BRITISH STANDARD

BS 6281-1: 1992

Devices without moving parts for the prevention of contamination of water by backflow —

Part 1: Specification for type A air gaps

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee B/504, Water Supply, to subcommittee B/504/4, Backflow prevention, upon which the following bodies were represented:

Association of Consulting Engineers
Association of Manufacturers of Domestic Unvented Supply Systems Equipment (MODUSSE)
British Bathroom Council
British Foundry Association
British Non-Ferrous Metals Federation
British Plastics Federation
British Plumbing Fittings Manufacturers' Association
Department of the Environment (Property Services Agency)
Department of the Environment (Drinking Water Inspectorate)
Fibre Cement Manufacturers' Association Limited
Institute of Plumbing
Institution of Water and Environmental Management
Scottish Association of Directors of Water and Sewerage Services
Water Byelaws Advisory Service
Water Companies Association
Water Services Association of England and Wales

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Association of Manufacturers of Domestic Electrical Appliances
Association of Water Officers Ltd.
British Gas plc
British Valve and Actuator Manufacturers' Association
Builders Merchants Federation
Consumer Policy Committee of BSI
Department of the Environment (Building Research Establishment)
Department of Trade and Industry (National Weights and Measures Laboratory)
Institute of Clerks of Works of Great Britain Inc
Institution of Gas Engineers
Metal Sink Manufacturers' Association
National Association of Plumbing, Heating and Mechanical Services Contractors
Royal Institute of British Architects
Society of British Gas Industries
Society of British Water Industries
South London Consortium
Water Research Centre

This British Standard, having been prepared under the direction of the Technical Committee B/504, was published under the authority of the Standards Board and comes into effect on 1 May 1992

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The following BSI references relate to the work on this standard:
Committee reference B/504/4
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Amendments issued since publication

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Contents

Foreword

This Part of BS 6281 has been prepared under the direction of Technical Committee B/504, Water Supply, at the request of the Department of the Environment on the advice of the Standard Technical Committee on Water Regulations. It is one of a series of standards (BS 6280 to BS 6282) that specify the requirements for particular devices for preventing the backsiphonage and backflow of water in installations, and is intended to be suitable for citing as deemed to satisfy the relevant regulations or byelaws.

This revision makes available the opportunity to formulate a type A air gap or to identify the appropriate air gap from a graph plotting the relationship between the weir width and the gap over the weir. It supersedes the 1982 edition which is withdrawn.

BS 6281 has been divided into the following Parts:

— *Part 1: Specification for type A air gaps;*

— *Part 2: Specification for type B air gaps;*

— *Part 3: Specification for pipe interrupters of nominal size up to and including DN 42.*

This standard is based on experimental work carried out by the Building Research Establishment.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 6, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 6281 specifies the characteristics of type A air gaps for inlet or feed pipes of nominal size up to and including DN 150. Air gaps that comply with this Part of BS 6281 are devices suitable for protection against class 1 risk.

This Part of BS 6281 does not cover air gaps for draw-off taps.

NOTE The titles of the publications referred to in this Part of BS 6281 are listed on the inside back cover.

2 Definitions

For the purpose of this Part of BS 6281 the following definitions apply.

2.1
type A air gap

a visible, unobstructed and complete gap measured vertically downwards from between the lowest point of discharge of the inlet pipe and the spill-over level provided at the associated receiving pipe, cistern, vessel or apparatus into which the flow is discharged

2.2
class 1 risk

risk of serious contamination that is likely to be harmful to health (continuous or frequent)

2.3
spill-over level

the level at which water first begins to overflow

3 Design

3.1 Flow from an inlet pipe in any type A air gap shall be into air at atmospheric pressure, downwards and not more than 15° from the vertical.

3.2 No object shall be closer than three times the bore of the inlet or feed pipe to the inlet pipe or to the vertical projection of the inlet or feed pipe between the pipe and the spill-over level of the receiving vessel (see Figure 1).

3.3 Where non-circular pipes are used, the bore shall be taken as the internal diameter of a circular pipe having the same cross-sectional area as the non-circular pipe.

