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**Agrément
Certificate
No 92/2796**
Fourth issue*

Designated by Government
to issue
European Technical
Approvals

GEBERIT HDPE DRAINAGE SYSTEMS

Systèmes de canalisations d'évacuation
Abflußleitungen

Product




• THIS CERTIFICATE RELATES TO GEBERIT HDPE DRAINAGE SYSTEMS, COMPRISING THE ABOVE GROUND SYSTEM AND THE PLUVIA SYPHONIC ROOF DRAINAGE SYSTEM, THE COMPONENTS OF WHICH ARE DESCRIBED IN THE ACCOMPANYING DETAIL SHEETS.

• The systems are for use in installations designed in accordance with BS 5572 : 1994 and/or BS EN 12056-3 : 2000 for the conveyance of surface water and domestic sewage as is permitted to be discharged into public sewers by the Water Industry Act 1991 and surface water and sewage as is permitted and defined by

continued

Building Regulations — Detail Sheet 1

1 The Building Regulations 2000 (England and Wales)

 The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of drainage systems with the Building Regulations. In the opinion of the BBA, Geberit HDPE Above Ground Drainage Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: B3	Internal fire spread (structure)
Comment:	Any pipe passing through a separating wall, compartment floor or compartment wall should meet the appropriate provisions.
Requirement: C4	Resistance to weather and ground moisture
Comment:	The joints between the roof outlet and the roof will adequately resist the passage of moisture to the inside of the building. See section 7 of the appropriate Detail Sheets.
Requirement: H1(1)	Foul water drainage
Comment:	See the marked sections of the <i>Design Data</i> parts of the accompanying Detail Sheets.
Requirement: H3	Rainwater drainage
Comment:	See the marked sections of the <i>Design Data</i> parts of the accompanying Detail Sheets.
Requirement: Regulation 7	Materials and workmanship
Comment:	The systems are acceptable.

continued

the Sewerage (Scotland) Act 1968 and the Water and Sewerage Services (Northern Ireland) Order 1973.

- Components of the systems can be used individually or in combination as described in the accompanying Detail Sheets.
- This Certificate does not cover the use of any of the products for untreated trade effluents.

These Front Sheets must be read in conjunction with the accompanying Detail Sheets, which provide information specific to particular products.

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2 The Building Standards (Scotland) Regulations 1990 (as amended)



In the opinion of the BBA, Geberit HDPE Above Ground Drainage Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related

Technical Standards.

Regulation:	10	Fitness of materials
Standards:	B2.1 and B2.2	Selection and use of materials and components
Comment:		The systems are acceptable.
Regulation:	12	Structural fire precautions
Standard:	D5.1	Service openings
Comment:		A pipe which passes through a separating wall or separating floor or a compartment wall or compartment floor must be constructed, or protected, so that in the event of fire, the fire resistance required for the wall or floor is maintained. Every service opening through an element must be suitably fire-stopped.
Regulation:	24	Drainage and sanitary facilities
Standard:	M2	Drainage system
Comment:		The systems will meet the relevant requirements of this Technical Standard. See the marked sections of the <i>Design Data</i> parts of the accompanying Detail Sheets.
Regulation:	17	Preparation of sites and resistance to moisture
Standard:	G3.1	Resistance to precipitation
Comment:		The systems meet the relevant requirement of this Standard. See the marked section of the <i>Design Data</i> parts of Detail Sheet 3 of this Certificate.

3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, Geberit HDPE Above Ground Drainage Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The systems are acceptable. See the marked sections of the <i>Design Data</i> parts of the accompanying Detail Sheets.
Regulation:	E6	Internal fire spread — Structure
Comment:		Geberit HDPE Above Ground Drainage Systems will contribute to meeting this Regulation. See the marked sections of Detail Sheet 3 of this Certificate.
Regulation:	N3	Sanitary pipework
Comment:		The systems meet the relevant requirements of this Regulation.
Regulation:	N7	Rain-water drainage
Comment:		The systems meet the relevant requirements of this Regulation.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		The systems meet the relevant requirements of this Regulation. See section 7 of the appropriate Detail Sheets.

Bibliography

BS 5572 : 1994 *Code of practice for sanitary pipework*

BS EN 12056 *Gravity Drainage Systems inside Buildings*

BS EN 12056-3 : 2000 *Roof drainage, layout and calculation*

Conditions of Certification

4 Conditions

4.1 This Certificate:

- (a) relates only to the product that is described, installed, used and maintained as set out in this Certificate;
- (b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;
- (c) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- (d) is copyright of the BBA.

4.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, shall be construed as references to such publication in the form in which it was current at the date of this Certificate.

4.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabricating process(es) thereof:

(a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked by the BBA or its agents; and

(c) are reviewed by the BBA as and when it considers appropriate.

4.4 In granting this Certificate, the BBA makes no representation as to:

(a) the presence or absence of any patent or similar rights subsisting in the product or any other product;

(b) the right of the Certificate holder to market, supply, install or maintain the product; and

(c) the nature of individual installations of the product, including methods and workmanship.

4.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the installation and use of this product.



In the opinion of the British Board of Agrément, Geberit HDPE Drainage Systems are fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

Certificate No 92/2796 is accordingly awarded to Geberit Ltd.

On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'P. Q. Newson', is written over a light grey background.

Date of Fourth issue: 5th September 2001

Chief Executive

**Original Certificate issued to Geberit AG on 22nd May 1992. This revised version issued to include change of company name and address, telephone and facsimile numbers, and reference to the revised national Building Regulations.*

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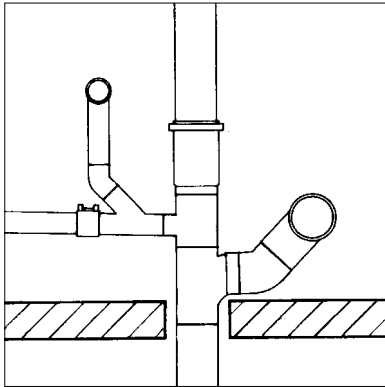
Geberit AG

Certificate No 92/2796

GEBERIT HDPE ABOVE GROUND DRAINAGE SYSTEM PIPES, ADAPTORS AND FITTINGS

DETAIL SHEET 2

Product



- THIS DETAIL SHEET RELATES TO GEBERIT HDPE ABOVE GROUND DRAINAGE SYSTEM PIPES, ADAPTORS AND FITTINGS.
- The products are easily installed and joints will remain watertight under all normal service conditions.

This Detail Sheet must be read in conjunction with the Front Sheet and Detail Sheet 1 which give Conditions of Certification and the product's position regarding the Building Regulations respectively.

Technical Specification

1 Description

1.1 Geberit hdpe Above Ground Drainage System Pipes, Adaptors and Fittings comply with the recommendations of ISO R161/1 : 1978 *Plastic pipes for the conveyance of liquids*. They are black in colour and are normally supplied in 5 m lengths, but can be produced in suitable lengths to form prefabricated pipeline elements.

1.2 The nominal (outside) diameters and wall thicknesses of pipes are given in Table 1.

1.3 The dimensions of the fittings are given in Tables 2 to 15, fittings available are:

concentric reducers
 ring-seal sockets
 electroweld sleeve couplings
 screw-threaded joints
 91½° branch fittings
 access pipes with screwed access cover
 expansion sockets
 90° reduced bends
 135° Y-branch fittings
 135° double Y-branch fittings
 91½° long turn Y-branch fittings
 short eccentric reducers
 90° long radius bends
 135° bends
 91½° bends.

Table 1 Diameter and wall thickness of pipes

Nominal (outside) diameter (mm)	Minimum wall thickness (mm)
40	3.0
50	3.0
56	3.0
63	3.0
75	3.0
90	3.5
110	4.3
125	4.9
160	6.2
200	6.2
250	7.8
315	9.8

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Table 2 Concentric reducers: dimensions

	d (mm)	d1 (mm)	H (mm)
	40	32	80
	50	32	80
		40	80
	63	40	80
		50	80
	75	40	80
		50	80
		56	80
		63	80
	90	40	80
		50	80
		56	80
		63	80
		75	80
	100	40	80
	50	80	
	56	80	
	63	80	
	75	80	
	90	80	
125	63	80	
	75	80	
	90	80	
	110	80	

Table 3 Ring-seal sockets: dimensions

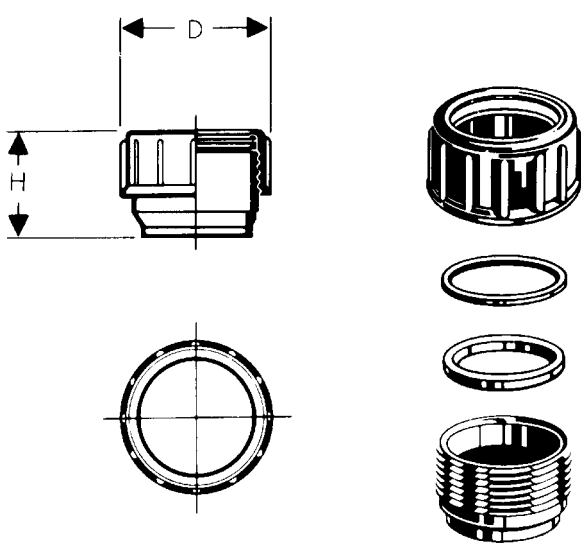
	d (mm)	D (mm)	H (mm)
	32	46	25
	40	57	63
	50	67	63
	56	72	63
	63	80	63
	75	92	88
	90	108	88
	110	131	88
	125	149	88
	160	188	123

Table 4 Electroweld sleeve couplings: dimensions

	d (mm)	D (mm)	H (mm)
	40	52	64
	50	62	60
	56	68	60
	63	76	60
	75	89	60
	90	104	60
	110	125	60
	125	142	60
	160	178	60
	200	224	150
	250	275	150
315	343	150	

