

Water Suppliers' Approved Installation Method



Type BA Device – Verifiable Backflow Preventer with Reduced Pressure Zone (RPZ Valve)

Requirements for installation, on-site testing and maintenance

Incorporating the WRAS Information and Guidance Note 9-03-02

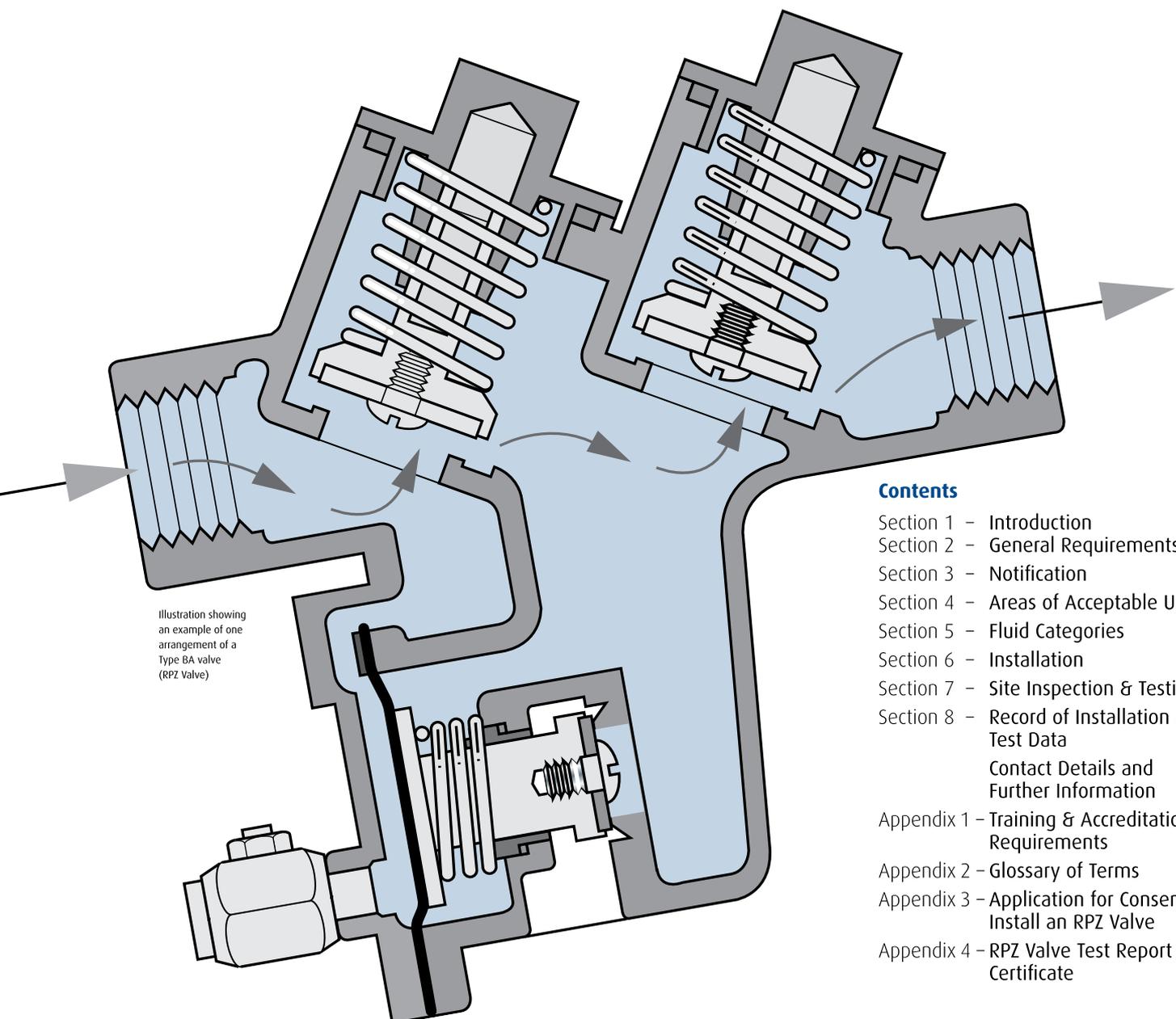


Illustration showing an example of one arrangement of a Type BA valve (RPZ Valve)

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Approved Installation Method

Type BA Device – Verifiable Backflow Preventer with Reduced Pressure Zone (RPZ Valve)

1. INTRODUCTION

- 1.1** This document sets out the Water Supply Industry's requirements for the installation, commissioning, on-site testing and maintenance of the Type BA Device – a Verifiable Backflow Preventer with Reduced Pressure Zone – referred to as either a BA device or an RPZ valve. This document should be read in conjunction with the Water Supply (Water Fittings) Regulations 1999. The Regulations state that RPZ valves must comply with the requirements for water fittings (Regulation 4) and must be installed 'in a workmanlike manner'. One way of complying with the 'workmanlike manner' requirement is to conform to a method of installation approved by the Water Supplier [Regulation 4 (6)(c)]. This document has been endorsed by the UK Water Supply Industry as the **Approved Installation Method (AIM)** for these valves and it applies to both new installations and the replacement of existing valves.
- 1.2** The information and water industry requirements in this document will assist designers, installers and testers who are involved directly or indirectly with water supply systems within premises and will be used by the Water Supply Industry in its enforcement of the Regulations.