4 Height of air gap

NOTE See Figure 2.

4.1 In the case of a single inlet or feed pipe to a single vessel having a continuous, unobstructed, overflow around the top, the height, *S,* of the type A air gap as defined in **2.1** shall be not less than the value given in Table 1.

NOTE It is assumed that when the inflow of water ceases the water level falls to spill-over level before critical vacuum conditions in the inlet or feed pipe are established.

4.2 The height of the type A air gap as defined in **2.1** shall be not less than $S + h$ in the following cases:

a) a single inlet or feed pipe to a single vessel having a formed spill-over weir;

b) multiple inlets or feed pipes to a single vessel having a continuous, non-obstructed, overflow around the top; or

c) multiple inlets or feed pipes to a single vessel having a formed spill-over weir.

The value of S shall be taken from Table 1, for the inlet or feed pipe under consideration. The value of h shall be determined either by measurement of the depth of water above the spill-over level of the weir, with maximum inflow and with all outlets (except the weir) closed, or by calculation using the following formula[1)]:

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

where

Q is total maximum inflow (in l/min);

W is width of weir (in mm).

The calculation is only valid where:

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

2) crest thickness of weir (C_W) is less than or equal to $5h$;

3) upstream face of weir (U_W) is vertical to a depth greater than or equal to $2h$;

4) the depth of the letter box or notch weir (O_W) is greater than or equal to $S + h$.

Where the calculation is not validated the value of h shall be measured.

[1)] A graphical solution to this formula is illustrated in Appendix A.

