ACO Water Management:
Building + Landscape

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ACO Rainwater Outlets

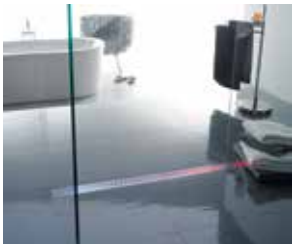
ACO Rainwater Outlets

High performance rainwater outlets

Introduction to the ACO Group

Throughout the world ACO branded drainage and surface water management systems are recognised for their innovative design, high quality manufacture, environmental excellence and industry leading performance.

Today the ACO Group has a research and production base that reaches across four continents. This unmatched resource pioneers the development of solutions that are tailored to individual applications, meeting the need for high performance, sustainable products that deliver optimum value throughout their operational life.



ACO Technologies plc

ACO operates as ACO Technologies plc in the United Kingdom. Founded over 30 years ago, the company has grown quickly on a reputation for design innovation and customer service.

There are now 2 divisions within ACO Technologies that serve every sector of the construction industry, providing solutions for applications as diverse as rail, highways, airports, landscaping, retail, distribution centres and environmentally sensitive projects.

To help architects, designers and contractors meet the legal requirements that now tightly control the way surface water is managed, ACO has created its unique 'Surface Water Management Cycle' – Collect, Clean, Hold, Release – the four core processes now required for the complete and sustainable management of surface water drainage.

The ACO Group / www.aco.com

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Introduction to ACO Rainwater Outlets

Flat Roofs

The past few years have seen major advances and improvements in the materials used in modern roofing technology. A specifier now has renewed confidence to take full advantage of the benefits flat and low-pitched roof designs can offer.

Flat roofs provide opportunities for planning and design flexibility, for example; terracing, roof-top gardens, patios, car parks, delivery areas, building services and ventilation equipment and the ability to add additional storeys at a later date.

Large area roofs or irregular shaped buildings can be completed more quickly, easily and cost effectively than a pitched roof.

Flat roofs also allow easy access to natural light and because of the simple construction, internal partitioning is easy and particularly advantageous for commercial or industrial buildings.

Materials

All ACO High Performance Rainwater Outlets are manufactured from diecast marine-grade LM6 aluminium silicon alloy. This grade of aluminium alloy is highly corrosion resistant, weather-proof and resistant to ultra-violet radiation.

All cast components are polyester powder coated. For additional protection, this tough and resilient powder coated finish prevents natural galvanic corrosion in applications where dissimilar metals are dressed into the outlets. 304 stainless steel fixings are used to ensure long-service durability and reliability.

All ACO Rainwater Outlets are available in leaded gun metal to BS EN 1982:2008 to special order for lead or copper-clad roofs or connection to copper pipework.

Typical Applications

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- Flat roofs
- Balconies
- Roof terraces

Standard References:

Design requirements and flow rate performance refer to EN 1253:2015 *Gullies for Buildings – Part 2: Roof drains and floor gullies without trap.*

Roof drainage layout and hydraulic calculations refer to BS EN 12056-3:2000 *Gravity drainage systems inside buildings – Part 3: Roof drainage, layout and calculation.*

Design Considerations

Hydraulic Design

The following notes are intended as a guide to the specifier who is designing a rainwater drainage system for a roof. It is recommended to refer to BS EN 12056-3:2000 *Gravity drainage systems inside buildings – Part 3: Roof drainage, layout and calculation* for a comprehensive design guide.

For any rainwater drainage system to work effectively and reliably, it is recommended the specifier considers the following:

- Geographical location of the building
- Rainfall intensity
- Storm duration and return period
- Effective catchment area of roof
- Risk category of the building
- Hydraulic capacity of the drainage system(s) employed

Practical Design Tips

When designing an engineered rainwater scheme, the following design hints are suggested:

- Do not design for the maximum outlet hydraulic capacity. Allow a 10% factor of safety margin for intense storms and leaf/debris blockage.
- Always allow for a back-up outlet, even though only one outlet may be required.
- Rainwater outlets should be inspected and cleaned at least every 6 months to ensure reliable and continuous operation.

Geographical Location

Rainfall intensity has a direct impact on the performance requirements of any rainwater drainage system. For roofs and paved areas, it is normally impracticable to guard against very infrequent, extremely heavy rainfall situations so the designer should aim to strike a balance between the cost of the drainage system, the risk category of the building and the frequency and subsequent consequences of flooding in the advent of particularly high rainfall events.

The United Kingdom experiences complex and varied rainfall patterns, for example; although the upland areas of northern and western parts of the British Isles experience higher average annual rainfall than the lowland areas however, the lowland areas experience more frequent and more intense short duration rainfall than the upland areas. BS EN 12056-3:2000 provides further information and guidance on this topic.

A rainfall intensity of 75mm/hr (0.02083 l/s/m^2) is used throughout this design catalogue.

Flow Rate Calculation

The runoff, or flow rate Q, from roofs, paved areas as surfaces is calculated as follows and assumes that all surfaces are impermeable:

$$Q = \frac{A \times I}{3600} \text{ litres/second}$$

where

Q = Volumetric flow rate (l/s)
A = Effective catchment area (m^2)
I = Rainfall intensity (75mm/hr)

Alternatively,

Q = r x A litres/second

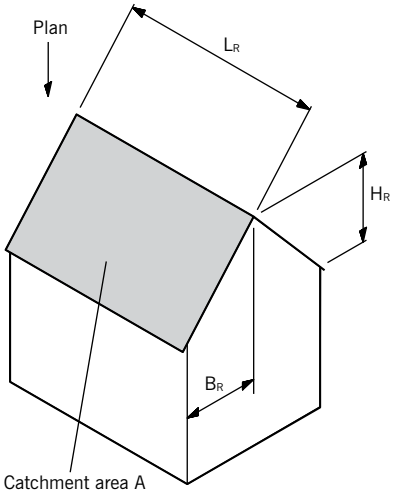
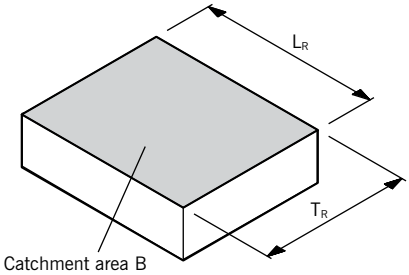
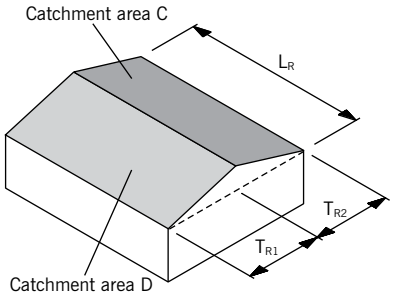
where

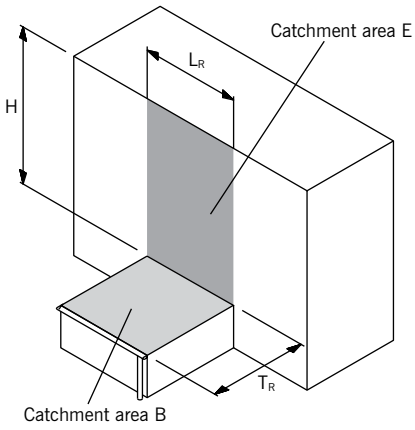
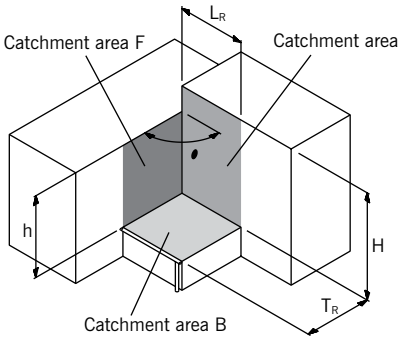
Q = Volumetric flow rate (l/s)
r = Rainfall intensity (l/s/m^2)
A = Effective catchment area (m^2)
For reference, a rainfall intensity of 75mm/hr = 0.02083 l/s/m^2

Note. Using either of the formulae above to calculate runoff (Q), for a given rainfall intensity and by knowing the flow rate performance of an individual rainwater outlet, the effective roof area drained can be calculated.

