Department for Environment Food & Rural Affairs

Llywodraeth Cymru
Welsh Government

Specification on the Prevention of Backflow

Specification for backflow prevention devices and arrangements

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Introduction

The Water Supply (Water Fittings) Regulations 1999 (the 'Regulations'), have the specific purpose to prevent the waste, misuse, undue consumption, contamination or erroneous measurement of public water supplies, meaning those supplied by a water undertaker (an appointed water company) or a water supply licensee.

The Regulations apply to any water fitting installed or used, or to be installed or used, in premises to which water is or is to be supplied by a water undertaker or water supply licensee.

The Regulations set out the legal requirements for plumbing systems and play an important role in protecting public health, safeguarding public water supplies and promoting the efficient use of water within premises. The Regulator, which is the Secretary of State or Welsh Ministers, can approve specifications to ensure fittings are of an appropriate quality and standard and suitable for the circumstances in which they are used. They can also approve specifications to ensure fittings are installed, connected, altered, repaired or disconnected in a workmanlike manner.

This specification sets out the different types of arrangements and devices available for preventing backflow and back-siphonage (see sections 2 and 3) and, in tables 1 and 2, those fluid categories for which each arrangement and device is suitable. This specification is accompanied by a series of other specifications known as Test Code Sheets.

Conformity testing

To demonstrate conformity with Regulation 4(1)(a), manufacturers should, as good practice, have in place a documented system of assessment of the performance of the backflow prevention arrangement or device. They should also have factory production controls to ensure consistency of manufacturing and product performance as described in the Construction Products Regulations 2011 as amended.

Schedule 2: Paragraph 15 Backflow prevention

15.

(1) Subject to the following provisions of this paragraph, every water system shall contain an adequate device or devices for preventing backflow of fluid from any appliance, fitting or process from occurring.

(2) Paragraph (1) does not apply to-

(a) a water heater where the expanded water is permitted to flow back into a supply pipe, or

(b) a vented water storage vessel supplied from a storage cistern,

where the temperature of the water in the supply pipe or the cistern does not exceed 25°C.

(3) The device used to prevent backflow shall be appropriate to the highest applicable fluid category to which the fitting is subject downstream before the next such device.

(4) Backflow prevention shall be provided on any supply pipe or distributing pipe-

(a) where it is necessary to prevent backflow between separately occupied premises, or

(b) where the water undertaker has given notice for the purposes of this Schedule that such prevention is needed for the whole or part of any premises.

(5) A backflow prevention device is adequate for the purposes of paragraph (1) if it is in accordance with a specification approved by the regulator for the purposes of this Schedule.

Backflow prevention arrangements and devices

1. General interpretation of terms relating to backflow prevention

"**An air gap**" means a visible, unobstructed and complete physical air break between the lowest level of water discharge and the level of potentially contaminated fluid downstream (critical water level) within a cistern, vessel, fitting or appliance, hereinafter called a receptacle, that:

(a) is not less than 20 mm or twice the internal diameter of the inlet pipe whichever is the greater; and

(b) from which water discharges at not more than 15° from the vertical centreline of the water stream.

"**Critical level**" means the physical or piezometric level of the fluid in any part of the receptacle two seconds after closing the water inlet, starting from maximum water level.

"**Maximum level**" means the highest physical or piezometric level of the fluid reached in any part of the receptacle when operated continuously under fault conditions.

"**Spillover level**" means the level at which the fluid in a receptacle will first spill over the top edge of a receptacle if the inflow of water exceeds the outflow through any outlet and any overflow pipe.

"**Tap gap**" means the vertical distance between the lowest part of a tap outlet and the spillover level of the appliance or receptacle over which the tap discharges.

