TYPE AB AIR GAP CALCULATOR TOOL
User guide

For app version 1.0.0

How to use the app to calculate overflow dimensions for an AB air gap explained below:

INTRODUCTION

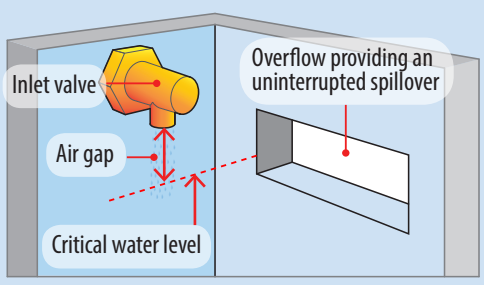
Supplying an installation via a type AB air gap is one way of providing fluid category 5 backflow protection.

Type AB air gap is formed by an arrangement of an air gap and spillover slot.

The WRAS type AB air gap calculator tool is an easy-to-use design aid for designers and installers. It provides details of the height of the spillover slot; the air gap distance between the inlet valve and the critical water level; and as the calculation method is used rather than the test method, three validation criteria.

Even when the arrangement satisfies the dimensional requirements, addition onsite tests are required to ensure there are no other factors which may contaminate the inlet or reduce the air gap so that it no longer provides the required backflow protection.

The calculator app can only be used for systems with a rectangular shaped overflow supplied via a single inlet valve with flows not exceeding 3m/second. It cannot be used with alternative water supplies e.g. a backup to a greywater system.



What is a type AB air gap?

It is an arrangement of fittings where a complete physical air gap (minimum 20mm) is maintained between the lowest water discharge point and the critical water level of a receiving vessel.

A rectangular overflow (referred to in the calculator as the 'spillover slot') within the receiving vessel provides the uninterrupted spillover to atmosphere.

To use the app users will need to know the size of the **inlet valve**, the **dimensions of the base of the spillover slot** and if used details of the **mesh screen**.

DESIGN

The inlet size is whichever dimension is the largest, the internal diameter of inlet device (e.g. float/solenoid valve), or that of the last one meter of pipework feeding it.

A mesh screen may be used to eliminate insects etc. and in doing so the free area of the spillover slot will be reduced by the area taken up by the wires of the screen mesh. It is the details of the remaining free unrestricted area that are required by the calculator.

The free area is normally quoted as a percentage (for 50% enter 50) and can usually be found in the manufacturer's specification. Where this value is not available users can select to input the specific details of the mesh screen using the '**I don't know the free area**' button.

The user will require details of, the size of the holes in the mesh screen (height and width) and the thickness of the wire used.

There are no specified requirements for mesh screens, however they must be suitable for the circumstances e.g. to protect against insects a maximum hole size of 0.65mm x 0.65mm is recommended.

Where a screen is not being used make sure the '**Mesh screen details**' box is left blank.

Tool Tip: Where the thickness of the screen's mesh is specified in SWG (Standard Wire Gauge) use the converter within the app to find the metric equivalent needed for the calculation.

RESULTS

Type AB air gaps designed by calculation provides minimum dimensions and specific validation criteria which must be met (see **Technical** and **Information** sections). In addition observations are required after installation to ensure any interactions that take place between the incoming water and the receiving vessel, such as foaming, splashing, turbulence or backflow (see **Installation**), do not contaminate the inlet valve, or reduces the air gap so that it no longer provides the required backflow protection.

The calculator displays two diagrams with the dimensions required. A technical summary of the calculations and the validation criteria that have to be satisfied are displayed in the **Technical** section of the app. The dimension from the inlet valve to the spillover slot is measured from the lowest point of water discharge.

The width of the spillover slot may need to be adjusted to ensure all requirements (such as the validation criteria) can be met.

When a mesh screen is used the calculator will account for the reduced free area by increasing the width of the spillover slot to accommodate it. Users can select an alternative option that increases the height of the spillover slot.

Tool Tip: The width of the proposed spillover slot may need to be adjusted to ensure all validation requirements can be met.

TECHNICAL

This section provides a summary of the results of the calculations, depending on the options selected and the minimum dimensional requirements for the **Validation Criteria**. Further details of these are provided in the **Information** section of the calculator app.

