



Test Code Sheet 2212.3 – Vacuum / Dimensional

Issue No. 5

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Pages: 1-9

1. PURPOSE

Type AG air gap arrangement verification as described in the Specification for the Prevention of Backflow.

2. TYPE OF TEST(S)

Vacuum / Dimensional

3. REGULATION REQUIREMENTS FOR FITTINGS

Schedule 2

15-(1) every water system shall contain an adequate device or devices for preventing backflow of fluid from any appliance, fitting or process from occurring.

4. GENERAL TOLERANCES AND MEASUREMENTS

In the absence of specific tolerances or accuracies the following shall apply.

1. Dimension: up to and including 75 mm $\pm 5\%$; over 75 mm $\pm 2\%$.
2. Flow rate and pressure: $\pm 5\%$ of the value specified.
3. Temperature: cold water $\pm 10\text{ }^{\circ}\text{C}$ of the value specified.
4. Linear measuring instruments shall have a minimum resolution of 0.5 mm.
5. Timing instruments shall have a minimum resolution of 0.1 seconds.
6. All the measuring instruments shall have an error limit of $\pm 2\%$ of the measured value.

5. TEST PROCEDURE

Note 1: Unless otherwise stated the temperature of the test fluid shall be $20 \pm 10^{\circ}\text{C}$

5.1 Tests applicable to the following:-

(A) TYPE AG AIR GAPS

TEST METHOD

i. SCOPE

This procedure specifies the characteristics of type AG air gaps, verified by measurement or by vacuum test. Air gaps that comply with the requirements of this procedure are devices for protection of potable water installations from pollution. In addition to factory assembled products this procedure includes requirements for site constructed air gaps.

This is a performance standard for 'AG' air gaps. Materials of construction must be fit for the purpose and application to ensure compliance with this procedure during normal working use.

ii. DEFINITIONS

For the purpose of this procedure the following definitions apply.

ii.i Air Gap(s) Family A Type G

The AG device is an air gap placed permanently and vertically between the lowest point of the feed orifice and the critical water level.

The overflow shall be capable of draining the maximum inflow of water in a positive pressure fault condition.

ii.ii Spillover Level

The level at which water will start to overflow the receiving vessel, with all outlets closed.

ii.iii Maximum Level

The highest water level reached above the spillover level under positive fault conditions, with all outlets closed.

ii.iv Critical Water Level

The level (h) above the spill over level two seconds after the maximum water flow has ceased. (The height between the spillover level and the critical level is dimension 'h').

ii.v Internal Diameter 'D' of Feed Pipe (Bore)

Diameter 'D' (mm) is the maximum internal diameter found within the last metre of the supply pipe or the DN of the inlet connection.

ii.vi Graphic Symbol



iii. DESIGNATION

The air gap is designated by:

- the reference to this standard.
- its Family, its Type.
- the DN of the feed pipe to the assembly.

iv. MATERIALS

iv.i Materials choice

The manufacturer shall state the type of materials chosen in his technical and commercial documents.

The surface condition of materials in contact with water shall be chosen to be the least inclined to scale.

The materials used upstream, and including the atmospheric outlet opening, must comply with BS 6920 or other national standard which provides an equivalent level of protection or performance.

The choice of other material is discretionary but shall be suitable for the intended use of the appliance (temperature, corrosion, scale, etc).

There are no special requirements concerning the materials downstream of the atmospheric outlet opening provided they do not have any harmful effect on the upstream part.

v. DESIGN

v.i General

The protection assembly comprises four parts integral with one another:

- a water inlet device.
- a receiving vessel.
- an overflow.
- air break to drain.

v.ii Water Inlet Device

- v.ii.i Every float-operated valve or other device which controls the inflow of water to a receiving vessel shall be securely and rigidly fixed to that vessel.
- v.ii.ii Every feed pipe supplying water to such a valve assembly or other device shall be fixed in its position to prevent it from moving or buckling, (i.e. bending or deformation of the assembly).
- v.ii.iii Submerged supply pipes to the inlet device that have joints which are adjustable or can be dismantled, are not permitted below the critical water level (h).
- v.ii.iv The discharge outlet of the inlet device shall not come into contact in any way with a product from downstream at the maximum water level.

