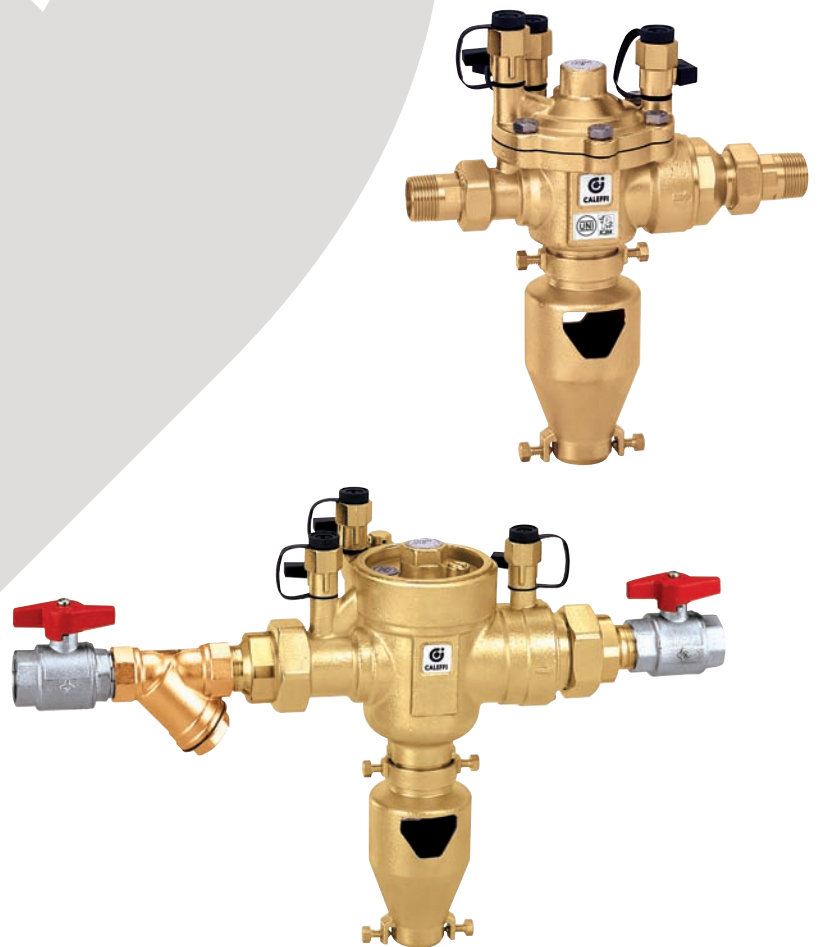


574, 575 & 570 'BA'

backflow preventers



WRAS
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PRODUCT

altecnic

574, 575 & 570 'BA' backflow preventers

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Scope

This document is intended for persons responsible for the maintenance or the refurbishment of existing water installations and those responsible for the design of new installations. In particular it is intended for those persons proposing to use the backflow prevention devices identified as a type 'BA'.

Introduction

There are legal requirements regulating water installations in domestic, commercial and health care premises.

These requirements make it a criminal offence for any person, whether the owner or occupier, to allow the wholesome water supply system within their premises to become:

- Contaminated
- Wasted
- Misused
- Unduly consumed

It is also a criminal offence to allow any contaminated water to backflow into the Water Undertakings distribution system.

Connections between wholesome and unwholesome water systems can create a serious risk to public health where backflow from a cross connection results in contamination of the wholesome water supply system.

Persons with the responsibility for the water installation within their premises should make themselves familiar with the appropriate legislation and the risks that can occur from the backflow and back siphonage of a contaminate.

Introduction

The legislation which governs water installations within private premises is set out in:

- The Water Industry Act 1991
- The Water Supply (Water Fittings) Regulations 1999
- The Water Byelaws 2000, Scotland
- European standard EN 1717

To prevent the contamination of the wholesome water supply system, the Water Regulations require backflow protection devices to be installed at or near to all points where water is to be drawn off for use.

This is generally described as the point of use protection, the type of device will depend upon the proposed use of water and the risk level posed to the wholesome water supply.

Subject to approval by the Water Undertaking, backflow devices may also be installed to provide zone or whole site protection.



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Zone or Whole Site Protection

Zone or whole site protection is used when it is considered necessary to protect one building from another building or one part of a building from another part of the building.

Consideration to install zone or whole site protection is usually given to premises where industrial, chemical or medical processes are carried out. In all instances zone or whole site protection is in addition to and not as a substitute for the required point of use protection.

The 'BA' Backflow Preventer

The 'BA' Backflow Preventer is a verifiable mechanical device designed to prevent contamination of the wholesome water by either back-siphonage due to a reduced or negative pressure in the mains water supply or system back pressure from the water installation within the premises.

The device consists of an arrangement of water fittings within three pressure zones having different obturators and a dump valve.

When backflow or back pressure conditions occurs the device provides an atmospheric separation between the wholesome water system and the contaminated fluid.

Note: Prior to the publication of the Water Regulations on the 1st July 1999 the 'BA' Backflow Preventer was known in the UK as the valve.

Where can the 'BA' Backflow Prevention device be Used?

