

**Backflow Prevention**  
**Code of Practice**  
**for**  
**Water Suppliers**  
**Draft**

Revised September 2012

# ACKNOWLEDGEMENTS

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# FOREWORD

This update to Backflow Code of Practice is in response to changes in legislation at the request of and funding by the Water Services Managers' Group of the Water New Zealand, and produced by the Backflow Group of Water NZ. The code addresses *Boundary Protection Only* with internal protection at the source of possible contamination controlled by the Building Act 2004.

The Code is a practical document, to be used by Water Engineers, Designers, Water Supply Staff, Plumbers and Architects. Its contents include Ownership, Water Supplier and Customer Responsibilities, Product and Design Standards, and Testers and Surveyors Qualifications.

It covers both public and private water supplies and addresses the boundary device ownership question providing options and practical guidelines. Particular attention has been paid to fire system lines with the assistance of experienced fire industry leaders relating to various fire standards and best practice guidelines.

Within Water distribution systems there can potentially be cross-connections whereby non-potable substances are inadvertently connected to potable water supplies. Under normal operating conditions these cross-connections go unnoticed until such time a backflow incident occurs. Unfortunately by then it is too late as the potable supply has been contaminated and a potential danger to public health has been created.

A brief definition for backflow is "the reversal of flow of a liquid or gas caused by a pressure differential within the distribution and/or piping system". Backflow can occur either because of reduced pressure in the distribution system (back siphonage) or the presence of increased pressure from a downstream source (back pressure).

Back siphonage itself may be caused by a variety of circumstances, such as main breaks, flushing, shutdowns or pump failures, whilst back pressure may occur when heating, pumping or industrial pressure manufacturing systems are connected to potable water supply and the pressure in the external system exceeds the pressure within the distribution system.

The extent of contamination in the distribution system depends, in part, on the location of the cross-connection, the concentration of the contaminant entering the distribution system plus the magnitude and duration of the pressure differential causing the backflow.

Backflow is happening and ultimately the Water Supplier is responsible for taking all practical steps to protect Public Health.

Nick Fleckney – Chair  
Water NZ Backflow Group

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# 1. BACKGROUND

This Code provides guidance to reduce adverse public consequences caused by individuals consuming contaminated water resulting from backflows from individual premises into common or public water mains. Following this code will reduce that risk.

Sections of the Health (Drinking Water) Amendment Act 2007 (the Act) refer specifically to backflow prevention. This code of practice is the Water Suppliers guide to complying with the Act and ensuring the quality of the water supplied.

It is intended that this Code will be adopted by all Water Suppliers as the method of compliance with the Act and providing uniformity throughout New Zealand. This may be reinforced by means of a bylaw.

The Ministry of Health produced a document, *Public Health Risk Management Plan (PHRMP) Guide – Distribution System - Backflow Prevention version 1 Ref D2.4 June 2001*. This code reflects the philosophy of that document and refers to sections of it.

This document requires all connections supplied with drinking water to have appropriate boundary backflow prevention. This includes residential properties.

Particular attention is paid to Fire Lines with the fire industry being consulted as to their requirements.

Comments have been included in the code to assist in understanding some of the reasons behind the statements in the code. They are not considered to be a formal part of the code. A typical comment follows.

## **Comment**

*There have been many serious backflow incidents recorded in New Zealand although they are not often widely publicised. Many of these incidents, such as beer from a brewery back-siphoning into a public water main, fortunately did not result in any known significant public health consequences but had circumstances been different there could have been dire public health consequences for the brewery's neighbours.*

*More serious incidents sometimes get reported as headline news such as in May 1994 when it was reported that caustic soda from a dairy factory back-siphoned into a common water main resulting in at least six people receiving burns, some of them serious.*

*The incident was caused by a maintenance worker's mistake. Had a proper boundary device been installed, the incident would have been contained within the factory.*

*Preventing incidents like these are the prime reason for producing this code. The likelihood of backflow is low but the consequences could be catastrophic.*

## 2. PRINCIPLES

The objective of this Code is to prescribe industry “best practice” for the protection of water supplies from contamination. The water and backflow industries have been consulted in the update of this code.

It is intended that the code will be voluntarily adopted across New Zealand by organisations that supply water to their customers, including private water suppliers. Procedures to monitor and update the code shall be covered in the code.

The protection of public health through the installation and the monitoring of boundary devices is a primary responsibility of all water suppliers who supply water to customers.

The water supplier is responsible for ensuring that the actions, deliberate or accidental, of any one customer do not have the potential to have an adverse effect on other customers through the contamination of water supply mains.

The water supplier shall be proactive in determining what customers pose significant risks to the integrity of the mains water supply.

The water supplier shall ensure those involved in the specifying, installation and monitoring of backflow devices are appropriately trained to carry out their work.

The water supplier shall have clear policies on backflow prevention, which are easily understood by its customers.

Point of use or source backflow prevention within buildings is required by the New Zealand Building Code clause G12 Water Supplies (specifically G12.3.5) of the Building Regulations 1992, and is outside the present scope of this code.

The water supplier shall have a process to ensure Customer’s complaints will be handled promptly, fully and fairly.

The Code is not a Standard. Reference to relevant standards is contained in the document. Some parts of relevant standards are reproduced in the code to assist understanding.

The contents of the code do not take precedence over any legislative requirements.

Current legislation may include but is not limited to:

- Health (Drinking Water) Amendment Act 2007
- Building Act 2004 and amendments and Building Regulations 1992
- Local Government Act 2002 and subsequent amendments
- Health and Safety in Employment Act 1992
- Health Act 1956
- Resource Management Act 1991
- Plumbing, Gasfitters and Drainlayers Act 2006
- NZS 4541 Automatic Fire Sprinkler Systems



### 3. DEFINITIONS

**The Act** means Health (Drinking Water) Amendment Act 2007

**Backflow IQP** means approved backflow technician (i.e. not a company) having met the requirements contained within this code. A person shall be certified for testing (testing backflow prevention devices) and may have an additional surveying (surveying for potential backflow risks) certification.

**Backflow** means a flow that is contrary to the normal intended direction of flow. In this code it refers to flow from the customer's premises back into the common or public supply.

**Backflow prevention device** means a device to prevent backflow as defined in ASNZ 2845 part 1. Usually these include reduced pressure backflow devices, testable double check valves and non-testable dual check valves, vacuum breakers and air gap separation.

**Back pressure** refers to a situation where the pressure in the downstream (customer's) plumbing is greater than the pressure in the water supplier's mains resulting in a reversal of normal flow direction and thereby possible contamination of the mains water.

**Back-siphonage** refers to a situation where the pressure in the water supplier's main is less than the pressure in the downstream (customer's) plumbing resulting in a reversal of normal flow direction and potential contamination of the mains water by water being sucked back into the water supplier's main.

**Boundary device (or Containment device)** means any backflow prevention device located at or near the point of supply as defined by the water supplier, usually close to the property boundary.

**Common or public water supply** means any water supply system that serves individual customers from a common system. Often such systems will be public water supplies owned and directly or indirectly, operated by public organisations such as city councils. Private organisations also operate similar water supply systems.

**Customer** refers to the owner or occupier of the property who is responsible for the purchasing and use of water supplied.

**Fire Lines** means any water supply service pipe with the primary purpose to supply water for fire fighting within a property.

**NZBC clause G12** Water Supplies of the New Zealand Building Code which is contained in the First Schedule of the Building Regulation 1992.

**PHRMP guide** means the Public Health Risk Management Plan Guide – Distribution System - Backflow Prevention version 1 Ref D2.4 June 2001.

**Point of Supply** is that point which marks the boundary of responsibility between the customer and the Water Supplier irrespective of the property boundary.

**Water NZ** is Water New Zealand.

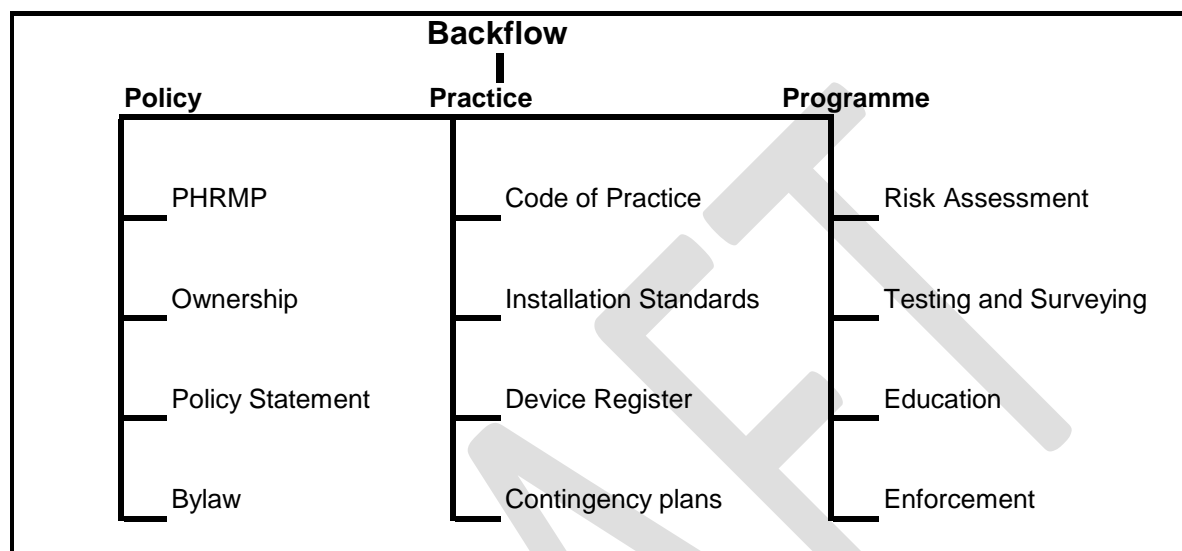
**Water supplier** means any organisation that supplies water to another organisation or individual customers as defined as drinking-water supplier in the Health (Drinking Water) Amendment Act 2007.

**Working days** refers to the ordinary days of work for the general community and excludes weekends and public holidays.

DRAFT

## 4. WATER SUPPLIER RESPONSIBILITIES

The Water Suppliers responsibilities in relation to backflow are comprehensive and can be broken down into three areas- Policy, Practice and Programme grouping together similar responsibilities, however not all are applicable to every Water Supplier. This code endeavours to provide guidance on best practice in each of these areas shown below.



### 4.1 Public Health Risk Management Plans

The determination of the risk is required by Section 69ZZZ of the Act and it is recommended to use the Public Health Risk Management (PHRMP) format provided by the Ministry of Health Guideline; Distribution System – Backflow Prevention Version 1, Ref D2.4 available from the website [www.health.govt.nz/publication/public-health-risk-management-plan-guides-drinking-water-supplies](http://www.health.govt.nz/publication/public-health-risk-management-plan-guides-drinking-water-supplies) as this document is specific to backflow and will also partially fulfil the requirements of Section 69Z of the Act to prepare PHRMP.

