp: 2025-03-28

Company: SpayPoint

Name: Gary Tester

Office Phone: (202) 555-0012

Email: tester@spaypoint.com

Test Equipment Used

Make	Model
MINNIST	840-3
Serial #	07200009
Calibration Date	2024-09-29
Calibration Status	OK

Getting Help

Portal Tour: Testers are given a brief clickthrough tour of the main features of the portal on their first login. This is available to take again at any time.

Take the Portal Tour

Help Page: Basic help materials including embedded videos on common tester processes can be made available through the Help page in the menu.

[Contact Support](#)

Contact Support: If an error occurs in the portal, the "Contact Support" link in the footer opens a modal available to any logged in user. The user is prompted to fill in an email address, subject, and description. This will email the backflow program administrator with the provided information.

Common Tester Issues

Locked Out/Password Reset

If a tester has forgotten their password, they must use the "Forgot Password?" link or ask admin to send password reset.

If a tester has done the above and says that they are not receiving the email:

1. Check that it's not being redirected to junk/spam folders.
2. Check that the admin email address (in the organization config) is whitelisted.

If a tester has received the password reset email and says that the link is not working:

1. Make sure they are trying to use the most recent password reset link. Some email providers group emails based on sender and may show the older email first while the newer emails are collapsed.
2. A tester that has locked themselves out must be unlocked by an admin before they can reset their password.

Missing Test PIN/No Test Found

If the customer has lost their Test PIN or never received it, the customer or tester must contact the utility admins.

If the tester has a Test PIN and it isn't working:

1. Ensure the PIN is for that assembly and it hasn't been used to submit a pending or approved test already. The PIN cannot be used for multiple assemblies nor will the same PIN work for multiple years.
2. Ensure that the PIN is correct with the utility. The letters i and o are not used in the system-generated Test PINs to reduce confusion with the numbers 1 and 0.