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Cl/SfB (52.5)	

# ACO Water Management: Civils + Infrastructure

ACO MultiDrain™ PPD



*ACO MultiDrain™ PPD channel drainage system*  
**Specification manual**



# 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 25 years ago, the company has grown quickly on a reputation for design innovation and customer service.

There are now 6 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.



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# Introduction to ACO MultiDrain™ PPD

The new ACO MultiDrain™ PPD channel and grating system provides versatile and efficient linear drainage for infrastructure and hard landscaping projects.

## What is ACO MultiDrain™ PPD?

ACO MultiDrain™ PPD 1m constant depth channel elements are available in 3 widths: 100mm, 150mm and 200mm. This gives the designer the means to select the optimum channel size and hydraulic performance required, minimising the number of outlets and keeping installation costs as low as possible.

An extensive choice of grating styles, materials and load classes is available fitted with the ACO Drainlock™ fastening system, which provides simple and quick installation yet prevents traffic displacing the gratings. If there is a risk of unwanted grating removal or theft then security locking systems are available.

Where slot drainage is preferred ACO Brickslot tops are available for the 100mm and 150mm wide channels, providing discreet slot drainage in either block paving or natural stone surfaces. The offset drainage slot also enables ACO Brickslot to be used right up to building façades or for threshold drainage.



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## Why choose the ACO MultiDrain™ PPD system?

The system meets the highest standards for performance and quality, being fully compliant with and independently certified to BS EN 1433:2002 for applications ranging from A 15 up to and including D 400\*, ideal for pedestrians, cars, service vehicles or HGV traffic.

The constant depth 1m recycled polypropylene channels with protective galvanised steel edge rails are extremely robust and durable yet all weigh under 5kg thanks to ACO's unique HexTechnology™ channel structure. ACO MultiDrain™ PPD has the performance to withstand the rigours of installation and provide long service life.

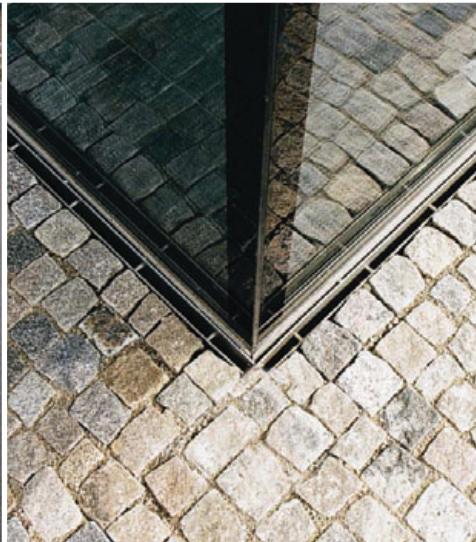
Installation and maintenance costs are kept to a minimum with each channel packed with labour saving features, such as clip together end details for rapid channel connection and alignment, knockout panels for outlet pipe work, and the 'V' shaped channel bore that promotes self cleansing. Guidance on preparation, installation and maintenance of this system is given in the ACO MultiDrain™ PPD installation manual or visit [www.aco.co.uk](http://www.aco.co.uk).



## Typical applications

The ACO MultiDrain™ PPD system can provide a channel drainage solution for many applications by selecting the appropriate channel width, depth and grating type. Typical applications include:

- ▶ Commercial developments
- ▶ Residential developments
- ▶ Private and public parking areas
- ▶ Landscaping
- ▶ Light industrial units
- ▶ Pedestrian precincts
- ▶ Schools
- ▶ Sports and leisure facilities
- ▶ Discreet slot drainage
- ▶ Threshold drainage
- ▶ Cable ducting



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## Key features and benefits

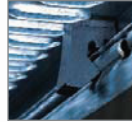
- ▶ Range of sizes and depths suits many drainage designs
- ▶ Strong, robust channel unit
- ▶ Galvanised edge rail for improved installed strength
- ▶ 100% recyclable
- ▶ Extensive choice of gratings and accessories
- ▶ Easily cut to 500mm lengths
- ▶ Unique ACO Drainlock™ grating fixing improves hydraulic capacity
- ▶ CE marked and fully certified to BS EN 1433:2002 Load Class D 400\*
- ▶ Efficient surface water drainage for a wide variety of applications
- ▶ Channel design improves flow velocity, promotes self cleansing
- ▶ Lightweight design is simple and fast to install



If you need help with specification, design or installation, or just wish to learn more about this and other Surface Water Management products from ACO, contact our free, no obligation ACO Water Management Design Services Team who can provide advice and dedicated design support for your project – 01462 816666 or visit [www.aco.co.uk](http://www.aco.co.uk).