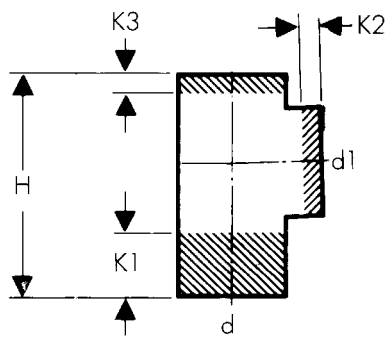
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Table 5 Screw-threaded joints: dimensions

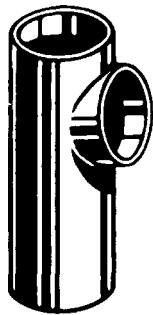


d (mm)	D (mm)	H (mm)
32	56	45
40	64	63
48	75	55
50	74	63
56	85	68
63	90	68
75	112	96
90	129	97
110	149	97

Table 6 Branch fittings 91½°: dimensions

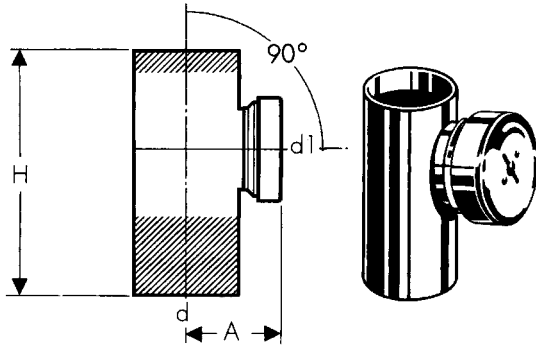


d/ (mm)	d1 (mm)	H (mm)	K1 (mm)	K2 (mm)	K3 (mm)
32/	32	85	25	10	10
40/	32	130	50	25	20
	40	130	45	25	25
50/	40	150	60	25	30
	50	150	55	25	25
63/	40	175	70	30	30
	50	175	70	30	35
	56	175	65	30	30
	63	175	60	30	30
75/	40	175	75	25	40
	50	175	70	25	35
	56	175	65	25	30
	63	175	60	25	25
	75	175	55	25	25
90/	40	200	85	25	45
	50	200	85	25	45
	56	200	80	25	40
	63	200	75	25	35
	75	200	70	25	30
	90	200	65	25	25
110/	40	225	100	25	60
	50	225	95	25	50
	56	225	90	25	45
	63	225	90	25	40
	75	225	85	25	35
	90	225	75	25	30
	110	225	65	20	20
125/	50	250	110	25	60
	56	250	105	25	55
	63	250	105	25	50
	75	250	100	25	45
	90	250	90	25	40
	110	250	80	20	30
	125	250	70	20	20
160/	110	350	135	45	60
	125	350	125	45	50
	160	350	105	35	30



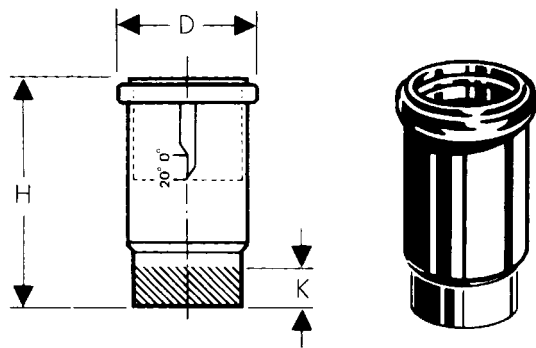
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Table 7 Access pipes with screwed access cover: dimensions



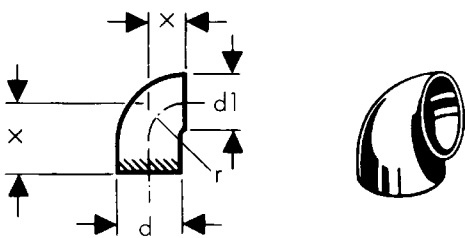
d/d1 (mm)	H (mm)	A (mm)
63/63	175	90
75/75	175	95
90/90	200	110
110/110	240	90
125/110	250	130
160/110	350	150

Table 8 Expansion sockets with ring-seal for horizontal or vertical installation: dimensions



d (mm)	D (mm)	H (mm)	K (mm)
32	50	85	—
40	66	230	40
50	80	233	40
63	93	233	40
75	105	233	40
90	123	234	40
110	135	255	20
125	162	239	40
160	202	240	40

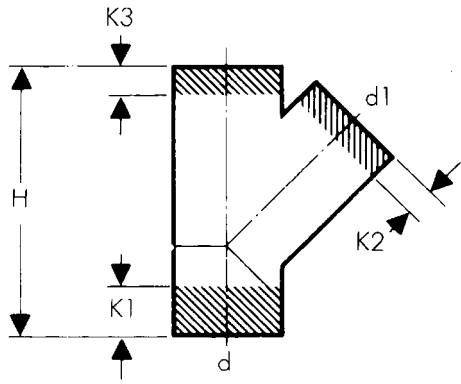
Table 9 Bend 90° reduced: dimensions



d/d1 (mm)	x/r (mm)
50/40	40
63/50	50
56	50

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Table 10 Y-branch fittings 135°: dimensions



d/d1 (mm)	H (mm)	K1 (mm)	K2 (mm)	K3 (mm)
32/32	105	20	20	20
40/32	135	30	35	35
40	135	25	30	30
50/40	165	40	45	45
50	165	35	20	20
63/40	195	45	45	40
50	195	50	30	30
56	195	45	25	25
63	195	40	20	20
75/40	210	65	50	60
50	210	60	30	40
56	210	55	25	35
63	210	45	25	35
75	210	40	25	25
90/40	240	75	55	65
50	240	80	40	50
56	240	75	35	45
63	240	70	30	40
75	240	65	30	25
90	240	50	20	30
110/40	270	95	60	75
50	270	95	50	55
56	270	90	40	45
63	270	85	35	40
75	270	75	30	35
90	270	65	25	30
110	270	55	20	20
125/63	300	105	45	60
75	300	95	40	50
90	300	85	30	35
110	300	70	25	25
125	300	60	20	20
160/75	375	135	65	75
110	375	110	45	55
125	375	100	40	50
160	375	75	25	25

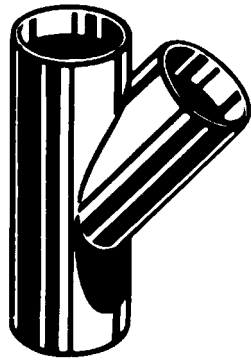
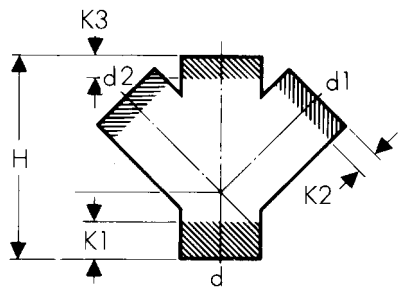
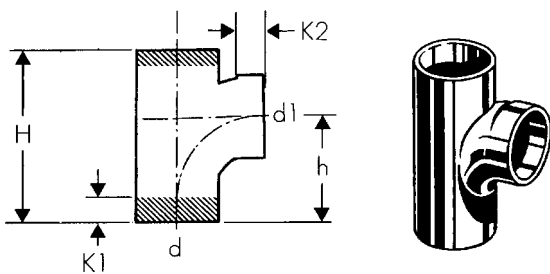


Table 11 Double Y-branch fittings 135°: dimensions



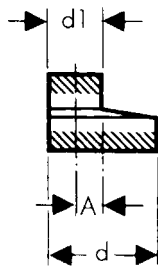
d1 (mm)	d1/2 (mm)	H (mm)	K1 (mm)	K2 (mm)	K3 (mm)
110/	40/40	270	95	60	75
	50/50	270	95	60	75
	110/110	270	50	15	15

Table 12 Long turn Y-branch fittings 91½°: dimensions



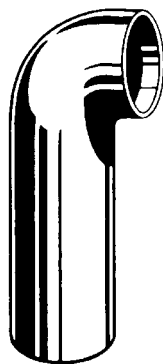
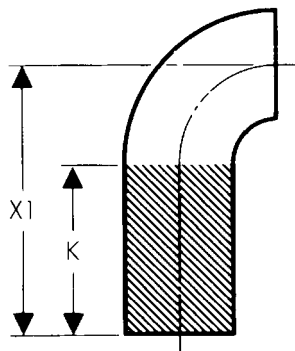
d/d1 (mm)	H (mm)	h (mm)	K1 (mm)	K2 (mm)
110/110	225	138	35	20

Table 13 Short excentric reducers: dimensions



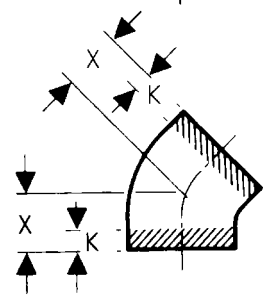
d (mm)	d1 (mm)	A (mm)
50	40	5.0
63	40	11.5
	50	6.0
	56	3.0
75	40	17.5
	50	12.0
	56	10.0
	63	6.0
90	50	20.0
	56	16.0
	63	13.0
	75	7.0
110	40	33.7
	50	29.0
	56	26.0
	63	22.0
	75	16.0
	90	9.0
125	50	36.0
	56	33.0
	63	29.0
	75	23.0
	90	16.0
	110	7.0
160	110	23.0
	125	16.0

Table 14 Bends: dimensions



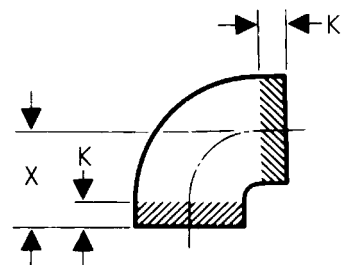
90° with long radius

d (mm)	X1 (mm)	K (mm)
32	100	70
40	150	120
50	180	140
63	210	160
75	210	140
90	240	150
110	270	170
125	200	90
160	200	60



135°

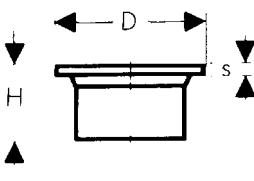
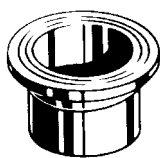
d (mm)	X (mm)	K (mm)
40	40	20
50	45	20
63	50	20
75	50	20
90	55	20
110	60	25
125	65	25
160	69	20