1.3 Reference to 'Regulations' in this document means the Water Supply (Water Fittings) Regulations 1999 in England and Wales and the Scottish Water Byelaws 2004. Technically similar legislation is being prepared for introduction in Northern Ireland. The Regulations are made under the provisions of the Water Industry Act 1991 and the Scottish Byelaws under the Water (Scotland) Act 1980. They replace the earlier water supply byelaws and are enforced by the water suppliers. The Regulations make it clear that any fitting, whether or not it is installed for the purpose of preventing contamination, shall be maintained in full working order. Failure to do so may be an offence and non-compliance with this Approved Installation Method (AIM) would be a relevant consideration in determining whether an offence has been committed.

- 1.4** **Commissioning and testing of an RPZ Valve must only be carried out by an accredited tester approved by the Water Supplier as being competent to test.** A current list of testers is available from WRAS and is published on the WRAS website www.wras.co.uk.
- 1.5** Backflow from fittings or appliances resulting in unwholesome water passing into drinking water supplies can constitute a serious public health hazard. There are numerous, well documented cases where backflow has resulted in contamination incidents which were harmful to health. The risk is a continuous one because plumbing systems are frequently being installed, altered, or extended.
- 1.6** Prevention of backflow requires a thorough knowledge and continual vigilance. Education is essential and even those who are experienced in plumbing systems may fail to recognise potential backflow and cross-connection situations. Those responsible for the water supply in their premises must be familiar with the potential risks from backflow and cross-connections and must carefully monitor their systems.



1.7 It is a criminal offence to contaminate the water supply or to use fittings which cause or are likely to cause contamination. This applies equally to backflow causing contamination of water in the Water Supplier's mains or in the customer's premises before use.

1.8 The particular requirements relevant to risk assessment, backflow protection and backflow protection devices are to be found in Regulations 3 and 4 and Paragraphs 6, 14 and 15 of Schedule 2 of the Regulations.

2. GENERAL REQUIREMENTS

2.1 The installation and use of RPZ Valves must be notified in advance to the Water Supplier (see *Section 3*) and may be subject to additional terms and conditions made by the Water Supplier when granting consent. Potential users of RPZ Valves must be made aware of all the terms of consent regarding installation and maintenance. RPZ Valves create a pressure drop across the device and may not be suitable for use on low pressure supplies. The water pressure at the intended location of the valve must be known before it is installed and must be suitable.

2.2 All water fittings must satisfy the requirements of the Regulations. Some manufacturers have had their products tested and WRAS Approved, to show compliance with the Regulations. A full list of WRAS Approved products, including RPZ valves, can be found in the 'Water Fittings and Materials Directory', on the WRAS website www.wras.co.uk.

2.3 The installation and use of an RPZ Valve requires a long-term commitment to testing and maintenance on a regular basis (see *Section 7*). Test methods and maintenance regimes shall be in accordance with the Water Supplier's requirements. Failure to comply with these requirements increases the risk of contamination by backflow and may result in the Water Supplier temporarily suspending the supply and requiring the removal of the RPZ Valve and the installation of an alternative, suitable backflow prevention arrangement.

3. NOTIFICATION

3.1. All proposed installations of RPZ valves must be notified in advance to the local Water Supplier. Normally this will be done as part of the notification process carried out to comply with Regulation (Byelaw) 5. Details of the proposed work must be sent to the Water Supplier at least ten days before work is due to start. Installing or using an RPZ Valve without the required consent could result in criminal prosecution. (For Approved Contractors, see Section 3.3b).

3.2 The form 'Application For Consent to Install an RPZ Valve (Type BA Device)' on page 10 shows the minimum information needed by a Water Supplier for granting consent. When granted, consent to install may include specific conditions required by the Water Supplier. These conditions and the general requirements set out in this document covering RPZ valve installation, commissioning and on-site testing, must be complied with.