Flow rate performance and effective area drained are provided for each outlet contained in this catalogue.

Effective Catchment Area of Roofs

Roof Type	Diagram	Catchment Area Calculation
Pitched roofs Taking into account the effects of wind driven rain, the effective area of a freely exposed pitched roof draining to an eaves gutter or parapet wall gutter is equal to the plan area of the roof plus half its maximum elevation area.	**Figure 1.** 	**Catchment Area** A = (BR x LR) + HR/2 x LR) (m^2) = LR(BR x HR/2) (m^2) All dimensions in linear metres.
Flat roofs & paved areas Monopitch Flat Roof: For a monopitch flat roof or paved area with a freely exposed horizontal surface, the effective catchment area is equal to the plan area of the area to be drained as shown below:	**Figure 2.** 	**Catchment Area** B = LR x TR (m^2)
Dual Pitch Flat Roof: For a dual pitch flat roof, split the roof into discrete areas to isolate the catchment areas as shown:	**Figure 3.** 	For a dual pitch flat roof, split the roof into discrete areas to isolate the catchment areas as shown: **Catchment Area** C= LR x TR2 (m^2) **Catchment Area** D= LR x TR1 (m^2) All dimensions in linear metres.

Roof Type	Diagram	Catchment Area Calculation
Adjacent vertical surfaces Flat roofs or paved areas that are adjacent to vertical walls and/or glazed surfaces will be subject to an increased hydraulic load due to the effects of wind driven rain against these vertical surfaces and subsequently running off onto the roof. Monopitch Flat Roof with One Adjacent Vertical Wall For a flat roof exposed to a single wall, assume the effective catchment areas to be half the exposed vertical area of the wall and is shown as follows:	**Figure 4.** 	Catchment Area B = LR x TR (m^2) Catchment Area E = LR x H/2 (m^2) Total Catchment Area = (LR x TR) + (LR x H/2) (m^2) All dimensions in linear metres.
Monopitch Flat Roof with Two Adjacent Vertical Walls Similarly, for a flat roof exposed to two or more vertical walls forming an angle or bay, the assumed resulting wind direction requires that the combined areas of the walls should be considered together as follows:	**Figure 5.** 	Catchment Area B = LR x TR (m^2) Catchment Area E = LR x H/2 (m^2) Catchment Area F = TR x h/2 (m^2) Total Catchment Area = (LR x TR) + ½√ (E^2 + F^2 - 2F x Cos Θ) (m^2) All dimensions in linear metres; angles in degrees.

Product range overview

ACO HP vertical spigot outlet

General purpose rainwater outlets suitable for convenient direct connection to PVC-U 'O'-ring socket pipe to BS 4514:2001 or to cast iron pipework to BS 416:1990 or BS EN 877: 1999. Other connections can be made using an appropriate flexible coupling or heat shrink sleeving.

Vertical spigot outlets are available with either domed or flat gratings. Flat gratings are used where either vehicles or pedestrian traffic is likely.

ACO HP two-way screw outlet

The two-way outlet is designed to be used at the junction of roofs and parapet walls, or wherever horizontal and vertical surfaces meet.

This flexible design of outlet allows either a horizontal or vertical outflow take-off. Pipework connections as for vertical screw details.

ACO HP 45° & 90° outlets

These angled problem solving outlets are particularly relevant to suit more complex pipe run detail. Pipework connections as spigot or screwed outlets.

ACO HP vertical screw outlet

Screwed outlets are recommended where connection to the outlet occurs within the thickness of the slab and threaded connections will form a completely gas-tight seal.

Vertical screw outlets have a female parallel thread to BS 21:1985 for connecting directly to pipes conforming to BS EN 10226:2005. This ensures a completely watertight seal when screwed home into the outlet body.

A range of ABS threaded adaptors are available from to allow connection to PVC-U, socketless cast iron and aluminium rainwater pipes.

ACO HP balcony spigot outlet

The balcony outlet provides discrete safe drainage for balconies and walkways. Supplied complete with a 'D'-shaped flat grating, the outlet can be installed directly against a wall. The grating is supplied with suitable apertures to accommodate 50mm, 75mm or 100mm nominal bore rainwater downpipes, easily cut on site to suit the application.

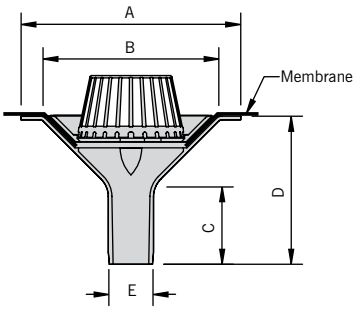
ACO HP Refurbishment outlet

When an existing flat roof is being upgraded, the refurbishment outlet is designed to fit inside the existing outlet and pipework with minimal disruption without the need to remove the original unit or pipework.

Outlets are supplied with a flexible finned pipe seal ensuring a watertight connection to existing pipework. The ease of use and minimal disruption to the existing rainwater system makes this an extremely cost effective solution when upgrading flat roofs.

ACO HP Vertical Spigot Outlet – Dome Grate

Part No	Nominal Bore Pipe Size (mm)	Pipe OD (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105900	50	60	82	1.7	2.50
105901	75	83	240	5.0	2.40
105902	100	110	514	10.7	3.10
105903	150	160	725	15.1	3.60



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D	E
105900	50	300	260	105	200	60
105901	75	300	260	110	200	83
105902	100	380	310	130	240	110
105903	150	380	310	160	240	160

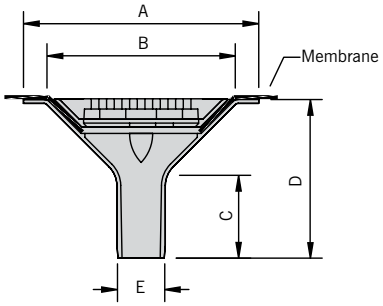
Pipework connections

Vertical spigot outlets may be directly connected to the following:

- Cast iron pipework to BS 416:1990 or BS EN 877:1999.
- PVC-U 'O'-ring socketed pipe to BS 4514:2001 (for 105901, 105902 and 105903 outlets only).
- Connection to 105900 outlets via pipe couplings or heat shrink socket.

ACO HP Vertical Spigot Outlet – Flat Grate

Part No	Nominal Bore Pipe Size (mm)	Pipe OD (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105904	50	60	82	1.7	2.80
105905	75	83	240	5.0	2.70
105906	100	110	514	10.7	3.80
105907	150	160	787	16.4	4.20



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D	E
105904	50	300	260	105	200	60
105905	75	300	260	110	200	83
105906	100	380	310	130	240	110
105907	150	380	310	160	240	160

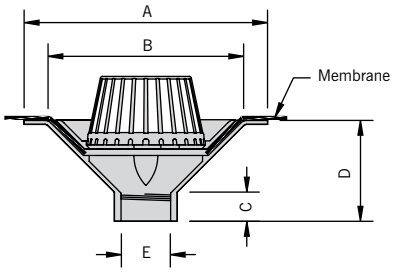
Pipework connections

Vertical spigot outlets may be directly connected to the following:

- Cast iron pipework to BS 416:1990 or BS EN 877 :1999.
- PVC-U 'O'-ring socketed pipe to BS 4514:2001 (for 105905, 105906 and 105907 outlets only).
- Connection to 105904 outlets via pipe couplings or heat shrink socket.