The **Validation Criteria** is just one of the requirements which must be met for the whole air gap arrangement to be compliant with the standard and meet the Water Fittings Regulations and Scottish Byelaws (also see **Installation**).

Note 1: In some cases the validation criteria can only be verified once the air gap arrangement has been installed.

Note 2: Altering the sizes of the mesh holes and thickness of wire will directly affect the dimensions of the spillover slot.

Tool Tip: For spillover slots fitted with a mesh screen use the height or width toggle buttons within Results screen to identify which may be the most suitable configuration.

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INFORMATION

The calculation method is not able to predict all interactions which may occur within a particular design. The standard (BS EN 13077) sets validation requirements for the calculation method (used in this app) and observation requirements once the design has been installed.

This section of the calculator app provides an overview of the technical terms used within the standard. It also describes the minimum requirements of the three validation criteria (reproduced in this guide), that need to be satisfied so that water will discharge correctly under fault conditions.

In addition checks will need to be made after installation to confirm compliance (see **Installation**).

About the tool:

The calculation methods and associated validation criteria are based on those set out in:

BS EN 13077:2008

Devices to prevent pollution by backflow of potable water — Air gap with non-circular overflow (unrestricted) — Family A — Type B

VALIDATION CRITERIA

The following validation criteria must be met along with, the minimum design dimensions, and satisfactory observations of the installation.

1) ***Internal face (Uw)*** – is the vertical face immediately below the spillover slot and this vertical dimension must be uninterrupted. ***Uw*** is measured vertically downwards from the bottom of the spillover slot as shown in Figure 1, below.
The minimum dimension shall be equal to or greater than 5 times dimension ***h***.

2) ***Horizontal Surface (Cw)*** – is the thickness of the cistern wall and any horizontal surface at the bottom of the spillover slot. ***Cw*** shall be equal to or less than to 5 times dimension ***h*** as shown in Figure 2 below.

3) ***Base of the spillover slot (L)*** is the length of the base of the spillover slot. This shall not be less than 10 times dimension ***h*** as shown in Figure 2 below.

Note: ***The critical water level (h)*** – is the level at which water will rise to under fault conditions. An air gap between this level and the lowest point of the inlet device must be maintained to protect the incoming water supply from potential contamination.
(see Figure 3)

INSTALLATION

Users should note that full compliance can only be determined once the type AB arrangement is installed. Additional checks will be needed to:

- Check the design meets the calculated dimensions;
- Check the validation criteria have been met; and
- An onsite test to ensure all performance requirements are met such as;
  - no contact of fluids with the inlet valve;
  - no restrictions surrounding the spillover slot; or
  - any other factors which may contaminate the inlet or compromise the operation of backflow protection arrangement.

These onsite tests are normally carried out by observing the device when operating at the maximum flow rate under normal operating conditions.

If contact is observed between the inlet device and any liquid (e.g. because of splashing, foaming, turbulence or backflow) it may be necessary to make modifications, such as increasing the air gap to the inlet device to a point where no contact is observed.

Onsite testing to confirm the adequacy of type AB air gaps should be carried out in consultation with the local water company (where it is being installed). The water company may require that their representative witnesses the onsite test.

IMPORTANT

Don't forget installing a type AB air gap may require notification to the local water company. See the WRAS website for more information – https://wras.co.uk/plumbing_professionals/advice_for_plumbing_professionals/notification/

You can find the contact details for water company regulations teams on it too – https://wras.co.uk/contacts/water_company_contacts/

Users should note that routine maintenance is required, particularly where mesh screens are used to ensure they remain free from debris or obstructions which would impair water exiting when operating.

Tool Tip: Light cowls or covers are permitted to reduce the ingress of light. However the cowls must not restrict the discharge of water during fault conditions. Additional design and installation guidance is provided on the WRAS website www.wras.co.uk/consumers/resources/publications/ titled – Design and installation guidance: light cowl or shroud to protect wholesome water from light ingress.