3.3 APPROVED CONTRACTORS

a. The Regulations permit Water Suppliers and other authorised organisations to designate Approved Contractors. They are allowed to certify that installation work (excluding commissioning and testing) or alterations they have carried out comply with the Regulations. On completion of the installation the Approved Contractor must provide a copy of the installation compliance certificate to the person who asked for the work to be carried out and, in most cases, must also send a copy of the certificate to the Water Supplier.

b. The Regulations do not require an **Approved Contractor** to have the Water Supplier's prior consent before making alterations or extensions of plumbing systems in any premises or installing mechanical backflow prevention devices up to and including Fluid Category 4 risks. However, it is a Water Supply Industry requirement under this Approved Installation Method (AIM) that prior notice shall be given for the installation of all RPZ Valves, to ensure the backflow risk assessment is correct.

4. AREAS OF ACCEPTABLE USE

- 4.1** An RPZ valve can be installed to provide protection against backflow at the point of use from a fluid category 4 risk. Fluid risk Categories are defined in Schedule 1 of the Regulations.
- 4.2** The recommendations of the 'Report of the Expert Group on the Risk of Contamination of the Public Supply by Backflow' (IGN 9-04-05) included the use, where necessary, of an RPZ valve to provide protection against backflow from the whole premises (whole-site protection) or from a part of it (zone protection). Zone or whole-site protection does not replace the Regulations' requirement for adequate point-of-use backflow protection.
- 4.3** It is acceptable to use an RPZ valve to protect against backflow risks for fluids categories of less than 4. However, where RPZ valves are to be installed in these circumstances, the Water Supplier's consent must still be obtained in advance and the valve must still be commissioned, maintained and tested according to the requirements of this document.
- 4.4** RPZ valves intended for use other than with cold water must be suitably approved.
- 4.5** In exceptional circumstances, at the discretion of the Water Supplier, an RPZ valve may be permitted as backflow protection for risks which are greater than Fluid Category 4 for a limited period, e.g. to allow a system to be upgraded.
- 4.6** The responsibility rests with the Water Supplier's customer to ensure the water quality downstream of the RPZ valve is suitable for the use to which it is put and to ensure the backflow risk does not exceed fluid category 4.

5. FLUID CATEGORIES

- 5.1** Each water fitting or appliance that conveys or is intended to convey water supplied by a Water Supplier must be assessed for its risk of contaminating the water supply by backflow. Schedule 1 of the Regulations defines backflow risks into five 'fluid categories' and Schedule 2 defines appropriate devices and arrangements to protect against backflow. The fluid category should be assessed on the highest level of risk to which the water fitting is or may be exposed.

DEFINITION OF FLUID CATEGORY 4

Fluid which represents a significant health hazard due to the concentration of toxic substances, including any fluid which contains:

- a. *chemical, carcinogenic substances; or pesticides (including insecticides and herbicides); or*
- b. *environmental organisms of potential health significance.*

- 5.2** Table 1 below, gives examples of fluid category 4 backflow risks where RPZ valves could be used. It should be noted that the list is not exhaustive. The fluid category is dependent on a risk assessment which takes into account the site-specific circumstances. Further guidance can be sought from the Water Supplier.

TABLE 1: FLUID CATEGORY 4 EXAMPLES

Type of installation/appliance with Fluid Category 4 backflow risk

General

Fire sprinkler systems using anti-freeze solutions

Primary circuits and central heating systems, in other than a house, with design heat output greater than 45 kWh (150,000 Btu/h)

Domestic or residential gardens

Mini-irrigation systems without fertiliser or insecticide application, such as pop-up sprinklers or porous hoses

Food processing

Bottle washing apparatus

Dairies

Food preparation

Catering

Bottle washing apparatus

Dishwashing machines (not for healthcare patients)

Potato peeling machine (pre-washed produce)

Refrigerating equipment

Industrial and commercial installations

Brewery and distillation plant

Car washing and degreasing plants

Commercial clothes washing plants, excluding use for medical or healthcare items

Dyeing equipment

Pressurised fire-fighting systems

Printing and photographic equipment

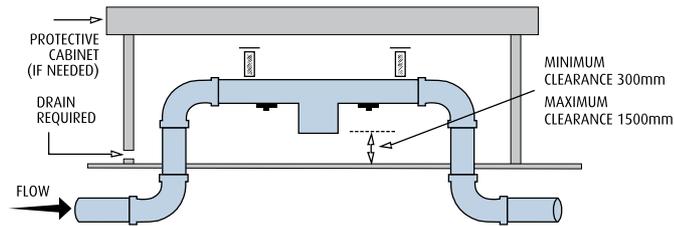
Water treatment plant using other than salt