ACO HP Vertical Screw Outlet – Dome Grate

Part No	Nominal Bore Pipe Size (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105908	50	82	1.7	2.20
105909	75	240	5.0	2.30
105910	100	514	10.7	3.00
105911	150	725	15.2	3.10



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D	E
105908	50	300	260	45	130	2" BSP
105909	75	300	260	45	130	3" BSP
105910	100	380	310	45	130	4" BSP
105911	150	380	310	45	130	6" BSP

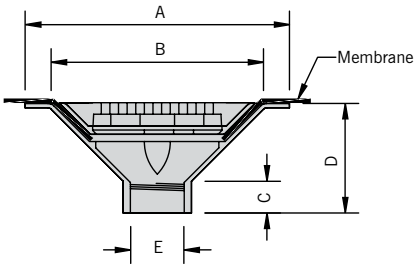
See Page 27 for ABS threaded adaptors

Pipework connections

ACO threaded outlets are supplied with a parallel female screw thread to BS 21: 1985 for connection to tube conforming to BS EN 10255:2004 with male taper thread to BS 21:1985. This ensures a completely watertight seal when screwed fully home into the outlet body. Threaded outlets are recommended where connection to the outlet occurs within the thickness of the slab as threaded connections will form a completely gas-tight seal within the slab.

ACO HP Vertical Screw Outlet – Flat Grate

Part No	Nominal Bore Pipe Size (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105912	50	82	1.7	2.50
105913	75	240	5.0	2.50
105914	100	514	10.7	3.70
105915	150	736	15.9	3.80



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D	E
105912	50	300	260	45	130	2” BSP
105913	75	300	260	45	130	3” BSP
105914	100	380	310	45	130	4” BSP
105915	150	380	310	45	130	6” BSP

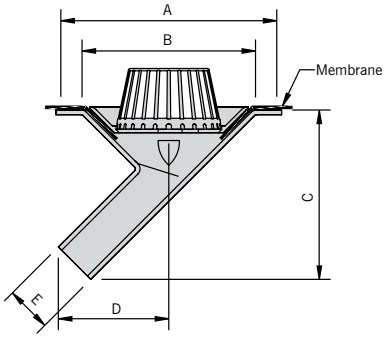
See Page 27 for ABS threaded adaptors

Pipework connections

ACO threaded outlets are supplied with a parallel female screw thread to BS 21: 1985 for connection to tube conforming to BS EN 10255:2004 with male taper thread to BS 21:1985. This ensures a completely watertight seal when screwed fully home into the outlet body. Threaded outlets are recommended where connection to the outlet occurs within the thickness of the slab as threaded connections will form a completely gas-tight seal within the slab.

ACO HP 45° Spigot Outlet – Dome Grate

Part No	Nominal Bore Pipe Size (mm)	Pipe OD (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105916	50	60	82	1.7	2.90
105917	75	83	240	5.0	3.5
105918	100	110	422	8.8	5.00



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm)				
		A	B	C	D	E
105916	50	300	260	245	135	60
105917	75	300	260	260	160	83
105918	100	380	310	275	200	110

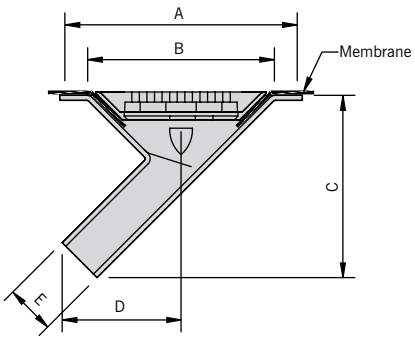
Pipework connections

45° spigot outlets may be directly connected to the following:

- Cast iron pipework to BS 416:1990 or BS EN 877 :1999.
- PVC-U 'O'-ring socketed pipe to BS 4514:2001 (for 105917, and 105918 outlets only).
- Connection to 105916 outlets via pipe couplings or heat shrink socket.

ACO HP 45° Spigot Outlet – Flat Grate

Part No	Nominal Bore Pipe Size (mm)	Pipe OD (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105919	50	60	82	1.7	3.60
105920	75	83	240	5.0	4.00
105921	100	110	494	8.8	6.20



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm)				
		A	B	C	D	E
105919	50	300	260	245	135	60
105920	75	300	260	260	160	83
105921	100	380	310	275	200	110

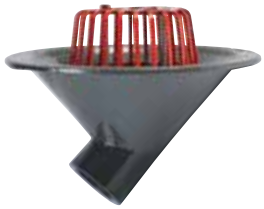
Pipework connections

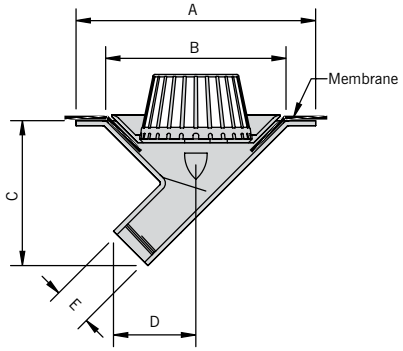
45° spigot outlets may be directly connected to the following:

- Cast iron pipework to BS 416:1990 or BS EN 877 :1999.
- PVC-U 'O'-ring socketed pipe to BS 4514:2001 (for 105920 and 105921 outlets only).
- Connection to 105919 outlets via pipe couplings or heat shrink socket.

ACO HP 45° Screw Outlet – Dome Grate

Part No	Nominal Bore Pipe Size (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105922	50	82	1.7	3.10
105923	75	240	5.0	2.60
105924	100	418	8.7	4.40





† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D	E
105922	50	300	260	190	80	2" BSP
105923	75	300	260	200	120	3" BSP
105924	100	380	310	210	145	4" BSP

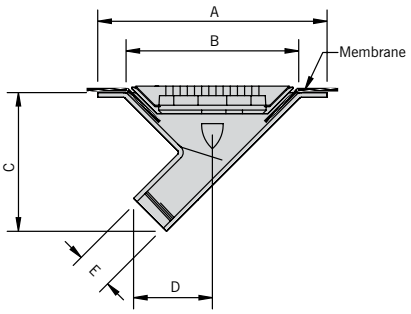
See Page 27 for ABS threaded adaptors

Pipework connections

ACO threaded outlets are supplied with a parallel female screw thread to BS 21: 1985 for connection to tube conforming to BS EN 10255:2004 with male taper thread to BS 21:1985. This ensures a completely watertight seal when screwed fully home into the outlet body. Threaded outlets are recommended where connection to the outlet occurs within the thickness of the slab as threaded connections will form a completely gas-tight seal within the slab.