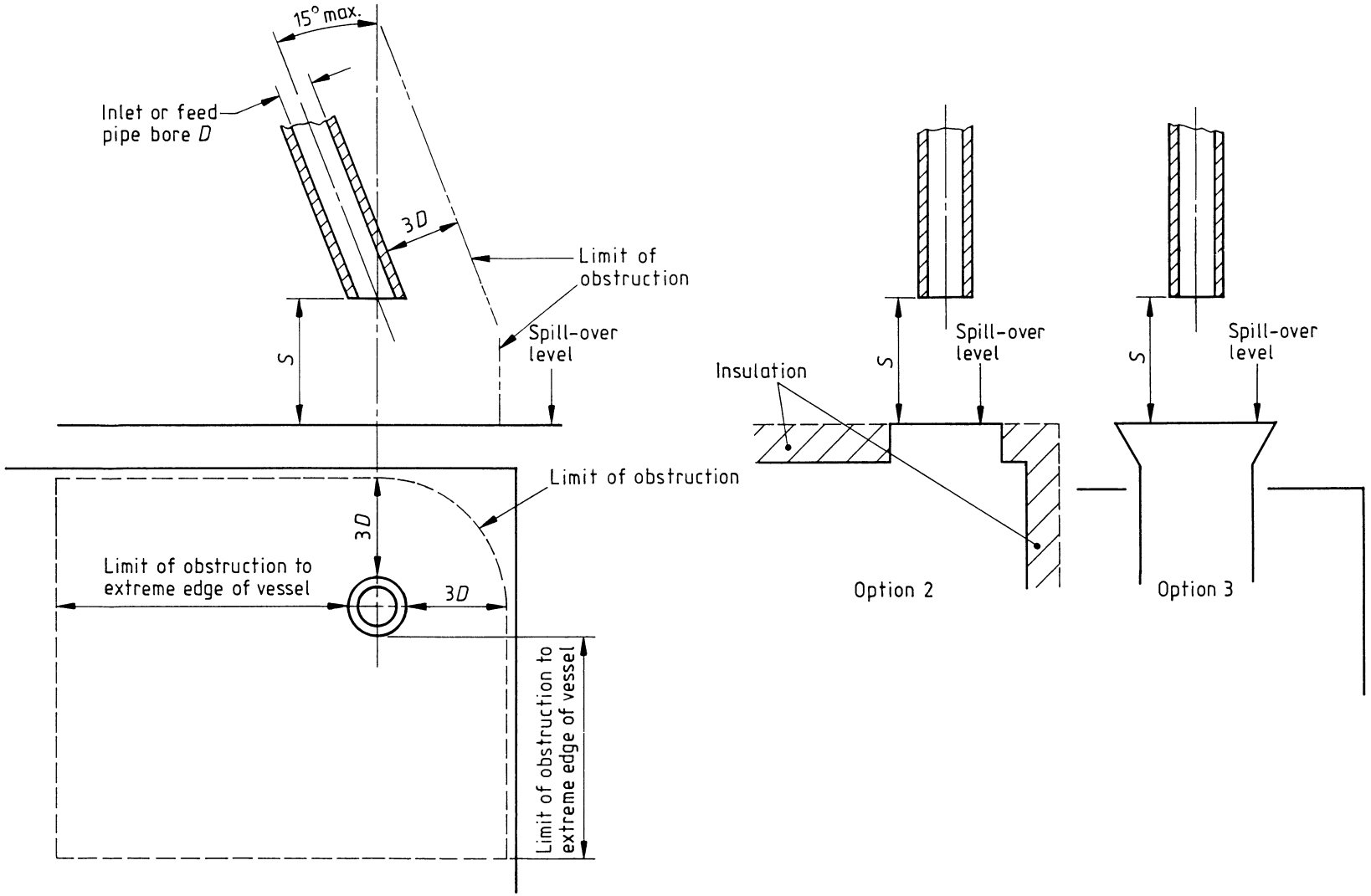
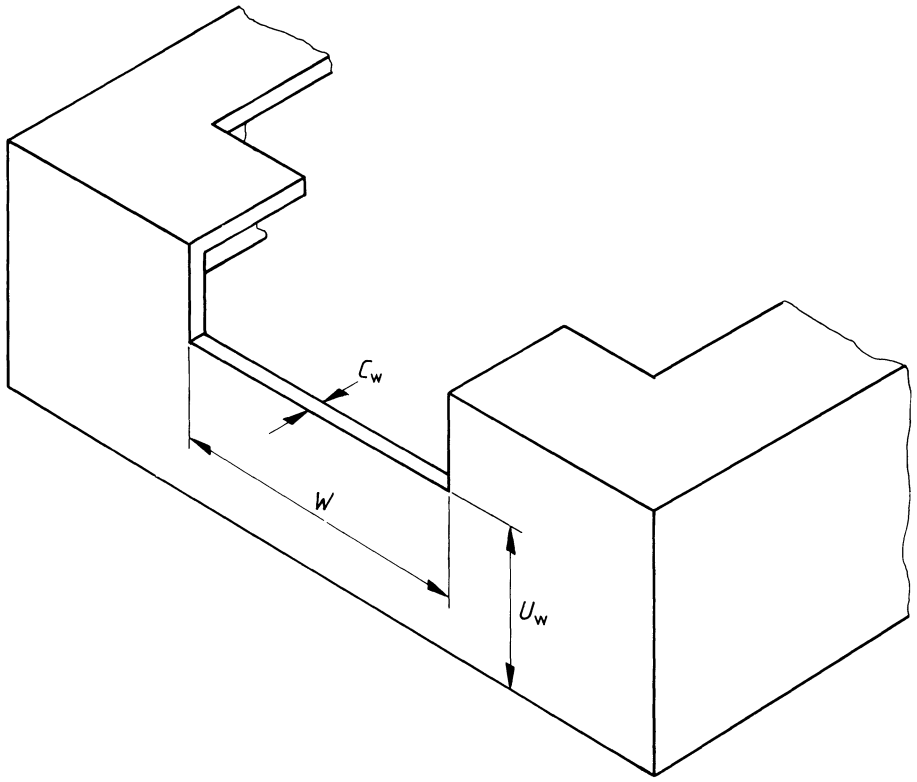
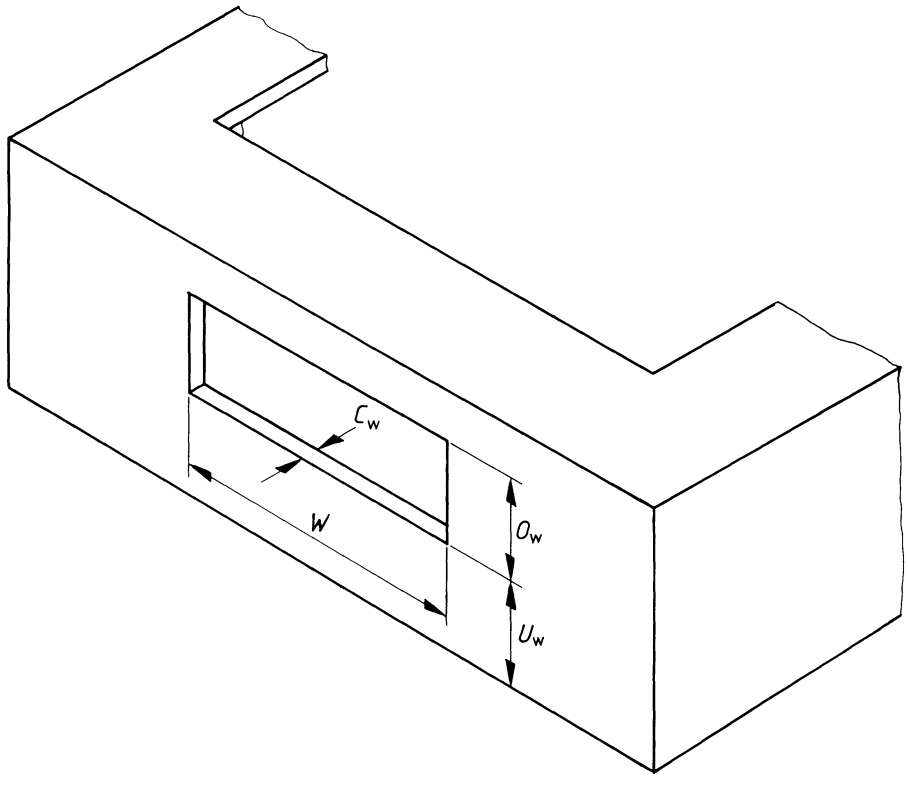