6. INSTALLATION

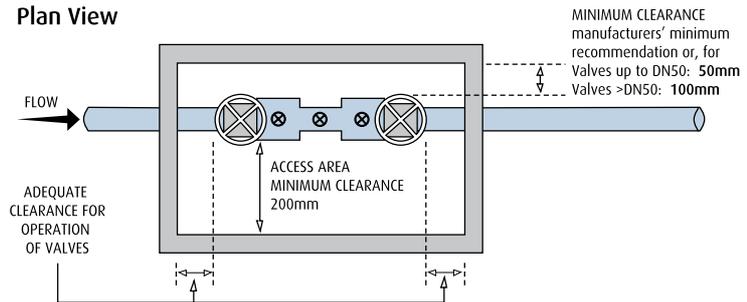
- 6.1** RPZ valves shall not be installed in a place or position which is:
- liable to flooding
 - above electrical equipment
 - liable to mechanical or other damage
 - exposed to freezing, unless measures are taken to prevent the assembly from freezing
 - concealed.
- 6.2** Careful consideration should be given to the design of installations with regard to fluctuating pressures. Installation of a single check valve upstream of the RPZ valve can prevent upstream pressure fluctuations which may lead to frequent discharges from the relief valve. Manufacturers' advice should be sought.
- 6.3** Any discharge from the relief port must be readily visible. There shall be an air gap at the exit port of the relief valve mechanism, which may discharge directly onto the floor or through a tundish. If a tundish is installed to receive the discharge this must be in accordance with BS EN 1717 air break to drain.
- 6.4** Unless the valve is specifically approved for vertical installation, it must be installed horizontally with the relief valve discharging downwards. An in-line strainer shall be installed upstream of the RPZ valve to prevent any fouling of the elements of the assembly. Large assemblies should be fitted with additional support brackets as necessary.
- NB.** Strainers are not required or recommended on fire supplies.
- 6.5** The RPZ valve shall be installed (*see Fig 1.*) above the floor level at a height that enables effective inspection, testing and maintenance. The minimum height from the ground or floor level or the base of any cabinet to the underside of the exit port of the relief valve shall not be less than 300mm. The maximum height from the ground or floor level including permanently fixed gantries shall not be more than 1.5m. The use of permanently available mobile access platforms can be considered suitable.

Figure 1. Type BA (Reduced Pressure Zone Backflow Preventer)
Typical installations with minimum clearances

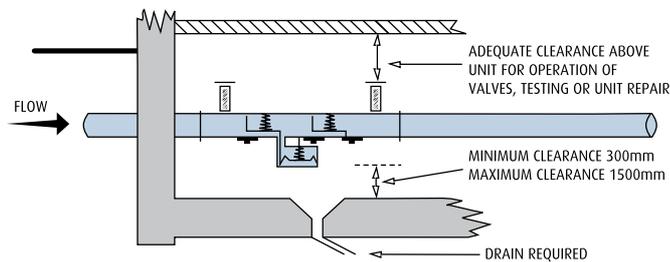
ABOVE GROUND Side View



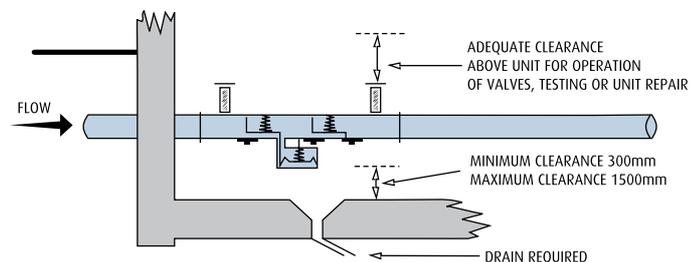
ABOVE GROUND Plan View



IN BUILDING Side View



IN BASEMENT Side View



- 6.6** Except for the closure of secure cabinet doors and lids there shall be free access for the maintenance of the assembly and the use of test equipment to provide the manufacturers' minimum recommended clearances or those detailed in Figure 1.
- 6.7** Every assembly shall be installed with a resilient seat or seal isolation valve at both inlet and outlet, adjacent to the assembly (if not incorporated with the device) and upstream of the inlet strainer, where fitted, so that the internal components of the assembly may be inspected, tested and maintained as necessary.
- 6.8** Following installation the assembly shall be flushed and, if required, disinfected in accordance with BS 6700, 'Design, installation, testing and maintenance of services supplying water for domestic use within buildings or their curtilages', before being commissioned and site tested (See Section 7).

7. SITE INSPECTION AND TESTING

7.1 GENERAL

- 7.1.1** Each valve must have a unique reference number for identification purposes permanently attached to or engraved on the body of the valve.
- 7.1.2** Site testing of a RPZ Valve must only be carried out by an accredited tester approved by the Water Supply Industry as being competent to test the assembly. Testing shall be carried out at least annually or at more frequent intervals as specified by the Water Supplier.