ACO HP 45° Screw Outlet – Flat Grate

Part No	Nominal Bore Pipe Size (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105925	50	82	1.7	3.50
105926	75	240	5.0	3.60
105927	100	485	8.7	5.10



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm)				
		A	B	C	D	E
105925	50	300	260	190	80	2” BSP
105926	75	300	260	200	120	3” BSP
105927	100	380	310	210	145	4” BSP

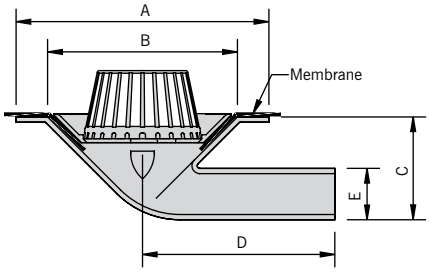
See Page 27 for ABS threaded adaptors

Pipework connections

ACO threaded outlets are supplied with a parallel female screw thread to BS 21: 1985 for connection to tube conforming to BS EN 10255:2004 with male taper thread to BS 21:1985. This ensures a completely watertight seal when screwed fully home into the outlet body. Threaded outlets are recommended where connection to the outlet occurs within the thickness of the slab as threaded connections will form a completely gas-tight seal within the slab.

ACO HP 90° Spigot Outlet – Dome Grate

Part No	Nominal Bore Pipe Size (mm)	Pipe OD (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105928	50	60	82	1.7	3.00
105929	75	83	240	5.0	3.00
105930	100	110	346	7.2	5.10



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D	E
105928	50	300	260	130	230	60
105929	75	300	260	130	230	83
105930	100	380	310	160	290	110

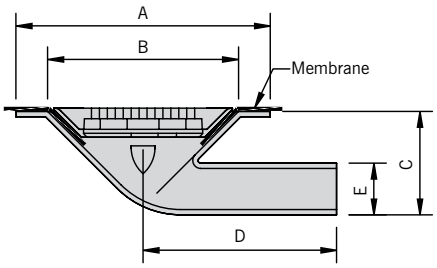
Pipework connections

90° spigot outlets may be directly connected to the following:

- Cast iron pipework to BS 416:1990 or BS EN 877 :1999.
- PVC-U 'O'-ring socketed pipe to BS 4514:2001 (for 105929 and 105930 outlets only).
- Connection to 105928 outlets via pipe couplings or heat shrink socket.

ACO HP 90° Spigot Outlet – Flat Grate

Part No	Nominal Bore Pipe Size (mm)	Pipe OD (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105931	50	60	82	1.7	3.30
105932	75	83	192	4.0	3.40
105933	100	110	398	8.3	6.00



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm)				
		A	B	C	D	E
105931	50	300	260	130	230	60
105932	75	300	260	130	230	83
105933	100	380	310	160	290	110

See Page 27 for ABS threaded adaptors

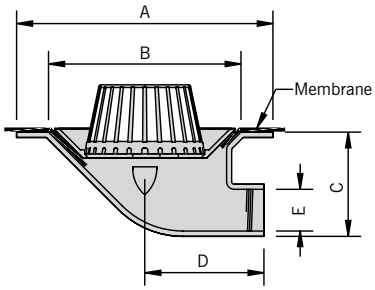
Pipework connections

90° spigot outlets may be directly connected to the following:

- Cast iron pipework to BS 416:1990 or BS EN 877 :1999.
- PVC-U 'O'-ring socketed pipe to BS 4514:2001 (for 105932 and 105933 outlets only).
- Connection to 105931 outlets via pipe couplings or heat shrink socket.

ACO HP 90° Screw Outlet – Dome Grate

Part No	Nominal Bore Pipe Size (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105934	50	82	1.7	2.90
105935	75	182	3.8	2.90
105936	100	341	7.1	4.70
105937	150	507	10.6	4.90



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

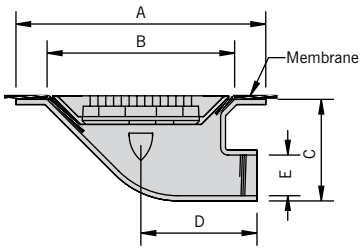
Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm)				
		A	B	C	D	E
105934	50	300	260	130	160	2" BSP
105935	75	300	260	130	160	3" BSP
105936	100	380	310	170	190	4" BSP
105937	150	380	310	215	140	6" BSP

Pipework connections

ACO threaded outlets are supplied with a parallel female screw thread to BS 21: 1985 for connection to tube conforming to BS EN 10255:2004 with male taper thread to BS 21:1985. This ensures a completely watertight seal when screwed fully home into the outlet body. Threaded outlets are recommended where connection to the outlet occurs within the thickness of the slab as threaded connections will form a completely gas-tight seal within the slab.

ACO HP 90° Screw Outlet – Flat Grate

Part No	Nominal Bore Pipe Size (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105938	50	82	1.7	3.30
105939	75	197	4.1	3.20
105940	100	389	8.1	5.50
105941	150	624	13.0	5.00



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D	E
105938	50	300	260	130	160	2" BSP
105939	75	300	260	130	160	3" BSP
105940	100	380	310	170	190	4" BSP
105941	150	380	310	215	140	6" BSP

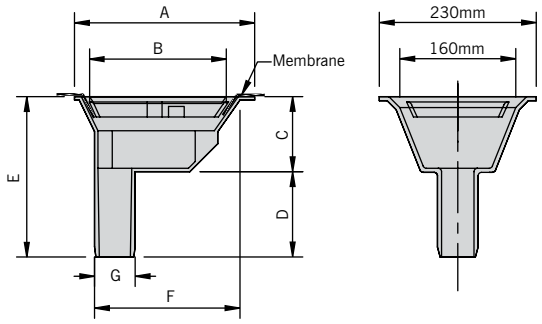
See Page 27 for ABS threaded adaptors

Pipework connections

ACO threaded outlets are supplied with a parallel female screw thread to BS 21: 1985 for connection to tube conforming to BS EN 10255:2004 with male taper thread to BS 21:1985. This ensures a completely watertight seal when screwed fully home into the outlet body. Threaded outlets are recommended where connection to the outlet occurs within the thickness of the slab as threaded connections will form a completely gas-tight seal within the slab.

ACO HP Balcony Spigot Outlet – Flat Grate

Part No	Nominal Bore Pipe Size (mm)	Pipe OD (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105942	50	60	82	1.7	2.60
105943	75	83	240	5.0	2.60
105944	100	110	345	7.6	2.80



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D	E	F	G
105942	50	265	205	90	125	215	210	60
105943	75	265	205	90	125	215	210	83
105944	100	265	205	90	125	215	210	110

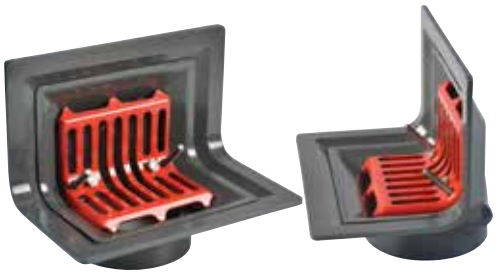
Pipework connections

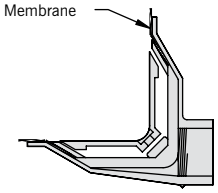
Vertical spigot outlets may be directly connected to the following:

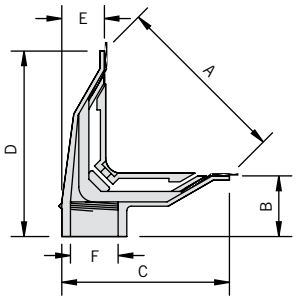
- Cast iron pipework to BS 416:1990 or BS EN 877 :1999.
- PVC-U 'O'-ring socketed pipe to BS 4514:2001 (for 105943 and 105944 outlets only).
- Connection to 105942 outlets via pipe couplings or heat shrink socket.