NOTE 2: Mechanical joints are joints which when undone open a direct pathway between the wholesome water (incoming supply) and the water stored within the flushing cistern. These include joints that are 'adjustable' or can be 'dismantled'; rely on elastomeric, or other material, to provide a water-tight seal; or where the coupling of two components being dependent upon mechanically applied forces, with or without the use of secondary seal.

NOTE 3: For the purposes of this specification the following are not considered *mechanical joints*. Nuts or jointing mechanism on the diaphragm housing assembly of the inlet device. Joints where the joining surface are permanently fused together e.g. by a chemical process or the application of heat.

v.iii Overflow Arrangements

- v.iii.i The overflow shall be capable of draining off the maximum inlet flow.
- v.iii.ii Shall not be less than 19mm internal diameter.
- v.iii.iii Overflow arrangements must include an air break prior to a connection to drain. An air break to drain must conform to Test Code Sheet 2212.10 or BS EN 1717 requirements.

NOTE 4: The length of the overflow before the air break to drain must not be of such a length that it will cause air gap 'AG' to be violated. All air gaps to drain arrangements shall be visible.

NOTE 5: Clauses A5.1 v.iii.ii and A5.1 v.iii.iii do not apply to a WC suite where the overflow discharges internal to the WC bowl providing the overflow is not less than 19

mm internal diameter at the point water enters the overflow to be discharged; and the critical water level (h) has been verified by test.

6. ACCEPTANCE CRITERIA

6.1 Air Gap Distance

For air gaps 'AG' the critical water level shall be established and the air gap distance measured from the lowest point of the water inlet to the critical water level or by vacuum test (see Annex A).

Air gaps 'AG' must be greater than $2D$ and never less than 20mm or must meet the requirements of the vacuum test specified in Annex A.

6.2 Test Procedure

The overflow

(a) The overflow shall be verified by a 2mm deep 19mm diameter plug or no less effective method.

The air gap 'AG' is determined by either:-

(b) Measurement by test - 'h' is determined by measurement of the depth of water above the spillover level of the overflow two seconds after the inflows equal to $Q = 0.14D^2$ in litres per minute has stopped, or a dynamic pressure of 10 bar has stopped if the flow rate Q cannot be achieved, where 'D' is the bore inlet (see ii.v) and with all outlets closed, based on a velocity of 3 m/s.

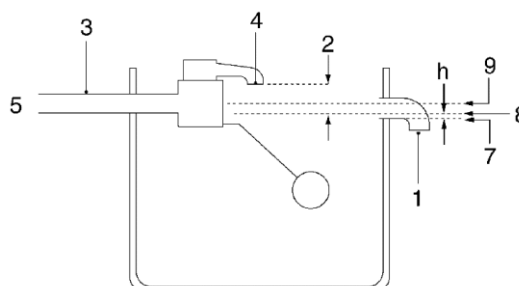
NOTE 6: The receiving vessel must be fitted with a warning / overflow pipe.

NOTE 7: There is no relationship between the maximum fault level and the topmost level of the warning overflow pipe.

(c) Vacuum Test

The body of the inlet valve must satisfy the vacuum test specification in Annex A.

Air Gap – Vacuum test



1 = Warning/Overflow Pipe

2 = Air Gap (AG)

3 = Feed Pipe

4 = Feed Orifice

5 = Internal Diameter of Feed Pipe (Bore)

7 = Spill-over Level

8 = Critical Water Level (h)

9 = Maximum Water Level

7. COMING INTO EFFECT

This test code sheet will come into effect on 6 May 2027, being one year after its publication on gov.uk.

ANNEX A (INFORMATIVE)

Vacuum test

A1. APPARATUS

A1.1 General

The test apparatus shall be arranged and constructed so that the absolute pressure measured near the appliance under test on its supply side remains less than 50 KPa (-50 KPa gauge pressure) for at least 5 seconds.