An "**upstand**" means either one of two alternative arrangements of water fittings to prevent backflow by back-siphonage:

Type A upstand	An upward flowing supply or distributing pipe surmounted by an anti-vacuum valve (Type DA), or an anti-vacuum valve combined with a single check valve (Type DUK1), any part of the outlet of which is located not less than 300mm above the spillover level of an appliance

Type B upstand	A branch pipe serving an appliance, where the height of any part of the branch connection to the vented distributing pipe is not less than 300 mm above: a. the spillover level of the appliance; or b. the highest possible discharge point served by the vented distributing pipe, whichever is the highest.

"**A verifiable backflow prevention device**" means a device, consisting of one or more backflow prevention elements, which can be tested in-situ; usually achieved by the provision of test ports immediately upstream, and between, the mechanical elements comprising the device.

"**flushing device**" means a device fitted to a flushing cistern to provide controlled measured volume(s) of water for flushing the receiving vessel (e.g. to a WC pan).

> NOTE: A flushing device can be a siphon, drop valve, flap valve or pressurised cistern etc. For the purposes of this specification, the flushing device includes the activator (i.e. handle, button, linkages, etc.) and all seals, pistons, or other integral components.

2. Interpretations of backflow prevention arrangements as listed in Table 1

"**Type AA - Air gap with unrestricted discharge**" means a non-mechanical backflow prevention arrangement of water fittings where water is discharged through an air gap into a receptacle which has at all times an unrestricted spillover to the atmosphere.

"**Type AB - Air gap with weir overflow**" means a non-mechanical backflow prevention arrangement of water fittings complying with Type AA, except that the air gap is the vertical distance from the lowest point of the discharge orifice which discharges into the receptacle, to the critical level of the rectangular weir overflow.

"**Type AC - Air gap with vented submerged inlet and circular overflow**" means a non-mechanical backflow prevention arrangement of water fittings with a vented, but submerged, inlet; the air gap being measured vertically downwards from the lowest point of the air inlet to the critical level.

"**Type AD - Air gap with injector**" means a non-mechanical backflow prevention arrangement of water fittings with a horizontal injector and a physical air gap of 20 millimetres or twice the inlet diameter, whichever is the greater.

"**Type AF - Air gap with circular overflow**" means a non-mechanical backflow prevention arrangement of water fittings with an air gap measured downwards from the lowest point of the discharge orifice, which discharges into the receptacle, to the critical level.

“**Type AG - Air gap arrangement with minimum size circular overflow**” means a non-mechanical backflow prevention arrangement of water fittings with an air gap; together with an overflow, the size of which is determined by measure or a vacuum test.

“**Type AUK1 - Air gap with interposed cistern**” means a non-mechanical backflow prevention arrangement consisting of a cistern with a Type AG overflow and an air gap; the spillover level of the receiving vessel (WC pan or other receptacle) being located not less than 300 millimetres below the overflow pipe and not less than 15 millimetres below the lowest level of the interposed cistern.

> NOTE: In the case of WC suites within the Regulator’s Specification Test Code Sheet 2213.14 (Type AUK1 air gaps), reference to the distance from the spillover level of the receiving vessel and the invert of the “warning pipe” can be taken to be the dimension from the spillover level of the receiving vessel and invert of the overflow pipe.

“**Type AUK2 - Domestic tap gap**” means the height of air gap between the lowest part of the outlet of a tap, combination fitting, shower head or other fitting discharging over a domestic sanitary appliance or other receptacle, and the spillover level of that appliance, where a fluid category 2 or 3 risk is present downstream.

“**Type AUK3 - Higher risk tap gap**” means the height of an air gap between the lowest part of the outlet of a tap, combination fitting, shower head or other fitting discharging over any appliance or other receptacle, and the spillover level of that appliance, where a fluid category 4 or 5 risk is present downstream.

“**Type AUK4 - Air gap with interposed flushing cistern**” means a non-mechanical backflow prevention arrangement consisting of a flushing cistern feeding by gravity a receiving vessel; the interposed flushing cistern incorporating a Type AG or Type AC air gap; an overflow; the spillover level of the receiving vessel (e.g. WC pan) being located not less than 150 millimetres below the overflow pipe (or combined warning/overflow pipe), and not less than 15 millimetres below the internal spillover level with all devices (e.g. flushing valve and associated attachments) completely removed.