ACO HP Two-Way Screw Outlet – Flat Grate

Part No	Nominal Bore Pipe Size (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105945	50	82	1.7	2.10
105946	75	197	4.1	2.20
105947	100	374	7.8	2.20







† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D	E	F
105945	50	202	70	193	213	50	2" BSP
105945	75	202	70	193	213	50	3" BSP
105947	100	202	70	193	213	50	4" BSP

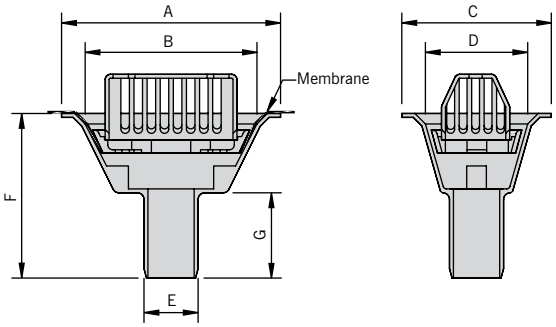
See Page 27 for ABS threaded adaptors

Pipework connections

ACO threaded outlets are supplied with a parallel female screw thread to BS 21: 1985 for connection to tube conforming to BS EN 10255:2004 with male taper thread to BS 21:1985. This ensures a completely watertight seal when screwed fully home into the outlet body. Threaded outlets are recommended where connection to the outlet occurs within the thickness of the slab as threaded connections will form a completely gas-tight seal within the slab.

ACO HP Gully Spigot Outlet – Dome Grate

Part No	Nominal Bore Pipe Size (mm)	Pipe OD (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105948	75	80	240	5.0	3.10
105949	100	110	514	10.7	3.40



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm)						
		A	B	C	D	E	F	G
105948	75	345	260	240	160	80	230	125
105949	100	345	260	240	160	110	230	125

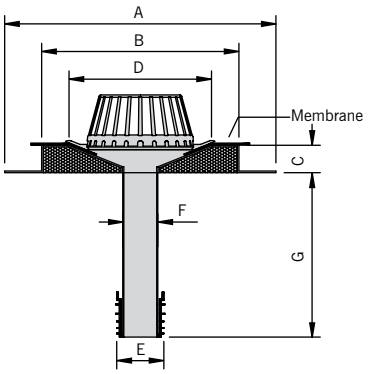
Pipework connections

Vertical spigot outlets may be directly connected to the following:

- Vertical spigot outlets may be directly connected to the following:
- Cast iron pipework to BS 416:1990 or BS EN 877 :1999.
- PVC-U ‘O’-ring socketed pipe to BS 4514:2001.

ACO HP Gully Refurbishment Outlet – Dome Grate

Part No	Nominal Bore Pipe Size (mm)	Area Drained‡ (m^2)	Flow rate† (l/s)	Weight (kg)
105950	75	240	5.0	7.70
105951	100	240	5.0	8.20



† Actual flow rate through outlets may be significantly higher but stated capacity limited to conform to BS EN 12056-3:2000 to prevent siphonic action for gravity rainwater drainage systems.

† Flow rate measured at 35mm head of water over outlet body for outlets up to 110mm diameter and 45mm head for 160mm diameter outlets as per EN 1253-2:2015.

‡ Based on a rainfall intensity of 75mm/hr (0.02083 l/s/m^2).

Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm)						
		A	B	C	D	E	F	G
105950	75	494	354	50	236	89	64	285
105951	100	494	354	50	236	114	89	285

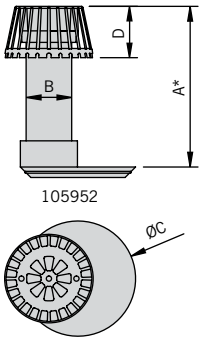
Pipework connections

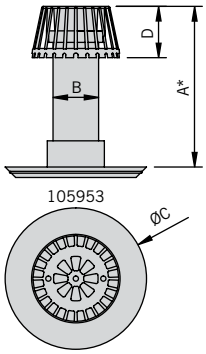
Refurbishment outlets are designed to fit the following range of existing pipework systems:

- 105950 : 71.5 to 78.5mm internal diameter.
- 105951 : 97.0 to 104.0 mm diameter.

ACO HP Overflow Outlet Module – Dome Grate

Part No	Nominal Bore Pipe Size (mm)	Flow rate† (l/s)	Weight (kg)
105952	50	2.4	2.20
105953	75	2.4	2.70





† **35mm head of water over outlet**

* **Easy cut on site to suit application.**

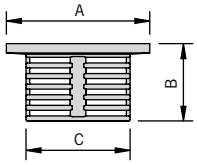
Part No	Nominal Bore Pipe Size (mm)	Product Dimensions (mm) A	B	C	D
105952	75	310	90	215	95
105953	100	310	90	273	95

Overflow modules are easily attached to an appropriate circular 50/75HP or 100/150HP rainwater outlets in applications where grating blockage from leaves, for example, would lead to an excessive accumulation of water on the roof area. Unplanned excess water on the roof area can lead to over-spill to the sides of the building and significantly increase the load applied to the roof structure.

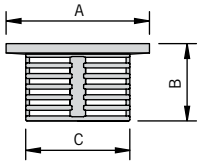
Overflow units are supplied with a PVC tube 250mm long that can be easily cut on site to the maximum permissible overflow height required for the application. Overflow units are used in conjunction with an appropriate spigot outlet unit.

ACO Raising Rings for Circular Outlets

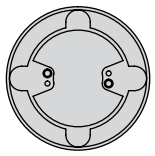
Part No	Suitable for Outlet Product Ref	Product Dimensions (mm) A	B	C	Weight (kg)
105954	105900, 105901, 105904, 105905, 105908,105909, 105912, 105913, 105916, 105917, 105919, 105920, 105922, 105923, 105925, 105926, 105928, 105929, 105931, 105932, 105934, 105935, 105938, 105939	230	125	170	1.50
105955	105954, 105902, 105903, 105906, 105907, 105910, 105911, 105914, 105915, 105918, 105921, 105924, 105927, 105930, 105933, 105936, 105937, 105940, 105941	230	125	170	1.40

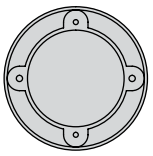


105954



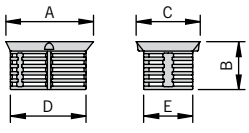
105955



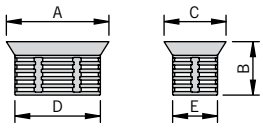


ACO Raising Rings for Balcony and Gully Outlets

Part No	Suitable for Outlet Product Ref	Product Dimensions (mm) A	B	C	D	E	Weight (kg)
105956	105942, 105943, 105944	207	117	150	177	115	0.80
105957	105948, 105949	240	125	145	200	105	1.60



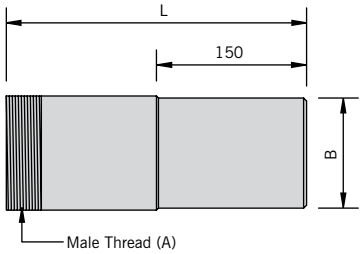
105956



105957

ACO ABS Threaded Adaptors

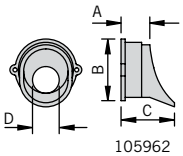
Part No	Male Thread A (BSP)	Spigot Dia B (mm)	Length L (mm)	Weight (kg)
105958	2”	55	300	0.30
105959	3”	83	300	0.60
105960	4”	110	300	1.00
105961	6”	160	300	1.60



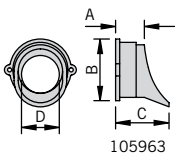
For use with ACO Screw Rainwater Outlets.

ACO Discharge Spouts

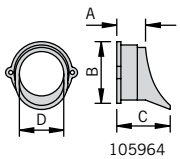
Part No	Product Dimensions (mm) A	B	C	D	Weight (kg)
105962	75	150	135	64	1.20
105963	75	150	135	92	1.10
105964	75	150	135	118	0.90



105962



105963

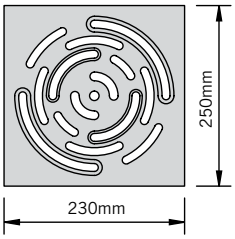


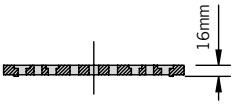
105964

Discharge spouts provide a convenient and aesthetically pleasing finishing detail to attach to a parapet/vertical wall outlet pipe. Manufactured from LM6 aluminium silicon alloy they can be directly connected to ACO ABS Threaded Adaptors with a watertight seal and secured to the vertical wall using two fixing lugs. Discharge spout projection from the vertical wall’s: 40mm.

ACO Terrace Grate for Circular Outlet Raising Rings

Part No	Grating Size (mm)	Weight (kg)
105965	230 x 230 x 16	1.30

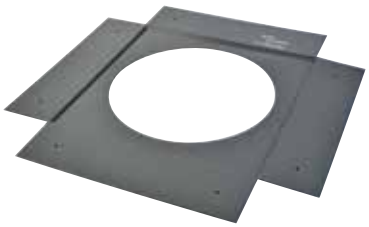


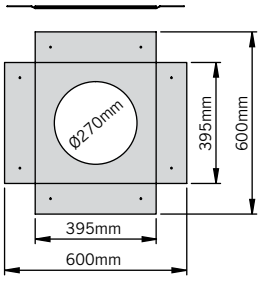


Terrace grates are designed for installations with terraced paving slabs or block paviors. Terrace grates can only be used with raising rings for circular outlets as shown on Page 26. A slotted fixing detail allows 90° rotational movement to accommodate slab/pavior patterns.

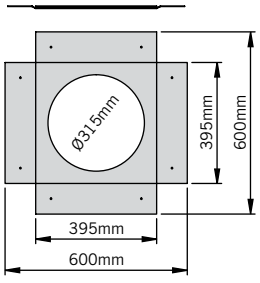
ACO Deck Supports for Circular Outlets

Part No	Suitable for Outlet Product Ref	Weight (kg)
105966	105900, 105901, 105908, 105909, 105916, 105917, 105922, 105923, 105928, 105929, 105934, 105935	2.20
105967	105902, 105903, 105910, 105911, 105918, 105924, 105930, 105936, 105937	2.50





105966



105967

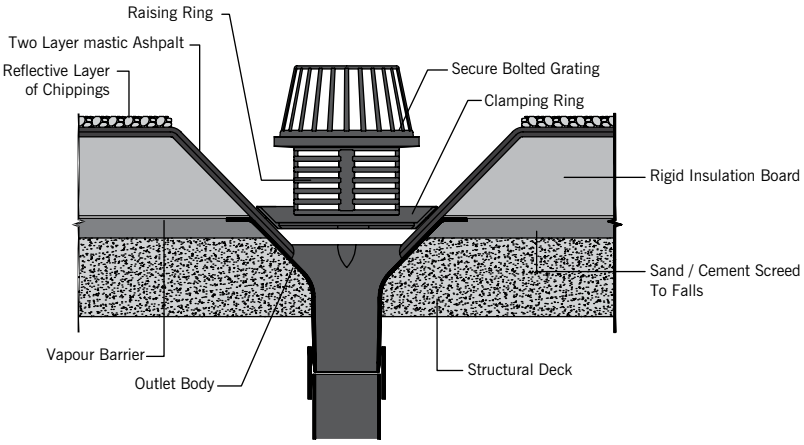
Deck supports are used where ACO HP Rainwater Outlets are installed in metal deck roof constructions, providing a stable and secure interface between the outlet and roof. Deck Supports are manufactured from mild steel and primed in a red oxide paint finish and finished in a polyester powder coat. They are suitable for all types of roof decking.

Installation Detail

Typical Flat Roof Construction Details

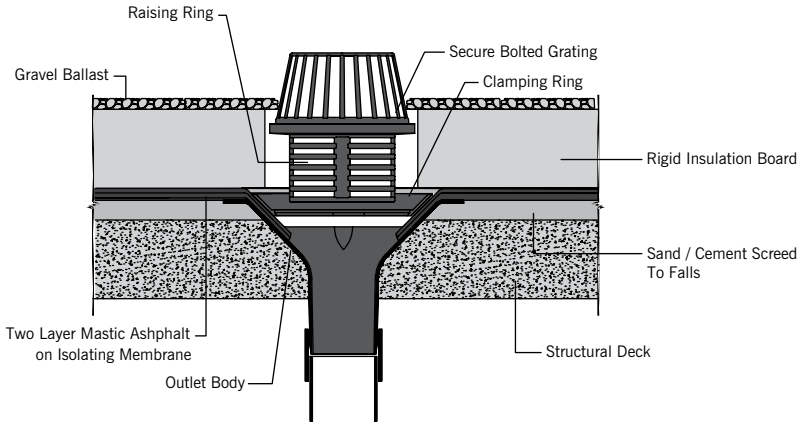
Warm Roof

A warm roof is where the main mass of the roof structure lies below the main thermal insulation. The waterproof membrane is positioned above the insulation.



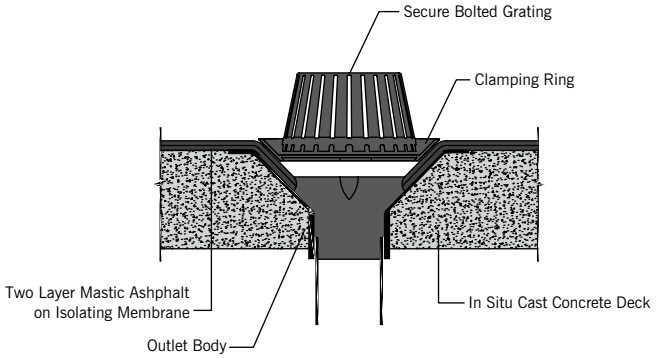
Inverted Roof

An inverted roof is a form of warm roof where the main mass of the roof structure lies below the main thermal insulation, however, the waterproof membrane lies beneath the thermal insulation.



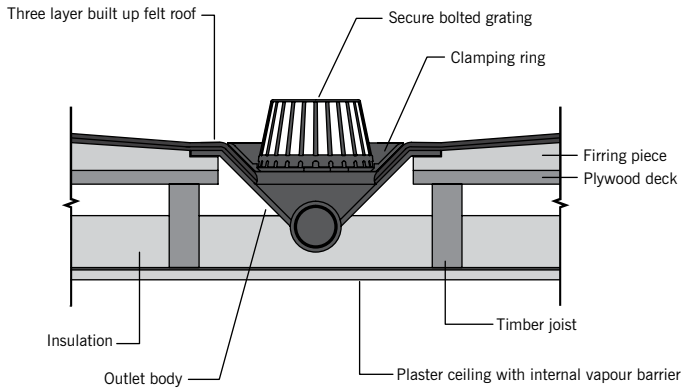
Un-insulated Roof

A roof without thermal insulation. This type of construction is only permitted in non-habitable buildings, e.g. garages.

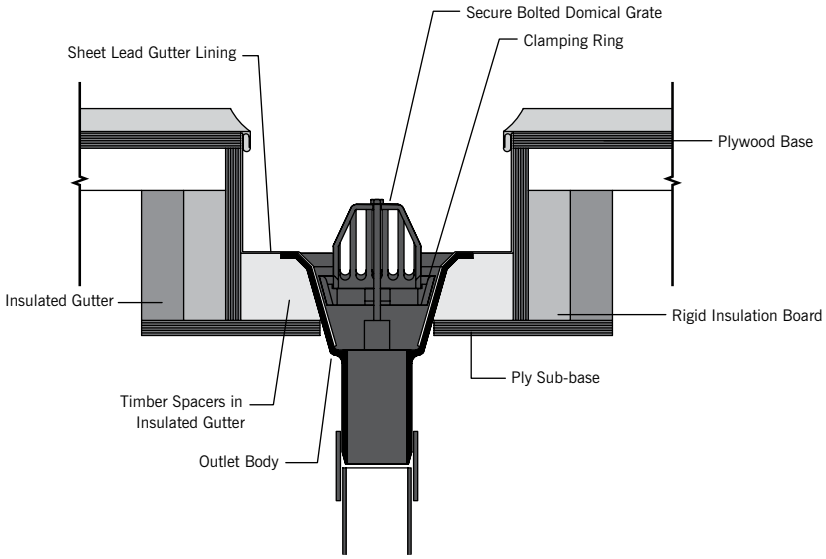


Installation Detail

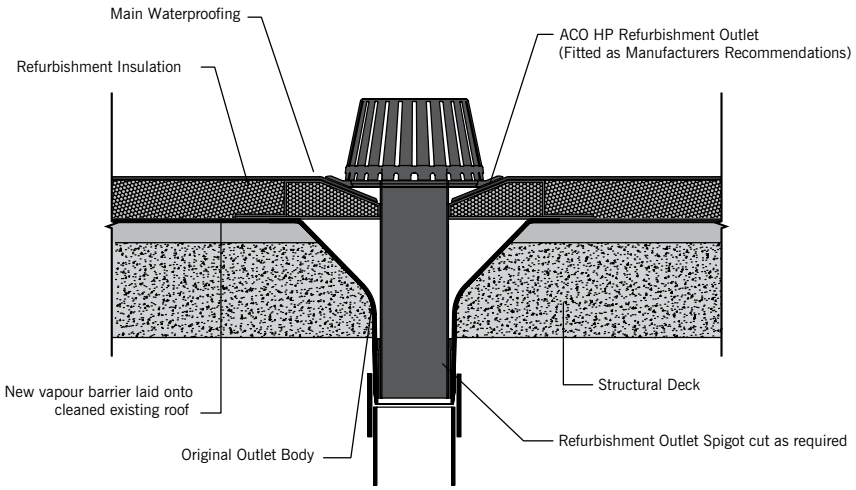
HP 90° outlet



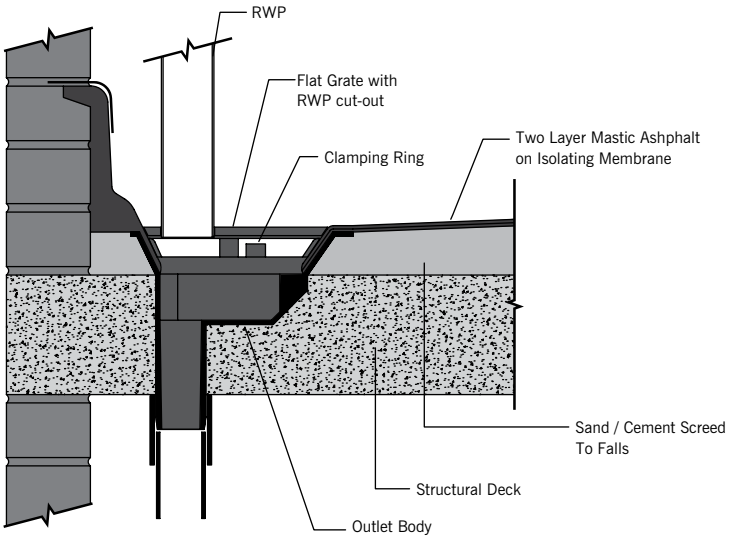
Gully outlet



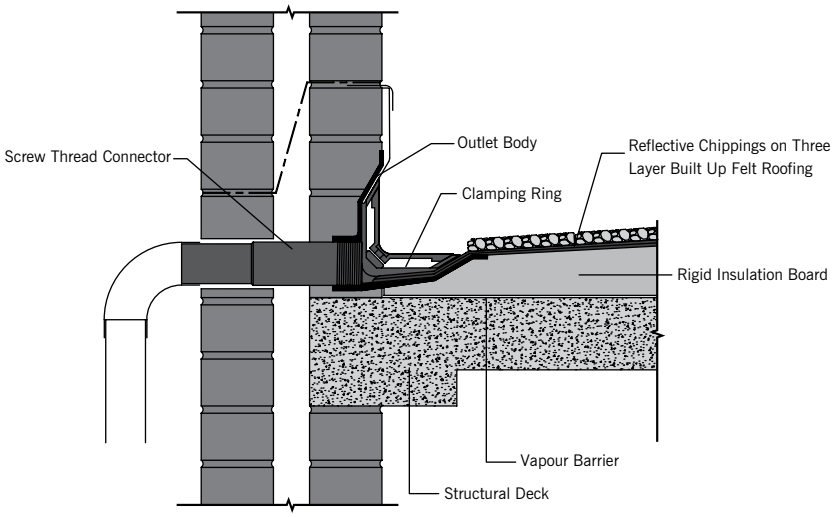
Refurbishment outlet



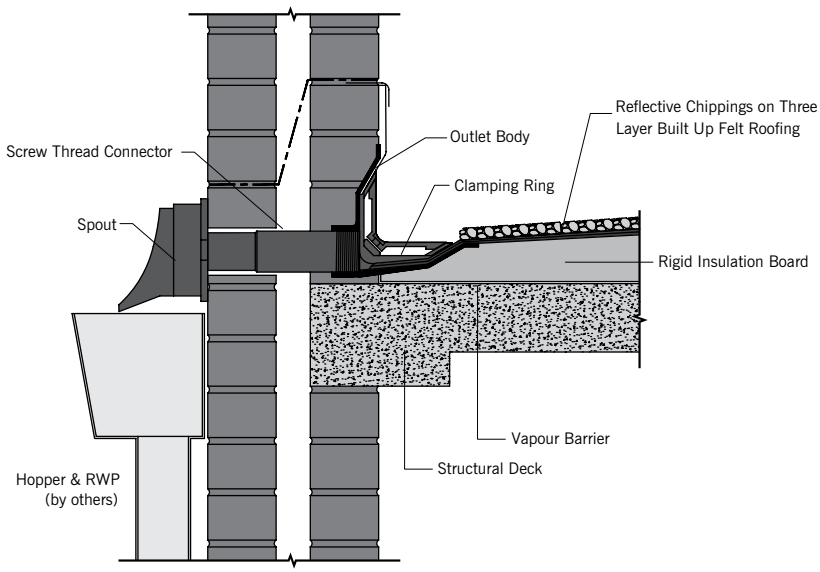
Balcony outlet with downpipe



Two-way outlet

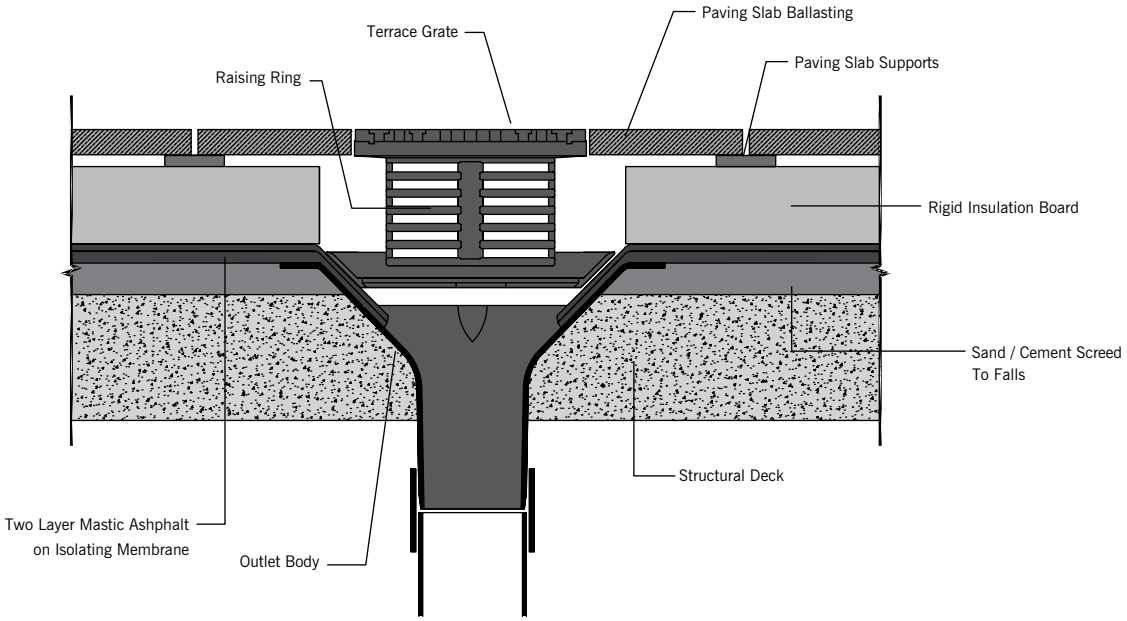


Two-way outlet with spout

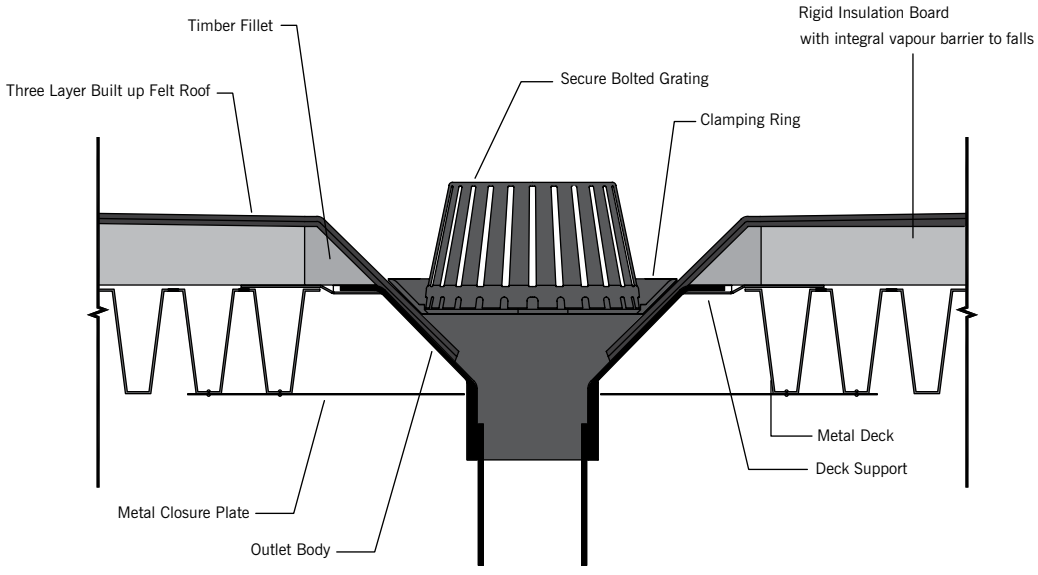


Installation Detail

Terrace grate

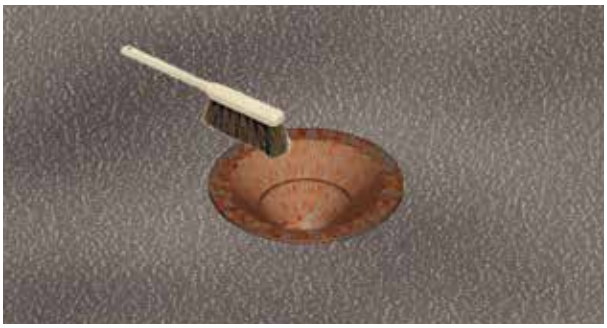


Metal deck support



Refurbishment outlet installation

Step 1

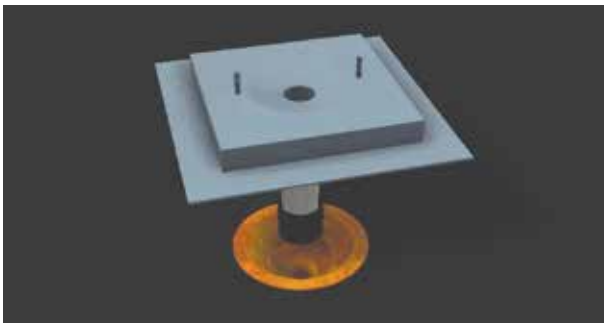


Remove redundant roofing materials; brush & clean surfaces ready for new installation.

Step 2

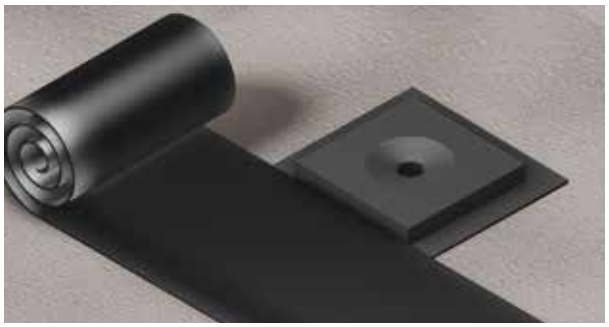
Lay new vapour barrier & bond into existing rainwater outlet.

Step 3



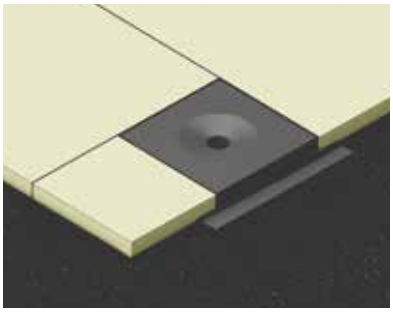
With the finned rubber seal removed, insert the ACO Refurbishment Outlet into the sump of the existing rainwater outlet body. If necessary, reduce the spigot length of the new outlet to allow full insertion. Replace rubber seal and re-insert.

Step 4



Bond strips of vapour barrier to the Refurbishment Outlet flanges and existing vapour barrier to ensure a total seal.

Step 5



Cut and lay insulation board around refurbishment outlet. If insulation is greater than 50mm thick, chamfer board so that outlet is at same level as the outlet top surface.

Step 6

Lay main waterproofing material over entire area and trim into the sump of the refurbishment outlet, ensuring the spigot outlet is clear or waterproofing material.

Step 7

With the waterproofing material still pliable, install clamping ring and tighten nuts evenly. Fit the grating to complete the installation.

Notes

Notes

ACO Technologies plc

- ACO Water Management
  Civils + Infrastructure
  Building + Landscape
- ACO Building Drainage
- ACO Sport
- ACO Wildlife

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