\*Not suitable for carriageways of public roads or motorways

ACO MULTIDRAIN PPD FEATURES OVERVIEW



ACO MultiDrain™ PPD gratings are fitted with the ACO Drainlock™ fastening system for quick installation



Anti shunt feature holds grating securely in place




Security locking option available to restrict unwanted grating removal

Durable galvanised steel edge rail protects channel from traffic damage

Channels clip together easily

Sealant groove for simple watertight installations

V shaped channel bore improves speed of water flow and promotes self cleansing

 Environmentally friendly product – manufactured from recycled polypropylene and 100% recyclable

Constant depth channels are provided with a 90° channel connection



High quality channel CE marked and certified to BS EN 1433:2002 Load Class D 400\* (see table below)

Channels available in 100mm, 150mm and 200mm widths, enabling efficient hydraulic drainage design

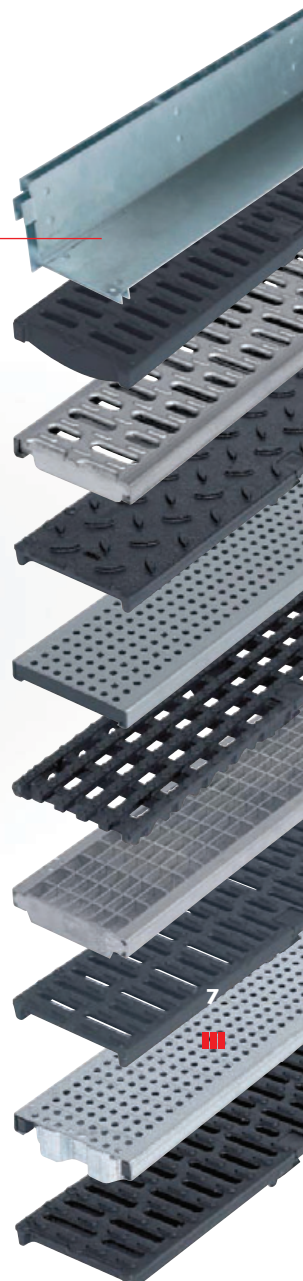
A wide choice of gratings is available in various materials and designs

Textured external surfaces and anchors key the product securely into concrete surround

Vertical outlet for connection to sump units or pipework

0.5m cutting guide enables simple on site modification to create shorter channel lengths

HexTechnology™: provides a rigid channel body during and after installation



### LOAD CLASSES



A 15 Pedestrian, cycleways and domestic drives.



B 125 Pedestrian precincts, light vehicles, private car parks and drives.



C 250 Parking areas, service stations (cars) and slow-moving light commercial vehicles.