Figure 1 — Illustration of obstruction of inlet or feed pipe



(a) Notch weir



(b) Letterbox slot weir

Figure 2 — Typical illustrations of symbols used in clause 4

Table 1 — Dimensions of type A air gap

D	S	Examples			
		W	Q	h	O_W **and** $S + h$ min.
mm	mm	mm	1/min	mm	
Equal to or less than 14	20	300	28[a]	9.6	29.6
Over 14 up to and including 21	25	600	62[a]	10.3	35.3
Over 21 up to and including 41	70	2 600	238[a]	9.5	79.5
Over 41	$2D$	$28.5Q$[b]	$0.14D$[bc]	5.0	$2D + 5$

Key

D is bore of inlet or feed pipe
S is the minimum height of type A air gap specified in **4.1**
W is the width of the weir
Q is the maximum inflow
h is the depth over the weir
$S + h$ is the minimum air gap specified in **4.2**
O_W is the minimum depth for a "letterbox slot" or "notch" weir

NOTE A graphical solution to this formula is illustrated in Appendix A.

[a] Based on velocity 3 m/s in pipe of largest bore in range.
[b] Based on $h = 5$ mm.
[c] Based on velocity 3 m/s.

Appendix A Relationship between h and W for type A air gaps

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. Interpolate, if necessary, a constant velocity line to the required value of W (or h) and read off the corresponding value of h (or W). The chart shows this for the examples in Table 1.