Subject to agreement with the Water Supplier a device may be tested prior to the expiry of a current test period. The acceptable timing shall be:

- UP to 30 days prior to the expiry of any test period of 6 months or more
- UP to 14 days prior to the expiry of any test period of less than 6 months.

When testing takes place within these timescales, the new certificate shall be dated from the expiry date of the one it is replacing.

- 7.1.3** Where an RPZ valve is part of equipment which is portable or is routinely moved from premises to premises – for example on a cement-batching plant or attached to a standpipe – the valve must be tested on being transferred from one premises to another or at intervals not exceeding six months, whichever occurs first.

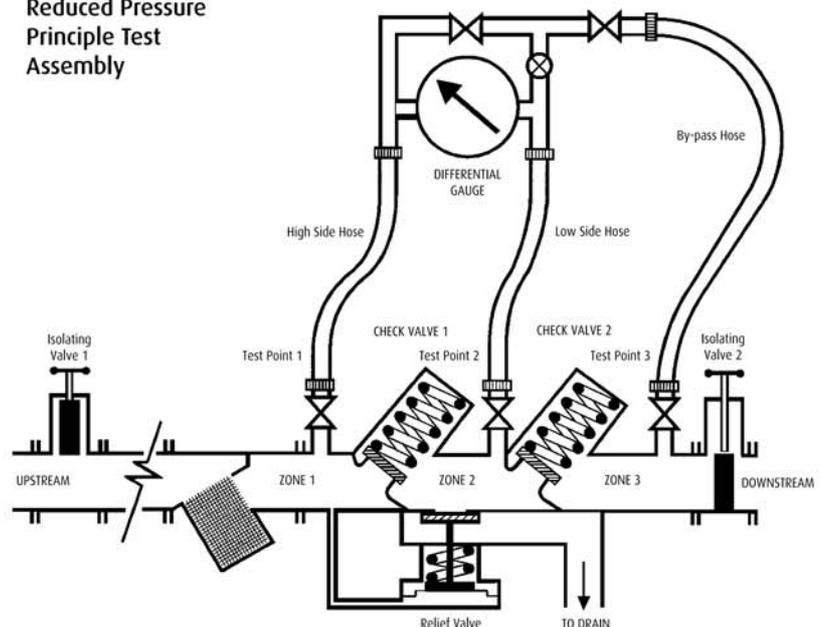
- 7.1.4** RPZ valves used on hot water must be tested under normal operating conditions.

Due regard to health and safety must be observed during commissioning and testing. Assurance of the suitability of RPZ valves and test instruments for use on hot water should be sought from the appropriate manufacturer or supplier.

7.2 INSPECTION AND TESTING

- 7.2.1** Assemblies shall be inspected to establish:
- Accessibility
 - The measurements of air-gaps at drain points
 - The satisfactory function of the strainer (debris to be removed if necessary)
 - Conformity with this document.
- 7.2.2** The function of the RPZ valve and associated fittings shall be tested and recorded by the accredited tester to establish:
- The tightness of the isolating valves, dependant on the field test method used. i.e. North American or European.
 - The function of the relief valve (opening and closing)
 - The relief valve shall be watertight at both the commencement and conclusion of the test.
 - The relief valve should start to open at a differential pressure between zone 1 and zone 2 (see Fig 2) of not less than 0.14 bar. (See Note 1.)

Figure 2.
Reduced Pressure
Principle Test
Assembly



- c. Water tightness of **both** check valves in a no flow situation.
 - No. 1 (upstream) check valve shall maintain a minimum direction of flow pressure differential of not less than 0.2 bar in the direction of flow, greater than the opening point of the relief valve (the buffer). (See Note 2)
 - No. 2 (downstream) check valve shall be watertight against a back pressure and shall maintain a minimum direction of flow pressure differential of not less than 0.07 bar. However, If the No. 2 check valve is a type EB check valve conforming to the relevant parts of BS EN 13959, the pressure differential shall be not less than 0.005 bar. (See Note 3)

Standard test kits may not be able to record differential pressures as small as 0.005 bar. Manufacturers of RPZ valves which use EB devices may offer advice on suitable test equipment or look on the WRAS website for a suitable test method.

- d. Any supplementary information required by the Water Supplier.

7.2.3 In the event of a RPZ valve failing a test, it should be repaired or replaced and satisfactorily re-tested. Where this cannot be done within 72 hours of the initial test failure, the Water Supplier must be informed immediately. The Water Supplier will assess the nature of the test failure and whether the risk of backflow requires the water supply to the RPZ valve to be shut off or other measures taken to minimise the risk.