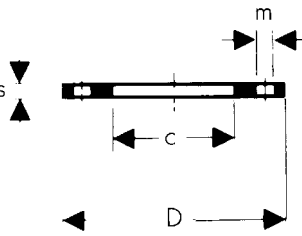
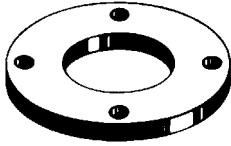


91½°

d (mm)	X (mm)	K (mm)
50	60	20
63	70	20
75	75	20
90	80	20
110	95	25
125	100	25
160	120	25

Table 1.5 Flange dimensions

		adaptors			
		d (mm)	D (mm)	H (mm)	s (mm)
		50	80	60	8
		56	90	60	8
		63	90	60	8
		75	110	65	9
		90	128	70	11
		110	148	75	12
		125	160	80	14
		160	198	90	17
		200	260	80	14
		250	325	80	16
315	370	100	20		

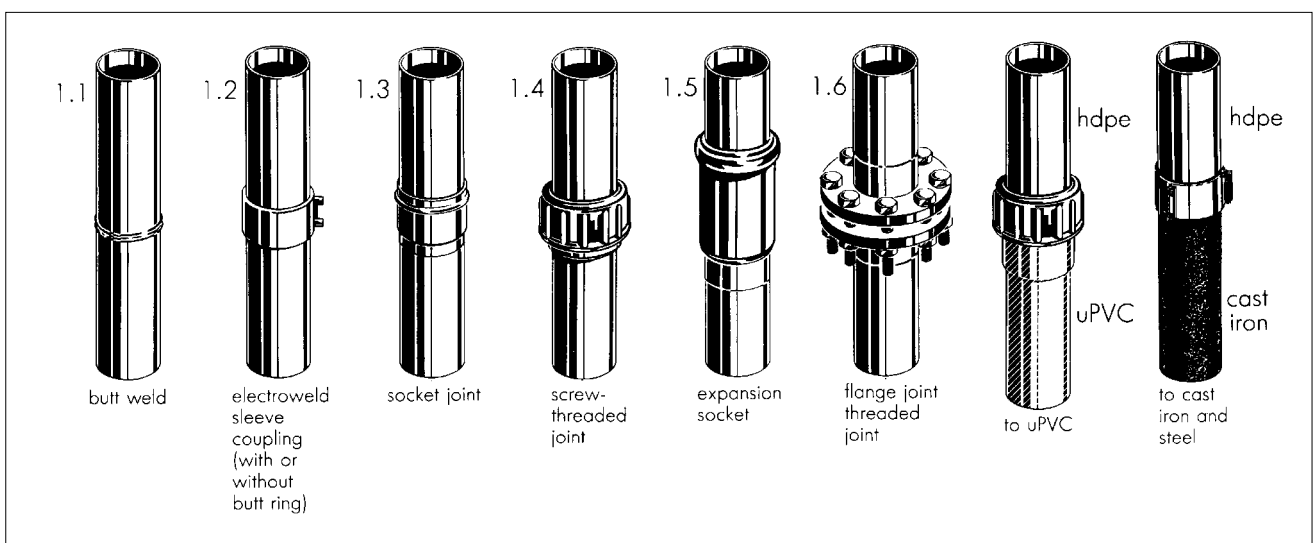
		plates					
		d (mm)	D (mm)	c (mm)	s (mm)	m (mm)	bolts (mm)
		50	150	55	12	18	4
		56	165	69	12	18	4
		63	165	69	12	18	4
		75	185	82	12	18	4
		90	200	97	14	18	8
		110	220	119	14	18	8
		125	250	134	14	18	8
		160	285	168	14	23	8
		200	340	208	14	23	8
		250	395	260	16	23	12
		315	445	328	20	23	12

1.4 Methods available for joining the pipe/ fittings are:

- butt welding — utilising Geberit hot-plate type KSS160 or KSS200 (see Figure 1.1)
- electroweld sleeve couplings (see Table 4) — a Geberit welding apparatus reference ESG160 must be used for pipes 40 mm to 160 mm diameter and reference ESG315 for pipes 200 mm to 315 mm diameter (see Figure 1.2)
- ring-seal sockets (see Table 3) — these items are for welding to pipe or fitting spigots (see Figure 1.3)
- expansion sockets (see Table 8) — these sockets are for welding to pipe or fitting spigots at one

- end and incorporate a ring-seal joint at the other. They permit longitudinal movement between adjacent pipes (see Figure 1.5)
- screw-threaded joints (see Table 5) — this component consists of a male threaded spigot which must be butt welded to the pipe or fitting, an EPDM compression seal, a nylon bush and a polyethylene female threaded cap (see Figure 1.4)
- a flanged joint (see Table 1.5) — the joint assembly incorporates two flange adaptors which must be butt welded to the pipe/spigots to be joined, an EPDM flange seal, two cast iron flange plates and the appropriate number of steel bolts and washers (see Figure 1.6).

Figure 1 Joint types



2 Manufacture

2.1 The pipes are extruded from batch mixed raw materials and cut to length. Fittings are injection moulded or produced by welding pipe sections together.

2.2 Continuous quality control is exercised during manufacture to maintain product quality, and includes checks on:

pipes

appearance

dimensional accuracy

shrinkage

fittings

appearance

dimensional accuracy

appearance and dimensional stability after heating to 80°C

weld appearance.

3 Delivery and site handling


3.1 Pipes are supplied unprotected and should be stored in stacks not more than 1 m high and away from heat sources to avoid distortion.

3.2 Each pipe bears the manufacturer's code, the external diameter, wall thickness and Avis Technique No 15/75–15 identification markings. Fittings are marked with nominal diameter without reference to thickness.

3.3 The BBA identification mark including the number of this Certificate is stamped onto all sales invoices.

Design Data

4 General

 4.1 Geberit hdpe Above Ground Drainage System Pipes, Adaptors and Fittings are satisfactory for use in domestic, commercial and public buildings and in installations designed in accordance with BS 5572 : 1978 *Code of practice for sanitary pipework* for the conveyance of surface water and domestic sewage as is permitted to be discharged into public sewers by the Public Health Act 1936 (England and Wales), and surface water and sewage as is permitted and defined by the Sewerage (Scotland) Act 1968 and the Water and Sewerage Services (Northern Ireland) Order 1973.

4.2 The average linear expansion coefficient for Geberit pipes is 200×10^{-6} per °C. Installations must be designed to accommodate or prevent the anticipated thermal movement as follows:

Prevention of longitudinal thermal movement

4.3 Movement can be prevented by embedding in concrete or by rigid fixings.

Embedment

4.4 The adhesion between concrete and pipe is inadequate to prevent movement. When installed within concrete floors the movement is prevented by the use of electroweld sleeves or bushes which protrude from the external surface of the pipe. These fittings must be used near each branch connection. Ring-seal sockets should not be embedded in concrete. The expansion and contraction forces created by thermal movement must be accommodated by the concrete.

Rigid installation


4.5 The forces exerted on pipe supports, anchors and the structure must be considered when this approach is used. Rigid fixings are not considered suitable for pipes over 160 mm. Guidance on the load exerted on fixings is available from the manufacturer.

Accounting for length/longitudinal movement

4.6 Vertical and horizontal expansion can be catered for by the linear expansion socket. The product is designed to cope with the expansion equivalent to a 6 m run of pipe through a temperature change of 80°C. This product should be used in conjunction with rigid anchor fixings and sliding guide hangers as fully described in the manufacturer's installation guide.


4.7 Thermal movement can also be accommodated by the incorporation of a deflection leg in the system design (see Figure 2). The maximum anticipated movement is determined using graph 1, and the length of the required deflection leg appropriate to the predicted movement is read from graph 2. The procedure is fully explained in the *Geberit Installation Guide*.

5 Strength

 5.1 Geberit hdpe pipes, adaptors and fittings will have adequate resistance to the forms of loading associated with installation and normal service conditions.

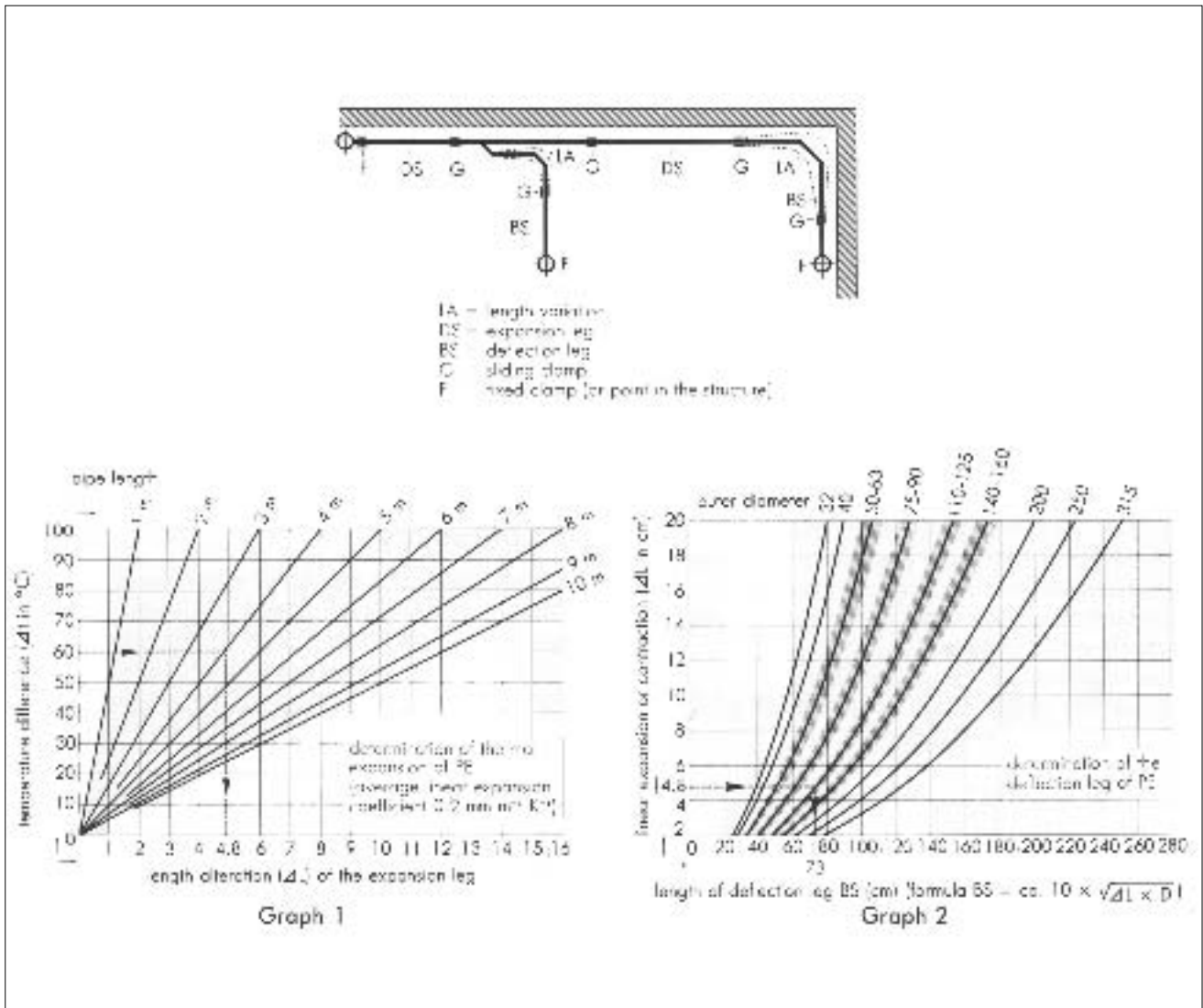
5.2 The products should be protected from impacts, for example from heavy vehicles, such as fork-lift trucks used on commercial premises.

6 Performance of joints

 6.1 The joints will not be adversely affected by thermal movement provided the correct provision is made.

6.2 The joints will remain watertight under conditions of pipeline movement in excess of those expected to occur in normal good drainage practice.

Figure 2 Deflection leg



7 Practicability of installation

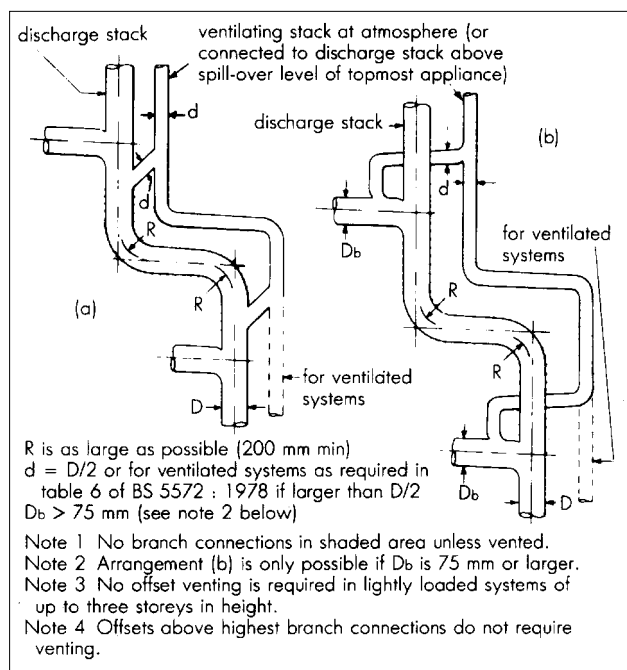
Installation of the pipes is achieved easily providing the procedures detailed in section 14 are strictly adhered to.

8 Flow characteristics

8.1 A system comprising Geberit hdpe pipes, adaptors and fittings will have satisfactory flow characteristics. Single-stack systems with non-swept branch connections are restricted in accordance with BS 5572 : 1978, clause 7.3.3.1 and Table 6, Note 3.

8.2 Offsets in the wet portion of a discharge stack should be avoided. However, if unavoidable, large radius bends should be used (see BS 5572 : 1978). A ventilation stack may be necessary above and below the offset (see Figure 3).

Figure 3 Offsets in discharge stacks



9 Resistance to chemicals



9.1 The products will be unaffected by those types and quantities of chemicals likely to be found in the effluents defined in section 4.1 of this Detail Sheet.

9.2 Details of the chemical resistance of hdpe are given in BS Code of Practice 312 : Part 1 : 1973 *Code of practice for plastics pipework (thermoplastics material) — General principles and choice of material.*

10 Resistance to elevated temperatures



The products have adequate resistance to the temperatures likely to occur in the effluents defined in section 4.1 of this Detail Sheet.

11 Behaviour in relation to fire



11.1 In common with other plastics materials, Geberit pipes, adaptors and fittings are combustible, and in a fire situation may ignite and burn. The pipes, adaptors and fittings are high density polyethylene and their burning will not result in the release of toxic gases. However, consideration should be given to the need for protective fire resistant ducting when assessing the fire risk in a building, particularly where large quantities of piping may otherwise be exposed.



11.2 In England and Wales the detailed requirements are given in Approved Document B2/3/4 Appendix F8.



11.3 In Scotland and Northern Ireland, pipes which penetrate separating or compartment walls or floors must be constructed or protected so that, in the event of fire, the fire resistance required for the wall or floor is maintained, and they must be fire-stopped.

12 Maintenance



Sections of the system can be easily removed and replaced. The installation must be designed so that access is provided in accordance with BS 5572 : 1978.

13 Durability

In the opinion of the BBA, when used in the context of this Detail Sheet, the materials from which the component parts of the pipes, adaptors and fittings are manufactured will not significantly deteriorate and the products will have serviceable life equivalent to PVC-U sanitary pipework systems.

14 Procedure

14.1 Installation must be in accordance with the manufacturer's literature and with the recommendations given in BS 5572 where appropriate.

14.2 End-to-end butt weld joints must be carried out under controlled conditions:

pipe must be cut square and clean using a Geberit pipe cutter

the welding plate must be clean

the required lateral pressure must be applied appropriate heat-up and weld time should be used.

14.3 Welding procedure is as follows:

the face of each item is heated by lightly pressing the components against the heating plate for the correct period

clamping pressure is gradually increased to the required value and held for the specified period clamps and jigs are available to ensure correct alignment of the joint.

14.4 Electroweld joints using the appropriate Geberit welder must be carried out as follows, the pipe end and sleeve must be kept dry at all times:

the pipe is cut off at right-angles, deburred and cleaned

the pipe or fitting is inserted into the sleeve to the central register the welder is connected to the sleeve and operated in accordance with the manufacturer's instructions.

14.5 Other types of connection sleeve must be butt welded to the spigot to be joined in accordance with sections 14.2 and 14.3. The connection is made according to the joint type:

ring-seal socket — the pipe or fitting spigot is lubricated and pushed fully into the socket

expansion socket* — the pipe is pushed the appropriate length into the socket, depending on the temperature at the time of installation (see Table 8 and Table 16).

screw-threaded fittings are connected to spigots by inserting the spigot fully into the joint and tightening the locking collar by hand.

*These sockets should be protected from the ingress of dirt by wrapping the joint with a felt bandage and securing with adhesive tape.

Table 16 Insertion depth (mm)

Nominal diameter (mm)	-10°C	0°C	+10°C	+20°C
40-160	70	80	90	105
200-315	170	180	190	205

14.6 Pipes are secured by anchor brackets on hangers (not covered by this Certificate). The maximum spacing of the supports must be 1.2 m on vertical pipes and 0.5 m on near horizontal pipes.

Technical Investigations

The following is a summary of the technical investigations carried out on the Geberit hdpe Above Ground Drainage System Pipes, Adaptors and Fittings.

15 Tests

The results of tests carried out by the Centre Scientifique et Technique du Bâtiment on Geberit hdpe pipes, adaptors and fittings were assessed in relation to comparable UK test requirements. Tests were carried out to include:

- dimensional control
- Vicat softening point
- bending temperature under load
- specific mass
- heat revision
- tensile strength
- thermal shock
- resistance to pressure
- deflection of typical assemblies.

16 Other investigations

The technical data in the confirmation report of the Commission Chargée de Formuler des Avis Techniques were evaluated in the context of UK above ground drainage practice.



On behalf of the British Board of Agrément

Date of issue: 22nd May 1992

A handwritten signature in black ink, appearing to read 'P. C. Hewitt', is written over a light grey background.

Director

Electronic Copy

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For information about Agrément
Certificate validity and scope, tel:
Hotline: 01923 665400



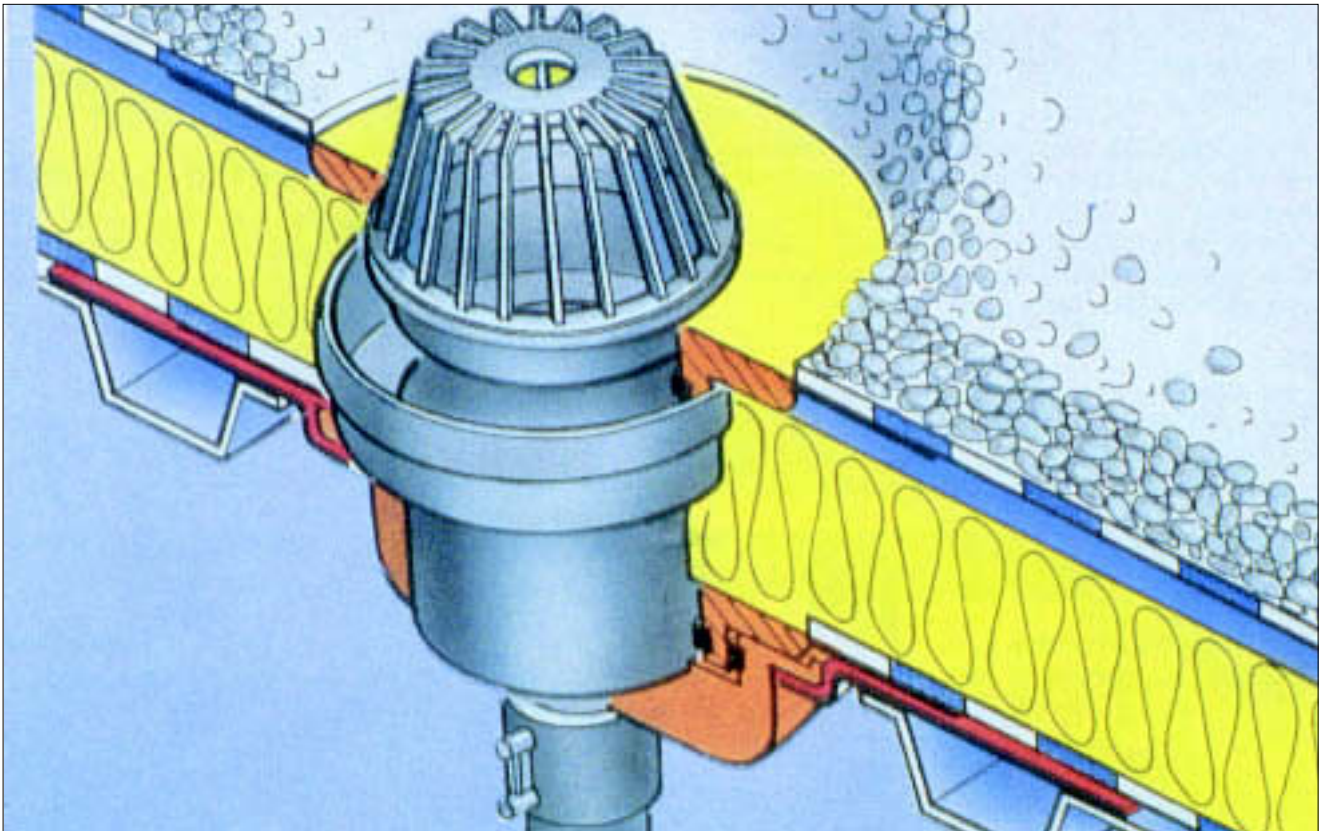
Geberit International AG

GEBERIT PLUVIA SYPHONIC
ROOF DRAINAGE SYSTEM

Certificate No 92/2796

DETAIL SHEET 3

Product



- THIS DETAIL SHEET RELATES TO GEBERIT PLUVIA SYPHONIC ROOF DRAINAGE SYSTEM COMPONENTS AND THE GEBERIT SOFTWARE USED IN DESIGN.
- The products are for the drainage of roof areas of industrial, commercial and public buildings, conveying the rainwater from the roof to the below ground system.
- The products are used in conjunction with the pipe and fittings covered by Detail Sheet 2 of this Certificate.
- At the design rainfall intensity, installations designed using Geberit software and installed in accordance with this Certificate will ensure that the outlets eliminate the intake of air into the system thus enabling the rainwater to flow at the maximum pipework capacity. This sets up the syphonic action and maximises the capacity of the pipework.
- Collecting pipes can be installed horizontally under the roof reducing the number of downpipes and the associated underground work and drainage.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations, general information relating to the product and the Conditions of Certification, respectively.

Figure 1 Stainless steel and PVC-U coated steel outlets

1 Description

1.1 The Geberit Pluvia Syphonic Roof Drainage System consists of roof outlets and computer software to design the pipework for each installation.

1.2 Pluvia roof outlets are available with connection to 56 mm and 75 mm diameter spigots and are constructed from stainless steel, PVC-U coated steel or HDPE.

1.3 The outlets are for use with the pipes and fittings covered by Detail Sheet 2 of this Certificate.

1.4 The stainless steel and PVC-U coated steel outlets are formed from the assembly of components illustrated in Figure 1 and the range of products is given in Figure 2. Each unit is supplied with a temporary polystyrene insert and stainless steel fixing straps.

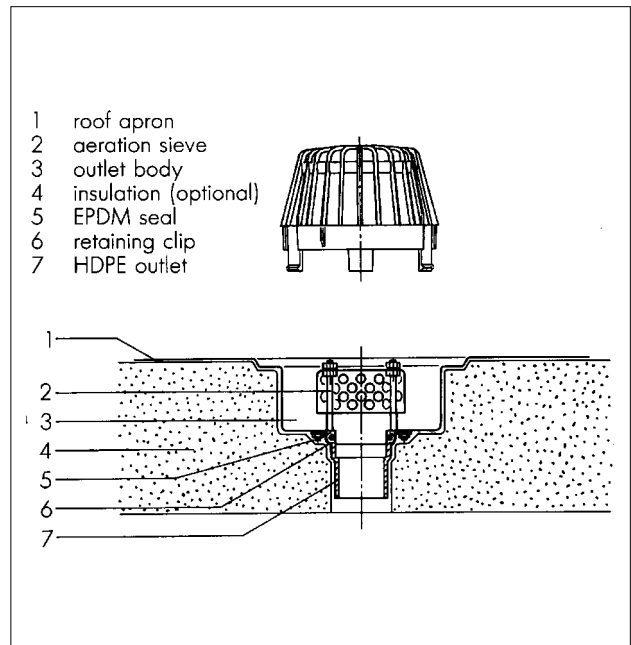
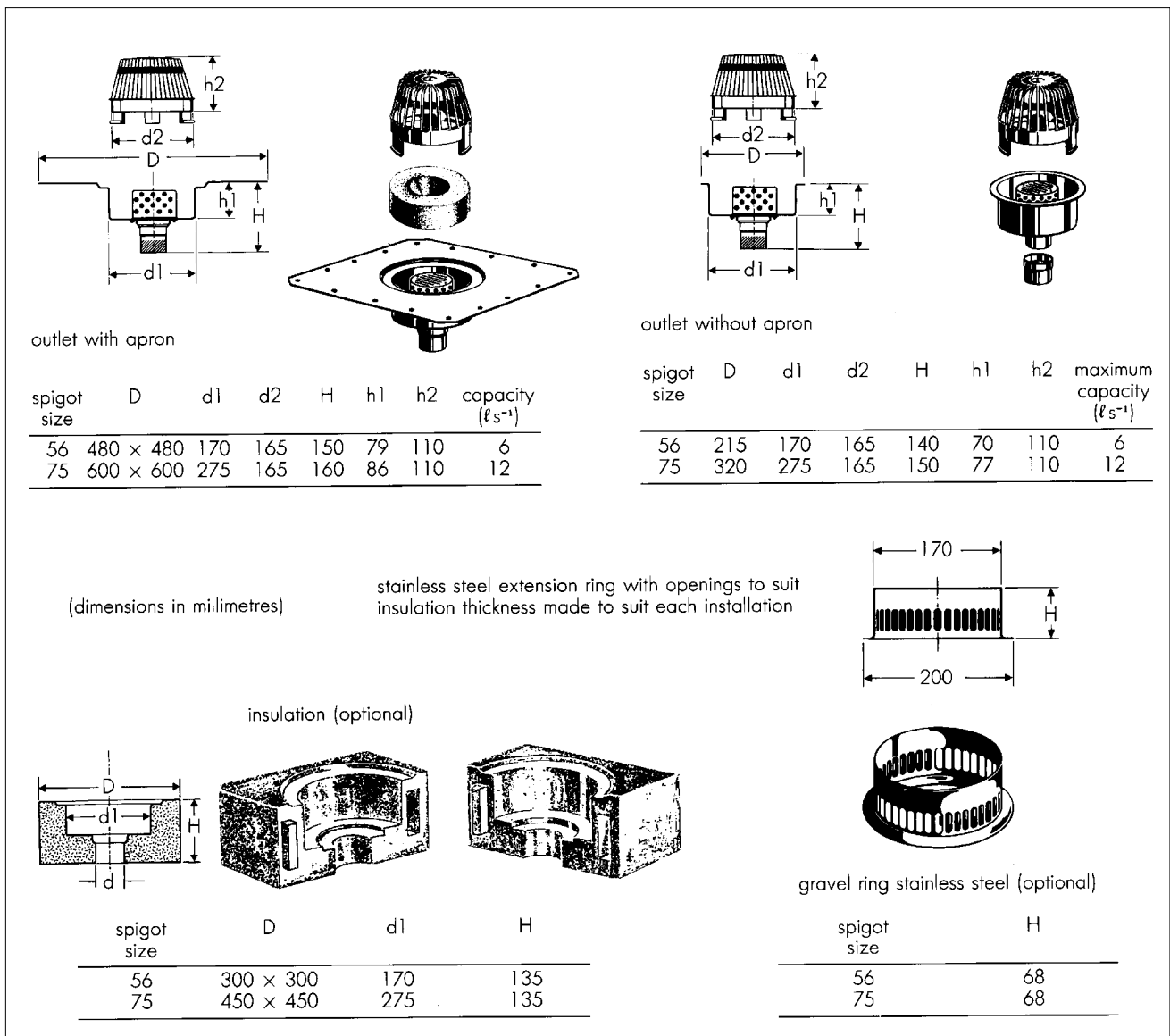


Figure 2 Pluvia product range



1.5 The 56 mm plastic outlet (see Figure 3) consists of a base moulding forming the outlet sump, aeration sieve and drain connection and a roof connection piece comprising a section of the roof membrane sandwiched within a polyurethane moulding and EPDM seal. An extension piece is available for use in certain types of roof construction. The product is also available with an 8 W/124 V heating element moulded into the polyurethane moulding.

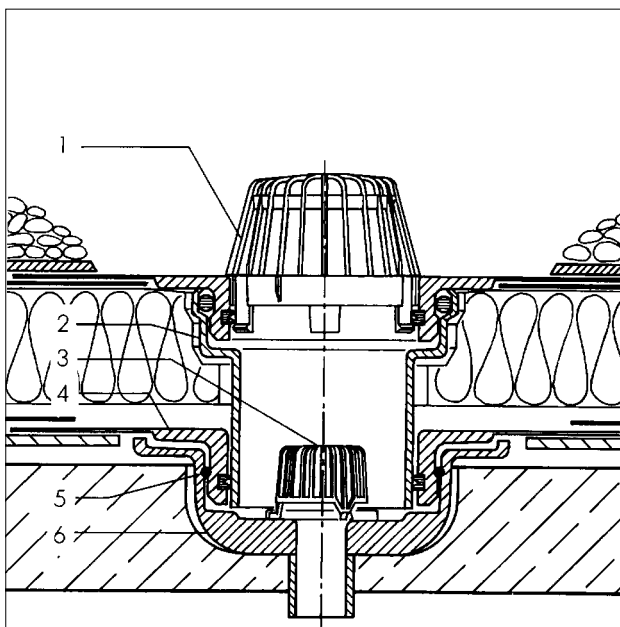
1.6 Quality control is carried out on each component in accordance with ISO 9001 (E-Q Net certificate) and is accepted by BSI as equivalent to the former BS 5750 documented procedures to cover checks on dimensions, thickness, appearance and material quality.

2 Delivery and site handling

2.1 Each outlet is packaged in a cardboard box. Each box carries a label bearing the product code and the manufacturer's name. The BBA identification mark including the number of this Certificate is incorporated in the company's technical literature.

2.2 The polystyrene protective insert should remain in position until the roof is nearing completion.

Figure 3 Plastic outlet compartments



- 1 PP leafguard
- 2 HDPE extension piece
- 3 PP aeration sieve
- 4 roof connection piece, EPDM seal, PUR moulding (A)
- 5 apron to body and to SBR extension piece seal
- 6 outlet housing, HDPE and PUR (B)


Note:

(A) The roof connection piece is available with aprons made from EPDM, PVC-U, bitumastic material and other roofing materials.


(B) The outlet housing is also available with a 8W/24V heating element.

Design Data

3 General

 3.1 When designed, installed and used in accordance with the provisions of this Certificate the Geberit Pluvia Syphonic Roof Drainage System will convey rainwater from the roof to a below ground drainage system.

3.2 Where the sumps are used, the gutters should be designed in accordance with BS 6367 : 1983.

 3.3 The underground drainage system must be capable of accepting without surcharge the rate of flow of water discharged by the syphonic drainage system in addition to other discharges which may be received.

4 System design and dimensioning

4.1 Each Geberit Pluvia Syphonic Roof Drainage System must be designed by a person trained and approved by Geberit International AG to use their Pluvia computer software.

4.2 The system is designed to flow at maximum capacity when rainfall is at the design intensity. A system using the minimum pipe dimensions obtained from the design will ensure sufficient capacity to transport the water from the roof to the discharge point.

4.3 Information required to enable a design to be carried out includes:

- design rainfall intensity (normally selected from BS 6367)
- geometric layout of the roof and outlets including the height of the building and its location and plan location
- position of underground connection.

4.4 Use of the computer program ensures the most economic and effective design is achieved. Critical conditions to be achieved in any design include:

- the maximum negative pressure must not be less than 0.2 bar absolute (0.8 bar below atmospheric) for pipes rated at a pressure of 4.0 bar and up to 160 mm diameter. For pipes 200 mm or more, the limiting pressures are dependent on the nominal pressure rating of the pipe. For pipes with a pressure rating of 3.2 bar, the limiting pressure is 0.4 bar absolute (0.6 bar below atmospheric). For pipes with a pressure rating of 4.0 bar, the limiting pressure is 0.2 bar absolute (0.8 bar below atmospheric).
- minimum water velocity must be 1.0 ms^{-1} at the design flow intensity to achieve a self-cleansing velocity,
- computed flow⁽¹⁾ from an individual outlet must be within 10% of the nominal required flow and must not exceed the specified maximum for each outlet size.

(1) The computation is based on two-phase modelling of the flow conditions and incorporates standard hydraulic principles and has been verified by testing.

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4.5 An approximate indication of the pipe sizes required can be made using a manual dimensioning procedure detailed in the *Geberit Technical Data Sheets*.

4.6 The maximum permitted flow through an outlet is 12 ls⁻¹ and 6 ls⁻¹ for 75 mm and 56 mm diameter outlets, respectively.

5 Strength



The Pluvia outlets and accessories have adequate strength to resist loads associated with installation and subsequent use.

6 Roof/gutter design



6.1 The roof must be designed to allow rainwater to flow freely to the outlets.

6.2 When the outlets are being utilised at their maximum flow capacity, the water retention at an outlet on a roof or in a gutter should be less than 40 mm.

6.3 When used in long valley gutters only outlets of 6 ls⁻¹ capacity should be used.

6.4 The roof and/or gutter design must incorporate a built-in overflow facility. The roof must be designed to hold water up to this level should the design rainfall be exceeded or unexpected blockages occur.

7 Performance of joints



7.1 Correctly made joints within the pipework system are watertight under conditions of pressure and thermal movement in excess of those expected to occur in practice.

7.2 The performance of the joint between the outlet and the roof material is dependent on the installation. However, conventional jointing techniques for roofs constructed of similar materials applied correctly should give satisfactory performance.

8 Flow characteristics



When the system is operating syphonically, the high velocity of the water will ensure the system is self-cleansing. This effect can also

occur at rainfall intensity of up to 50% of the design intensity. At rainfall intensities less than this the Pluvia system will operate as a conventional system.

9 Resistance to chemicals



The performance of the Pluvia outlets will be unaffected by the types and quantities of chemicals associated with rainwater.

10 Resistance to blockage



The high velocities at which the water flows through the pipework together with the design of the Pluvia outlets reduce the risk of blockages (see also section 13).

11 Behaviour in relation to fire

The bodies of the Pluvia outlets will not affect the overall fire hazard of the roof in which they are installed.

12 Thermal insulation

Outlets are supplied with 10 mm thick foamed polystyrene insulation fitted to the underside. It may be desirable in some situations to provide additional insulation and to insulate the pipework to prevent condensation. This will depend on the relative humidity and the temperature.

13 Maintenance

Periodic inspection in accordance with BS 6367 : 1983, clause 18.1, should be carried out to ensure that the outlets are free from gravel, leaves and other debris which could impair the performance of the system. Maintenance is the responsibility of the owner.

14 Durability



The materials used for the manufacture of the outlets are highly durable and when installed correctly will have an effective life equivalent to, or in excess of, the roof in which they are installed.

15 General

15.1 The design of the layout of the roof outlets should be in accordance with the recommendations given in BS 6367 : 1983.

15.2 Geberit Pluvia roof outlets should be placed at the roof low points to allow efficient flow of water to the drains.

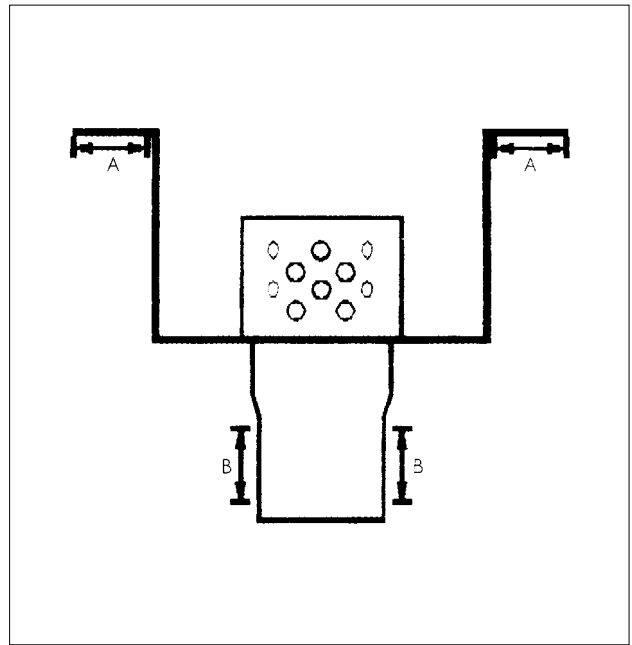
16 Procedure

16.1 An appropriately sized hole must be left in the roof structure to accommodate the outlet (see Figures 1 and 2). The weight of the outlet is secured either to the roof structure via the stainless steel straps or by adequately supported pipework.

16.2 The BBA has not assessed individual installation details since they will depend on the roof construction. However, the following general principles must be followed:

- the roof outlet may be supported at locations A and B shown in Figure 4
- when using the stainless steel straps supplied with each unit, the horizontal distance between the roof outlet support and roof fixing must not exceed 50 mm and both straps must be used.

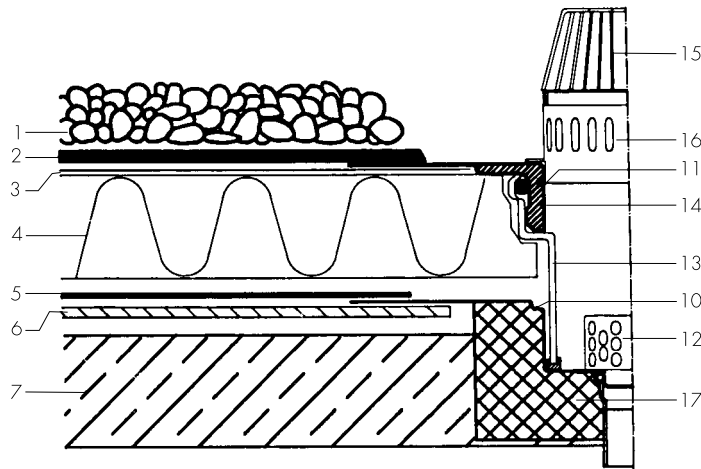
Figure 4 Acceptable anchorage locations



16.3 Typical installation details not assessed by the BBA but suggested by Geberit are shown in Figure 5.

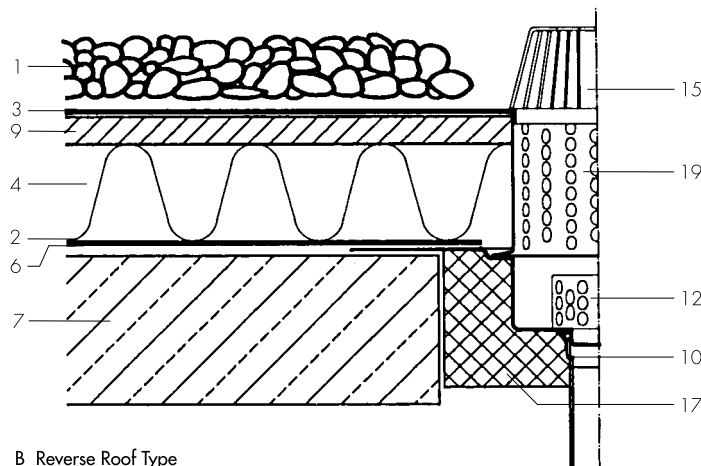
16.4 The pipework is connected to the outlets in accordance with the procedures given in Detail Sheet 2 of this Certificate.

Figure 5 Application technology



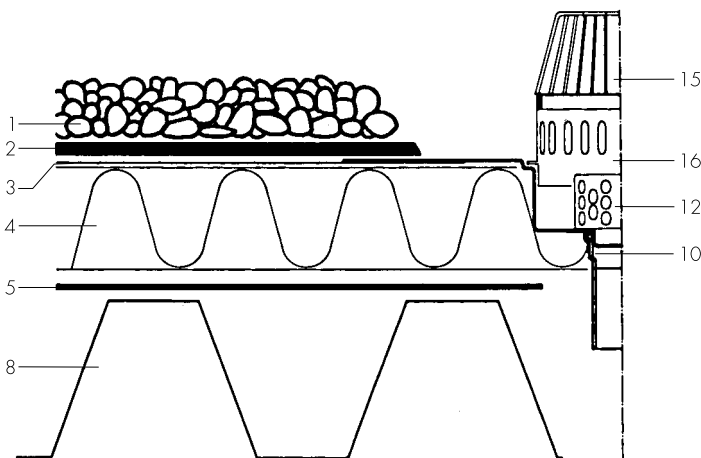
A Warm roof Type

56 mm outlet with extension piece for use in concrete slab construction



B Reverse Roof Type

concrete slab with stainless steel extension ring to suit



C Warm Roof Type

lightweight construction, corrugated metal panels

Roof construction

- 1 gravel
- 2 watertight roof membrane
- 3 wooden frame
- 4 insulation
- 5 vapour barrier
- 6 screed
- 7 concrete slab
- 8 corrugated metal panels
- 9 separation layer

Pluvia articles

- 10 Pluvia outlet piece
- 11 O-ring for extension
- 12 aeration piece
- 13 extension piece
- 14 roof connection piece
[see Figure 3, Note (A)]
- 15 leafguard
- 16 gravel ring
- 17 insulation

Job side articles

- 19 stainless steel ring with
openings to suit the
insulation height

Technical Investigations

The following is a summary of the technical investigations carried out on the Geberit Pluvia Syphonic Roof Drainage System.

17 Tests

Tests were carried out to determine:

- dimensional accuracy
- maximum flow capacities*
- watertightness
- resistance to loading.

*full-scale tests to verify the Pluvia computer software calculation model.

18 Other investigations

18.1 An evaluation of existing data was made to assess:

- resistance to chemicals
- suitability of materials
- durability
- ease of jointing to pipework
- practicability of installation.

18.2 An investigation was carried out to verify the scientific basis and the correlation with full-scale testing of the computer software used to design the installations.

18.3 The manufacturing processes were examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 6367 : 1983 *Code of practice for drainage of roofs and paved areas*

ISO 9001 : 1987 *Quality systems — Model for quality assurance in design/development, production, installation and servicing*



On behalf of the British Board of Agrément

Date of issue: 13th September 1994

A handwritten signature in black ink, appearing to read 'P. C. Newson'.

Director

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Geberit Ltd

GEBERIT SERIES 7 PLUVIA SYPHONIC
ROOF DRAINAGE SYSTEM

Certificate No 92/2796

DETAIL SHEET 4

Product



- THIS DETAIL SHEET RELATES TO GEBERIT SERIES 7 PLUVIA SYPHONIC ROOF DRAINAGE SYSTEM COMPONENTS AND THE GEBERIT SOFTWARE USED IN DESIGN.
- The products are for the drainage of roof areas of industrial, commercial and public buildings, conveying the rainwater from the roof to the below ground system.
- The products are used in conjunction with the pipe and fittings covered by Detail Sheet 2 of this Certificate.
- At the design rainfall intensity, installations designed using Geberit software and installed in accordance with this Certificate will ensure that the outlets eliminate the intake of air into the system thus enabling the rainwater to flow at the maximum pipework capacity. This sets up the syphonic action and maximises the capacity of the pipework.
- Collecting pipes can be installed horizontally under the roof reducing the number of downpipes and the associated underground work and drainage.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations, general information relating to the product and the Conditions of Certification, respectively.

1 Description

1.1 The Geberit Series 7 Pluvia Syphonic Roof Drainage System consists of roof outlets and computer software to design the pipework for each installation.

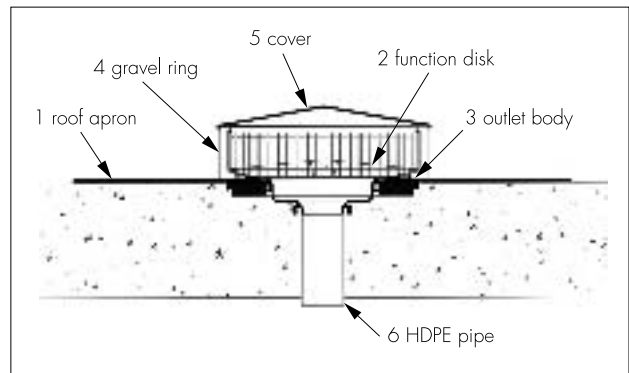
1.2 Pluvia roof outlets are available with connection to 56 mm pipework (with adaptors to all other Geberit pipe diameters).

1.3 The outlets are for use with the pipes and fittings covered by Detail Sheet 2 of this Certificate.

1.4 The outlets are formed from the assembly of components illustrated in Figure 1 and the range of products is given in Figure 2. Each unit is supplied with stainless steel fixing straps.

1.5 Quality control is carried out on each component.

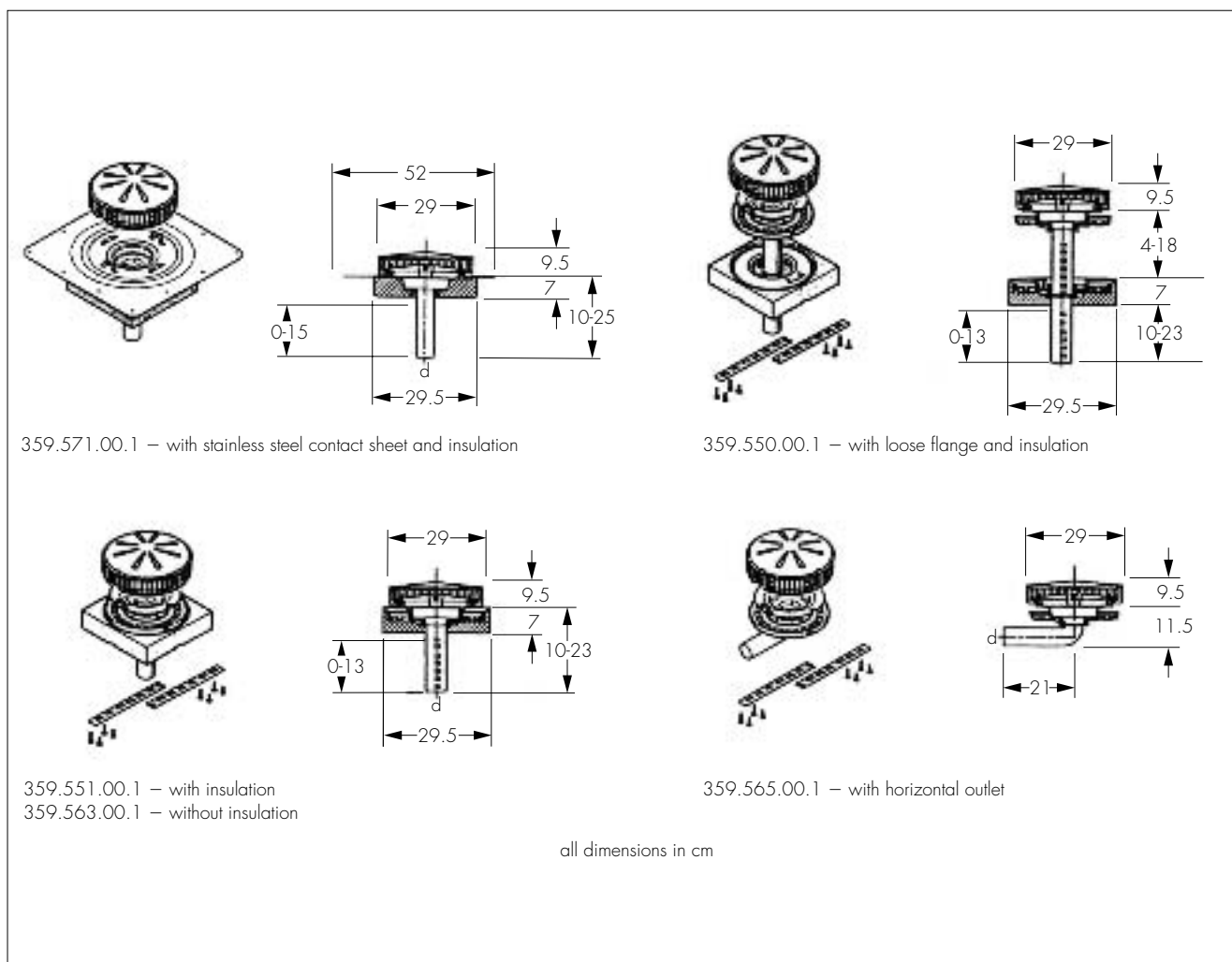
Figure 1 Geberit Pluvia outlet



2 Delivery and site handling

Each outlet is packaged in a cardboard box. Each box carries a label bearing the product code and the manufacturer's name. The BBA identification mark including the number of this Certificate is incorporated in the company's technical literature.

Figure 2 Pluvia product range



Design Data

3 General



3.1 When designed, installed and used in accordance with the provisions of this Certificate the Geberit Series 7 Pluvia Syphonic Roof Drainage System will convey rainwater from the roof to a below ground drainage system.

3.2 Gutters should be designed in accordance with BS EN 12056-3 : 2000.



3.3 The underground drainage system must be capable of accepting without surcharge the rate of flow of water discharged by the syphonic drainage system in addition to other discharges which may be received.

4 System design and dimensioning

4.1 Each Geberit Series 7 Pluvia Syphonic Roof Drainage System must be designed by a person trained and approved by Geberit Ltd to use their Pluvia computer software.

4.2 The system is designed to flow at maximum capacity when rainfall is at the design intensity. A system using the minimum pipe dimensions obtained from the design will ensure sufficient capacity to transport the water from the roof to the discharge point.

4.3 Information required to enable a design to be carried out includes:

- design rainfall intensity (normally selected from BS EN 12056-3 : 2000)
- geometric layout of the roof and outlets including the height of the building and its location and plan location
- position of underground connection.

4.4 Use of the computer program ensures the most economic and effective design is achieved. Critical conditions to be achieved in any design include:

- the maximum negative pressure must not be less than 0.2 bar absolute (0.8 bar below atmospheric) for pipes rated at a pressure of 4.0 bar and up to 160 mm diameter. For pipes 200 mm or more, the limiting pressures are dependent on the nominal pressure rating of the pipe. For pipes with a pressure rating of 3.2 bar, the limiting pressure is 0.55 bar absolute (0.45 bar below atmospheric). For pipes with a pressure rating of 4.0 bar, the limiting pressure is 0.2 bar absolute (0.8 bar below atmospheric)
- minimum water velocity must be 0.7 ms^{-1} at the design flow intensity to achieve a self-cleansing velocity
- computed flow⁽¹⁾ from an individual outlet must be within 10% of the nominal required flow and must not exceed the specified maximum for each outlet size.

(1) The computation is based on two-phase modelling of the flow conditions and incorporates standard hydraulic principles and has been verified by testing.

4.5 An approximate indication of the pipe sizes required can be made using a manual dimensioning procedure detailed in the Geberit *Technical Data Sheets*.

4.6 The maximum permitted flow through an outlet is 12 ls^{-1} (10 ls^{-1} in gutters).

5 Strength



The Pluvia outlets and accessories have adequate strength to resist loads associated with installation and subsequent use.

6 Roof/gutter design



6.1 The roof must be designed to allow rainwater to flow freely to the outlets.

6.2 When the outlets are being utilised at their maximum flow capacity, the water retention at an outlet on a roof or in a gutter should be less than 40 mm.

6.3 The roof and/or gutter design must incorporate a built-in overflow facility. The roof must be designed to hold water up to this level should the design rainfall be exceeded or unexpected blockages occur.

7 Performance of joints



7.1 Correctly made joints within the pipework system are watertight under conditions of pressure and thermal movement in excess of those expected to occur in practice.

7.2 The performance of the joint between the outlet and the roof material is dependent on the installation. However, conventional jointing techniques for roofs constructed of similar materials applied correctly should give satisfactory performance.

8 Flow characteristics



When the system is operating syphonically, the high velocity of the water will ensure the system is self-cleansing. This effect can also occur at rainfall intensity of up to 50% of the design intensity. At rainfall intensities less than this the Pluvia system will operate as a conventional system.

9 Resistance to chemicals



The performance of the Pluvia outlets will be unaffected by the types and quantities of chemicals associated with rainwater.

10 Resistance to blockage



The high velocities at which the water flows through the pipework together with the design of the Pluvia outlets reduce the risk of blockages (see also section 1.3).

11 Behaviour in relation to fire

The bodies of the Pluvia outlets will not affect the overall fire hazard of the roof in which they are installed.

12 Thermal insulation

Outlets are supplied with 30 mm thick foamed polystyrene insulation fitted to the underside. It may be desirable in some situations to provide additional insulation and to insulate the pipework to prevent condensation. This will depend on the relative humidity and the temperature.

13 Maintenance

Periodic inspection should be carried out to ensure that the outlets are free from gravel, leaves and other debris which could impair the performance of the system. Maintenance is the responsibility of the owner.

14 Durability

The materials used for the manufacture of the outlets are highly durable and when installed correctly will have an effective life equivalent to, or in excess of, the roof in which they are installed.

Installation

15 General

15.1 The design of the layout of the roof outlets should be in accordance with the recommendations given in BS EN 12056-3 : 2000.

15.2 Geberit Pluvia roof outlets should be placed at the roof low points to allow efficient flow of water to the drains.

16 Procedure

16.1 An appropriately sized hole must be left in the roof structure to accommodate the outlet (see Figures 1 and 2). The weight of the outlet is secured either to the roof structure via the stainless steel straps or by adequately supported pipework.

16.2 The BBA has not assessed individual installation details since they will depend on the roof construction. However, the following general principles must be followed:

- the roof outlet may be supported at locations A and B shown in Figure 3
- when using the stainless steel straps supplied with each unit, the horizontal distance between the roof outlet support and roof fixing must not exceed 50 mm and both straps must be used.

16.3 Typical installation details not assessed by the BBA but suggested by Geberit are shown in Figure 4.

16.4 The pipework is connected to the outlets in accordance with the procedures given in Detail Sheet 2 of this Certificate.

Figure 3 Acceptable anchorage locations

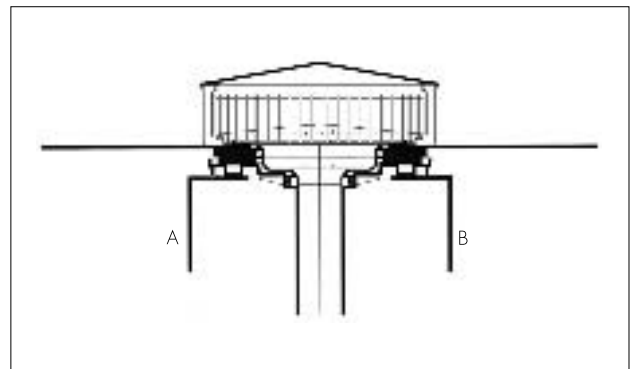
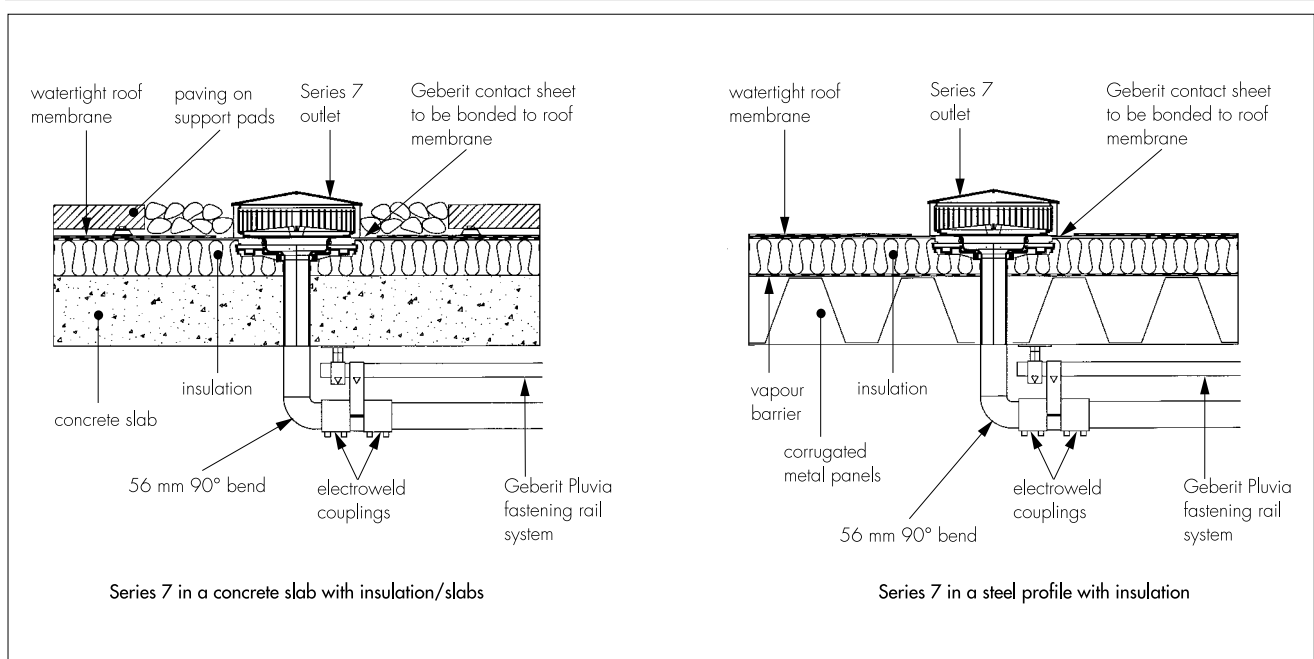


Figure 4 Typical installation



Technical Investigations

The following is a summary of the technical investigations carried out on the Geberit Series 7 Pluvia Syphonic Roof Drainage System.

17 Tests

Tests were carried out to determine:
dimensional accuracy
maximum flow capacities⁽¹⁾
watertightness
resistance to loading.

(1) Full-scale tests to verify the Pluvia computer software calculation model.

18 Other investigations

18.1 An evaluation of existing data was made to assess:

resistance to chemicals
suitability of materials
durability
ease of jointing to pipework
practicability of installation.

18.2 An investigation was carried out to verify the scientific basis and the correlation with full-scale testing of the computer software used to design the installations.

18.3 The manufacturing processes were examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 5572 : 1994 *Code of practice for sanitary pipework*

BS EN 12056 *Gravity Drainage Systems inside Buildings*

BS EN 12056-3 : 2000 *Roof drainage, layout and calculation*



On behalf of the British Board of Agrément

Date of issue: 5th September 2001

A handwritten signature in black ink, appearing to read 'P. C. Newson', is written over a light grey background.

Chief Executive

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