Figure 1 – How to measure the 'internal face' (***Uw***)

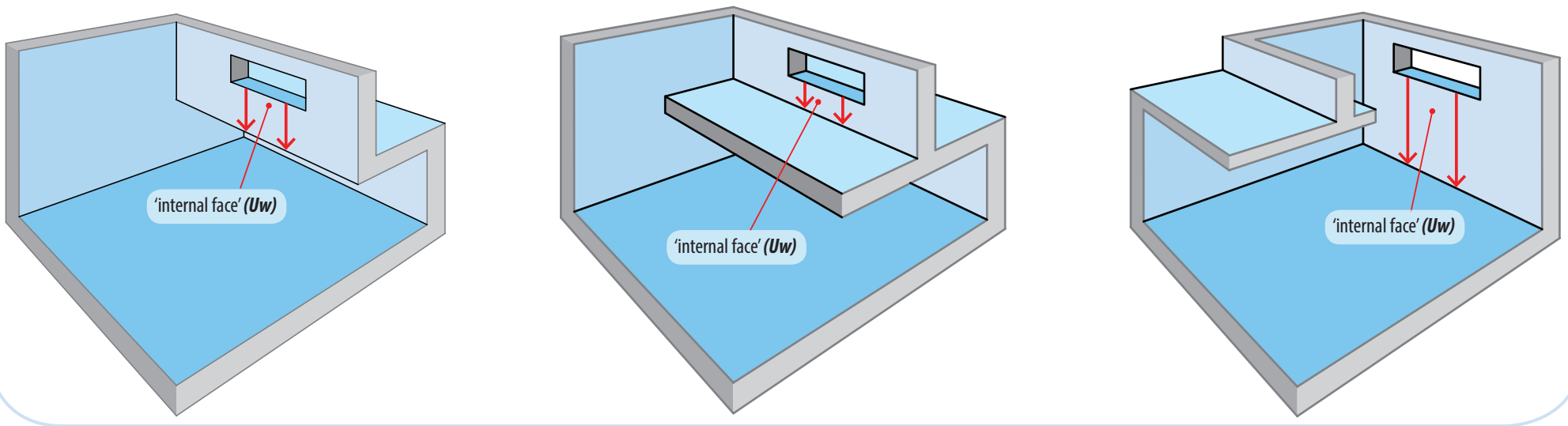

Figure 2 – Where to measure the 'horizontal surface' (***Cw***) and the base of the 'spillover slot' (***L***)

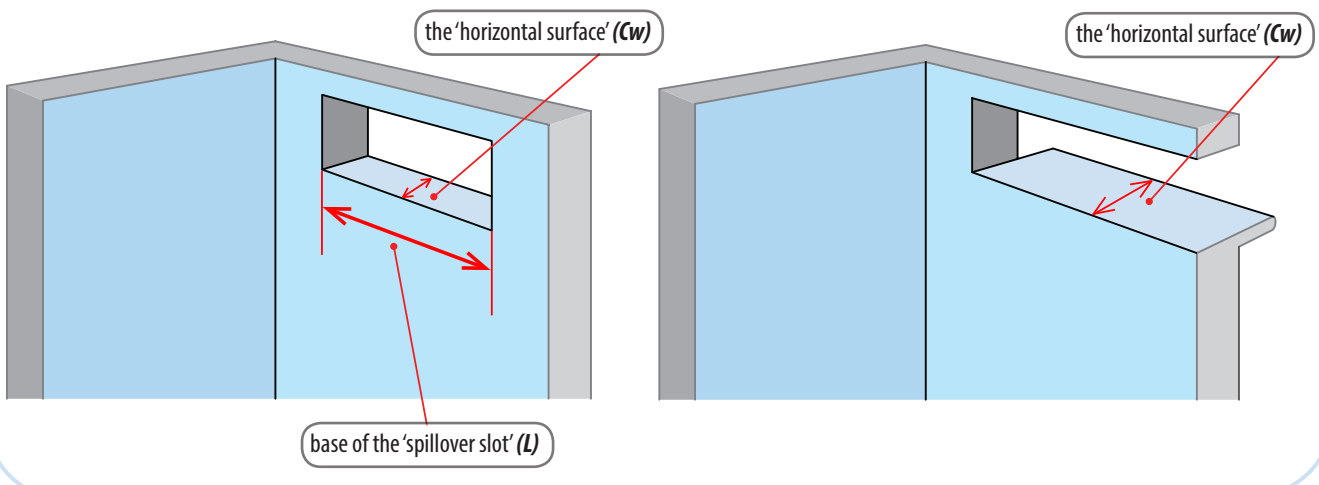

Figure 3 – Critical water level (***h***)