“**Type DC - Pipe interrupter with permanent atmospheric vent**” means a non-mechanical backflow prevention device with a permanent unrestricted air inlet, the device being installed so that the flow of water is in a vertical downward direction.

3. General interpretations of backflow prevention devices as listed in Table 2

“**Type BA - 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.

“**Type CA - Non-verifiable disconnector with different pressure zones**” means a non-verifiable mechanical backflow prevention device which provides disconnection by venting the intermediate pressure zone of the device to the atmosphere when the difference of pressure between the intermediate zone and the upstream zone is not greater than 10% of the upstream pressure.

“**Type DA - Anti-vacuum valve (or vacuum breaker)**” means a mechanical backflow prevention device with an air inlet which is closed when water within the device is at or above atmospheric pressure but which opens to admit air if a vacuum occurs at the inlet to the device.

“**Type DB - Pipe interrupter with atmospheric vent and moving element**” means a mechanical backflow prevention device with an air inlet closed by a moving element when the device is in normal use but which opens and admits air if the water pressure upstream of the device falls to atmospheric pressure, the device being installed so that the flow of water is in a vertical, downward direction.

“**Type DUK1 - Anti-vacuum valve combined with a single check valve**” means a mechanical backflow prevention device comprising an anti-vacuum valve with a single check valve located upstream.

“**Type EA - Verifiable single check valve**” means a verifiable mechanical backflow prevention device which will permit water to flow from upstream to downstream but not in the reverse direction.

“**Type EB - Non-verifiable single check valve**” means a non-verifiable mechanical backflow prevention device which will permit water to flow from upstream to downstream but not in the reverse direction.

“**Type EC - Verifiable double check valve**” means a verifiable mechanical backflow prevention device consisting of two verifiable single check valves in series, which will permit water to flow from upstream to downstream but not in the reverse direction.

“**Type ED - Non-verifiable double check valve**” means a non-verifiable mechanical backflow prevention device consisting of two single check valves in series, which will permit water to flow from upstream to downstream but not in the reverse direction.

“**Type HA - Hose union backflow preventer**” means a mechanical prevention backflow device for fitting to the outlet of a hose union tap and consisting of a single check valve with air inlets that open if the flow of water ceases.

“**Type HC - Diverter with automatic return**” means a mechanical backflow prevention device used in bath/shower combination tap assemblies which automatically returns the bath outlet open to atmosphere if a vacuum occurs at the inlet to the device.

“**Type HUK1 - Hose union tap incorporating a double check valve**” means a hose union tap in which a double check valve has been incorporated into either the inlet or outlet of the tap.

"**Type LA - Pressurised air inlet valve**" means an anti-vacuum valve or vacuum breaker, similar to Type DA but suitable for conditions where the water pressure at the outlet of the device under normal conditions of use is greater than atmospheric.

"**Type LB - Pressurised air inlet valve combined with a check valve downstream**" means a mechanical backflow prevention device comprising a Type LA anti-vacuum valve and a single check valve located downstream.

Fluid category backflow prevention suitability for arrangements and devices

Table 1: Schedule of non-mechanical backflow prevention arrangements and the maximum permissible fluid category for which they are acceptable

Type	Description of backflow prevention arrangements and devices	Suitable for protection against fluid category	
		Back-pressure	Back-siphonage
AA	Air gap with unrestricted discharge above spillover level	5	5
AB	Air gap with weir overflow	5	5
AC	Air gap with vented submerged inlet	3	3
AD	Air gap with injector	5	5
AF	Air gap with circular overflow	4	4
AG	Air gap with minimum size circular overflow determined by measure or vacuum test	3	3
AUK1	Air gap with interposed cistern (For example, a WC suite)	3	5