It is important to note that the compliance timeframes to prepare and implement PHRMP, which are linked to population size served by a water supply, are not related to the requirements of Section 69ZZZ of the Act for backflow prevention - which has been in force since the legislation was enacted. So for smaller water supplies even if PHRMP are not due, the backflow risk assessment needs to be undertaken as soon as practicable.

It is recommended to develop a PHRMP first and to look at the need to protect the water supply as a whole and what is the likelihood and potential consequence of backflow occurring at some time in the water supply. When assessing the risk of backflow to the drinking water the water supplier should consider all elements of their supply and distribution systems; including areas of low pressure and/or higher breakage rates, upstream rural connections and the location of industrial customers and sewage pumping stations.

In most water supplies there is a real risk or even past events of backflow. Appendix 6 is an example PHRMP risk assessment tables which are referenced to the risk determination provided in the Ministry of Health guideline document for preparation of PHRMP.

The water supplier shall have a risk assessment process included in the backflow prevention programme, which is in accordance with the principles contained in the PHRMP guide and Building Regulations clause G12 Water Supplies, to identify individual potential risks and to ensure that the correct backflow prevention devices are installed at all properties/premises. This is detailed further in section 6.1.1.

## 4.2 Ownership

Having undertaken a PHRMP, if the Water Supplier considers there is a risk section 69ZZZ of the Act protecting water supplies from backflow provides two choices - either the Water Supplier installs a backflow device on their side of the supply or allows the owner of the property to do it with a verifiable monitoring system. The relevant sections of the Act are in Appendix 1.

This presents the Water Supplier with a decision around ownership of boundary backflow devices. This code recommends that this decision is best determined from a workshop or series of meetings with those knowledgeable about backflow and policy implications plus those affected by any change. A suggested format is found in the table below

Ownership Decision Workshop		
Attendees:	persons with	
	Water Management	Operational field knowledge
	Backflow expertise	Asset/Data knowledge
	Policy/bylaw skills	Billing/customer focus
Considerations	Information required	Discussion/Outcomes
Current Policy	Summarise all current documentation and history to date Include: Water Supply Bylaw, agenda items and backflow policies Standards and requirements for new connection.	Is policy still based on the Water Supply Protection Regulations? Which sub-clause under the Act does it currently fit? Does it comply with the Act?
PHRMP	Note: Do or revisit the PHRMP backflow assessments prior to an ownership decision workshop. Backflow risk assessment and improvements proposed. Known/suspected backflow incidents.	Which events have the highest risk? What improvements are proposed? Will ownership address these?
Current Practices	Numbers commercial/industrial, domestic connections with and	How are new connection requirements enforced?

	without boundary backflow. Who tests and maintains devices. How is test information requested/received? What are the data requirements and ability of current asset system?	Customer issues experienced Is the location and condition of existing devices known? How to remedy non-compliant sites/devices. What works, what doesn't?
Ownership Decision	Pros and Cons of ownership options Experience of similar Water Suppliers Internal procedural guidelines to be followed.	Agree an outcome that will be supported. Current data system ability What are the resources required Assign responsibilities, tasks and timeframes.

The outcome of the ownership decision workshop is three likely scenarios. These are based on the assumption that boundary devices are currently owned by the customer.

**Option1: Water Supplier owned.** The decision to take over ownership of existing boundary devices which as well as policy and bylaw changes may involve correspondence with customers to enable vesting to the Water Supplier. This will require policy and bylaw changes to the point of supply. Asset management will involve maintenance and testing and require valuation and depreciation processes for acquired assets.

**Option 2: Customer owned.** To continue with the current policy and practices of customer owned devices under Water Supply Protection Regulations (WSPR) updated to include HDWAA requirements and PHRMP improvements.

**Option 3: Combined approach.** New boundary devices are owned and maintained by the Water Supplier and existing devices are owned by the property owner. This may require policy and bylaw changes as well as updating practices and processes and administration of two different systems.

Each option will have requirements, issues and considerations particular to each Water Supplier the general ones are listed below.

Option 1: Water Supplier owned	Issues	Comments
Point of supply after last fitting of meter and backflow assembly. Water Supplier responsible for testing, maintenance and replacement Customer responsible for paying	Accepting and vesting of devices. Customers wishing to retain ownership. Possible access issues if existing or new devices inside the boundary also may have private supply pipe in between	Water Supplier arranges annual testing and also repair and retest of failed devices. Lower risk of devices not being tested annually or non-compliant. Less administration time chasing test reports.

Option 2: Customer owned	Issues	Comments
Point of supply up stream of the backflow device Owner to test and maintain device Verifiable monitoring system being one approved by both Water Supplier and drinking water assessor. Verifiable monitoring system requires proof that a suitable qualified IQP has been engaged to do testing and maintenance.	The collation and maintaining of accurate records for devices and testing. Reliant on property owner or IQP to provide test reports. Water Supplier needing to require and audit test reports. Non tested, failed devices or non-compliant devices a risk to the water supply and enforcement will be required.	Allows customer choice as per Commerce Act.  Water Supplier and Building Control Authority need to work together.
Option 3: Combined approach	Issues	Comments
Point of Supply options in Policy/Bylaw. Options and responsibility for ownership detailed to customer at time of connection and agreements required.	Issues of options 1&2 above. Disputes may arise if IQP doesn't test or test is duplicated because BWoF/compliance schedule timeframes differ from Water Supplier owned programme for testing.	Allows customer and water supplier choice. Water Supplier may not wish to own large devices or those with access/shutdown issues.

The decision regarding ownership is up to the individual Water Supplier and should only be made after careful consideration. Feedback received from the Water NZ Water Services Managers' Group is that Water Supplier owned is best practice. Therefore the recommendation in this Code that best practice is option 1: Water Supplier owned as it has less risk of non-compliance due to wrong device selection, installation and/or devices not being tested.

It is important regardless of which option is adopted that the Water Supplier should take into consideration the Commerce Commissions' views on anti-competitive or monopolistic behaviour. For option 1: Water Supplier owned the customer should be given the option to vest or to retain ownership and to arrange own testing and maintenance.

Once the ownership decision is made then further consultation with a wider group of building compliance officers, IQPs, suppliers/ contractors is advisable. This will assist to gauge the issues that the proposed ownership decision may present.

**Note:** Option 2: Customer owned is not solely using the buildings Warrant of Fitness (BWof) system as not all buildings have a BWof e.g. residential with swimming pools, rain water tanks or home businesses.

## **4.3 Policy**

The water supplier shall have a clear and easily obtainable policy covering backflow prevention. Customers shall be clear as to their responsibilities under the policy.

The policy shall clearly and simply address the issues of ownership and responsibilities for approval, installation, on-going maintenance, annual testing and other matters associated with boundary devices.

Once made the Water Supply management needs to follow up the ownership decision with:

- The development of a policy statement on ownership of devices either predominately water supplier, customer owned or combined.
- Have the policy statement approved or adopted at a high level.
- The policy statement may result in the need to develop or alter Water Supply bylaw or customer charter/contracts.
- Having options in the policy/bylaw/contract for exceptions to the ownership decision.

Appendix 2 is examples of a policy statement and bylaw clauses provided by a Water Supplier following option 1: Water Supplier owned.

## **4.4 Bylaw and consultation**

Of critical importance is gaining approval and understanding of the decision on ownership at an Executive team /Councillor level. The changes to the policy documents outlined above will have procedures to be followed specific to each Water Supplier that will also require approval. Amendments to a bylaw need to follow section 86 of the Local Government Act 2002 and use of special consultative procedure prior to adoption. Consultative processes have long time frames and are probably best combined with Annual Plan or Long Term Plan consultation.

## **5. CUSTOMER RESPONSIBILITIES**

### **5.1 Payments**

The customer shall be responsible for payment of all annual fees, installations, disconnections, testing, consent and permit costs as decided by the water supplier.

#### ***Comment***

*It is considered Best Practice for the Water Supplier to publish and review these charges annually.*

### **5.2 Accessibility**

Customers shall ensure that the boundary protection device is accessible at all times for inspection and maintenance purposes. The water supplier reserves the right to charge customers for time spent making a device accessible.

The customer shall not interfere with the device in any way. This particularly includes raising the ground levels around the device that would compromise minimum air gaps or the ability for the device to be tested or using the test ports as a bypass or temporary water supply.

There shall be no bypassing of the boundary device other than with another similar device in parallel to ensure continuity of supply.

### **5.3 Reporting**

The customer shall report leaks or any other problems in the water supplier's system including the device as soon as is practical.

### **5.4 Change of use**

The customer shall report any significant change or proposed change to which the water is to be used/consumed.

The customer shall also report any significant change or proposed change that will substantially change the volume or flow pattern of water consumed.

The customer or the water supplier shall review the type of boundary protection device before the new activity commences or where appropriate, within a timeframe stipulated by the water supplier.



The customer must not alter or change the device without the permission of the water supplier.

**Comment**

*Under Section 46 of the Building Act 2004, property owners are required to notify the water supplier in writing of any change in use of the water supplied.*

*Boundary devices may need to be resized and/or changed to a different type as a result of change of use.*

*Some Water Suppliers require customers to identify how the water is to be used if the use is greater than normal domestic consumption.*

*Similar responsibilities also apply to customers in respect to their water meter.*

## **5.4.1 Removal of boundary device**

Where a property owner considers that the type of boundary device is no longer necessary, they may make a request to the water supplier that the device be removed and another device type (e.g. a non-testable device) installed in its place, in accordance with this code.

Where the request is granted, the removal and replacement procedures shall be approved by the water supplier. Any costs shall be borne by the property owner. Full and appropriate records of the change shall be supplied to the water supplier.

Alternatively the water supplier may require the device to remain in place to mitigate future risks and may agree to suspend testing with a specified periodic review.

## **5.5 Building Act responsibilities**

In addition to the requirements for boundary devices the property owner shall ensure that the requirements of the Building Act are complied with for that property. This includes:

- Obtaining a building consent for plumbing work that includes the installation or removal of a backflow prevention device
- Maintaining backflow prevention devices in accordance with the compliance schedule
- Ensuring the building is safe and sanitary

### **Comment**

*Boundary devices are administered under the Health (Drinking Water) Act 2007 and are additional to requirements of the Building Act, in which internal backflow devices maybe required.*

The customer shall not alter the plumbing arrangements within the premises without first obtaining the necessary building consents. Any alterations shall comply with the requirements of the NZBC including clause G12 Water Supplies.

### **Comment**

*Any work on internal plumbing systems is to be carried out only by persons Licensed or authorised under the Plumbers, Gasfitters and Drainlayers Act.*

*If in doubt contact the Plumbers Gasfitters and Drainlayers Board in Wellington.*

*<http://www.pgdb.co.nz>*

## **5.6 Customer ownership of boundary devices**

The installation is to be in accordance with the water supplier requirements, standards and/or drawings.

Where a customer owns and is responsible for the boundary device, the customer shall be responsible for ensuring that it remains fully operational at all times and is tested annually or, where appropriate, more frequently in accordance with the requirements of the compliance schedule and/or Water Supplier.

The results of all tests shall be sent to the water supplier within five working days of the test.