Proper use of the BA type backflow preventer is regulated by the European standard on prevention of pollution from backflow.

The relevant standard is BS EN 1717:2000 'Protection against pollution of potable water in water installations and the general requirements of devices to prevent pollution by backflow'.

The types of water contained in water systems are classified in this standard according to the degree of risk to health.

Category 1

Water used for human consumption provided by a water company.

Category 2

Fluid which does not present a health hazard, as in category 1, whose quality has been compromised as a result in changes to its temperature, taste, odour or appearance.

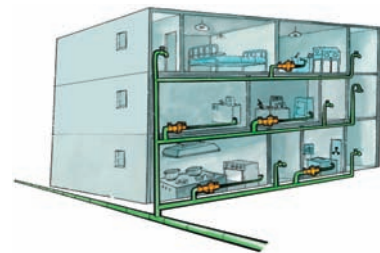
Category 3

Fluid which presents a slight health hazard due to concentrations of "low toxic" substances.

Zone or Whole Site Protection



Back Siphonage caused by a Fractured Mains Pipe.



'BA' Back Flow Preventer installed in a Hospital.



'BA' device installed in a Fire Fighting System

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Protection Matrix

| Type of System | 5 | 4 |
|--|---|---|
| General | | |
| Sprinkler fire fighting systems using anti freeze solution | | • |
| Industrial cistern | • | |
| Non-domestic hose union tap | • | |
| Permeable hoses in other than domestic gardens, laid below or at ground level. with or without chemical additives | • | |
| Primary circuits and central heating circuits in non domestic property. | | • |
| Reclaimed water systems | • | |
| Urinals, WC's and bidets | • | |
| Swimming pools | • | |
| Domestic or residential gardens | | |
| Mini irrigation systems without fertilisers or insecticides such as pop-up sprinklers or porous hoses | | • |
| Food processing | | |
| Bottle washing machines | | • |
| Butchery and meat processing | • | |
| Dairies | | • |
| Food preparation | | • |
| Slaughterhouse equipment | • | |
| Fruit and Vegetable washing | • | |
| Medical | | |
| Medical or dental equipment with submerged inlets | • | |
| Bed pan washing | • | |
| Commercial clothes washing in health care premises | • | |
| Domestic appliances such as sinks, baths and wash basins | • | |
| Hospital dialysing machines | • | |
| Laboratories | • | |
| Mortuary equipment | • | |
| Catering | | |
| Bottle washing machinery | | • |
| Dish washing machines in commercial premises | | • |
| Dish washing machines in health care premises | • | |
| Drink vending machines in which ingredients or CO ₂ are injected into the supply or distribution pipe. | | • |
| Refrigeration equipment | | • |
| Vegetable washing | • | |
| Industrial and commercial applications | | |
| Brewery and distillation | | • |
| Car washing and degreasing plants | | • |
| Commercial clothes washing plants | | • |
| Drain cleaning plant | • | |
| Dyeing equipment | | • |
| Industrial and chemical plants | • | |
| Industrial disinfection equipment | | • |
| Laboratories | • | |
| Mobile plant, tankers and gully emptiers | • | |
| Printing and photographic equipment | | • |
| Water storage for agricultural purposes | • | |
| Animal drinking systems | • | |
| Water treatment plant or water softeners using product other than salt | | • |
| Pressurised water for fire fighting systems | | • |
| Water storage for fire fighting purposes | • | |
| Agricultural | | |
| Commercial irrigation with outlets below or at ground level and/or permeable pipes, with or without chemical additives | • | |
| Commercial hydroponic systems | • | |
| Insecticide or fertiliser application | • | |

Where can the 'BA' Backflow Prevention device be Used?

Category 4

Fluid that presents a significant health hazard due to concentrations of "toxic substances".

Category 5

Fluid that presents a serious health hazard due to concentrations of "pathogenic organisms, radioactive or very toxic substances".

Appropriate backflow prevention devices must be fitted in water systems on the basis of this classification.

Backflow preventers (BA type) can be used to protect against the risk of pollution from backflow for types of water up to category 4.

For category 5 types of water an air gap separation must be used.

Whilst it is usual for the 'BA' device to be installed at the point of use it can if considered necessary.

However it should be remembered zone or whole site protection is in addition to and not a substitute for the required point of use protection.

When a 'BA' device is installed to provide zone or whole site protection, the Water Undertaking will not regard the water downstream of the device as water supplied for domestic purposes. It is the responsibility of the owner or occupier of the premises to ensure the water is suitable for its intended use.

Protection Matrix

To help the designer and/or the installer of the water installation the Water Industry has produced a matrix known as the 'Protection Matrix'.

The matrix indicates the type of installation or application where a 'BA' device is considered to offer an acceptable level of protection to prevent the contamination of the wholesome water supply.

The matrix also identifies high risk installations and applications where a 'BA' device is not considered to give sufficient protection where a 'BA' device will not be allowed to be installed

The standard BS EN 12729 "Devices to prevent pollutions by backflow of potable water. Controllable backflow preventers with reduced pressure zone. Family B. Type A" stipulate the functional, dimensional and mechanical requirements that must be met for controllable reduced pressure zone backflow preventers (BA type).

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Fluid Categories

Category 1

Water undertakers have a duty to supply water which complies with the Water Quality Regulations made under Section 67 of the Water Industry Act 1991.

Compliance with which ensures a wholesome water suitable for domestic or food production purposes and this quality of water is classified as fluid category 1. Therefore, where ever practical water for drinking purposes should be obtained directly from a supply pipe, that is without any intervening storage before use.

Category 2

Fluid category 2 is water which could be classed as fluid category 1 except that it has undergone a change in taste, odour, appearance or temperature. These changes in water quality are aesthetic changes only and the water is considered to present no human health hazard.

Typical applications of fluid category 2 water in domestic situations are:

- a Water heated in a secondary hot water system
- b Mixtures of fluid categories 1 and 2 discharging from mixer tap or shower
- c Water that has been softened by a domestic common salt regeneration process

Note: Where a water softener is installed, water used for mixing with powdered milk for feeding babies should be drawn from an unsoftened supply. A person on a sodium restricted diet should follow their doctors instructions regarding drinking softened water.

Category 3

Fluid in category 3 represents a slight health hazard and are unsuitable for drinking or other domestic purposes.

Typical applications of fluid category 3 water are given below;

- a In houses or other single occupancy dwellings
 - i water in primary heating circuits, whether water treatment chemicals have been added to the system or not
 - ii water within a wash basin, bath or shower tray
 - iii water within clothes or dish washing machines
 - iv home dialysing machines
 - v hand held garden hoses with flow control spray or shut-off control
 - vi hand held fertiliser spray

Fluid Categories

Category 3

- b In premises other than single occupancy dwelling.

Where domestic fittings, such as wash basins, baths or showers are installed in commercial, industrial or other premises these appliances may still be regarded as category 3, unless there is a potentially higher risk. Typical premises in which some or all of these appliances may be regarded as justifying a higher risk category include hospitals and medical establishments.

- c Domestic garden or commercial irrigation systems, without insecticide or fertiliser additives, and with fixed sprinkler heads not less than 150mm above ground level.

Category 4

Fluid category 4 represents a significant health hazard and is not suitable for drinking or other domestic purposes.

'Carcinogenic substances' are those that may on prolonged exposure cause cancer.

'Environmental organisms' refer to micro-organisms, bacteria, viruses and parasites of significance for human health, which can occur or survive in the general environment e.g. legionella or cryptosporidium.

Some typical general applications of fluid category 4 are;

- a Water in primary and heating systems other than in domestic houses, irrespective of whether water treatment chemicals have been added or not.
- b Water treatment or softeners using other than salt
- c Clothes or dishwashing machines other than for domestic uses.
- d Mini-irrigation systems in domestic gardens without fertiliser or insecticide application such as pop-up sprinklers, permanent hoses or fixed rotating sprinkler heads fixed less than 150mm above ground level.



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Category 5

Fluid category 5 represents a serious health hazard and is the most polluting category listed.

'Pathogenic organisms' are micro-organisms such as bacteria, viruses or parasites which are capable of causing illness, especially in humans e.g. Salmonella, Virgo Cholera, . They generally arise in living creatures and may be released to the environment, for example, in faecal matter, animal waste or body fluids.

Some typical general applications of fluid category 5 are;

- a Sinks, urinals, WC pans and bidets in any location
- b Permeable pipes or hoses in other than domestic gardens, laid below or at ground level, with or without chemical additives
- c Grey water recycling systems
- d Clothes or dishwashing machines in high risk premises

The principle distinction between category 4 and 5 is that the toxicity or concentration of substances in category 4 fluids is such that a prolonged period of exposure (days to weeks to months) is generally necessary before serious harm to health occurs.

Category 5 fluids are those which contain substances with higher toxicity or a greater concentration than category 4, resulting in them causing harm to health after short exposure - a single or brief (minutes to hours) exposure.

Installation

Subject to compliance with fitting instructions of the manufacturer and any terms and conditions required by the Water Undertaker the 'BA' device can be installed by"

- The owner or occupier.
- The owner or occupiers nominated contractor.
- The supplier of the 'BA' device.
- The manufacturers/suppliers nominated contractor.

The 'BA' device must be installed horizontally and with the discharge from the relief port must always be in a downwards direction.

The discharge tundish must comply with BS EN 1717 and be connected to a suitable drain.

Before installing the 'BA' device the strainer and pipework be thoroughly flushed.

When used to protect the mains supply the 'BA' device must be installed downstream from the water meter, whereas when used to protect the potable water system inside a building they should be installed close to the point of use where pollution might occur, e.g. dish washing machine, garden irrigation system.

Installation

The device must be above ground and not installed in locations that are or can be affected by:

- Flooding
- Damage by frost
- Physical damage

Also they must not be installed over or near electrical equipment.

The location should enable free access for installation and at all times allow access for any necessary maintenance, repair or replacement.

To facilitate maintenance, the 'BA' device must be incorporated within a 'protection unit' which consists of:

- An inlet servicing valve - a WRAS approved isolating valve
- An in-line strainer - a WRAS approved product
- The 'BA' device - a WRAS approved product
- An outlet servicing valve - a WRAS approved isolating valve

'BA' devices also require periodic testing to ensure they are continuously maintain their optimum performance level. The frequency of testing will be determined by the Water Undertaker and included in their terms and conditions of installation. Whilst the Water Undertaker may require more frequent tests, tests in excess of 12 months will not be permitted.

Full installation details, including dimensional details are given later.



Note: Only 'BA' devices which are approved by the Water Industry are permitted to be installed. A full list of all approved 'BA' devices can be found in the Water Industries 'Water Fittings and Materials Directory' published by the 'Water Regulations Advisory Service' WRAS.

574, 575 & 570 'BA' backflow preventers

Installation Guidelines

This additional information applies to new installation and the replacement of existing assemblies.

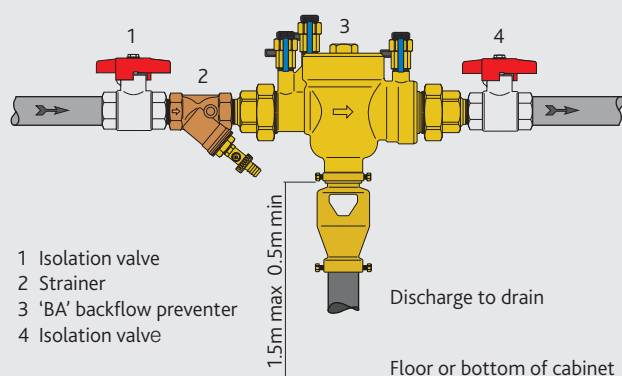
The assembly shall be housed in a tamper free environment or secure cabinet.

There shall be an air gap between the exit port of the relief valve mechanism and the tundish. This air gap dimension will be dependent upon the size of the inlet pipe to the assembly. Adequate drainage from the cabinet must be provided.

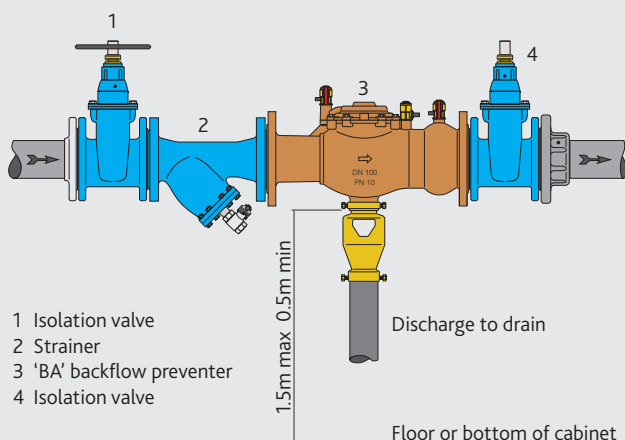
The assembly shall be installed horizontally with the discharge from the relief port in a downwards direction (unless approved for vertical installation).

An in-line strainer shall be installed downstream of the inlet isolating valve and immediately upstream of the 'BA' device so as to prevent debris entering the device which could impair its performance.

Large assemblies should be fitted with additional support brackets as necessary.



Sizes DN15 to DN50



Sizes DN65 to DN100

Installation Guidelines

The 'BA' device shall be installed above ground at a height that enables effective inspection and maintenance.

The minimum height from the floor or base of the cabinet to the underside of the exit port of the relief valve shall not be less than 0.5m and maximum height shall not be more than 1.5m.

Except for the closure of the cabinet doors and lids there shall be free access for maintenance of the assembly and use of the test equipment.

For assemblies of DN15 to DN50 (nominal bore) there shall be a minimum of 50mm horizontal clearance from any protrusion or surface at the rear of the assembly and any rear wall or rear of the cabinet.

For assemblies of DN65 to DN250 there shall be a minimum of 100mm clearance at the rear of the assembly.

Sufficient space should be allowed to clean the strainer element using the blow down valve on the cover and for removal of the strainer element should it become damaged or for more thorough cleaning.

Every assembly shall be installed with resilient seat isolation valves at both inlet and outlet (unless incorporated within the strainer) to allow isolation of the device and strainer.

Following installation the assembly shall be flushed and disinfected in accordance with guidance in BS 6700 'Design, installation, testing and maintenance of services supplying water to domestic use within buildings or their curtilages'.

Following flushing and prior to commissioning the accredited tester shall check to ensure the relief valve functions correctly.

With the downstream isolation valve closed, gradually open the upstream test point to release air. The procedure shall be repeated for the intermediate and downstream zones.

When all the air system is removed the upstream isolation valve should be closed.

The upstream test port valve is then eased open, releasing the upstream pressure on the diaphragm. The relief valve should then open automatically, discharging the water in the intermediate zone through the relief valve mechanism.

The exercise must be repeated no less than 4 times to ensure that the relief valve mechanism is not sticking closed or failing to open.

The assembly may now be commissioned and site tested.

A test certificate must be issued.

Note: Specific requirements may apply to fire protection systems.

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Installation Registration

It is a requirement that all 'BA' devices are registered with the Water Undertaker. Under their terms and conditions, the Water Undertaker will arrange for an inspection to be made of the complete installation.

The inspection will confirm the device has been correctly installed, is in the agreed location, and is fully accessible for periodic testing, maintenance, repair and replacement. The inspection will also confirm that any other terms and conditions of the installation have been complied with.

Subject to approval, the Water Undertaker will arrange for the 'BA' device to be included in their register of approved installations.

Commissioning and Periodic Testing

Prior to being brought into use, all 'BA' devices must be commissioned to ensure they function correctly and the correct pressure differential is being maintained between the upstream, intermediate and downstream pressure zones.

After commissioning the device will then be subject to periodic testing as determined by the Water Undertaker in their terms and conditions of installation.

An accredited tester who has been assessed by the Water Industry and whose name is included on the National Register of Approved Tester must carry out the commissioning and testing of 'BA' devices.

A list of all registered testers is included in the WRAS Water Fittings and Materials Directory.

Records

A record/test certificate is required to be completed after first commissioning and then after each subsequent test or maintenance of the device. The test certificate will record:

- The name of the company
- The name of the Water Undertaker
- The date of the test
- Location of the device
- Make, type, and size of the device
- Initial test results
- Details of any repairs
- Appropriate test results after any necessary repairs
- Name and address of the tester
- Tester's registration number
- Date of the next test

Copies of the test certificate are required to be sent to the Water Undertaker, with additional copies kept on site, at or near to the location of the device and by the tester.

Operating Principles

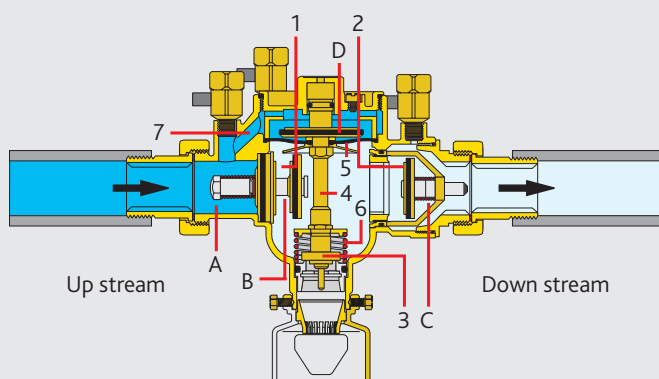
The controllable reduced pressure zone backflow preventer comprises a body with an inspection cover, an upstream check valve (1), a downstream check valve (2) and a discharge device (3).

The two check valves separate the three different zones, each of which is a different pressure; an upstream or inlet zone (A); an intermediate zone, also known as the reduced pressure zone (B); a downstream or outlet zone (C). Each of these zones has a test port for measuring the pressure.

A discharge device (3), is located in the lower part of the intermediate zone.

The obturator of the discharge device is connected via the valve stem (4) to the diaphragm (5).

This mobile unit is pushed upwards by the spring (6). The diaphragm (5) marks the limit of the top chamber (D), which is connected to the upstream zone by the channel (7).



Normal flow conditions

Under conditions of normal flow, both check valves are open, while the pressure in the intermediate chamber (B) is always lower than the inlet pressure by at least 140 mbar due to the pressure loss caused by the check valve (1).

In the top chamber (D), however, the pressure is the same as in the inlet zone.

In this situation, the mobile unit consisting of the diaphragm (5), the

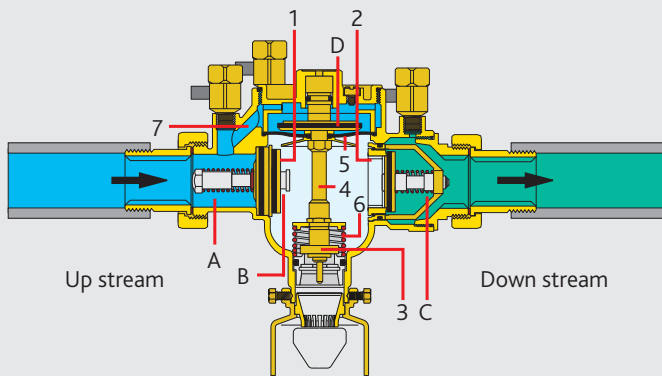
valve stem (4) and the valve obturator (3) is pushed down by the push created by the difference in pressure acting on the diaphragm which is greater than that of the spring (6) acting in the opposite direction.

The discharge valve is therefore held in the closed position

574, 575 & 570 'BA' backflow preventers

Operating Principles

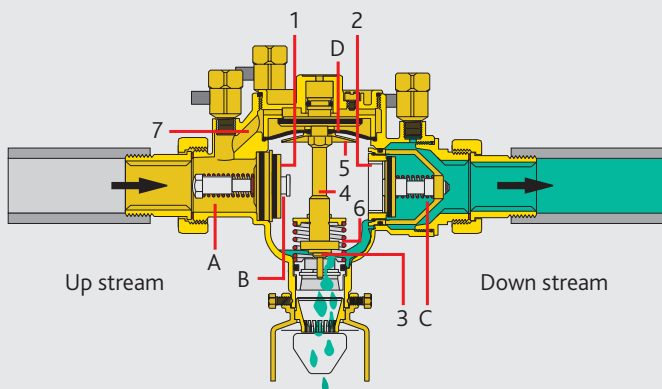
No flow conditions



The check valves (1) and (2) are now closed.