Type	Description of backflow prevention arrangements and devices	Suitable for protection against fluid category	
		Back-pressure	Back-siphonage
AUK2	Air gaps for taps and combination fittings (tap gaps) discharging over domestic sanitary appliances, such as a washbasin, bidet, bath or shower tray shall not be less than the following: Size of tap or combination fitting — Vertical distance of bottom of tap outlet above spillover level of receiving appliance Not exceeding G ½ — 20 mm Exceeding G ½ but not exceeding G ¾ — 25 mm Exceeding G ¾ — 70 mm	X	3
AUK3	Air gaps for taps or combination fittings (tap gaps) discharging over any higher risk domestic sanitary appliances where a fluid category 4 or 5 is present, such as: a any domestic or non-domestic sink or other appliance; or b any appliances in premises where a higher level of protection is required, such as some appliances in hospitals or other health care premises, shall be not less than 20 mm or twice the diameter of the inlet pipe to the fitting, whichever is the greater.	X	5
AUK4	Air gap with interposed flushing cistern (for example in a WC suite)	3	5
DC	Pipe interrupter with permanent atmospheric vent	X	5

Type	Description of backflow prevention arrangements and devices	Suitable for protection against fluid category	
		Back-pressure	Back-siphonage

Notes:

1 X Indicates that the backflow prevention arrangement or device is not applicable or not acceptable for protection against backpressure for any fluid category within water installations in the UK.

2 Arrangements incorporating Type DC devices shall have no control valves on the outlet of the device; they shall be fitted not less than 300 mm above the spillover level of a WC pan, or 150 mm above the sparge pipe outlet of a urinal, and discharge vertically downwards .

3 Overflows and warning pipes shall discharge through, or terminate with, an air gap, the dimension of which should satisfy a Type AA air gap.

Table 2: Schedule of mechanical backflow prevention arrangements and the maximum permissible fluid category for which they are acceptable

Type	Description of backflow prevention arrangements and devices	Suitable for protection against fluid category	
		Back-pressure	Back-siphonage
BA	Verifiable backflow preventer with reduced pressure zone	4	4
CA	Non-verifiable disconnector with difference between pressure zones not greater than 10%	3	3
DA	Anti-vacuum valve (or vacuum breaker)	X	3
DB	Pipe interrupter with atmospheric vent and moving element	X	4

Type	Description of backflow prevention arrangements and devices	Suitable for protection against fluid category	
		Back-pressure	Back-siphonage
DUK1	Anti-vacuum valve combined with a single check valve	2	3
EA	Verifiable single check valve	2	2
EB	Non-verifiable single check valve.	2	2
EC	Verifiable double check valve	3	3
ED	Non-verifiable double check valve	3	3
HA	Hose union backflow preventer. Only permitted for use on existing hose union taps in house installations	2	3
HC	Diverter with automatic return (Normally integral with some domestic appliance applications only)	X	3
HUK1	Hose union tap which incorporates a double check valve. Only permitted for replacement of existing hose union taps in house installations	3	3
LA	Pressurised air inlet valve	X	2
LB	Pressurised air inlet valve combined with a check valve downstream	2	3

Type	Description of backflow prevention arrangements and devices	Suitable for protection against fluid category	
		Back-pressure	Back-siphonage

Notes:

1 X Indicates that the backflow prevention device is not acceptable for protection against backpressure for any fluid category within water installations in the UK.

2 Arrangements incorporating a Type DB device shall have no control valves on the outlet of the device. The device shall be fitted not less than 300mm above the spillover level of an appliance and discharge vertically downwards.

3 Types DA and DUK1 shall have no control valves on the outlet of the device and be fitted on a 300 mm minimum Type A upstand.

4 Relief outlet ports from Types BA and CA backflow prevention devices shall terminate with an air gap, the dimension of which should satisfy a Type AA air gap.

Coming into effect

This specification for the prevention of backflow will come into effect on 6 May 2027, being one year after its publication on gov.uk.