TEST CODE SHEET

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1. TYPE OF TEST(S)

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

4.1 Tests applicable to the following:-

TYPE AB AIR GAPS – NON CIRCULAR (UNRESTRICTED)
Devices for the prevention of contamination by backflow.

(A) TYPE AB AIR GAPS – NON CIRCULAR (UNRESTRICTED) (Derived from PrEN 13077)

TEST METHOD

i. SCOPE

This procedure specifies the characteristics of type AB air gaps with non circular overflow (unrestricted) for nominal flow rates not exceeding 3 m/s. Air gaps that comply with the requirements of this procedure are devices for protection of drinking water installations from pollution. In addition to factory assembled products this procedure includes requirements for site constructed air gaps.

This is a performance criteria for type AB 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) with Non-Circular Overflow un-restricted Family 'A' Type B.

An 'AB' air gap is a permanent and vertical distance between the lowest point of the feed orifice and the critical water level.

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

ii.ii Spill over Level

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

ii.iii Critical Water Level

The level above the spill over level two seconds after the maximum water flow has ceased. The height between the critical water level and the spill over level is dimension ‘h’.

ii.iv Maximum Level

The highest water level (H) reached above the spill over level under positive pressure fault condition with all outlets closed.

ii.v Splash

Whilst maintaining the maximum water level there shall be no contact observed with the upstream components and the liquid in the receiving vessel due to splashing, foaming or turbulence.

ii.vi Diameter 'D' 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.vii Graphic Symbol

FIG 1

iii. DESIGNATION

The air gap family is designated by:

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

Example - air Gap Family A Type AB DN15 TSN AB-01.

iv. MATERIALS

iv.i Materials choice

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

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 concentrations which can be harmful to the users of the drinking water installation).

The choice of other material is discretionary but they 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 three parts:

- a water inlet device.

- a receiving vessel (container).

- an overflow, non circular.

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.

v.ii.iii The inlet device and its outlet shall not come into contact in any way with a product from downstream (i.e. should always be above level 'H').

v.iii Non Circular Overflow Arrangement

v.iii.i Shall be of non-circular design, shall discharge immediately into free air and shall be totally unobstructed.

For air gaps 'AB' 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 **ii.iii.**

The height of the overflow arrangement OW ≥ 2D + h.

For multiple inlets 'D' is taken as the largest feed pipe bore diameter.

NOTE: There is no relationship between the maximum water level and the top most level of the overflow arrangement.

An additional circular warning pipe may also be fitted if required.

5. ACCEPTANCE CRITERIA

5.1 Air Gap Distance (A)

5.1.1 For air gaps 'AB' the critical water level shall be established and the air gap distance 'A' measured from the lowest point of the water inlet to the critical water level.

5.1.2 ***Single Supply***

The distance of the air gap shall be not less than 'A' when 'A' is ≥ 2D and not less than 20 mm, 'D' is the bore diameter of the inlet or feed pipe under consideration and 'h' is determined either:

(1) by measurement of the depth of water above the spill-over level of the weir, two seconds after the inflow 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 of the inlet (see **ii.vi**) and with all outlets including optional warning

pipe (except the weir) closed, based upon a velocity of 3 m/s, or the maximum recommended flow rate for manufactured appliances, when the flow rate is > 'Q'.

(2) by calculating the depth of water above the spill-over level of the weir using the formula:

$$h = \sqrt[3]{\left(\frac{10^{3} Q}{3.143\ W} \right)^{2}}$$

When Q = total maximum inflow in L/min. at 3m/sec.

= ($Q = 0.14D^2$)

W = width of weir in mm

The calculation is only valid where:

a) width (W) is greater than or equal to 10 h at the spill over level;

b) crest thickness of weir (Cw) is less than or equal to 5 h;

c) upstream face of weir (Uw) is vertical to a depth greater than or equal to 2 h;

d) the depth of the weir or notch (Ow) is greater than or equal to 2D + h.

When the overflow is not rectangular in design, it must satisfy air gap dimension 'A' by test, [see 5.1.2 (1)].

5.1.3 ***Multiple Inlets***

In the case of multiple feed pipes to a single vessel having a non-circular unrestricted overflow, the distance of the air gaps for the potable water supply (fluid 1) shall be dimension 'A' above the critical water level. The critical water level shall be determined with all feed pipes discharging and having an individual inflow calculated at $Q = 0.14D^2$. If the flow rate 'Q' cannot be achieved, apply a dynamic pressure of 10 bar on all inlets. No feed orifice shall be less than distance 'A' determined for the largest bore diameter of the feed pipes.

