

References

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Glossary

ABT Approved Backflow Technician (i.e. not a company) having met the requirements of the NZWWA Code of Practice.

Backflow The flow of water or other liquids, mixtures, or substances into the distributing pipes of a water supply from a source or sources other than intended. Back-siphonage is one type of backflow.

Backpressure Backflow when the pressure in an unprotected downstream piping system exceeds the pressure in the supply piping.

Backflow prevention device A safety device used to prevent water pollution or contamination by preventing flow of water and/or chemicals in the opposite direction to that intended.

Back-siphonage Resulting from negative pressures in the distributing pipes of a water supply.

Check valve A device to provide positive closure which stops the reverse flow of liquid when an irrigation system pump plant or injection unit fails or is shut down.

Chemigation check valve Most chemigation valves consist of a dual or single check valve(s), a low pressure drain(s) and an air vent vacuum relief valve(s).

Cross-connection Any actual or potential connection between the water supply and a source of contamination.

Double check valve An assembly containing two independently acting approved check valves, four resilient-seated test cocks, and two resilient-seated isolation valves. This assembly is intended for use in continuous and non-continuous pressure applications in both siphonage and backpressure conditions. A double check valve is intended to provide protection only in low hazard situations and is not an approved device in the operation of fertigation systems.

Interlock device A safety device used to ensure if the irrigation pumping plant stops, the injection pump will also stop. Devices may also be used to shut down the irrigation system if the injection system fails. Interlock devices are used in combination with backflow prevention devices.

IQP Independent Qualified Person (i.e. not a company) who has completed the national 40 hour backflow preventer and three yearly refresher courses.

NZWWA New Zealand Water and Wastewater Association.

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Fertigation

Backflow Preventers: A best practices guide

The guide is intended for owners and operators of irrigation systems

It covers cross-connections, how to prevent backflow, and how to avoid the contamination of connected groundwater systems.

Methods to control cross-connection and prevent backflow

A **backflow preventer** is a device used to prevent water pollution or contamination in irrigation systems.

- Pollution is caused by substances that discolour water, or affect the smell or taste (but are not likely to cause sickness or death).
- Contamination is caused by substances that can result in illness or death (e.g. backflow from dairy effluent is a medium to high hazard, and it may cause contamination of drinking water supplies).

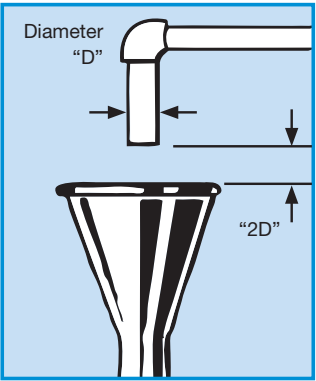
A backflow preventer is designed to handle a specific set of system characteristics, which include the hydraulic requirements of each backflow prevention design.

The only recommended backflow preventers, which meet the requirement of being testable, are:

- **Air gap system**
- **Chemigation check valve**
- **Reduced pressure zone devices**

Air gap systems

- The most reliable backflow prevention.
 - Very effective.
 - Non-mechanical.
 - Used where either back-siphonage or backpressure conditions may occur.
 - Provide a physical separation between a water supply and the source of contamination.
 - The air gap between the outlet of the water system and the flood level rim of the receiving vessel or any other source of contamination must be at least twice as large as the diameter of the water supply outlet.
 - Suitable for all hazard levels.
 - An additional pump may be required downstream of the receiving vessel to pressurise the water before it enters the irrigation system.
- Disadvantage – loss to atmosphere at point of discharge of any pressure built up by water system – and the need for an additional pump.**



Chemigation Check Valve (CCV)

- Come in two types either as single or double anti-siphon check valves.
- Protect against back-siphonage and backpressure.
- Lightweight, easy to install and maintain.
- If the relief valve is within 20m of the water source, a trough or conduit must be provided to carry valve discharge away from the water source.



Disadvantage – small pressure loss occurs across the device.

Fertigation

Fertigation (fertiliser-irrigation) is the application of fertiliser, soil amendment, animal effluent, or reclaimed water (from food processing or wastewater treatment) with irrigation water.

A commercial fertiliser is a substance containing one or more recognised plant nutrients claimed to have value in promoting growth. This includes lime, gypsum, and mixed or specialty fertilisers.

Reduced Pressure Zone backflow devices (RPZ)

- Similar to double check valve devices, but also contains an independently acting pressure relief valve between the two check valves (which is situated lower than the first check valve).
 - Protect against high water-pollution hazards.
 - Protect against back-siphonage and backpressure.
 - A minimum clearance of 300mm above the ground level is suggested to ensure an air gap between the relief valve and any water that might puddle beneath the device.
 - If the relief valve is within 20m of the water source, a trough or conduit must be provided to carry valve discharge away from the water source.
- Disadvantage – pressure loss of 4 to 20 psi occurs across the device.**

Installation

Reduced Pressure Zone backflow devices

The RPZ must be:

- Installed to allow easy access for inspection, testing and maintenance.
- Provided with adequate space for inspection, testing, maintenance and disassembly.
- Installed more than 300mm above ground level.
- Installed more than 300mm from walls.
- Installed downstream of the water meter.
- Protected from freezing
- Mounted in the horizontal position unless specifically designed for vertical installation.
- Installed so there is a visible free discharge from the relief port with no extension piping.



Recommendations

Install a parallel protected bypass flow around the device to protect the submersible pump during testing. The bypass RPZ and pipeline should be sized to accommodate minimum pump flow rate.

NOTE: Installation in pits or below ground level is prohibited.

Backflow preventer tests

General requirements

- Tests must be conducted annually.
- A copy of the test certificate must be displayed on the pump shed wall and sent to Environment Canterbury as per the consent conditions.
- Any backflow preventer which fails during a test must be repaired or replaced. The device must be retested, following repair or replacement, to ensure correct operation.

Specific requirements

Air gap systems	Reduced Pressure Zone backflow devices	Chemigation check valve
The test is generally visual and should include measurement and recording of the distance between the air gap and the outlet of the water system and the flood level rim of the receiving vessel (this should be no less than twice the diameter of the size of the water supply outlet).	The test must be performed by a certified ABT/IQP.	An inspection port is required to allow inspection of the in line check valve to see that it is functioning correctly and for any possible wear. It allows inspection of the low pressure drain for possible clogging and to make sure that it is functioning correctly.