### **Comment**

*Regardless of ownership the Water Supplier is responsible for the standards to which the device is installed.*

*This requirement is additional to section 6.5.2 and is designed to cover the situation where, for various reasons, the owner does not receive formal notification that it is time to retest the backflow device.*

*Not receiving a notice from the water supplier is not an acceptable reason for not testing the device.*

## 6. PROGRAMME AND PRACTICES

### 6.1 *Backflow programme*

The water supplier backflow programme should amongst other matters:

- Identify new and existing potential risks to the water supply
- Eliminate the potential risk where possible
- Result in the installation of boundary devices where there are potential risks
- Ensure an accurate database is kept of all boundary devices irrespective of whether or not they are owned by the water supplier
- Have a system in place to ensure that all boundary devices are tested in accordance with the water supplier's requirements and the New Zealand Building Code

This programme shall be proactive in seeking out new premises or changes of use within existing premises where backflow prevention devices do not exist or the standard of existing backflow protection needs to be changed.

The person surveying properties for potential backflow problems shall be an IQP-Surveyor. Appendix 8 contains a guide to hazards founds in various types of premises.

Where there is an unprotected hazard, the surveyor shall advise the owner and water supplier immediately. The water supplier shall inform the Territorial Authority (usually a council).

Where an industrial or commercial property is inspected and found to require a boundary device, the water supplier shall give the property owner an appropriate amount of time to install the required device depending on prevailing circumstances and the immediate risk posed. This period of time should not exceed three months.

The water supplier should endeavour to enter into agreements with those organisations that are responsible for the approval of construction of new buildings - usually councils and building certifiers - or be aware of the change of use within existing premises to minimise the risk of new or changed activities placing additional contamination risks on the water supply network.

<b><i>Comment</i></b>
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*Water suppliers are often local councils. There is considerable benefit to be gained by having Service Level Agreements or similar arrangements with other parts of council that are aware of new industry establishing, or changes in existing use. This could include dangerous goods, liquid and hazardous wastes, trade wastes, building consent sections and others.*

*Similarly the above sections could benefit from information shared by the water supplier.*

*Water suppliers need to know for a number of reasons when a change of use is proposed within an existing building. This includes changes to the flow patterns which may require a meter replacement, changing the standard of backflow prevention as a result of the new activity, generating wastes that may require trade wastes consents etc.*

*The water supplier also needs to carry out regular surveys of individual premises to determine where changes in the backflow protection standards are required. This can be done in conjunction with a number of other inspection activities such as for trade wastes, liquid and hazardous wastes, dangerous goods, etc.*

*All building consents processed by councils are examined in respect to their backflow need to comply with NZBC clause G12 Water Supplies.*

Once all existing properties have been surveyed random surveying programmes to determine the extent of change of use should be carried out at a frequency not greater than five yearly. This does not apply to very low risk properties such as residential dwellings, where it is unlikely that the risk classification has changed.

Public education should be part of the risk management programme.

## **6.1.1 Risk assessment**

All properties, including residential properties, are required to have boundary devices. The PHRMP guide gives minimum levels of protection for high, medium, low and very low risks. These are modified from information contained within table 3 of AS/NZS 3500.1.2 (1999).

The high, medium and low hazard definition is considered to be equivalent to the high, medium and low risk categories of the PHRMP which are not otherwise defined. The definitions should be used to assist in determining the appropriate level of risk where the event is not specifically contained in the Risk Assessment Table of the PHRMP.

### **Comment**

*The NZBC clause G12 Water Supplies has the following definitions, the definitions are similar to those contained in AS/NZS 3500 1.2. Lists of examples of the hazards are appended.*

### **High hazard**

*Any condition, device or practice which, in connection with the potable water supply system, has the potential to cause death.*

**Medium hazard**

*Any condition, device or practice which, in connection with the potable water supply system, has the potential to injure or endanger health.*

**Low hazard**

*Any condition, device or practice which, in connection with the potable water supply system, would constitute a nuisance, by colour, odour or taste, but not injure or endanger health.*

*In G12 there is no very low hazard category as there is in the PHRMP.*

The activity within a premise creating the greatest hazard should be the one determining the device to be installed. The hazard rating give a general consequence however when assessing risk it is the likelihood and the impact of consequence of the potential backflow hazard that determines the risk level. To simplify the risk assessment in most cases the hazard will equate to the risk level.

To do a more comprehensive risk assessment the water supplier also needs to take into consideration factors which effect the likelihood and the consequence such as; is the connection in an area of low pressure, high break rate or low chlorine, its proximity to sensitive customers or a water source, the size of the connection, the height of the premises above the main and the potential volume of backflow.

In some situation where internal devices contribute to reducing the overall risk, the water supplier may decide to moderate the type of device required at the boundary. The decision will be based on factors such as; the water supplier being satisfied with the on-going maintenance and testing of the internal devices, low likelihood of change of use and ease of survey.

Regardless of ownership the water supplier shall be responsible for determining the risk level and approving the selection type, design, and installation of the boundary device. Below is an example of a device selection guide which could be used by water suppliers to determine which device is appropriate for the risk assessed. Appendix 7 contains the device selection guide from G12 for source protection which differentiates between devices for use in back pressure or back siphonage situations.

<b>Risk Level</b>	<b>Boundary (Containment) Device type</b>
Very Low Risk	Non-testable Dual check valve
Low Risk	Double check valve
Medium Risk	Double check valve Double check detector
High Risk	Reduced pressure zone Reduced pressure zone detector

**Comment**

*The selection of and installation of non-testable dual checks for Commercial premises with only domestic type facilities is not considered best practice as the potential for change use is high. The Water Supplier may chose not to test Double check valve device annually if no change of use is verified.*

## **6.2 Backflow practices**

A water supplier specific Code of Practice and Installation Standard should be written based on this document and include the practical considerations that need to be factored into practices and programme once the ownership decision is made. Such considerations include but are not limited to:

### **Water Supplier owned devices**

On installation of the device consider:

- Adequate for hazard level
- Installation standards
- Device selection for maintenance and repair
- Cost to the customer needs to be competitive

Administration process may need to include:

- Mechanism for contracting annual testing and maintenance
- Engaging competent persons
- System for verifying competency
- Insurances

On-going programme should include:

- Audit of tests
- Test kit calibration
- Published charges to customer
- Verifying no change of use by owner

### **Private ownership of devices**

On installation of the device consider:

- Hazard identification
- Adequate for hazard level
- Installation standards required
- Building consent for minor works
- Cost to customers
- Vacant properties with no water use
- Residential properties with no BWoF and backflow hazards

Administration process may need to include:

- Different processes for properties with and without a BWoF
- Building consent checks and sign off

- Installation as part of building consent or connection permit
- Database/registry of devices
- Mechanism for prompting annual testing

Verifiable monitoring system includes proof of:

- BWoF and non BWoF devices
- Engaged competent persons to test and maintain
- Test certificates includes meter or connection identification
- Maintenance and repair detailed
- Verify no change of use by owner
- Test kit calibration
- IQP registration

On-going programme should include:

- System for verifying competency
- Audit of tests
- Independent surveys to identified change of use additions/alterations

These are detailed in the following sections of this code.

### **Comment**

*Water Suppliers are encouraged to identify the point of supply in their water bylaws.*

*Boundary devices are installed primarily to protect water supplier's customers from a backflow contamination incident. Irrespective of any ownership arrangements, the water supplier has a primary responsibility to ensure that backflow hazards are identified and appropriate boundary devices are installed and tested.*

*The water supplier should recognise that property owners and their advisors can be significantly less qualified in backflow prevention than their own staff and also may have a lesser appreciation of the consequences of failing to adequately prevent a backflow from occurring.*

*This code promotes as best practice that boundary devices are owned and maintained by the water supplier. The Health (Drinking Water) Amendment Act enables water suppliers to install backflow prevention systems on the side of the point of supply for which the supplier is responsible for maintaining. The owner of the land in respect of which the backflow prevention system operates may be required to reimburse the supplier for the cost of installation, testing and maintenance of the system.*

*Where the installation of the boundary device is a private installation, the customer is required to obtain approval from the Territorial Authority prior to the installation being carried out.*

*Note the requirements of section 5.6 in respect to customer ownership of boundary devices.*

## 6.2.1 Device register

The water supplier shall maintain a register of all boundary devices including dual checks and air gaps. This should be included as part of the asset management system. The register will include privately owned boundary devices. Where the devices are required to be tested, this information shall be included in the register together with test records.

This register could be used for both boundary devices and backflow prevention devices as required under the Building Regulations.

The boundary devices owned by the water supplier shall be included on a water supplier's asset register and given a unique identification number. It shall also be subject to an asset management/maintenance/replacement/testing programme. Devices should have their identification number permanently attached to, or stamped on them. This does not apply to the valves/stopcocks either side of the device which are expected to be separately accounted for in the water supplier's asset register.

Non-testable devices serving single residential dwellings shall be replaced at appropriate intervals as determined by the asset management programme or, where appropriate, when the water meter is replaced.

The water supplier shall have a clear policy on upgrading non complying devices to meet the requirements of the PHRMP guide.

## 6.2.2 Installation standards

The water supplier shall be responsible for approving the type, location, geometry and size of all boundary device installations.

The installation details shall be approved by the water supplier after consultation with the customer. The water supplier in giving approval shall consider:

- The level of risk
- The metering arrangement (if any)
- The size of the connection to meet anticipated flow rates
- Head losses through the device
- Manufacturer's recommendations
- The use of strainers
- Protection against frost
- The nature of the hazard and the likelihood of future changes of use
- The need for continuous supply to the premises
- Access for checking the device – Health and Safety considerations
- Drainage requirements including size of drains
- Protection from traffic, underlying hazards, vandalism, etc.
- Where private responsibility begins

<b>Comment</b>
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*Where continuous supply is needed, two devices in parallel should be required to enable testing to be carried out without interruption of flow.*

Backflow prevention devices shall be installed with isolating valves and a strainer upstream, and resilient seated valve or ball valve isolating valves downstream of the device with the exception of:

- Fire lines refer section 6.3
- Very low risk situations

Backflow prevention devices shall be sited in a position where;

- they can be safely and easily checked and tested by IQPs
- where the backflow installation is unlikely to be obstructed or subject to heavy vehicular traffic or other loads
- where they can be isolated

Where Reduced Pressure Zone backflow prevention devices are required they shall be installed above ground (minimum 300mm above flood level) and be protected from vehicular traffic, frost and vandalism. They shall be installed in a securely fenced or caged area with a lockable access gate, if possible located parallel to the property boundary.

The water supplier shall consult with the customer before deciding or approving the location of the boundary device. Where possible the device should be just inside the customer's property boundary and just downstream of the water meter (where installed). The installation geometry shall comply with the appropriate standards and requirements and manufacturer's recommendations.

Installation and repairs to devices that are covered under the Act should be carried out only by persons authorized by the water supply authority.

Installation and repairs to devices that are covered under the Building Act should be carried out only by persons licensed or authorized under the Plumbers, Gasfitters and Drainlayers Act.