Potable water inlets must terminate at a higher level than non potable inlets and never closer than 2D measured horizontally and vertically downward.

5.1.4 **Backflow / Back Pressure**

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 backflow fluid.

Potable water inlets must terminate at a higher level than non-potable inlets and never closer than 2D measured horizontally and vertically downward.

5.1.5 **Verification**

Verification can be achieved by calculation or by measurements.

Procedure for verification by measurement, [see 5.1.2 (1) and 5.1.3].

Sequence of test -
- Close all outlets
- Identify 'D'
- Calculate 'Q'
- Apply flow rate 'Q' and maintain maximum water level

- No contact between the water in the receiving vessel and the outlet of the water inlet device.
- Stop flow rate ‘Q’
- After 2 seconds establish level ‘h’
- Measure air gap between level ‘h’ and the lowest point of the feed orifice.

Requirement -

No contact between the receiving vessel and the inlet device outlet.
The height ‘OW’ shall be ≥ 2D + h.
The air gap ‘A’ shall be ≥ 2D and never less than 20mm.

For procedures for verification by calculation, see clauses 5.1.2 (2).

Air Gap Non-Circular (Unrestricted)

1. Optional Warning Pipe
2. Air Gap (A)
3. Feed Pipe
4. Feed Orifice
5. Internal Diameter of Feed Pipe (Bore)
6. Receiving Vessel
7. Spillover Level
8. Critical Water Level (h)
9. Maximum Water Level (H)