Note 1: The acceptable minimum 'on site' test figures may differ from any laboratory test figures. The reason for this is to assure the Water Supplier that the device, when installed on site is providing suitable backflow protection and will prevent no more than a reasonable operational discharge of water.

Note 2: The 'buffer' is the difference between the differential pressure across the No1 check valve and the differential pressure at the moment when the relief valve begins to discharge water. This facilitates reasonable fluctuations in the upstream pressure without the relief valve discharging unnecessarily. Some intermittent operational discharge is deemed acceptable. Devices that do not maintain the suitable buffer will fail the field test. These devices will be deemed to be likely to cause waste or undue consumption of water in contravention of appropriate water legislation.

Note 3: Valve testers need to identify if the No. 2 check valve of the RPZ valve they are proposing to test is a Type EB check valve conforming to the relevant parts of BS EN 13959. Refer to the WRAS website for details of valves incorporating these devices, or consult the manufacturer.

7.3 COMMISSIONING AND TEST DATA

- 7.3.1 The example test report form on page 12 is designed for the collection of test data during commissioning of the assembly and at subsequent prescribed test intervals.
- 7.3.2 On completion of a test, a 'test report' certificate must be completed by the tester in accordance with the requirements set out in Section 8 and copies submitted to the person responsible for the device and to the Water Supplier within 10 working days.
- 7.3.3 A test record card is recommended to be left on or adjacent to the RPZ valve. (See Fig. 3).

Figure 3. Test Record Card

Serial No.
Date Tested
Name of Tester
Tester's No.
Signed
Re-test Date
<i>Contact details:</i>	

8. RECORD OF INSTALLATION & TEST DATA

8.1 DUTIES AND RESPONSIBILITIES

Testing for defects and subsequent maintenance of the RPZ valve is critical to its function. Terms and Conditions for the supply of water for non-domestic purposes may be made for controlling the installation of a RPZ Valve. These Terms and Conditions will require a record to be kept of each assembly.

8.2 RECORDS

8.2.1 A copy of the current test certificate must be available on site.

8.2.2 Installation, commissioning and subsequent test data shall be forwarded to the Water Supplier and copies retained by the Tester and the Water Supplier's customer for a period of at least five years.

8.2.3 Examples are shown in Appendices 3 and 4 of application and test report certificate forms. This is the minimum information required.

8.2.4 The records relating to tests carried out on each RPZ Valve must indicate:

- a. The results of tests performed.
- b. Details of calibration dates of test equipment which will be at least annually and following damage or repair.
- d. Comments relevant to installation, maintenance and operation.
- e. Information to identify the valve, the tester and the tester's accreditation number.
- f. Date and time of commencement and of completion of inspection and test or tests.
- g. Date when the next test is due.

APPENDIX 1

TRAINING AND ACCREDITATION REQUIREMENTS

A1.1 For an accredited tester to be approved by the Water Supplier:-

- Accreditation of the tester will be by an organisation approved by WRAS on behalf of the Water Suppliers.
- For such an organisation to be approved by WRAS, its RPZ valve training and assessment will include the water industry approved curriculum, available from WRAS.
- A list of accredited testers meeting these requirements and approved by the Water Suppliers will be maintained by WRAS and suitably qualified testers can apply to WRAS for inclusion in that list.

A1.2 Training will include:-

- (a) Legal requirements: Familiarity with relevant provisions of the Water Fittings Regulations, health and safety and other appropriate statutory requirements.
- (b) Installation: Installation requirements and siting of the assemblies, including identification of contamination risks.
- (c) Maintenance: Theoretical and practical training in the maintenance of assemblies.
- (d) Testing: Theoretical and practical training in the testing of assemblies.
- (e) Records: Record keeping and administration.

A1.3 Assessment will include:-

- (a) Theoretical knowledge of assemblies, their application, installation and operation.
- (b) Practical knowledge of the installation, maintenance and testing of the assemblies, including fault finding and the keeping of appropriate records.



APPENDIX 2

GLOSSARY OF TERMS

For an Accredited Tester approved by the Water

Supplier – see Appendix A1.1 on right column page 8.

Approved contractor means a person who, for the purpose of the Water Supply (Water Fittings) Regulations or Scottish Water Byelaws

- a. has been approved by the Water Supplier for the area where a water fitting is installed or used, or
- b. has been certified as an approved contractor by an organisation specified in writing by the regulator;

Assembly – an arrangement of components or fittings forming a Type BA backflow prevention device which complies with the relevant recommendations of this Approved Installation Method.

Backflow – means flow upstream, that is in a direction contrary to the intended normal direction of flow, within or from a water fitting;

BS EN 1717:2000 – ‘Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow’.