Since the pressure in the upstream zone and therefore also in the top chamber (D), is still at least 140 mbar higher than the pressure in the intermediate chamber (B), the discharge valve remains closed.

Upstream pressure loss



Both check valves close as the pressure upstream drops.

The discharge valve (3) opens when the difference in pressure ΔP , between the upstream and the intermediate zones falls, drops below 140 mbar.

Under these conditions the action exerted by the pressure difference ΔP on the diaphragm (5), becomes weaker than that exerted by the spring (6), and the discharge valve (3) opens as a result. Discharge then occurs until the body of the backflow preventer is empty.

When the situation returns to normal (pressure upstream greater than pressure downstream), the discharge valve closes and the backflow preventer is again ready to operate.

Downstream back pressure

If the pressure in the downstream zone increases until it is greater than the upstream pressure, the check valve (2) closes and therefore prevents water already delivered from returning back into the mains system.

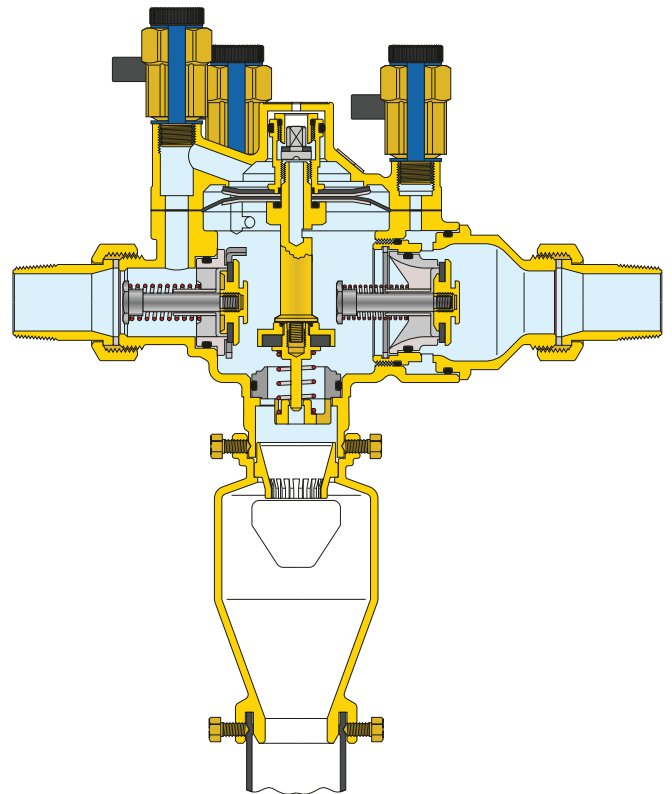
If the seal of the check valve (2), is slightly defective or in general terms there is any other type of fault in the backflow preventer, the device always interrupts (disconnects) the connection between the mains system and the receiving system.

The backflow preventer has been designed with all construction details required for a properly functioning positive action device; the best possible safety conditions are therefore ensured under all conditions.

Constructional Details

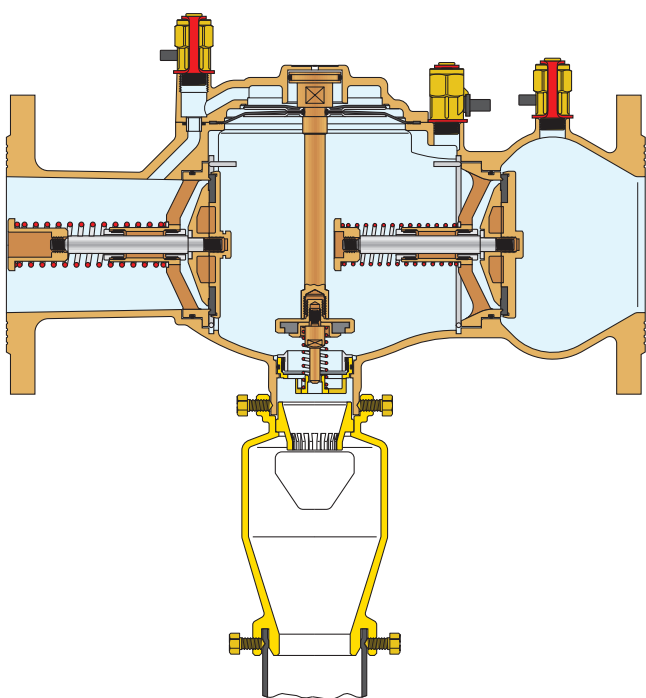
Discharge funnel

In compliance with standard EN 1717 backflow from the connected pipe must be prevented during discharge and this must occur without any external water spillage. Consequently the tundish connected to the discharge pipe must be of an appropriate size with special openings to create the necessary air gap and it must be equipped with a proper flow conveyor.



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Constructional Details



Anti-corrosion materials

The materials used to manufacture the backflow preventers must be corrosion resistant due to contact with drinking water.

They are therefore constructed using an dezincification resistant alloy, bronze and stainless steel to ensure long lasting high performance.

Elastomers complying with food regulations

The elastomers employed for the water seals are approved by Certifying Bodies in compliance with the most recent regulations governing compatibility for use with drinking water.

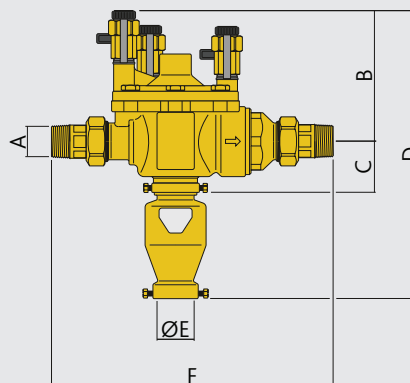
Easy maintenance

The backflow preventer is inspected periodically during its normal operating life to check that it is functioning correctly. Should the need arise, dismantling and maintenance operations are simple and easy to perform with components that are easy to inspect and replace without disconnecting the valve body from the pipework.

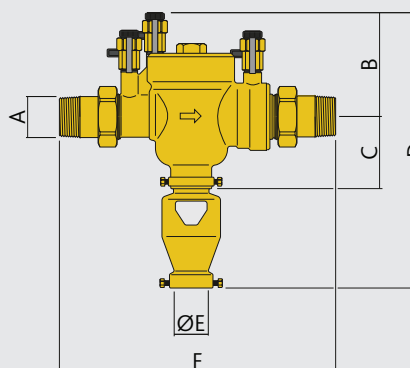
Certification

The series 574 and 575 BA type controllable reduced pressure zone backflow preventers are WRAS approved products.

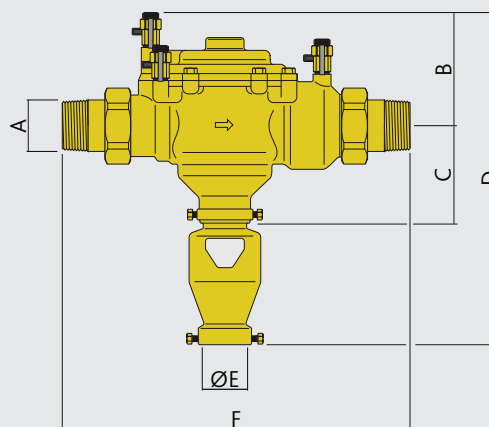
Dimensions



| Prod Code | A | B | C | D | E | F | kg |
|-----------|-----|-----|----|-----|----|-----|-----|
| 574040 | R1½ | 103 | 30 | 263 | 40 | 227 | 2.9 |
| 574050 | R¾ | 103 | 30 | 263 | 40 | 227 | 2.9 |



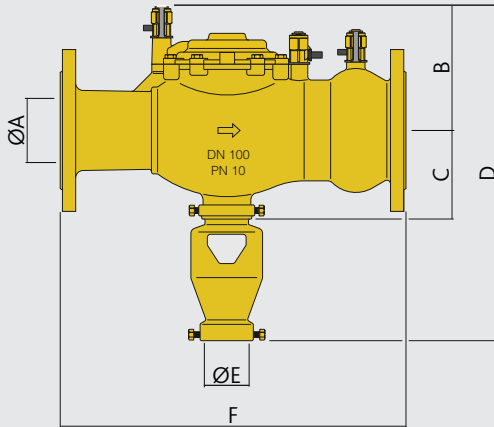
| Prod Code | A | B | C | D | E | F | kg |
|-----------|-----|-----|----|-----|----|-----|-----|
| 574600 | R1 | 100 | 30 | 292 | 40 | 280 | 3.6 |
| 574700 | R1¼ | 100 | 30 | 292 | 40 | 280 | 3.8 |



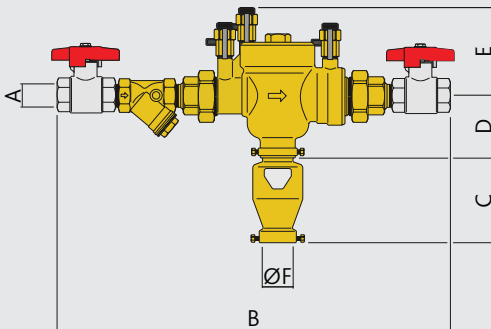
| Prod Code | A | B | C | D | E | F | kg |
|-----------|-----|-----|----|-----|----|-----|------|
| 574800 | R1½ | 130 | 31 | 382 | 50 | 387 | 11.3 |
| 574900 | R2 | 130 | 31 | 382 | 50 | 395 | 11.4 |