### **Comment**

*The Plumbers, Gasfitters and Drainlayers Act requires that any sanitary plumbing work that involves fixing or unfixing water supply pipes - carried out within private property is carried out by, or under the supervision of, a licensed plumber.*

On completion of the work, the water supplier shall be provided with signed as-built drawings clearly detailing the installation and the details of the protection device. The as-built records should also record the risks identified.

Where the water supplier is not the owner of the device, the details of the owner and, where appropriate, their agent(s) shall be included with the as-built information supplied.

This could include details of the maintenance and testing schedules and an indication that the owner is aware of their responsibilities under this code. This shall include the first test results.

### **6.2.3 Health and Safety**

The installation shall be sited so that it can be easily tested and maintained without compromising the health or safety of the individuals involved. Installations shall be able to be accessed without the need to climb ladders or scaffolding.

### **6.2.4 Manufacturing standards**

All backflow prevention devices shall be manufactured in accordance with AS/NZS 2845.1 2012, (as required by the Building Code).

The backflow device supplier shall keep manufacturer's data for all models supplied and compliance certification for ten years from the time of supply.

Unless specifically approved by the water supplier all devices installed shall be able to be readily serviced in line.

Where a double check valve device is installed in an in-ground chamber, it must be of a design that can be serviced by top entry.

All detector check assemblies must be supplied with "producer's statement" from the supplier confirming that the manufacturer has built and tested the assembly to comply with the relevant standards concerning bypass detector assemblies.

### **6.2.5 Testing**

Boundary devices, unless specifically described as non-testable by this code and references contained within it, shall be tested annually by an IQP or more frequently under special circumstances as determined by the water supplier.

Testing shall be carried out as per New Zealand Industry Standard: Field testing of backflow prevention devices and verification of air gaps.

The water supplier shall have a testing programme to ensure that all boundary devices irrespective of ownership are tested at least annually or a lesser frequency as otherwise specified by the water supplier. This shall not apply to very low risk devices which shall be subject to a random sampling program.

The water supplier shall formally remind owners of private boundary devices of their responsibility to have an IQP test their devices and their obligation to supply the water

supplier with test results by the appropriate date. This should be done by letter or similar means.

Where the test results are not received by the due date, the water supplier shall contact the owner responsible and arrange for the test to be carried out within ten working days where practicable.

The water supplier shall have robust systems in place to highlight and act upon tests results not received by the due date.

The water supplier shall ensure that all boundary devices requiring testing are tested within the required time frames by IQPs-Testing using certified equipment with the test results held for at least two years.

Securely fastened test tags should be attached to the device after testing showing as a minimum

- the serial number of the device
- the due date of the next test
- the IQP number, name of the tester and a contact phone number
- water supplier backflow registration number where appropriate.

Where a device fails to test, the IQP shall attempt to repair the device while on site and retest. Where it is not possible to repair the device on site the device shall be repaired as soon as is practically possible, with an equivalent substitute device installed (and tested) until repairs are completed.

Testing shall be carried out by an individual who is an IQP. The IQP must have no financial interest in the business being carried out at the site other than as a backflow device tester.

Testing shall also be carried out after installation and/or commissioning of the backflow prevention device and after each time maintenance has been carried out on the device.

In the event of a suspected backflow incident, the water supplier can request that a test be carried out.

The IQP shall provide the water supplier with a test certificate containing as a minimum, all the criteria contained on the sample test certificate – Appendix 3 of this code. The owner of the device shall also be supplied with a copy of the certificate.

IQPs, water suppliers and owners shall keep test records for a minimum of two years.

Test procedures and reports shall be the correct type for the device being tested as required by New Zealand Industry Standard: Field testing of backflow prevention devices and verification of air gaps.

The backflow test kit shall have a maximum working pressure of 1200 kPa and have colour hoses to minimise mistakes during use. The test kit used shall be certified/recertified every twelve months by an ISO registered laboratory. A copy of the test kit certification shall be kept with the kit.

<b>Comment</b>
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*Testing only covers the performance of the boundary device. It does not address whether the device is the appropriate device for the current risk. This is the responsibility of a qualified Backflow Surveyor.*

*Water suppliers may elect to carry out testing and surveying at the same time. This could be done by using a person with both qualifications.*

*Persons involved in backflow testing shall be fully aware of their responsibilities and actions required of them under the Health and Safety in Employment Act should they find that there are hazards to people using water on the site. Testers should have a Health and Safety plan available for inspection.*

## **6.3 Fire systems**

Fire sprinkler systems are required by the Approved Document G12 Water Supplies to contain backflow protection in accordance with the Cross Connection Hazard. Fire sprinkler systems fed solely from the water supply without auxiliary water supplies shall have a double check valve assembly installed.

Systems containing hazardous additives used for fire fighting foam or antifreeze shall have Reduced Pressure Zone (RPZ) devices installed.

The fire industry authorities request that Backflow prevention devices are to be installed in the valve house. Metering at the boundary will detect any unprotected connections, unwarranted usage and possible leakage of the fire line.

Where, at the request of the water supplier, an additional boundary device is required to be installed near the boundary then attention needs to be paid to the security of the boundary device.

Line strainers are not required to be installed upstream of backflow prevention devices installed on fire lines with an expected demand less than 2300 litres per min. When demand exceeds 2300 litres per min and or should the water supplier deem necessary due to high records of debris in the water reticulation system, then only Sprinkler System Certifier listed strainers shall be fitted on fire lines.

Backflow prevention devices installed in fire systems shall be tested annually and immediately after a fire and each full flow test.

Boundary devices shall be installed on fire mains with private in-ground hydrants. These devices may be in the sprinkler valve house.

IQPs testing boundary devices on fire lines shall be specifically approved for this type of work in addition to having attained the IQP-Testing qualification.

Domestic sprinkler systems fed from the potable supply and designed without dead ends do not require a testable backflow device.

## **Comment**

*It is a New Zealand Insurance requirement that only items listed by a Sprinkler System Certifier should be allowed to be installed on fire sprinkler lines.*

*The following comments are intended to assist with reiterating some of the key points in the document above.*

## **Location of devices**

*Backflow devices should be installed in a secure environment, such as sprinkler valve houses or pump rooms as part of the building consent process. Where a boundary backflow device is required, such as when the fire protection system includes in-ground hydrants, the valves shall be protected against vandalism as below.*

## **Protection of valves**

*In accordance with NZS4541 Automatic Fire Sprinkler Systems all valves on a connection serving a sprinkler system, other than the underground sluice valve at the public main connection, will be alarmed and/or monitored for unauthorised operation. Cages which may be used for protection do not negate the requirement of isolation valves to be monitored. Should the valve be installed in a pit then the pit must be locked and the isolation valves if deemed acceptable by the water supplier can be fitted with chains and padlocks. Consequently this may remove the need for monitoring.*

## **Testing of devices on fire systems**

*IQPs testing backflow prevention devices serving fire protection systems need to be also trained in fire system isolation procedures to ensure that fire system alarms are not activated during testing and that valves are not left closed after testing. IQPs must understand the protocols of isolating systems, with respect to insurance, life and property protection issues. These procedures also address the notification of the Fire Service, Building Owners, Insurers and the like, before a system is isolated for service. Failure to follow these protocols will expose the contractor to significant liability.*

## **Metering**

*No mechanical meters shall be installed on fire systems. Bypass meters with detector check systems do not provide backflow protection unless specifically manufactured with backflow devices in parallel.*

*Domestic sprinkler systems will include a water meter and non testable dual check for backflow protection as part of the water supply to the household. These may be of a larger size than an ordinary domestic connection.*

*For water supplying fire systems it is vital to ensure that the installation of backflow prevention and metering equipment does not compromise the reliability of fire protection systems. Special care must be taken not to disturb the designed margins and tolerances that the fire system has been commissioned to.*

*Similarly it is equally vital that fire systems do not compromise the quality of the water in the water supplier's mains and the health of those who consume it.*

## **6.4 Tanker filling and hydrant use**

Any operators or contractors taking water from common or public mains shall first obtain the permission of the water supplier. Before granting permission to take water, the water supplier shall examine the potential backflow risks posed by the proposed drawing of water.

For tankered water for human consumption, the water carrier must be registered under the Ministry of Health registration system. The list of registered water carriers is at <http://www.drinkingwater.esr.cri.nz/carriers/carriers.asp>

Registered water carriers have a code of practice document which details their requirements under the Act and including PHRMP and backflow protection. Ministry of Health, (2008): Guideline for the Safe carriage and Delivery of Drinking-water.

The water supplier should only allow registered water carriers with approved PHRMP to take water from the supply for human consumption, preferably from designated sterile filling points fitted with backflow prevention.

The water supplier may place conditions on the taking of water for non-potable use from its mains such as by requiring the contractor to use a hydrant standpipe with a double check valve, fixed air gaps and collapsible hoses. Where the water supplier requires a testable device, the IQP's test certificate shall be kept with the device or in the vehicle used to carry the device at all times.

This clause does not apply to the New Zealand Fire Service going about their normal business of fire fighting and hydrant testing or to Fire Certifiers assessing the availability of fire flows.

Where there is no backflow device and it is intended to fill a tank with mains water, a permanently mounted air gap of no less than 25 mm or twice the nominal diameter of the delivery pipe, shall be installed between the pipe outlet and the filling tank. In addition the tanker discharge shut off valve and any other valve and/or connections on the tank shall be designed so that they cannot be accidentally connected to a street hydrant by any fire hose with a male or female coupling.

Any other situations not clearly covered in the above shall be approved at the discretion of the water supplier having regard for the principles and requirements of this policy.

## **6.5 Bore water and auxiliary supplies**

Any backflow programme should give consideration to ensuring that bores are drilled, constructed and maintained in a manner which avoids any contamination of, or cross-

connection to, groundwater aquifers and does not allow any seepage or backflow of contaminants into groundwater.

This should include ensuring that well-head construction on all bores provides for the installation of a boundary device and, where required outside of this code, a water measuring device.

The water supplier shall ensure that all takes from an aquifer used for drinking water have adequate backflow protection. Ground water supplies with direct injection of chemicals for irrigation or stock water require as a minimum a double check backflow device to protect the aquifer.

Auxiliary supplies such as fire storage tanks and ponds, rainwater tanks, bores and surface waters require boundary backflow protection.

## **6.6 Contingency plans**

The water supplier shall have an incident response plan to deal with any contamination incident. It shall be formally reviewed on an annual basis. The plan could be part of an overall emergency response plan.

The plan shall be based on the PHRMP guide section - Contingency Plans.

Mechanisms shall be incorporated into the plan to update contact details on a regular basis.

The water supplier should have emergency exercises from time to time to familiarise staff with the plans and their content.

## 7. APPROVED BACKFLOW TECHNICIAN (IQP)

### 7.1 IQP qualifications

To become an approved IQP, it is required that all IQPs shall have a thorough knowledge of backflow prevention and cross connection control. This shall include knowledge of all relevant Acts and Regulations. They shall also be capable of recognising potential hazards while testing backflow devices.

In addition they shall have attended and passed an approved Backflow course based on the course requirements contained in Appendix 4.

IQPs are also required to attend and pass refresher courses at least every three years following the initial course, in order to maintain their IQP status.

IQPs shall have public liability and Surveyors professional liability insurance, both to the minimum value of \$1m covering the areas in which they are working.

#### **Comment**

*It is import to attend refresher courses as there is constant change within the industry and it is imperative that IQPs keep up with those trends.*

#### Staff Training

The water supplier shall ensure that all persons approving boundary devices are Survey qualified based on the course requirements contained in Appendix 5.

#### **Comment**

*This person does not necessarily have to be a member of the water supplier's staff. They could be from another water supplier's organisation or a contractor to the water supplier. It is essential that they are appropriately qualified.*

The water supplier should ensure that at least one staff member is a qualified IQP - Tester.

Staff members who are IQP-Tester should test at least five devices of each testable category on an annual basis. This may be done by arrangement with other IQPs engaged in the testing of backflow prevention devices.



## **7.1.1 IQP database**

Water NZ is currently working with Territorial Authorities and looking to create a National criteria and database of approved IQPs in backflow testing.

## **7.1.2 Auditing of IQP test reports**

The water supplier shall ensure that the quality and content of IQP reports are in accordance with this code. This applies to both in-house reports as well as those provided by external IQPs.

Ten percent of reports received from IQPs shall be checked to ensure that quality is maintained. This shall involve field audits.

## **8. OFFENCES**

Both the water supplier and the customer are responsible for complying with this code of practice. The supply of water to a customer is dependent on the customer agreeing to abide by this code and other terms and conditions contained within a water supply agreement.

### **8.1 Enforcement**

Where, in the opinion of the water supplier, a potentially serious hazard to the water supply is not removed within a reasonable period of time or an appropriate boundary device installed, the water supplier shall disconnect the water supply to the customer or install an appropriate backflow device, in order to manage the potential public health risk posed by the hazard.

The water supplier shall make every effort to assist the customer to understand and meet the requirements of the water supplier in respect to this code.

Should the supply be disconnected, the supply shall not be reconnected until the water supplier is satisfied that the hazard has been eliminated or that an appropriate boundary device has been installed and satisfactorily tested.

### **8.2 Damage and tampering**

The only persons authorised to carry out work on a boundary device owned by the water supplier are the water supplier's staff and those persons specifically authorised by the water supplier.

Customers shall not touch or tamper with a boundary device owned by the water supplier.

Private boundary devices shall be maintained by a licensed plumber who is an IQP, as part of a testing procedure.

### **8.3 Disputes resolution**

Each water supplier shall have a published and readily available disputes resolution process for disputes of any nature between the customer and the water supplier.

Customers should be encouraged to put their complaints in writing and have the letter/email acknowledged with an interim reply typically within 3-5 working days and a full response within 10-20 working days or in accordance with the organisation's stated policies.

The water supplier should have a senior position within their organisation specifically tasked with the receiving and resolution of customer complaints.

**Comment**

*A generic example of a dispute resolution procedure is;*

*Where a customer wishes to dispute an issue with the water supplier, the customer may formally take the issue to a specifically nominated senior position within the water supplier's organisation especially tasked to resolve such disputes. That person shall, individually or with the assistance of others, attempt to resolve the issue to the customer's satisfaction.*

*Should the customer not accept the outcome, they can resubmit the dispute to the water supplier's nominated person for further consideration or an independent mediator to hear the dispute and recommend a solution.*

*If the mediator fails to resolve the dispute, the customer can take the dispute to arbitration where the decision will be binding on both parties or to the court system.*

*The Disputes Tribunal can be used to resolve issues where the disputed amount is below the Tribunal's limits.*

*A local Ministry of Health representative could be used as part of a dispute resolution team where that was appropriate.*

## 9. EDUCATION

Water suppliers shall be proactive in informing property owners of their obligations under their Public Health Risk Management Plans. This should include informing the community on the risks of cross connections and backflow and how they can comply with the water supplier's policies and relevant legislation.

The water supplier shall have a list of standard risks with appropriate protection methods and/or devices. This can be based on the list contained in the PHRMP guide as a minimum requirement.

Water suppliers shall provide backflow information as public hand-outs available from their office(s) and other suitable facilities.

They should include but not be limited to the following advice;

- Information for plumbers
- Information on annual testing
- Backflow policies, codes of practice, etc.
- How to comply with the water supplier's policy guide for customers
- What services customers have to pay for and what services are provided free by the water provider
- Reference to further information

## 10. ADMINISTRATION

In order to achieve the objectives of the code, it is advisable for water suppliers to adopt the code. This could be done through incorporating it in to Water Supply Bylaws or policy where the supplier is a regional, district or local council. Other suppliers could incorporate the code in their customer agreements or contracts.

Water suppliers in adopting this code should produce a transition plan to ensure that all backflow procedures are in compliance with the code by nominated future dates. All new installations shall be in compliance with this code once adopted.

A transitional plan should include but not be limited to:

- Timeframes for identifying and upgrading existing high, medium, low and very low risk properties to this code.

PHRMP development and implementation plan for improvements.

### 10.1 ***This document***

This code will be maintained by Water NZ to ensure that it is readily available to all water suppliers and those who supply backflow equipment and services to water suppliers. It will be reviewed at periodic intervals as deemed appropriate by the Backflow Group of Water NZ.

## Appendices

## **Appendix 1**

### **Extracts of Health Drinking Water Amendment Act 2007**

#### **69ZZZ Protecting water supplies from risk of back-flow**

“(1) This section applies if a networked supplier considers that there is a need to protect the networked system from risks of pollution caused by water and other substances on properties connected to the networked system.

“(2) A networked supplier may,—

“(a) if the supplier considers it desirable or necessary,—

“(i) install a back-flow prevention system in the network on the side of the point of supply for which the supplier is responsible for maintaining; or

“(ii) allow the owner of property to which water is supplied to install a back-flow prevention system that incorporates a verifiable monitoring system (being a monitoring system approved by both the supplier and a drinking-water assessor):

“(b) require the owner of the property in respect of which the back-flow prevention system operates or the person who is required (whether under the Local Government Act 2002 or any contract) to pay for drinking water supplied to that property,—

“(i) if paragraph (a)(i) applies, to reimburse the supplier for the cost of that system (including the cost of installation, testing, and on-going maintenance); and

“(ii) if paragraph (a)(i) or (ii) applies, to repair or modify any back-flow prevention system that, in the opinion of the supplier, is not functioning adequately.

“(3) A person who installs a back-flow protection device must take all reasonable steps to ensure it can operate in a way that does not compromise the operation of any automatic sprinkler system connected to the water supply.

“(4) A networked supplier—

“(a) must test each back-flow protection device operating in its network at least once a year; and

“(b) must advise the territorial authority in its area of the results; and

“(c) may require the occupier of the property in respect of which the device operates to pay the reasonable costs involved in conducting the test.

#### **“69ZZZA Keeping, inspection, and copying of registers**

“(1) Any register that is required to be kept under this Part may be kept in any manner that the Director-General considers appropriate, including, either wholly or partly, by means of a device or facility that—

“(a) records or stores information electronically or by other means; and

“(b) permits the information so recorded to be readily inspected or reproduced in usable form; and

“(c) permits the information in the register to be accessed by electronic means, including (without limitation) by means of remote logon access.

“(2) The Director-General must keep any register that is required to be kept under this Part open for public inspection—

“(a) on the Ministry's website in an electronic form that is publicly accessible; and

“(b) during ordinary office hours, at—

“(i) the head office of the Ministry; or

“(ii) an office of the Ministry for the time being specified for the purposes of this subsection by notice published in the *Gazette*.

“(3) The Director-General must supply to any person a copy of all or part of any register that is required to be kept under this Part, on request, and on payment of a reasonable charge for the production of the copy.

#### 69Z Duty to prepare and implement public health risk management plan

“(1) Every drinking-water supplier must, on or before the date on which this section begins to apply to that drinking-water supplier, prepare in writing either or both of the following, whichever is applicable:

“(a) a public health risk management plan in relation to that drinking-water supplier's drinking-water supply:

“(b) in the case of a drinking-water supplier who is a water carrier, a public health risk management plan in relation to that water carrier's method of transporting raw water or drinking water.

“(2) A public health risk management plan prepared under subsection (1) must,—

“(a) if prepared by a drinking-water supplier in relation to that drinking-water supplier's drinking-water supply,—

“(i) identify the public health risks (if any) associated with that drinking-water supply; and

“(ii) identify critical points in that drinking-water supply; and

“(iii) identify mechanisms for—

“(A) preventing public health risks arising in that drinking-water supply; and





“(b) if the assessor issues a requirement under paragraph (a)(ii) or (iii), may, after any alteration to the public health risk management plan that is considered necessary by the assessor and made by agreement with the supplier or the water carrier, as the case may be, approve that plan.

“(6) The period of 20 working days referred to in subsection (5)(a) ceases to run during any specified period referred to in subsection (5)(a)(ii) or (iii).

“(7) If a drinking-water assessor does not approve a public health risk management plan, the assessor must notify the drinking-water supplier and give reasons for the non-approval.

“(8) Every drinking-water supplier must—

“(a) take all practicable steps to ensure that the supplier’s public health risk management plan is approved under subsection (5) within a 12-month period after the date on which this section begins to apply to the supplier (excluding any specified period referred to in subsection (5)(a)(ii) or (iii)):

“(b) start to implement a public health risk management plan within 1 month after the date on which that risk management plan is approved under subsection (5).

“(9) This section does not apply to a drinking-water supplier who supplies drinking water from a small drinking-water supply or a neighbourhood drinking-water supply.

## ***Appendix 2***

### **Policy Statement Option 1 Water Supplier owned**

This backflow prevention policy outlines Council commitment to the protection of the potable water.

The Health (Drinking Water) Amendment Act 2007 guides water suppliers in respect to the development of a backflow prevention policy to protect the water supply. Council will achieve this aim through effective implementation of the Backflow Prevention Code of Practice, efficient enforcement of the Water Supply Bylaw 2012, and public education.

To minimise the risk that the water supply once treated becomes contaminated Council's policy is that an appropriate level of backflow prevention is provided on all water connections.

Accordingly, this policy is made having regard to:

- All new connections require a type of backflow prevention at the point of supply between the customer and the water supplier
- The type of backflow prevention device being dependant on the risk to the water supply posed by the customer
- Generally domestic/ordinary use connections will have a non-testable dual check device and commercial/extraordinary use customers will require a testable backflow prevention device at the point of supply.
- Point of supply or boundary backflow prevention devices are vested to Council and will be maintained and replaced as required, with the option given to the customer to retain ownership.
- Testable backflow prevention devices will be done so at least annually and after maintenance.
- A schedule of targeted rates for backflow prevention devices of different sizes will be included in the Annual and Long Term Plans. The appropriate charge will be added to the customer's water account.
- Existing extraordinary use as defined by the bylaw (generally commercial and industrial) connections without adequate backflow prevention are to be upgraded at the customers cost. These will be prioritised according to potential risk and customers will be given the option to install the device or have Council install and pass on the cost.
- Existing ordinary use as defined by the bylaw (domestic) connections without backflow prevention will be upgraded when the meters are replaced.
- Periodic surveying of existing connections will be undertaken to determine any change of use requiring upgrading of backflow prevention.
- Enforcement where necessary will be as set out in the Water Supply Bylaw 2012.

# **Water Supply Bylaw Example for Option 1 Water Supplier owned**

## **Point of supply**

1. The point of supply to an individual customer is the point on the service pipe as deemed by Council, which marks the boundary of responsibility between the customer and Council.
2. Where there is a water meter and/or backflow prevention device then the point of supply is that point which is directly downstream of such water meter and/or backflow prevention device.
3. Where there is no water meter and/or backflow prevention device installed then the point of supply is the point where the service line crosses from Council's property (being generally road reserve) into private property so as to service an individual customer.

## **Backflow prevention**

1. Notwithstanding the provision of clause x.x.x:
  - a) Council may require the customer to install a Council approved backflow prevention device on Council side of the point of supply at the customer's expense
  - b) all fire connections shall have an approved backflow prevention device installed on Council side of the point of supply as shown in Figures 7d and 7e at the customer's expense
  - c) all water connections available to shipping shall have an approved backflow prevention device installed on Council side of the point of supply at the customer's expense
  - d) all extraordinary supplies as defined in x.x.x.x shall require a point of supply backflow prevention device unless agreed otherwise by Council
  - e) point of supply backflow prevention device shall remain the property of Council, unless agreed otherwise by Council.
2. Council will charge a fee in accordance with targeted rates for water supply as noted in the Long Term Plan or Annual Plan, for the annual inspection and maintenance of such devices and shall also require the customer to maintain the device to be accessible for testing. The fee may be added to the customers' water bill.
3. Where the property owner wishes to retain ownership of a point of supply backflow prevention device written agreement from Council is required. The property owners shall ensure all maintenance and inspection works are undertaken in compliance with Council's requirements. All costs are to be met by the property owners.
4. Any existing ordinary or extraordinary supplies which do not have backflow prevention at the point of supply, or have inadequate backflow prevention shall install a Council approved backflow prevention device as required by Council. All costs are to be met by the property owners.

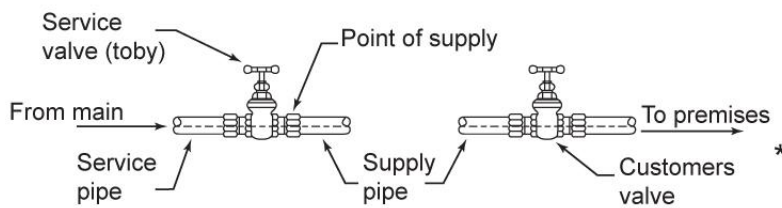
## **Customer's responsibilities**

1. It is the customer's responsibility under the Health (Drinking Water) Amendment Act 2007 and Building Act 2004, to take all necessary measures on the customer's side of the point of supply to prevent water which has been drawn from Council's water supply from returning to that supply.

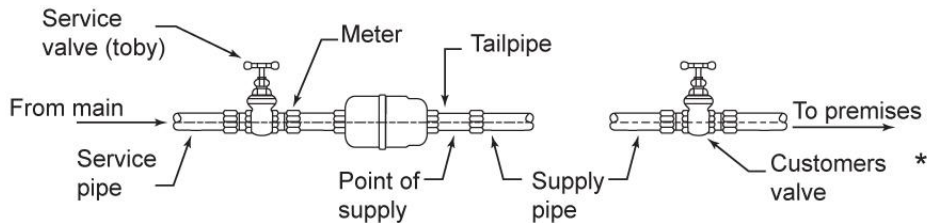
2. In installing point of supply Council owned backflow prevention device such must comply with AS/NZS 2845 and Council's Backflow Prevention Policy and Code of Practice.
3. For premises covered by the Building Act 2004 to ensure backflow prevention customers are to ensure:
  - a) backflow prevention either by providing an adequate air gap separation or by the use of a backflow prevention device which complies with the New Zealand Building Code; and/or
  - b) the prohibition of any direct cross connection between Council water supply and:
    - i) any other water supply potable or non-potable
    - ii) any other water source
    - iii) any storage tank
    - iv) any other pipe, fixture or equipment containing chemicals, liquids, gases, or other non-potable substances.
4. Customers with supplies serving agricultural or horticultural needs shall comply with the relevant sections of the Health (Drinking Water) Amendment Act 2007 regarding protection of potable water.
5. Compliance under the Building Act 2004 does not absolve the property owner from the requirements of the Health (Drinking Water) Amendment Act 2007 for point of supply backflow prevention.

**Figure 7. Examples of fitting details showing point of supply**

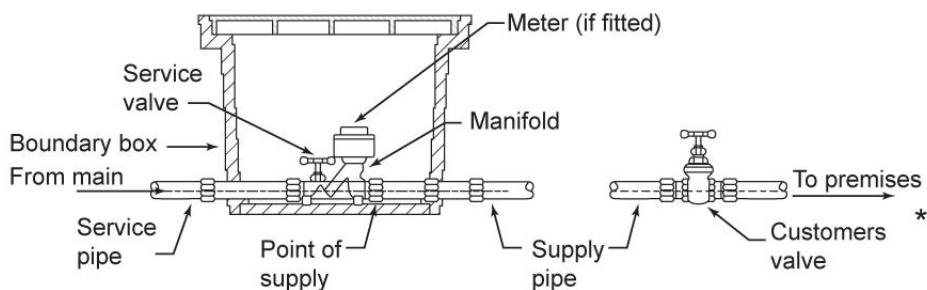
**7a Domestic unmetered supply**



**7b Domestic metered supply**



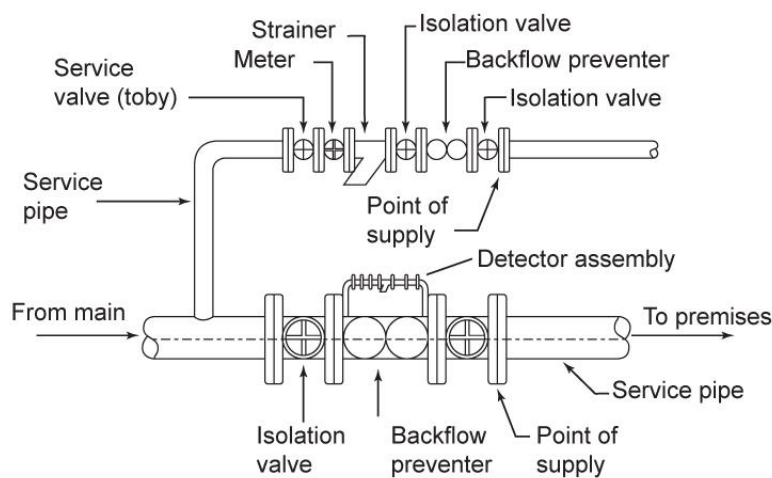
**7c Manifold assembly at boundary box**



\* As provided for in N.Z. Building Code approved document G12/AS1

WDC8184-7

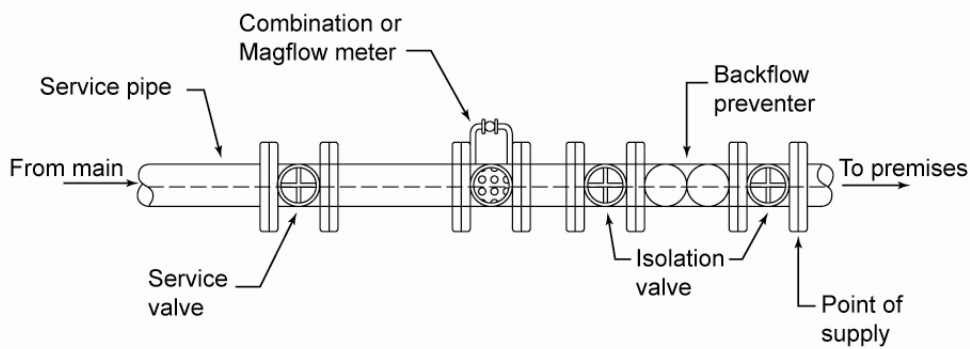
**7d Separate fire and metered service connection with common line from main**



WDC8184-8

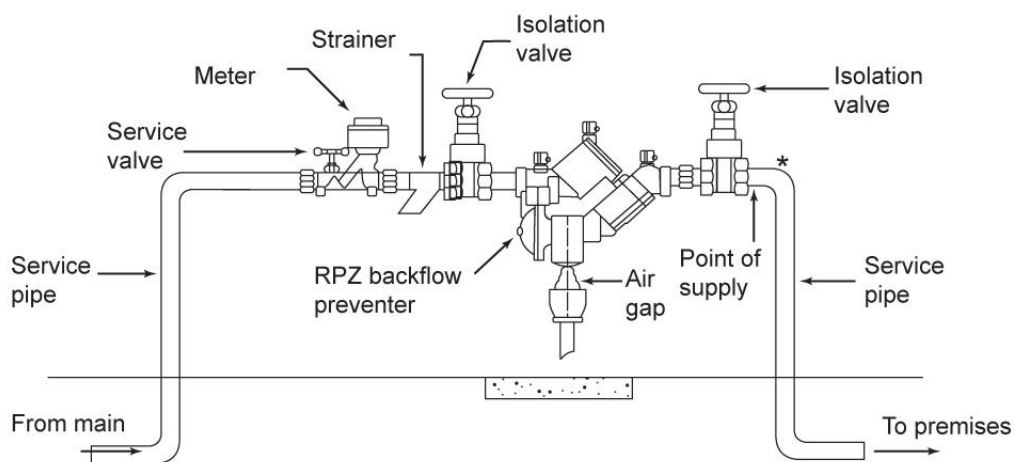
**Figure 7. Examples of fitting details showing point of supply**