BS EN 12729:2002 ‘Devices to prevent pollution by backflow of potable water – Controllable backflow preventer with reduced pressure zone – Family B – Type A’ – British Standard, which includes the Type BA devices.

Buffer – the difference between the differential pressure across the No. 1 check valve and the differential pressure at the moment when the relief valve begins to discharge water.

Concealed water fitting – means a water fitting which –

- a. is installed below ground;
- b. passes through or under any wall, footing or foundation;
- c. is enclosed in any chase or duct; or
- d. is in any other position which is inaccessible or renders access difficult.

Consent – the Water Supplier’s statutory approval for the proposed installation of water fittings, in accordance with Regulation 5.

Device – backflow prevention apparatus or arrangement

Point of use backflow protection – device(s) used to protect a particular fitting or outlet against backflow and usually located close to the fitting which it protects.

BS EN 13959 2004: ‘Anti-pollution check valves DN6 to DN250 inclusive – Family E. Type A, B, C and D. The British Standard which describes the Type EB device (non-verifiable single check valve).

Resilient seat or seal – Soft seating faces of a valve or its seat.

Isolation valve – valve to isolate the water supply to a fitting for test, repair or maintenance.

Mechanical damage – physical damage to a fitting from any cause.

Type BA device – Verifiable backflow preventer with reduced pressure zone means a verifiable mechanical backflow prevention device consisting of an arrangement of water fittings with three pressure zones with differential obturators and that will operate when potential backflow conditions obtain or there is a malfunction of the valve.

Whole site backflow protection – use of a single device or arrangement, usually located on the service pipe close to the boundary of the premises, to prevent backflow from the whole site entering the water main. This is additional to point of use or zone protection.

Wholesome water – Water supplied by a Water Supplier and complying with the requirements of the Water Supply (Water Quality) Regulations for England and Wales, Scotland and Northern Ireland, as from time to time amended or replaced. The term ‘wholesome water’ is equivalent to potable water (i.e. fit to drink), but potable is a term no longer used in regulations.

Zone Backflow Protection – the use, typically in industrial, chemical or medical premises, of a single device or arrangement, located on the supply or distributing pipe supplying a defined area of the premises, to prevent backflow from particular areas of activity or risk. This may be additional to point of use protection.

CONTACT DETAILS AND FURTHER INFORMATION

Details of contacts for Regulations matters in each Water Supplier are available on the WRAS website.

Further copies of this document and other technical information may be obtained from:

Water Regulations Advisory Scheme, Fern Close,
Pen-y-Fan Industrial Estate, Oakdale, Gwent NP11 3EH.

Tel: +44 (0)1495 248454

Fax: +44 (0)1495 249234

E-mail: info@wras.co.uk

Website: www.wras.co.uk

APPLICATION FOR CONSENT TO INSTALL AN RPZ VALVE (TYPE BA DEVICE)

Customer/Company Name:

If this application is being made in connection with a letter we have sent you following an inspection, could you please quote the reference number on top of the letter:

Address:
Post Code:
Telephone No:
Fax No:
E-mail:

Intended make of RPZ valve to be used (if known):

Model Number (if known):
Size:

Date of application:

Intended location (which part of the building):

Please state the name of the person on site who will be responsible for organising the commissioning and annual testing of the RPZ valve:
Telephone No:
E-mail:

Please state the type and use of the plant/equipment which the proposed RPZ valve is to supply:

Name/Company name seeking consent (if different from above):