574, 575 & 570 'BA' backflow preventers

Dimensions

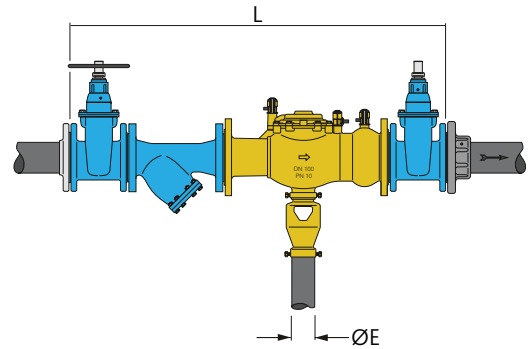


| Prod Code | A | B | C | D | E | F | kg |
|-----------|-----|-----|----|-----|----|-----|------|
| 575005 | 50 | 129 | 27 | 382 | 50 | 303 | 13.2 |
| 575006 | 65 | 133 | 27 | 385 | 50 | 305 | 17.0 |
| 575008 | 80 | 170 | 26 | 484 | 80 | 470 | 26.5 |
| 575010 | 100 | 170 | 26 | 484 | 80 | 470 | 28.0 |



| Prod Code | A | B | C | D | E | F | kg |
|-----------|----|-----|-----|-----|-----|----|------|
| 570004 | ½ | 365 | 130 | 45 | 103 | 40 | 3.0 |
| 570005 | ¾ | 390 | 130 | 45 | 103 | 40 | 3.6 |
| 570006 | 1 | 430 | 162 | 73 | 100 | 40 | 5.4 |
| 570007 | 1¼ | 540 | 162 | 73 | 100 | 40 | 6.2 |
| 570008 | 1½ | 670 | 221 | 104 | 130 | 50 | 14.4 |
| 570009 | 2 | 735 | 221 | 104 | 130 | 50 | 16.5 |

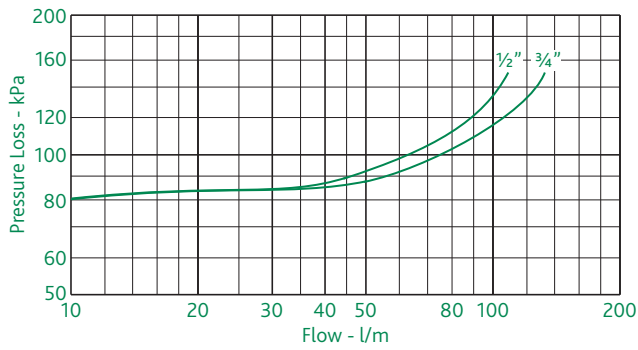
Dimensions



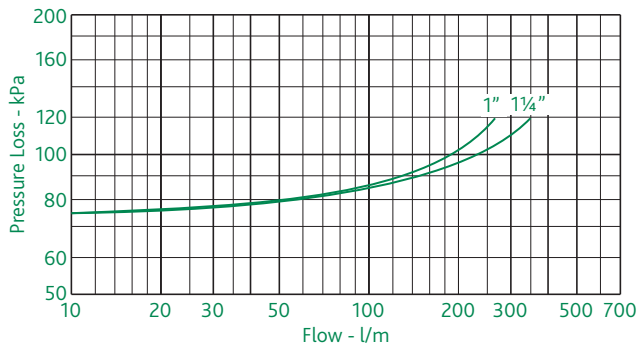
| Prod Code | DN | L | E | kg |
|-----------|-----|------|----|-----|
| 575050 | 50 | 1050 | 50 | 70 |
| 575060 | 65 | 1150 | 50 | 180 |
| 575080 | 80 | 1350 | 80 | 104 |
| 575100 | 100 | 1430 | 80 | 135 |

574, 575 & 570 'BA' backflow preventers

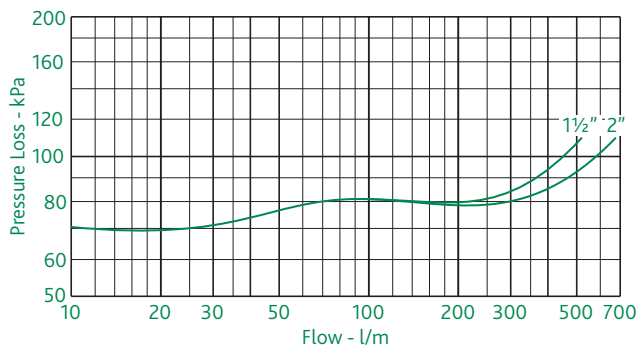
Flow Characteristic



Sizes: 1/2" & 3/4"

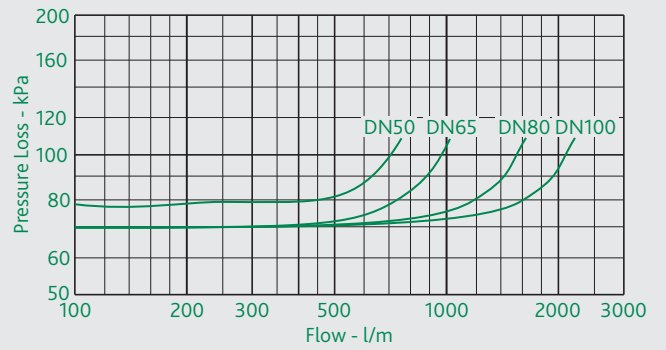


Sizes: 1" & 1 1/4"



Sizes: 1 1/2" & 2"

Flow Characteristic



Sizes: DN50 to DN100

E & O.E

Altecnic Ltd Mustang Drive, Stafford, Staffordshire ST16 1GW

T: +44 (0)1785 218200 E: sales@altecnic.co.uk

Registered in England No: 2095101

altecnic.co.uk

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