**7e Common fire and metered service connection**



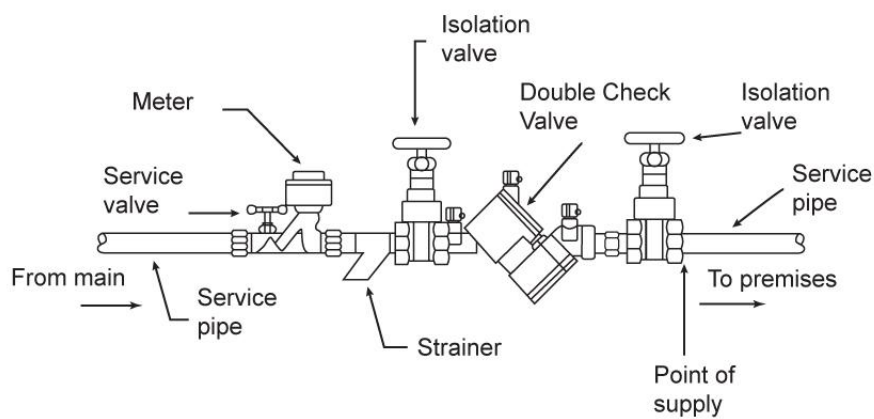
WDC8184-8

**7f Metered supply with reduced pressure zone backflow preventer (RPZ)**



WDC8184-3

**7g Metered supply with double check valve backflow preventer**



WDC8184-4

## Appendix 3

### Example of test certificates

<b>BACKFLOW PREVENTION DEVICE TEST CERTIFICATE</b> <b>AIR GAP</b>			
<b>Building Details:</b> Building name: <input style="width: 100%;" type="text"/> Block / level / unit no.: <input style="width: 100%;" type="text"/> *Street address: <input style="width: 100%;" type="text"/> Suburb: <input style="width: 100%;" type="text"/> Compliance Schedule No.: <input style="width: 100%;" type="text"/> Water meter no.: <input style="width: 100%;" type="text"/>		<b>Owner:</b> *Name: <input style="width: 100%;" type="text"/> Contact person: <input style="width: 100%;" type="text"/> *Address: <input style="width: 100%;" type="text"/> Phone number: <input style="width: 100%;" type="text"/>	
<b>Occupier:</b> Business name: <input style="width: 100%;" type="text"/> *Contact person: <input style="width: 100%;" type="text"/>		Type of business: <input style="width: 100%;" type="text"/> *Phone number: <input style="width: 100%;" type="text"/>	
<b>Device Details:</b>			
Protection: <input type="checkbox"/> Individual source <input type="checkbox"/> Zone <input type="checkbox"/> Boundary			
Location: <input style="width: 100%;" type="text"/>			
Supply pipe diameter: <input style="width: 100%;" type="text"/> mm		Required air gap: <input style="width: 100%;" type="text"/> mm	
Air gap unobstructed: Yes <input type="checkbox"/> No <input type="checkbox"/>		Measured air gap: <input style="width: 100%;" type="text"/> mm	
Overflow type*: 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/>			
Air gap determined: <input type="checkbox"/> by observation of spill <input type="checkbox"/> by calculation			
Repairs and materials used (if applicable): <input style="width: 100%;" type="text"/>			
<b>Comments:</b> <input style="width: 100%; height: 50px;" type="text"/>			
<b>Test Result:</b> Compliant <input type="checkbox"/> Non – compliant <input type="checkbox"/>			
<b>Tester Details:</b>			
Name of tester: <input style="width: 100%;" type="text"/>		Company name: <input style="width: 100%;" type="text"/>	
IQP No: <input style="width: 100%;" type="text"/>		Company address: <input style="width: 100%;" type="text"/>	
Signature: <input style="width: 100%;" type="text"/>			
Date of test: <input style="width: 100%;" type="text"/>			
<small>NOTE: This test report only constitutes an assessment of existing devices and does not mean ALL cross connections on the site have been addressed. Neither does it mean the existing devices are appropriate for the hazard. This must be addressed by an IQP (Survey). Cross connections are a major PUBLIC HEALTH RISK and are the owner's responsibility to ensure they are addressed.</small>			

\* required entry

\* see NZS ##### for definition of overflow types

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# BACKFLOW PREVENTION DEVICE TEST CERTIFICATE

## REDUCED PRESSURE ZONE DEVICE (RPZD)

### Building Details:

Building name:

Block / level / unit no.:

\*Street address:

Suburb:

Compliance Schedule No.:

Water meter no.:

### Owner:

\*Name:

Contact person:

\*Address:

Phone number:

### Occupier:

Business name:

\*Contact person:

Type of business:

\*Phone number:

### Device Details:

Protection: Individual source ☐ Zone ☐ Boundary ☐

Location:

Manufacturer:

Model:

Installation correct: Yes ☐ No ☐

Comments on installation:

Serial no.:

Nominal Size:  mm

Strainer installed: Yes ☐ No ☐

### Test Details:

Test kit serial no.:

Calibration date:

	1 <sup>st</sup> check valve		2 <sup>nd</sup> check valve		relief valve opening pressure	downstream isolating valve	
Initial test:	tight <input type="checkbox"/>	leaked <input type="checkbox"/>	tight <input type="checkbox"/>	leaked <input type="checkbox"/>	kPa	tight <input type="checkbox"/>	leaked <input type="checkbox"/>
Pressure reading:	kPa		kPa				
Test after repairs:	tight <input type="checkbox"/>	leaked <input type="checkbox"/>	tight <input type="checkbox"/>	leaked <input type="checkbox"/>	kPa	tight <input type="checkbox"/>	leaked <input type="checkbox"/>
Pressure reading:	kPa		kPa				

Repairs and materials used (if applicable):

Comments:

### Test Result:

Pass ☐ Fail ☐

Test method:

### Tester Details:

Name of tester:

IQP No:

Signature:

Date of test:

Company name:

Company address:

NOTE: This test report only constitutes an assessment of existing devices and does not mean ALL cross connections on the site have been addressed. Neither does it mean the existing devices are appropriate for the hazard. This must be addressed by an IQP (Survey). Cross connections are a major PUBLIC HEALTH RISK and are the owner's responsibility to ensure they are addressed.

\* required entry

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# BACKFLOW PREVENTION DEVICE TEST CERTIFICATE

## DOUBLE CHECK VALVE (DCV)

### Building Details:

Building name:

Block / level / unit no.:

\*Street address:

Suburb:

Compliance Schedule No.:

Water meter no.:

### Owner:

\*Name:

Contact person:

\*Address:

Phone number:

### Occupier:

Business name:

\*Contact person:

Type of business:

\*Phone number:

### Device Details:

Protection: Individual source ☐ Zone ☐ Boundary ☐

Location:

Manufacturer:

Model:

Installation correct: Yes ☐ No ☐

Comments on installation:

Serial no.:

Nominal Size:  mm

Strainer installed: Yes ☐ No ☐

### Test Details:

Test kit serial no.:

Calibration date:

	1 <sup>st</sup> check valve	2 <sup>nd</sup> check valve	downstream isolating valve
Initial test:	tight <input type="checkbox"/> leaked <input type="checkbox"/>	tight <input type="checkbox"/> leaked <input type="checkbox"/>	tight <input type="checkbox"/> leaked <input type="checkbox"/>
Pressure reading:	kPa <input type="text"/>	kPa <input type="text"/>	
Test after repairs:	tight <input type="checkbox"/> leaked <input type="checkbox"/>	tight <input type="checkbox"/> leaked <input type="checkbox"/>	tight <input type="checkbox"/> leaked <input type="checkbox"/>
Pressure reading:	kPa <input type="text"/>	kPa <input type="text"/>	
Repairs and materials used (if applicable):	<input type="text"/>		
Comments:	<input type="text"/>		

### Test Result:

Pass ☐

Fail ☐

Test method:

### Tester Details:

Name of tester:

IQP No:

Signature:

Date of test:

Company name:

Company address:

NOTE: This test report only constitutes an assessment of existing devices and does not mean ALL cross connections on the site have been addressed. Neither does it mean the existing devices are appropriate for the hazard. This must be addressed by an IQP (Survey). Cross connections are a major PUBLIC HEALTH RISK and are the owner's responsibility to ensure they are addressed.

\* required entry

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BACKFLOW PREVENTION DEVICE TEST CERTIFICATE <b>PRESSURE VACUUM BREAKER (PVB)</b>
-------------------------------------------------------------------------------------

**Building Details:**

Building name:	
Block / level / unit no.:	
*Street address:	
Suburb:	
Compliance Schedule No.:	
Water meter no.:	

**Owner:**

*Name:	
Contact person:	
*Address:	
Phone number:	

**Occupier:**

Business name:	Type of business:
*Contact person:	*Phone number:

**Device Details:**

Protection:	Individual source <input type="checkbox"/>	Zone <input type="checkbox"/>	Boundary <input type="checkbox"/>
Location:			
Manufacturer:	Serial no.:		
Model:	Nominal Size: mm		
Installation correct:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Strainer installed: Yes <input type="checkbox"/> No <input type="checkbox"/>
Comments on installation:			

**Test Details:**

Test kit serial no.:		Calibration date:	
Initial test:	Check valve	Air inlet valve	downstream isolating valve
	opened <input type="checkbox"/> did not open <input type="checkbox"/>	opened <input type="checkbox"/> did not open <input type="checkbox"/>	tight <input type="checkbox"/> leaked <input type="checkbox"/>
Pressure reading:	kPa	kPa	
Test after repairs:	opened <input type="checkbox"/> did not open <input type="checkbox"/>	opened <input type="checkbox"/> did not open <input type="checkbox"/>	tight <input type="checkbox"/> leaked <input type="checkbox"/>
	Pressure reading:	kPa	kPa
Repairs and materials used (if applicable):			
Comments:			

**Test Result:**

 Pass ☐ Fail ☐

Test method:

**Tester Details:**

Name of tester:	Company name:
IQP No:	Company address:
Signature:	
Date of test:	

NOTE: This test report only constitutes an assessment of existing devices and does not mean ALL cross connections on the site have been addressed. Neither does it mean the existing devices are appropriate for the hazard. This must be addressed by an IQP (Survey). Cross connections are a major PUBLIC HEALTH RISK and are the owner's responsibility to ensure they are addressed.

\* required entry

# BACKFLOW PREVENTION DEVICE TEST CERTIFICATE

## ATMOSPHERIC VACUUM BREAKER (AVB)

### Building Details:

Building name:

Block / level / unit no.:

\*Street address:

Suburb:

Compliance Schedule. No.:

Water meter no.:

### Owner:

\*Name:

Contact person:

\*Address:

Phone number:

### Occupier:

Business name:

\*Contact person:

Type of business:

\*Phone number:

### Device Details:

Protection: ☐ Individual source ☐ Zone ☐ Boundary ☐

Location:

Manufacturer:

Model:

Installation correct: ☐ Yes ☐ No ☐

Comments on installation:

Serial no.:

Nominal Size:  mm

Strainer installed: ☐ Yes ☐ No ☐

### Test Details:

	Poppet closed when pressure increased		Poppet opened when pressure decreased	
Initial test:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Test after repairs:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Repairs and materials used (if applicable):	<input type="text"/>			
Comments:	<input type="text"/>			

### Test Result:

Pass ☐ Fail ☐

Test method:

### Tester Details:

Name of tester:

IQP No:

Signature:

Date of test:

Company name:

Company address:

NOTE: This test report only constitutes an assessment of existing devices and does not mean ALL cross connections on the site have been addressed. Neither does it mean the existing devices are appropriate for the hazard. This must be addressed by an IQP (Survey). Cross connections are a major PUBLIC HEALTH RISK and are the owner's responsibility to ensure they are addressed.

\* required entry

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## Appendix 4

### Rules Governing the Accreditation of Approved Backflow Technician (IQP) - Tester

**Suitably qualified:** To become suitably qualified, an applicant must undertake & pass the appropriate NZQA Unit Standards:

**Duration** – Programme shall consist of a notional 40 hours of face-to-face tuition.

**Programme content** – Any course of study leading to Accreditation in the field of backflow prevention assembly testing, shall consist of 2 parts:

1. A course of theoretical study which culminates in a summative assessment.
2. Blind field testing of a range of appliances.

*Note: As Unit Standards are being assessed against, the assessor/s must hold Unit Standard 4098 Use standards to assess candidate performance.*

The theoretical programme shall cover the following:

- Local case histories of backflow incidents
- Definitions used within the industry
- Acts, Codes & Regulations
- Hydraulic principles
- Backflow hazards
- Operation of backflow prevention devices
- Installation of backflow prevention devices
- Testing of backflow prevention devices
- Repairs & maintenance of backflow prevention devices

The practical field tests shall cover the following devices:

- Pressure type vacuum breaker
- Double check valve assembly
- Spill – resistant vacuum breaker assembly
- Reduced pressure principle backflow prevention assembly.
- Verification of air gaps
- Verification of atmospheric vacuum breakers

**Accreditation:** Upon successful completion of the practical & theoretical examinations & payment of all fees, a certificate shall be issued by the course provider outlining topics covered and indicating the Unit Standard/s achieved. The provider shall also supply a photo identification card & shall state the type of accreditation with the full name of the tester & a renewal date.

The applicant then must apply to their relevant Water Authority supplying additional information and evidence in order to be accepted as a recognized Backflow Tester.

**Re-Accreditation:** Currency of accreditation shall be for a 3 year period. Proof of application for re-accreditation shall be accepted as an extension to an expired accreditation subject to Clause 7.1 of this code. This shall require attendance at a course of not less than six hours in duration.

## Appendix 5

### Rules Governing the Accreditation of Approved Backflow Technician – Survey

**Suitably qualified:** To become suitably qualified, an applicant must undertake & pass an assessed programme of study encompassing the following criteria:

**Pre-qualification** – The applicant shall be an IQP–testing.

**Duration** – Programme shall consist of a notional 24 hours of face-to-face tuition.

**Programme content** - Any course of study leading to certification in the field of cross connection control survey shall consist of 2 parts:

1. A course of theoretical study which culminates in a summative assessment.
2. Completion of a field survey

*Note: As Unit Standards are being assessed against, the assessor/s must hold Unit Standard 4098 Use standards to assess candidate performance.*

The theoretical programme shall cover the following:

- Common definitions
- Relevant legislation
- Approved documents
- Backflow prevention devices
- Common installations
- Site facilities
- Protection
- Surveying

The practical field survey shall involve:

- A moderately complex establishment that contains a range of hazards

**Accreditation:** Upon successful completion of the practical & theoretical examinations & payment of all fees, a certificate shall be issued by the course provider outlining topics covered and indicating the Unit Standard/s achieved. The provider shall also supply a photo identification card & shall state the type of accreditation with the full name of the tester & a renewal date.

The applicant then must apply to their relevant Water Authority supplying additional information and evidence in order to be accepted as a recognized Backflow Tester.

**Re–Accreditation:** Currency of accreditation shall be for a 3 year period. Proof of application for re–accreditation shall be accepted as an extension to an expired accreditation subject to Clause 7.1 of this code. This shall require attendance at a course of not less than six hours in duration.

## ***Appendix 6***

### **Example of PHRMP Assessment**

DRAFT

Example of PHRMP Risk Assessment									
Risk Event	Risk No.	Potential Cause	Likelihood	Consequence	Overall Risk	Indicators of Performance	Current Preventive Measures,	Immediate Corrective Actions	Improvement Items
Backflow prevention (D2.4) Network pressure less than premises. Introduction of contaminants into the mains	Council is reviewing its Policy on Back Flow Protection to take account of the new legislation re control and ownership of boundary backflow prevention (BFP) (refer Section 69ZZZ of the Health (Drinking Water) Amendment Act 2007). This may lead to a review of the Water Supply Bylaw.								
	1.1	Pressure drop	likely	moderate	High	Customer complaints of contaminated water E coli levels in network Levels of targeted chemical determinants	Installation of BFP that matches the risk to the supply from the premise (See Backflow Risk Assessment table) Annual testing of backflow prevention devices by owners IQP	For all Backflow events isolate and flush affected part of the network	Policy to install BFP on all premises with potential for back flow at owners cost. Contract requirements for qualifications and competency if water Supplier owned. Annual inspection and testing of backflow prevention devices. Only qualified persons permitted to install, inspect, test and maintain BFPs
	1.2	High consumer pressure	possible		Moderate			Determine reason for low pressure and rectify.	
	2.1	No or incorrectly connected backflow device	likely		High				
	2.2	Illegal cross connection	almost certain		Extreme		Annual testing of backflow prevention devices by owners IQP	Survey premise suspected of causing contamination	Policy to install BFP on all premises with potential for back flow at owners cost.
	2.3	Backflow device removed after installation	unlikely		Moderate		Annual testing of backflow prevention devices by owners IQP	Repair/replace	Device as part of meter assembly and owned by Water Supplier. Annual inspection, testing and where necessary replacement of backflow prevention devices. Implementation of spare parts policy
	2.4	Backflow device not installed. Need not identified due to change in use	likely		High		Annual testing of backflow prevention devices by owners IQP Ensure that water supply engineer is advised by Building Consent of any change of use that has occurred		Install appropriate device. Policy to install BFP on all premises with potential for back flow at owners cost.
	2.5	Device failure	likely		High		Annual testing of backflow prevention devices by owners IQP	Repair/replace	Ability to control the test and repair of devices
	2.6	Vandalism or accidental damage	unlikely		Moderate		Annual testing of backflow prevention devices by owners IQP	Repair/replace	Provide lockable enclosures as standard for above ground installations. Protect from further damage



## Appendix 7

### Selection of Backflow Protection from G12

Type of backflow prevention	Cross Connection Hazard					
	HIGH		MEDIUM		LOW	
	back - pressure	back-siphonage	back-pressure	back-siphonage	back-pressure	back-siphonage
Air Gap (Note 1)	X	X	X	X	X	X
Reduced pressure zone device (Note 1)	X	X	X	X	X	X
Double check valve assembly (Note 2)			X	X	X	X
Pressure type vacuum breaker(Note 3)		X		X		X
Atmospheric vacuum breaker(Note 4)		X		X		X
<b>Note:</b> 1. Air gaps and Reduced pressure zone device must not be installed in a toxic environment. 2. Double check valves can be installed in a medium and low hazard toxic environment. 3. Pressure type vacuum breakers are designed to vent at 7 kPa or less. However, they require a significantly higher pressure to reseal and must be installed only in systems which provide pressures sufficient to ensure full closing of the valve. 4. Hose outlet vacuum breakers are a specific type of atmospheric vacuum breaker.						

## Appendix 8

### Example of Backflow Hazard Criteria

HAZARD	ACTIVITY	EQUIPMENT	DEVICE REQUIRED	COMMENTS
<b>High</b> <i>Any condition, device or practice which, in connection with the potable water supply system, has the potential to cause death.</i>	Medical facilities (includes labs, hospitals, pharmacies)	Autoclaves, sterilisers, aspirators, Haemodialysis machines, pan washers, bidets, sluice sinks, spittoons/cuspidors	Reduced Pressure Zone Device, Registered Air Gap,	Equipment used for handling, mixing, measuring and processing chemical or microbiological substances
	Fire or cooling systems with chemicals	Systems containing chemicals such as anti-freeze, anti-corrosion, biocides, or fungicides		
	Industrial & trade waste customers	Boiler, chiller steam calorifier and cooling tower make-up & recycled water; electroplating, degreasing, descaling, pickling, stripping & dipping tanks & vessels		
	Car and factory washing facilities	Chemical dispensers & chemical injectors (high toxicity)		
	Water treatment facilities	Chlorinators, demineralising equipment using ion-exchange resins with acid/alkali regeneration		Plants with auxiliary supplies. Drinking water in reclaimed water plants.

HAZARD	ACTIVITY	EQUIPMENT	DEVICE REQUIRED	COMMENTS
	Dental clinics	Dental equipment		
		Direct heat exchangers (unsealed & toxic environment)		
	Commercial buildings	Fire sprinkler systems and fire hydrant systems that use toxic or hazardous water;		
	Commercial laundries	Recirculated or recycled water		
	Laboratories			
	Mortuaries	Embalming systems		
	Pest control businesses	Hose taps associated with High hazard situations like mixing of pesticides, aspirators, sprayers		
	Food preparation facilities	Clean in place tanks, vats & food storage vessels		
	Photography labs X-ray machines	Developer mixing facilities		
	Airports, piers and docks	Seawater cross- connections (i.e. hoses on wharves, fire systems using seawater, primed by town supply)		

HAZARD	ACTIVITY	EQUIPMENT	DEVICE REQUIRED	COMMENTS
	Sewage pump stations & sump ejectors	Wash-down hoses & decontamination systems		
	Horticultural and commercial gardens	Irrigation systems with chemicals		
	Livestock water supply with added chemicals	Livestock water supply without added chemicals (i.e. antibiotic injectors)		
	Veterinary clinic	Veterinary equipment		
	Water filling stations	Water tankers & associated hoses		
	Schools, universities & polytechnics	Boilers & water based heating systems, laboratories, irrigation systems, swimming pools		
	Purging of flammable or explosive gases in gas systems	Inappropriate use of hydrants		
<b>Medium</b> <i>Any condition, device or practice which, in connection with the potable water supply system, has the</i>	Beauty salon and hairdresser's sinks	Hairdresser's sinks	Reduced Pressure Zone Device, Registered Air Gap, Double check valve	
	Commercial car washes or vehicle wash down	Appliances, vehicles or equipment wash-down facilities without chemical additives		

HAZARD	ACTIVITY	EQUIPMENT	DEVICE REQUIRED	COMMENTS
<i>potential to injure or endanger health.</i>	Water treatment systems	Deionised water, reverse osmosis units and equipment cooling without chemicals		
	Auxiliary water supplies such as pumped and non-pumped fire sprinkler secondary water	Fire sprinkler systems and building hydrant systems  Hose taps and fire hose reels associated with Medium hazard		
	Horticultural and commercial gardens	Irrigation systems with underground controllers Irrigation without chemicals (includes residential irrigation)		
	Rural water supply	Livestock water supply without added chemicals; milking sheds		
	Untreated water storage tanks	Untreated water storage tanks		
	Water and steam cleaning	Water and steam cleaning		
	Water for equipment cooling	Water for equipment cooling		
	Swimming pools, spas and fountains	Swimming pools, spas and fountains		
	Recirculated water systems			

HAZARD	ACTIVITY	EQUIPMENT	DEVICE REQUIRED	COMMENTS
<b>Low</b> <i>Any condition, device or practice which, in connection with the potable water supply system, would constitute a nuisance, by colour, odour or taste, but not injure or endanger health.</i>	Commercial premises	Domestic sanitary fixtures only	Double check valve, Registered Air Gap	Commercial premises potential for change of use.
	Cafes, restaurants & other facilities used for the storage or preparation of food and beverages  Hose tap used for fixed domestic irrigation systems  Drinking water fountains	Drink dispensers with carbonators, coffee machines, dishwashers, garbage can washer, retractable hoses, urinal, auto vege peeler, ice maker  Hose tap used for fixed domestic irrigation systems	Hose connection vacuum break	
<b>Very Low</b>	Residential water connections	Domestic sanitary fixtures	Non-testable Dual Check valve	