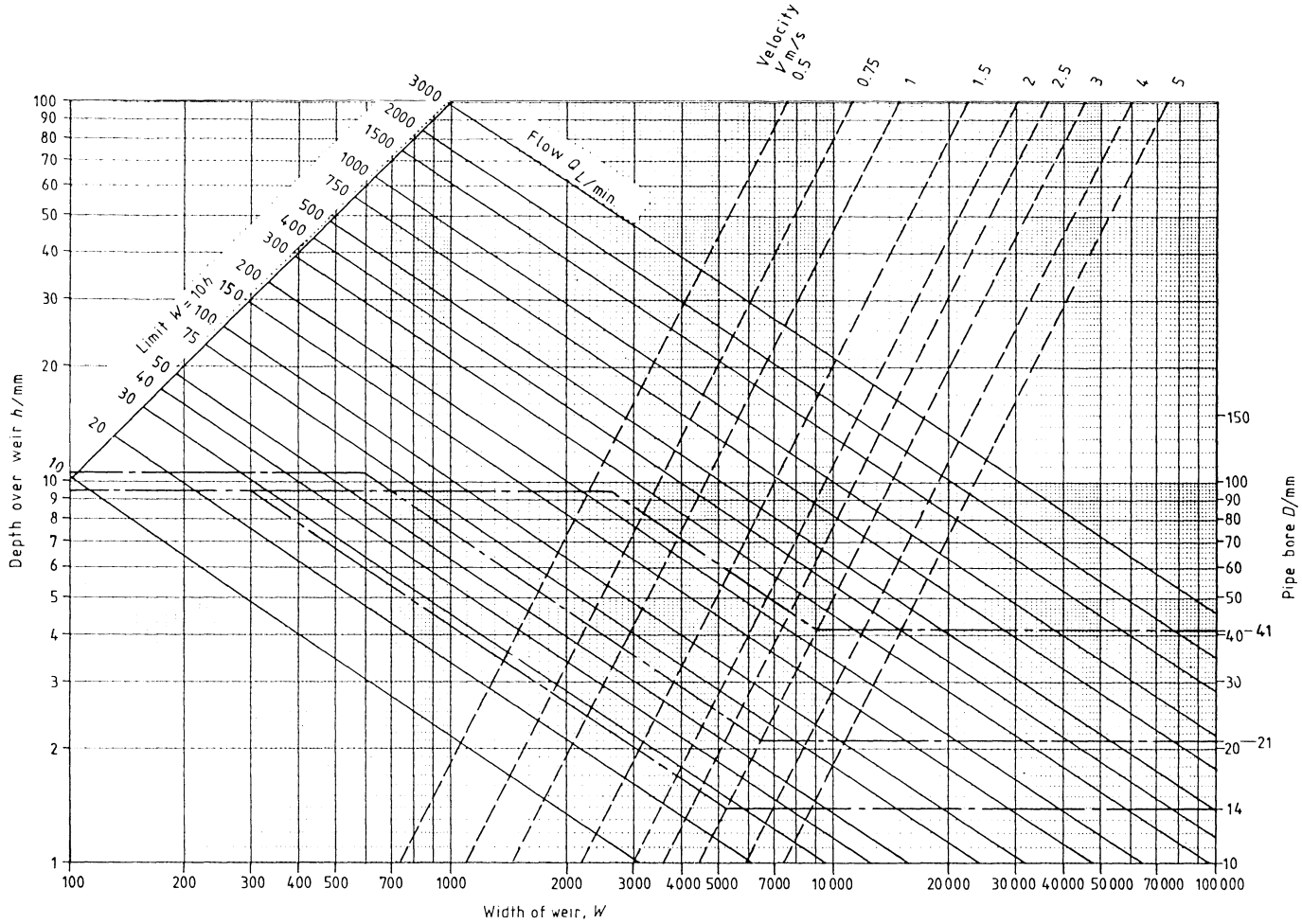


Figure 3 — Relationship between h and W for type A air gaps

Publication(s) referred to

BS 6280, *Method of vacuum (backsiphonage) test for water-using appliances*[2)].
BS 6281, *Devices without moving parts for the prevention of contamination of water by backflow.*
BS 6281-2, *Specification for type B air gaps*[2)].
BS 6281-3, *Specification for pipe interrupters of nominal size up to and including DN 42*[2)].
BS 6282, *Devices with moving parts for the prevention of contamination of water by backflowe*[2)].

[2)] Referred to in the foreword only.

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