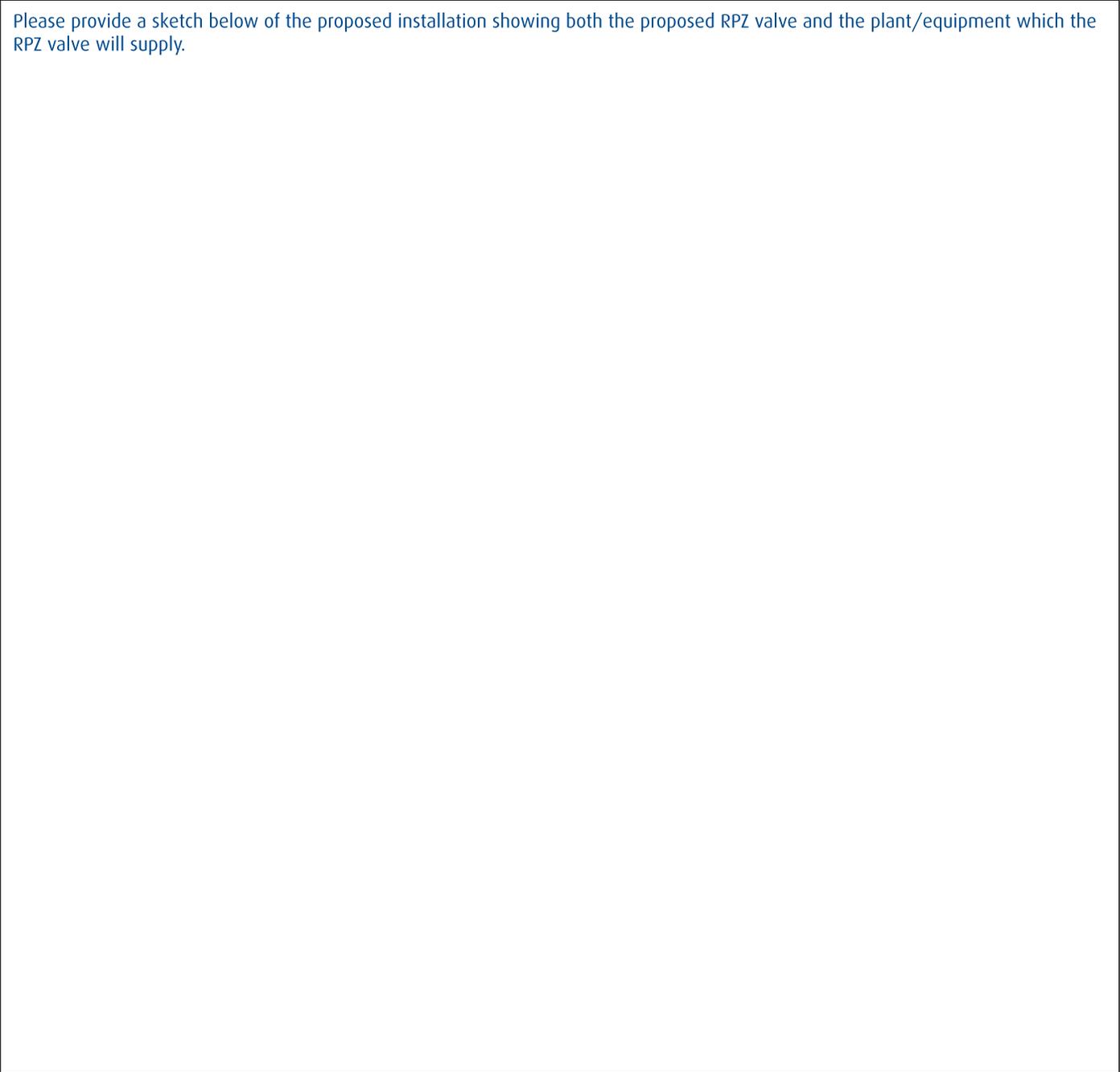
Please supply the names/concentrations and material safety data sheets of any chemicals and substances that are proposed to be used downstream of the RPZ valve:

Address (if different from above):
Post Code:
Telephone No:
Fax No:
E-mail:

Please confirm the method of water supply to the valve:
Mains* Storage* Hot water* Cold water*
* Please delete as appropriate

Temporary Arrangement* Permanent Arrangement*
* Please delete as appropriate

Please provide a sketch below of the proposed installation showing both the proposed RPZ valve and the plant/equipment which the RPZ valve will supply.



Water Supplier's Use Only

Date received:

Consent granted by and date:

Consent withheld by and date:

Comments and conditions required by Water Supplier:

RPZ VALVE (TYPE BA DEVICE) TEST REPORT CERTIFICATE

Name of person responsible for device:

Permission to turn **off** supply:
Name _____ Signature _____

Address of location of device:

Post Code: _____
Telephone No: _____

Permission to turn **on** supply:
Name _____ Signature _____

Turn off time: _____ Turn on time: _____

Location of device on site:

Make of test kit: _____ Serial No. of test kit: _____

Calibration date: _____

Type of plant/equipment being supplied:

Make of device: _____ Size: _____

Date of commissioning or scheduled test:

Model: _____ Serial No: _____

Strainer present: **Yes/No**

Unobstructed air gap: **Yes/No**

Accessibility acceptable:
If no comment below **Yes/No**

For criteria see WRAS AIM 08-01 Section 7.2	Check Valve 1 Closed tight	Relief Valve Opened at:	Check Valve 2 Closed tight	Check Valve 1 Differential pressure	Check Valve 2 Differential pressure
Initial test	Yes No	Bar:	Yes No	Bar: Buffer:	Bar:
Repairs and materials used					
Test after repair	Yes No	Bar:	Yes No	Bar: Buffer:	Bar:

Tester's name in CAPITALS

Tester's number:

Tester's signature:

Date of completion of test:

Date for next test:

Tester's address

Comments: