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Agrément Certificate

96/3279

Product Sheet 1

FULLFLOW ROOF DRAINAGE SYSTEMS

FULLFLOW SELF PRIMING SYPHONIC ROOF DRAINAGE SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Fullflow Self Priming Syphonic Roof Drainage System, for conveying surface water from the roof or gutter to the underground drainage system of industrial, commercial and public buildings.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

System design and dimensioning — the Primacalc software allows the system to be designed to deal with anticipated rainfall. A trained system designer is responsible for this work (see section 6).

Flow characteristics — the performance of the outlets running at normal and peak rainfall intensities has been assessed (see section 7).

Strength — the outlets have sufficient strength to resist the loads that may reasonably be expected to occur during installation and service (see section 9).

Durability — under normal service conditions, the outlets will have a service life of at least 40 years (see section 16).



The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Second issue: 29 January 2018

Originally certificated on 17 October 1996

Paul Valentine
Technical Excellence Director

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body – Number 113.

The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk
Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, the Fullflow Self Priming Syphonic Roof Drainage System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

| | | |
|---------------------|--------------|---|
| Requirement: | C2(b) | Resistance to 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 8.2 of this Certificate. |
| Requirement: | H3(1) | Rainwater drainage |
| Comment: | | The roof outlets will contribute to carrying the flow of the rainwater from the roof to an outfall, thus minimising the risk of blockage or leakage. See sections 8.1 and 12 of this Certificate. |
| Regulation: | 7 | Materials and workmanship |
| Comment: | | The system is acceptable. See section 16 and the <i>Installation</i> part of this Certificate. |



The Building (Scotland) Regulations 2004 (as amended)

| | | |
|--------------------|----------------|--|
| Regulation: | 8(1)(2) | Durability, workmanship and fitness of materials |
| Comment: | | The use of the system satisfies the requirements of this Regulation. See sections 15 and 16 and the <i>Installation</i> part of this Certificate. |
| Regulation: | 9 | Building standards applicable to construction |
| Standard: | 3.6(a) | Surface water drainage |
| Comment: | | The roof outlets will contribute to carrying the flow of rainwater from the roof to an outfall, minimising the risk of blockage or leakage and thereby satisfying the requirements of this Standard, with reference to clause 3.6.1 ⁽¹⁾⁽²⁾ . See sections 8.1 and 12 of this Certificate. |
| Standard: | 3.10 | Precipitation |
| Comment: | | The joints between the roof outlet and the roof will adequately resist the passage of moisture to the inside of the building. The system therefore satisfies the relevant requirements of this Standard, with reference to clause 3.10.7 ⁽¹⁾⁽²⁾ . See section 8.2 of this Certificate. |
| Standard: | 7.1(a)(b) | Statement of sustainability |
| Comment: | | The system can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. |
| Regulation: | 12 | Building standards applicable to conversions |
| Comment: | | Comments in relation to the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . |

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012 (as amended)

| | | |
|--------------------|--------------------|--|
| Regulation: | 23(a)(i) | Fitness of materials and workmanship |
| Comment: | (iii)(b)(i) | The system is acceptable. See section 16 and the <i>Installation</i> part of this Certificate. |

| | | |
|--------------------|-----------|---|
| Regulation: | 28 | Resistance to moisture and weather |
| Comment: | | The system satisfies the relevant requirements of this Regulation. See section 8.2 of this Certificate. |
| Regulation: | 82 | Rainwater drainage |
| Comment: | | The system satisfies the relevant requirements of this Regulation. See sections 8.1 and 12 of this Certificate. |

Construction (Design and Management) Regulations 2015 Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 18 *General* (18.5) of this Certificate.

Technical Specification

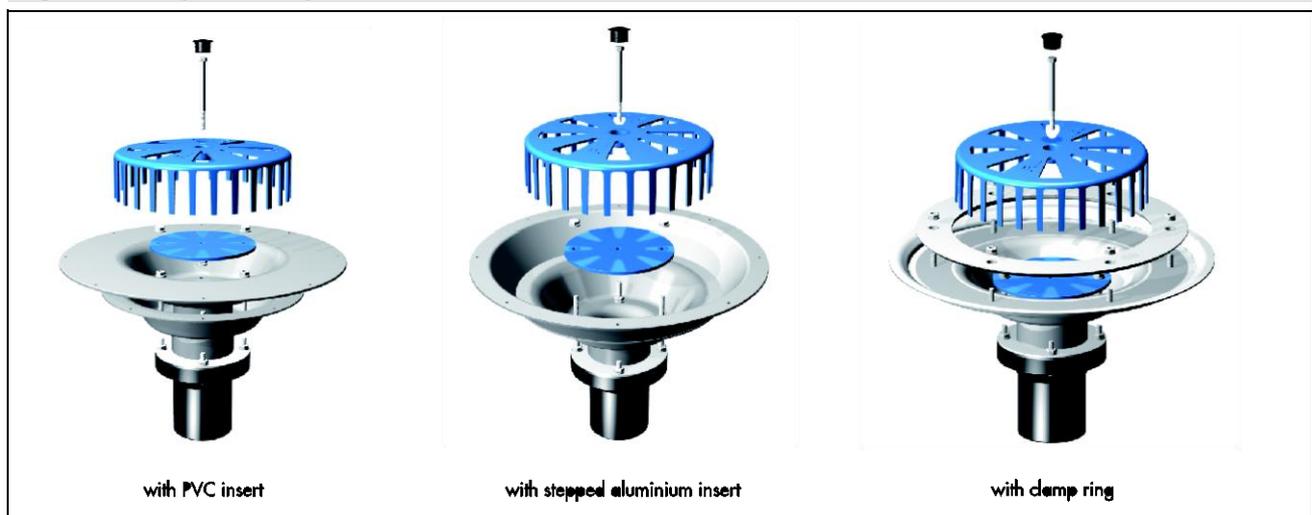
1 Description

1.1 The Fullflow Self Priming Syphonic Roof Drainage System may consist of Primaflow 09, Tholoflow or Trimline self-priming siphonic roof outlets, technical specifications and Primacalc computer software to design the pipework for each installation.

1.2 At the design rainfall intensity, systems installed in accordance with this Certificate using Primacalc software and Primaflow 09, Tholoflow or Trimline self-priming roof outlets, will ensure that the outlets eliminate the intake of air into the system. This sets up full bore flow and maximises the capacity of the pipework.

1.3 Primaflow 09 is available in 3 configurations to suit the roof or gutter in which it is to be installed (see Figure 1). Each configuration has a grade 316L stainless steel lower bowl with the same lower bowl profile which incorporates a flanged connection ready to receive the appropriate flanged stub pipe and EPDM gasket. All configurations include leafguards and anti-vortex plates manufactured from powder-coated, pressure die-cast aluminium. The leaf guard is available as a standard unit for primary systems, or with an integral ring for secondary systems in overflow applications. For PVC roof membranes, a PVC insert with a finished diameter of 350 mm is bonded to the inside of the lower bowl. For asphalt roofs, a stepped aluminium insert with an overall diameter of 360 mm is secured inside the lower bowl. For bituminous roofs, the top of the lower body has a lipped edge, a diameter of 350 mm, and is supplied with a 300 mm diameter aluminium clamp ring.

Figure 1 Primaflow 09 roof outlets

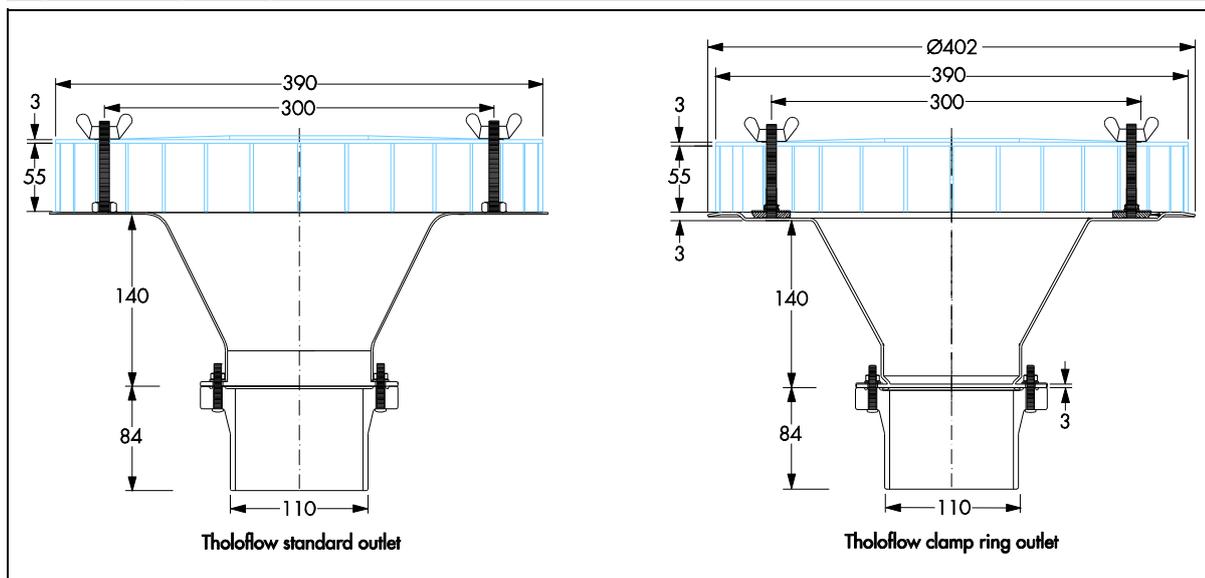


Note: This Figure is for illustration purpose only. Flanged spigots are supplied appropriate to the pipe material.

1.4 Tholoflow roof outlets (see Figure 2) are supplied with a flanged spigot of 110 mm external diameter and made from 316L grade stainless steel. The diameter of the lower bowl of the standard Tholoflow outlet is 390 mm. The clamp

ring Tholoflow outlet bowl has a diameter of 402 mm and is used to join roof membranes of any type to the outlet using an aluminium clamping ring. The standard and clamp ring Tholoflow outlets are shown in Figure 2. Leaf guards, which incorporate the anti-vortex plates are manufactured from powder-coated aluminium.

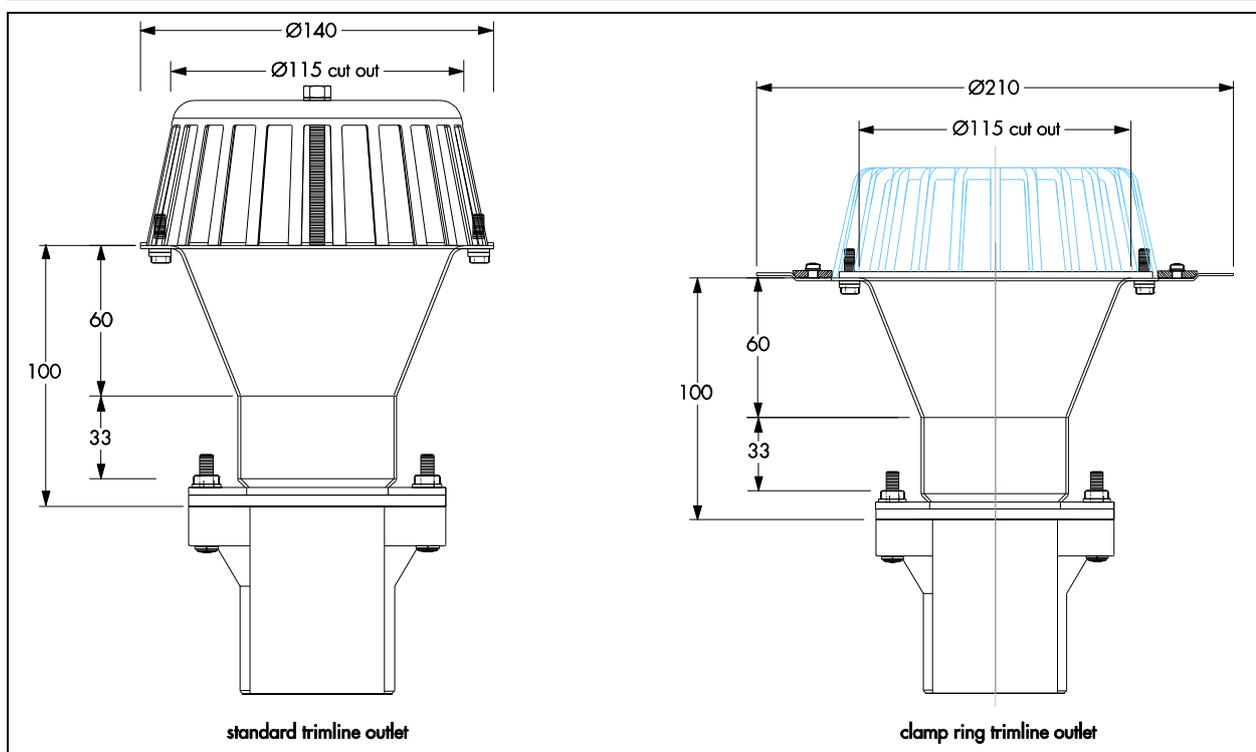
Figure 2 Tholoflow roof outlets



Note: This Figure is for illustration purpose only. Flanged spigots are supplied appropriate to the pipe material. Dimensions are in mm.

1.5 Trimline self-priming syphonic roof outlets (see Figure 3) are supplied with a flanged spigot of 63 mm external diameter and are made from 316L grade stainless steel. The diameter of the lower bowl of the standard outlet is 140 mm. The clamp ring Trimline outlet bowl has a diameter of 210 mm and is used to join roof membranes of any type to the outlet using a stainless steel clamp ring. The standard and clamp ring Trimline outlets are shown in Figure 3. Leafguards are manufactured from powder-coated pressure die cast aluminium. The anti-vortex plate is manufactured using 316L grade stainless steel.

Figure 3 Trimline roof outlet



Note: This Figure is for illustration purpose only. Flanged spigot outlet is not supplied. Dimensions are in mm.

1.6 Each type of roof outlet is for use with the pipes and fittings covered by the performance specification (see section 4). Pipework should be independently certificated for compliance with the declared specification.

1.7 Suitable pipes and fittings (see section 4.6) are available in the following materials but these are outside the scope of this Certificate.

- cast iron
- stainless steel
- galvanized steel
- aluminium
- copper
- PE 100
- PE 80
- powder-coated mild steel.

2 Manufacture

2.1 The roof outlets, formed using 316L grade stainless steel, incorporate leafguards and baffle plates. The outlet bowls are manufactured through the metal spinning process which ensures geometric consistency. The aluminium pressure die cast leafguards and baffle plates are coated using the powder-coating process.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control being operated by the manufacturer are being maintained.

2.3 Factory production control is exercised during manufacture including checks for conformity to specification of the raw materials, dimensions and visual appearance. Weld integrity of the studs and visual checks on the roof outlets are carried out on each unit.

2.4 The management systems of the Certificate holder have been assessed as meeting the requirements of BS EN ISO 9001 : 2008 by AQMS Ltd (Certificate No 020816).

3 Delivery and site handling

3.1 The roof outlets are delivered either on pallets or in single boxes, depending on the quantity.

3.2 Each roof outlet carries the product code, the Certificate holder's logo and the BBA logo. The BBA logo incorporating the number of this Certificate is included in the technical literature.

3.3 Appropriate measures should be taken to prevent damage to the system components during delivery and installation.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Fullflow Self Priming Syphonic Roof Drainage System.

Design Considerations

4 Use

4.1 The Fullflow Self Priming Syphonic Roof Drainage System is for use in installations designed in accordance with BS EN 12056-1 : 2000, BS EN 12056-3 : 2000 and BS 8490 : 2007 for the conveyance of surface water as is permitted to be discharged into public sewers by The Water Industry Act 1991, Chapter 56, and surface water as is permitted and defined by the Sewerage (Scotland) Act 1968 and the Water and Sewerage Services (Northern Ireland) Order 2006.

4.2 When designed, installed and used in accordance with the provisions of this Certificate, the system will effectively convey rainwater from the roof or gutter to a below-ground drainage system.

4.3 The system components are used in conjunction with conventional pressure-rated pipes and fittings which comply with the performance specification (obtainable on request from the Certificate holder's Technical Department).

4.4 Further advice on designing full-bore flow roof drainage systems is available from the Certificate holder's Technical Department and BS 8490 : 2007.

4.5 Gutters should be designed in accordance with BS EN 12056-3 : 2000. Where there is a deviation in calculated water depths between BS EN 12056-3 : 2000 and the Certificate holder's Technical Manual, the most conservative value should be used.

4.6 Pipes and fittings must satisfy the Certificate holder's performance specification. Key characteristics include:

- pipework must withstand both positive and negative pressure; negative pressures in accordance with the recommendations of BS 8490 : 2007, and positive pressures according to the design specification, which must not exceed the rating of the pipe
- joints must either be capable of resisting longitudinal forces without sliding apart or be restrained to prevent relative movement
- bends in excess of 45° deviation from straight flow must be of smooth radius
- eccentric reducers are recommended for use in horizontal flows with the crown of the pipe level.

4.7 The underground drainage system must be capable of accepting the rate of flow of water discharged by the syphonic system, in addition to other discharges which may be received. Care should be taken over the make-up of landscaping or hard standing when secondary systems are used and discharged above ground.

5 Practicability of installation

The system should only be installed by installers who have been trained and approved by the Certificate holder.

6 System design and dimensioning

6.1 The system must be designed by a person trained to use the Primacalc computer software, and familiar with hydraulic and roof drainage design procedures.

6.2 The system is designed to flow at maximum capacity when rainfall is at the design intensity. A system using the pipe dimensions obtained from the design will ensure sufficient capacity to convey the rainwater from the roof to a below-ground drainage system outside the building.

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

- design rainfall intensity (normally selected or calculated from BS EN 12056-3 : 2000)⁽¹⁾
- geometric layout of the roof and roof outlet positions, the height of the building and its location, preferred piping routes and plan location
- position of underground connection (the underground drainage must be adequately sized to prevent the underground drain acting syphonically).

(1) The Certificate holder can establish the design rainfall intensity given in the building location, category of risks and estimated building life, but this aspect is outside the scope of this Certificate.

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

- a) minimum water velocity must be $1 \text{ m}\cdot\text{s}^{-1}$ at the design flow intensity in order to aid the removal of air during priming

- b) computed flow⁽¹⁾ from an individual outlet must not exceed the nominal rated flow for each outlet size. The computer software is designed to prevent accidental incorporation of values in excess of these figures. However, the designer may override this if the associated depth of water in the gutter or on the roof (see Figure 4) is considered acceptable
- c) in systems with more than one roof outlet, the balance in the system should not exceed 1 m
- d) the maximum negative pressure at any point in the pipework must be within the recommendations of BS 8490 : 2007
- e) the time for the system to prime should not exceed 60 seconds unless there is storage capacity within the gutters as recommended by BS 8490 : 2007.

(1) The computation of the ultimate capacity under full-bore flow has been verified by testing.

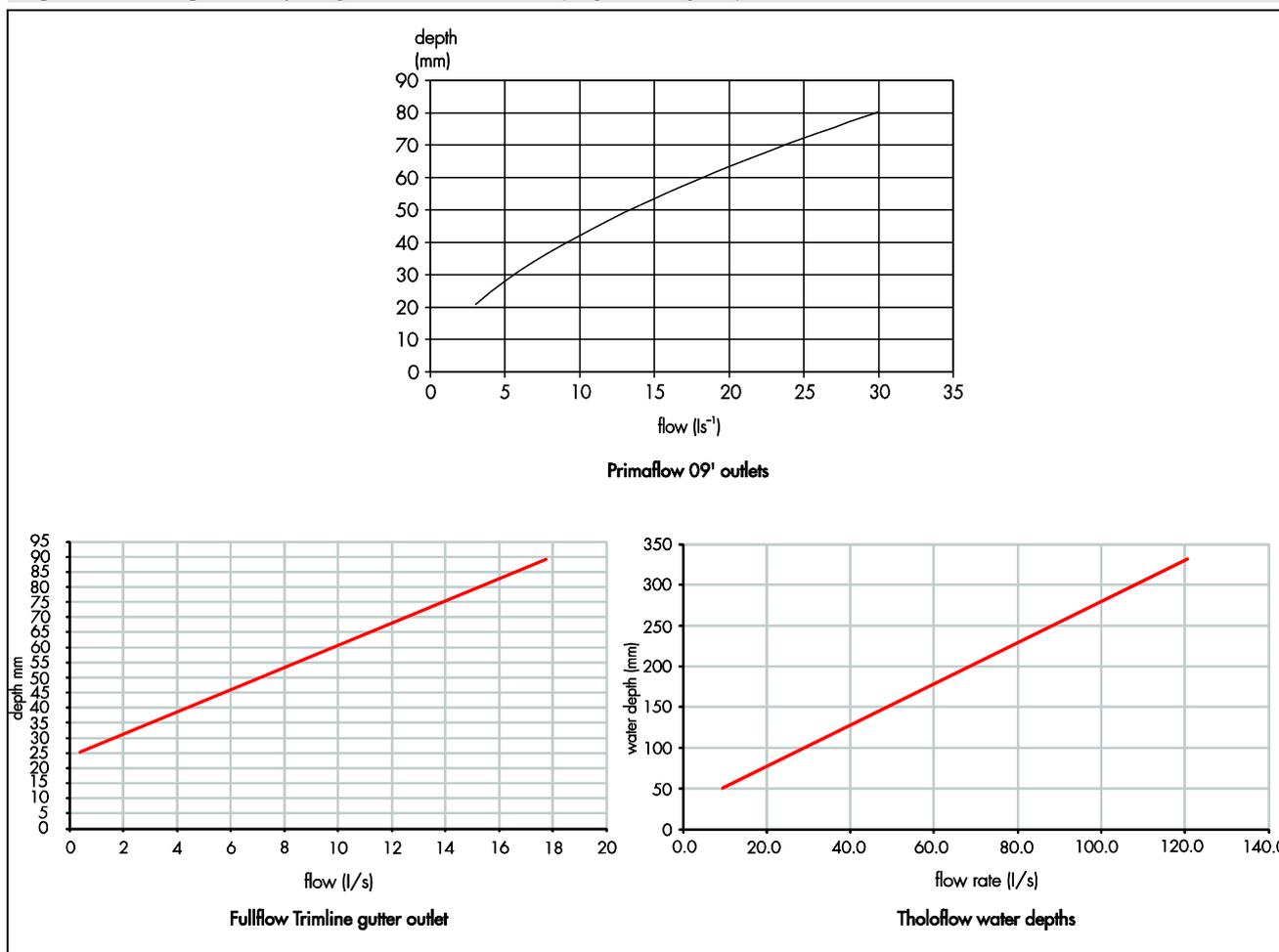
6.5 The designer may vary the pipework sizing, layout, or flow to each roof outlet to achieve an acceptable installation.

6.6 A simplified procedure for checking the suitability of a syphonic system is given in BS 8490 : 2007, Annex C. This procedure must not be used as a substitute for detailed design calculations.

7 Flow characteristics

When a system is operating at its design intensity, the high velocity of the water will ensure that the system is self-cleansing. Self-cleansing can also occur at rainfalls as low as 25% of the design intensity. At rainfalls less than this, the system will operate as a vented gravity system. The flow characteristics of the roof outlets are shown in Figure 4. The flow characteristics satisfy the performance requirement set out in BS EN 1253-1 : 2015.

Figure 4 Flow against depth of water at the outlet (at full bore flow)



8 Performance of joints



8.1 The performance of the joint to the pipework system is dependent on the pipework system adopted. Conventional jointing techniques using independently approved products should provide satisfactory performance (see section 1.5).

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

9 Strength

9.1 The roof outlets have adequate strength to resist the loads associated with installation and subsequent use. Tests previously issued showed no deflection of the leafguard.

9.2 The roof outlet and, in particular, the aluminium leaf guard should be protected from loads during the construction process.

9.3 The aluminium leafguards comply with BS EN 1253-2 : 2015, Class H1.5.

10 Roof/gutter design

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

10.2 The water depth around the roof outlet when the system is operating at its maximum flow rate (full bore flow) may be estimated from the graph in Figure 4.

10.3 The maximum water depth on the roof or in the gutter must be estimated in accordance with BS EN 12056-3 : 2000. Where calculated water depths differ between the Certificate holder's technical manual and BS EN 12056-3 : 2000, the most conservative values should be used.

10.4 The water loading on the roof or gutter, caused by the calculated water depth, must not exceed the allowable roof or gutter loading.

10.5 It is recommended that, in accordance with BS EN 12056-3 : 2000, the roof and/or gutter design incorporates 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.

11 Resistance to chemicals

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

12 Resistance to blockage



The high velocity at which the water flows through the pipework, together with the design of the roof outlets, reduces the risk of blockages (see also sections 6.3, 7 and 15).

13 Behaviour in relation to fire

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

14 Thermal insulation

Depending on the relative humidity and the temperature, in some situations it may be desirable to provide insulation for the roof outlet and pipework to prevent condensation.

15 Maintenance



Periodic inspection in accordance with BS EN 12056-3 : 2000, Clause NE 5.1, should be carried out to ensure that the roof outlets are free from gravel, leaves and other debris which could impair the performance of the system. Maintenance is the responsibility of the building owner.

16 Durability



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

16.2 To prevent galvanic corrosion it is essential that compatible fixings, as recommended by the Certificate holder, are used for each specified material. Stainless steel, PVC-coated aluminium, galvanized steel and copper roof outlets will, in normal environments, have a life expectancy of 40 years. In coastal areas or industrial/polluted regions, this may be reduced to 25 years.

17 Reuse and recyclability

The system components are manufactured from stainless steel and powder-coated aluminium, which can be recycled.

Installation

18 General

18.1 The design of the layout of the roof outlets should be in accordance with the recommendations given in BS EN 12056-3 : 2000 and the Certificate holder's design guidance.

18.2 The roof outlets should be placed at the roof low points to allow efficient flow of water to them.

18.3 The system must be installed exactly in accordance with the design. Even small deviations from the specified pipework lengths/diameters can significantly affect the performance of the system.

18.4 For roofs covered by gravel, an additional gravel guard should be incorporated around the outlet.

18.5 Appropriate Health and Safety measures should be taken during installation, particularly to protect personnel working at height and to prevent hazards from falling objects.

18.6 The guidance given in the Certificate holder's Installation Manual and BS 8490 : 2007, Clause 10, should be followed.

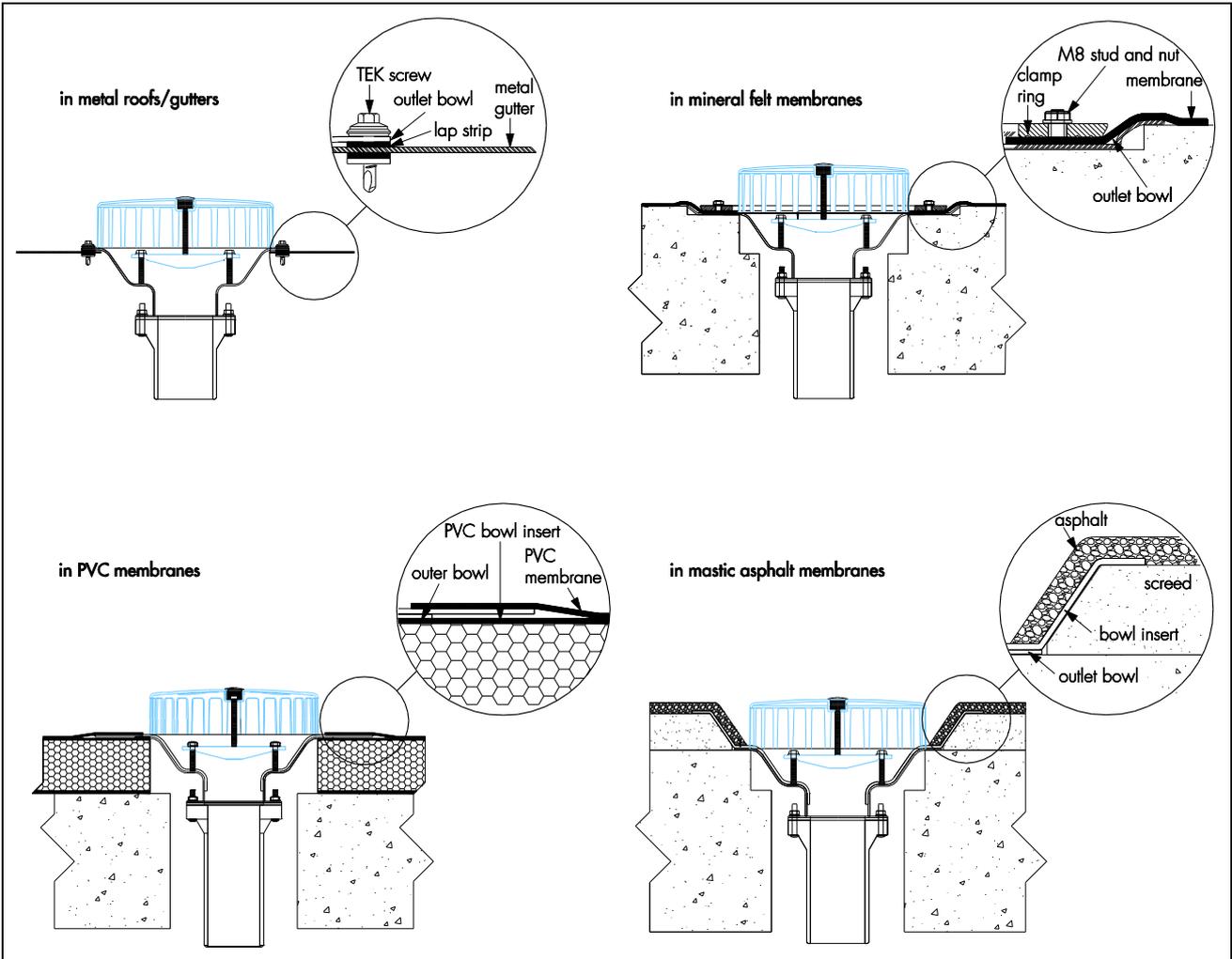
19 Procedure

19.1 An appropriately sized hole is formed or cut in the roof structure or gutter to accommodate the roof outlet, and the roof outlet is secured to the roof structure or gutter. Roof outlets can be mechanically fixed, welded directly into the gutter, or installed by a combination of mechanical and adhesive methods, using the fixings supplied (see section 1.1).

19.2 The BBA has not assessed individual installation details since they will depend on the roof construction.

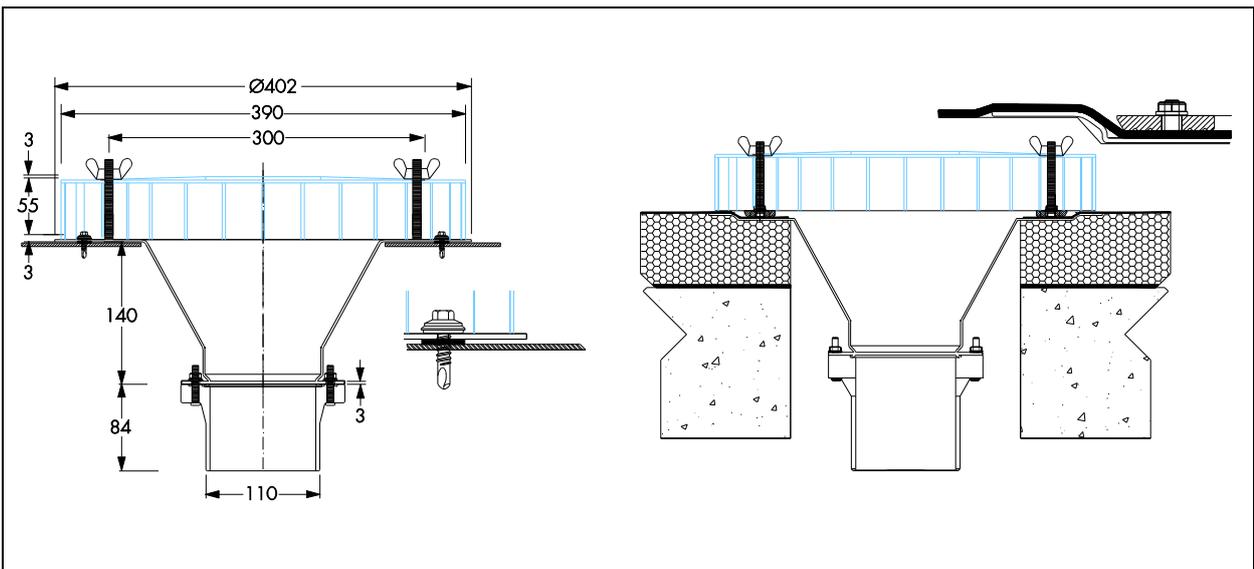
19.3 Typical installation details not assessed by the BBA, but suggested by the Certificate holder, and are available from the Certificate holder's Technical Department (see also Figures 5, 6 and 7).

Figure 5 Primaflow 09' roof outlets — typical installation details



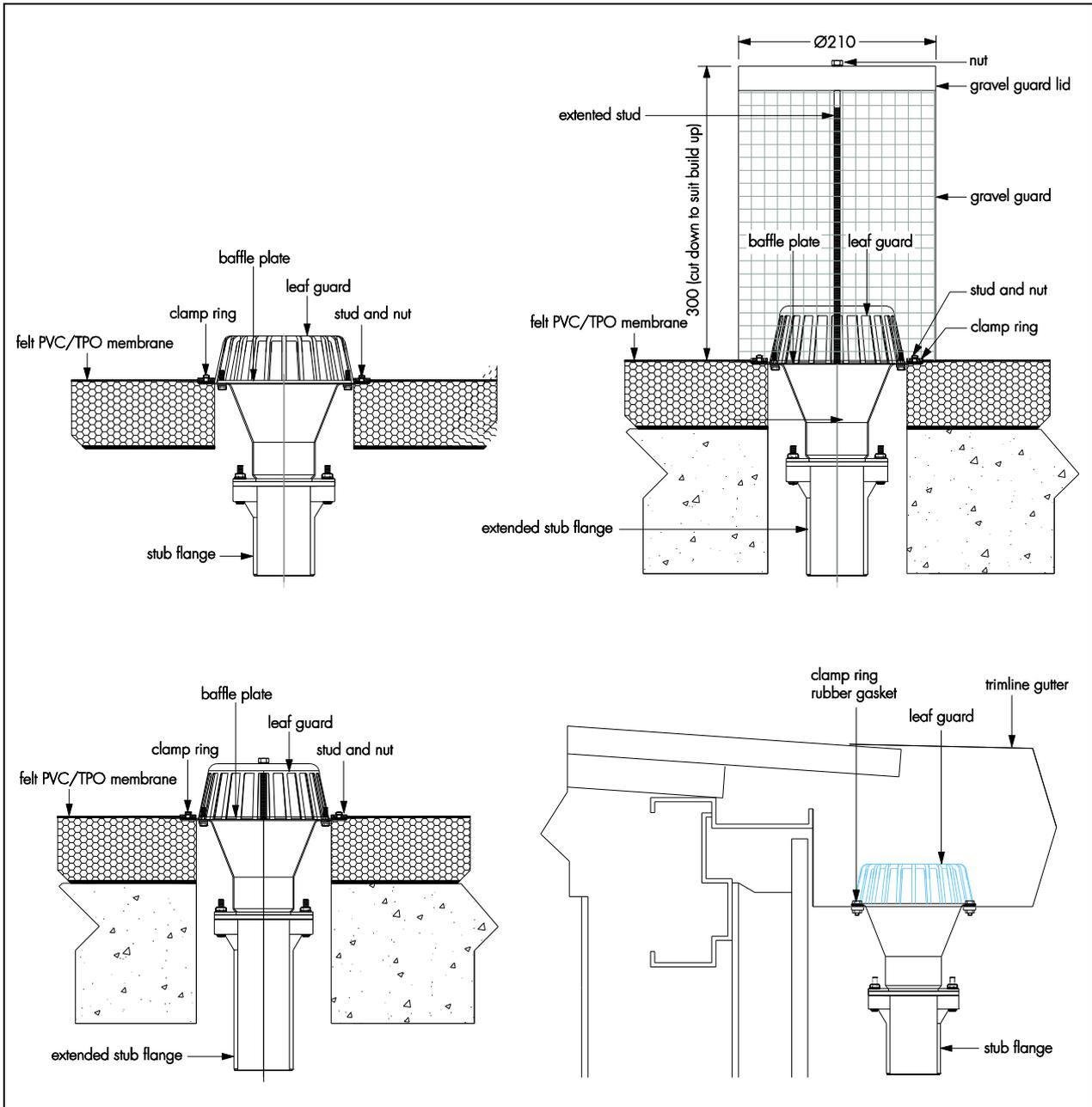
Note: This Figure is for illustration purpose only. Flanged spigot outlet is not supplied.

Figure 6 Tholoflow roof outlets — typical installation details



Note: This Figure is for illustration purpose only. Flanged spigot outlet is not supplied. Dimensions are in mm.

Figure 7 Trimline roof outlets — typical installation details



Note: This Figure is for illustration purpose only. Flanged spigot outlet is not supplied. Dimensions are in mm.

Technical Investigations

20 Tests

Tests were carried out and the results assessed to determine:

- dimensional accuracy
- maximum flow capacities for a defined system
- resistance to freeze/thaw and hot/cold cycle
- watertightness
- resistance to loading.

21 Investigations

21.1 An evaluation of existing data was made to assess:

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

21.2 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.

21.3 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 8490 : 2007 *Guide to siphonic roof drainage systems*

BS EN 1253-1 : 2015 *Gullies for buildings — Trapped floor gullies with a depth water seal of at least 50 mm*

BS EN 1253-2 : 2015 *Gullies for buildings — Roof drains and floor gullies without trap*

BS EN 12056-1 : 2000 *Gravity drainage systems inside buildings — General and performance requirements*

BS EN 12056-3 : 2000 *Gravity drainage systems inside buildings — Roof drainage, layout and calculation*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

22 Conditions

22.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

22.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

22.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

22.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

22.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

22.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.