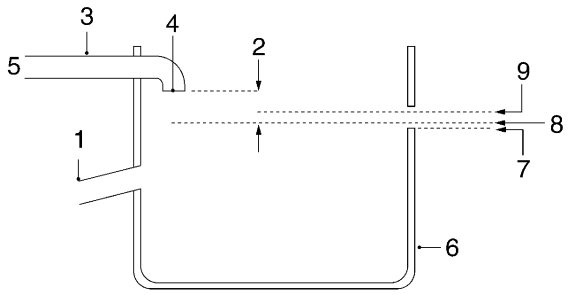


FIG 2

Air Gap - Letter Box Weir

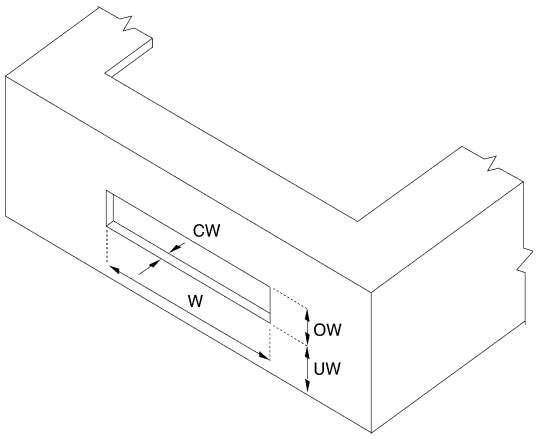


FIG 3

Air Gap - Notch Weir

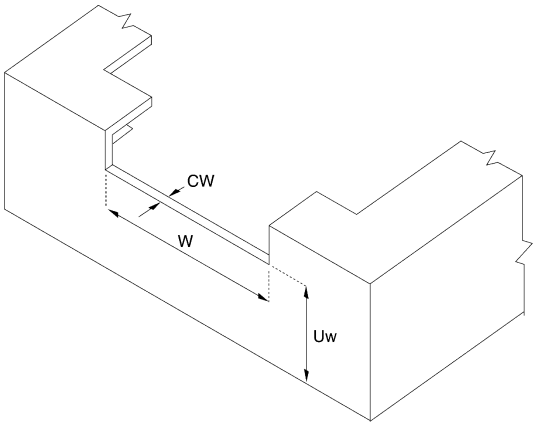


FIG 4

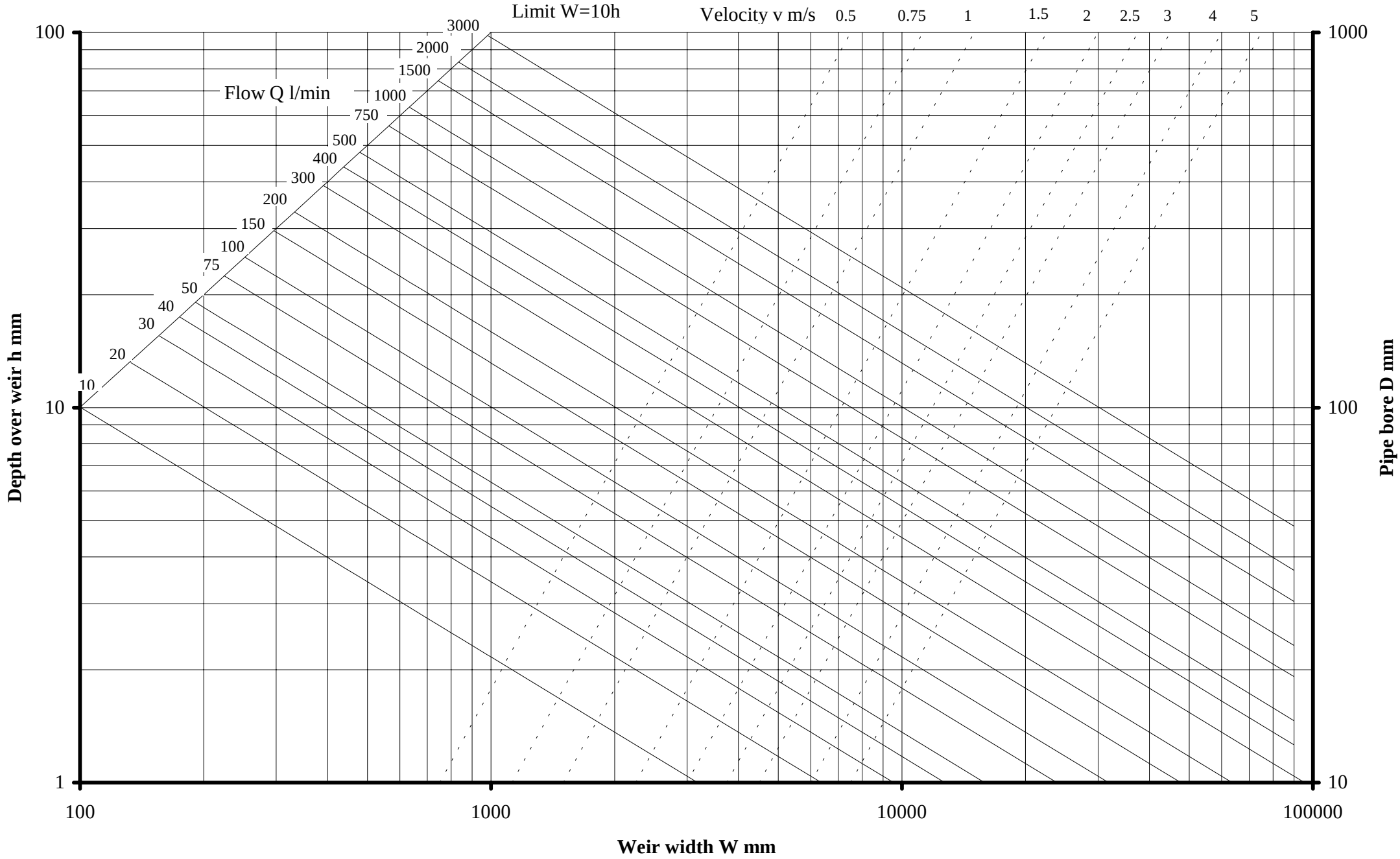
APPENDIX A

Relationship between ‘h’ and ‘W’ for type AB air gaps

[Reference Sheet 8 for graph]

A.1 For a known value of ‘Q’, read off the corresponding values of ‘h’ and ‘W’.

A.2 Given only ‘D’ and an assumed velocity, take a line across from the right hand scale of ‘D’ to intersect with the appropriate constant velocity line to the required value of ‘W’ (or ‘h’) and read off the corresponding value of ‘h’ (or ‘W’).


Limit W=10h
Velocity v m/s
0.5
0.75
1
1.5
2
2.5
3
4
5
Flow Q l/min
3000
2000
1500
1000
750
500
400
300
200
150
100
75
50
40
30
20
10
100
10
1
1000
100
10
Depth over weir h mm
Pipe bore D mm
100
1000
10000
100000
Weir width W mm