TEST CODE SHEET

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1. TYPE OF TEST(S)

Vacuum / Dimensional

2. WATER REGULATIONS 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.

3. BRITISH STANDARDS OR WATER SPECIFICATION, DEEMED TO SATISFY WATER REGULATIONS REQUIREMENTS

3.1 Fittings with 'kitemarks' which are deemed to satisfy the requirements of regulations are listed in the directory.

4. TEST PROCEDURE

Note Unless otherwise stated the temperature of the test fluid shall be 20 ± 10°C

4.1 Tests applicable to the following:-

TYPE AG AIR GAPS
Devices for the prevention of contamination by backflow.

(A) TYPE AG AIR GAPS (Derived from prEN 13077)

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

FIG 1

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 the relevant Standards, quality requirements and criteria for drinking water installations, BS6920 (i.e. may not release substances in concentration which can be harmful to the users of the drinking water installation).

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.*

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 EN requirements.

NOTE 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.

5. ACCEPTANCE CRITERIA

5.1 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 (see informative Annex B) 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.

5.2 Test Procedure

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

(a) **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: The receiving vessel must be fitted with a warning / overflow pipe.

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

(b) Vacuum Test

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

Air Gap – Vacuum test

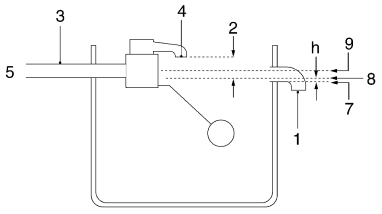


FIG 1

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

ANNEX A

TITLE: WORKING PAPER FOR METHOD OF VACUUM TEST

1. SCOPE

This annex describes the apparatus and a method for applying a vacuum test to backflow prevention devices and water-using appliances to determine that they have an acceptable degree of protection against backflow or backsiphonage.

2. DEFINITIONS

2.1 **Critical level:** The highest level of the fluid reached in any part of the appliance 2 seconds after closing water inlet starting from maximum fluid level.

In a pressurised system this is the maximum manometric height allowed.

3. APPARATUS

3.1 **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.

3.2 **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: Recommended capacities of the vacuum vessel are given in Table 1.

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

3.4 **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.

3.5 **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.

3.6 **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.

ANNEX A cont.

4. PROCEDURE

4.1 Remove or render inoperative any upstream backflow prevention device.

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

4.3 Maintain the critical water level as established in 5.2 (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.

4.4 Close the full-way valve and the water trap drain valve.

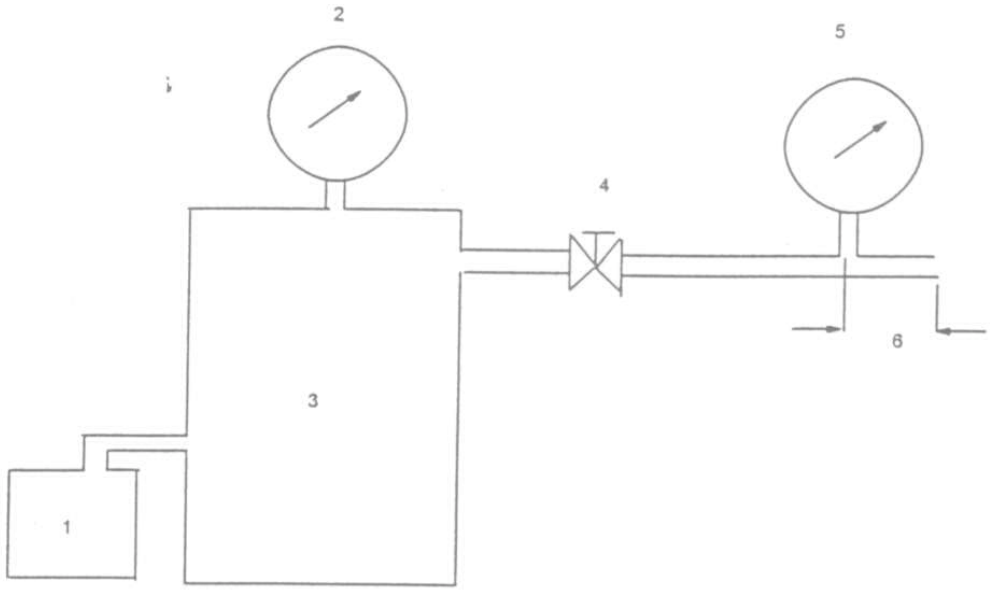
4.5 Evacuate the vacuum vessel to an absolute pressure of 20 KPa (-80 KPa gauge pressure) as indicated by vacuum gauge A.

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

4.7 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..

4.8 Observe the water trap.

NOTE: 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.



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

NOTE: Drawing is diagrammatic only.

Figures 1: Arrangement of apparatus for vacuum test

5. ACCEPTANCE CRITERIA

No water shall be collected in the water trap.

Table 1 : Recommended vacuum vessel capacities

Nominal size of appliance inlet connection (mm)	Recommended minimum capacity of vacuum vessel (m^3)
≤ 22	0.25
> 22 < ≤ 54	0.75
> 54 < ≤ 76.1	2
> 76.1 ≤ 108	4
> 108 ≤ 159	7
NOTE: Actual vacuum vessel capacity is also dependent upon the backflow prevention device being tested.	

ANNEX B informative

WC Flushing Cisterns

When this air gap principle is applied to a flushing cistern the following aspects should be considered.

If the air gap is maintained in accordance with this procedure no further action is required.

If the air gap is not maintained and the overflow / warning pipe cannot be adjusted the following solutions may be considered:

(a) The water inflow can be limited by a tamper proof means at the inlet device, (thus reducing the critical water level).

OR

(b) The inlet device is or incorporates an approved fluid 3 backflow protection unit.