A1.2 Vacuum vessel and connecting pipework, of sufficient strength to support a total vacuum. The vacuum vessel shall be provided with a drain cock to remove any water drawn into the vessel during the test.

NOTE A1: Recommended capacities of the vacuum vessel are given in Table 1.

A1.3 Vacuum device, capable of reducing the absolute pressure within the vacuum vessel to 20 KPa (-80 KPa gauge pressure).

A1.4 Pipes and fittings, of nominal size not less than that of the appliance under test.

Any valve or fitting installed in the test pipe shall be a full-way valve offering an unimpeded flow path.

Connections to the vacuum vessel shall not unduly impede the fluid flow and shall have a low loss profile when very low resistance appliances are tested.

A1.5 Vacuum gauges. from 100 KPa absolute to 10 KPa absolute, with an accuracy of 2 % of the reading. The system connection shall be made in such a way that it does not disturb the flow in the pipework.

A1.6 Water trap, provided with a cock to allow the trapped water to be drained. The trap shall not so restrict the flow that the requirement of 4.1 cannot be met.

A2. PROCEDURE

A2.1 Remove or render inoperative any upstream backflow prevention device.

A2.2 Connect the water inlet connection of the appliance under test to the test pipe.

A2.3 Maintain the critical water level as established in 6.2 (a). The critical level shall be maintained during the test by supply from a separate source. This supply shall be submerged to prevent disturbance of the water surface.

A2.4 Close the full-way valve and the water trap drain valve.

A2.5 Evacuate the vacuum vessel to an absolute pressure of 20 KPa (-80 KPa gauge pressure) as indicated by vacuum gauge A.

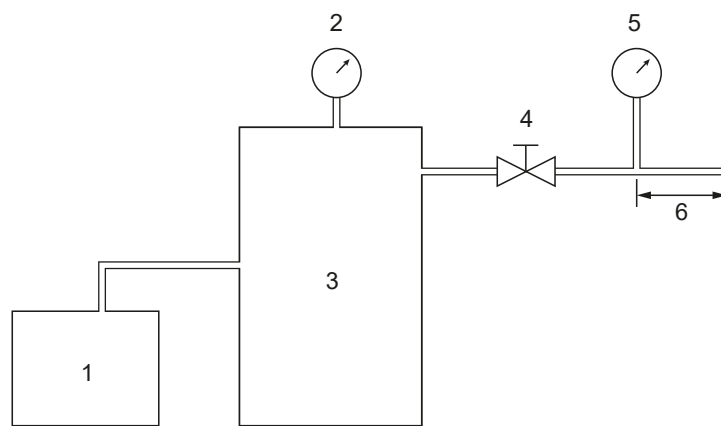
A2.6 Open the full-way valve within a period of 2 s.

A2.7 Read the vacuum gauge B. Check that the absolute pressure does not exceed 50 KPa (-50 KPa gauge pressure) for a period of at least 5 s after the full way valve is fully open.

A2.8 Observe the water trap.

NOTE A2: If the receiving vessel can be subject to positive pressure backflow, it is important that the inlet orifice is positioned so that it cannot be contaminated by the ascending / returning fluid.

Figure 1: Arrangement of apparatus for vacuum test



Drawing is diagrammatic only

KEY.

1 Vacuum pump

2 Vacuum gauge A

3 Vacuum vessel

4 Full-way valve

5 Vacuum gauge B

6 5 DN to 10 DN

A3. ACCEPTANCE CRITERIA

No water shall be collected in the water trap.

Table A1 : Recommended vacuum vessel capacities

Nominal size of appliance inlet connection (mm)	Recommended minimum capacity of vacuum vessel (m3)
≤ 22	0.25
> 22 < ≤ 54	0.75
> 54 < ≤ 76.1	2

> 76.1	≤ 108	4
> 108	≤ 159	7
NOTE A3: Actual vacuum vessel capacity is also dependent upon the backflow prevention device being tested.		