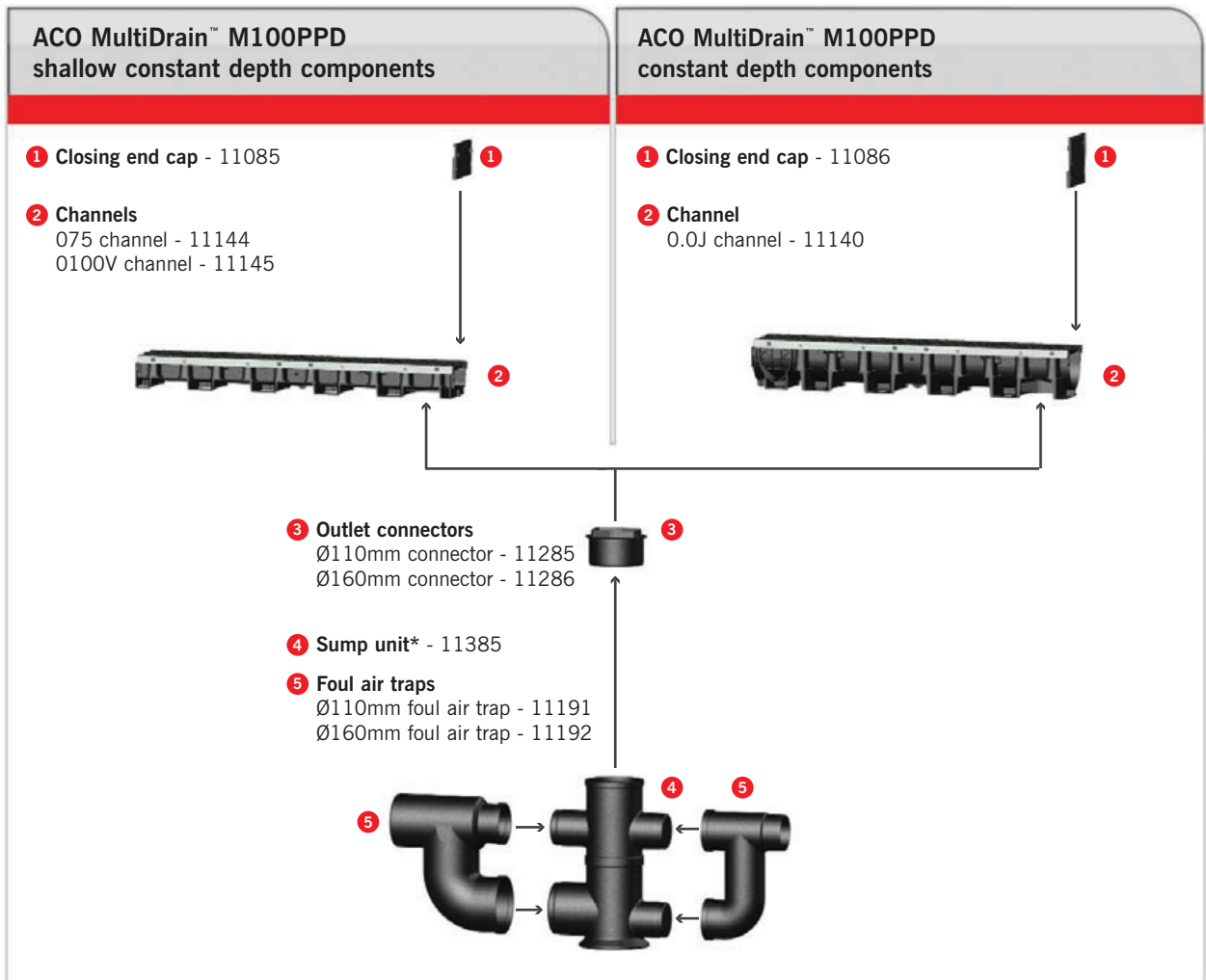


D 400 Parking areas for all vehicle types\*.

\*Not suitable for carriageways of public roads or motorways

# Components of the ACO MultiDrain™ PPD system layout

The layout diagram below illustrates the channels and accessories available within the ACO MultiDrain™ PPD range. Numerical product codes are provided after the product description for quick reference e.g. ❶ Closing end cap – 11085.



### Guidance for using the ACO MultiDrain™ PPD parts tables

The ACO MultiDrain™ PPD parts tables are shown on the forthcoming pages. The product information is split down by channel widths. This enables quick and simple product identification and selection.

All channels within the ACO MultiDrain™ PPD range are constant depth units.

\* Sump unit connects to channel via Ø160mm outlet connector which is provided as part of the sump assembly.  
 \*\* Sump unit connects to channel via Ø200mm outlet connector which is provided as part of the sump assembly

**ACO MultiDrain™ M150PPD**  
constant depth components

1 Closing end cap - 11093



2 Channel  
0.0J channel - 11151

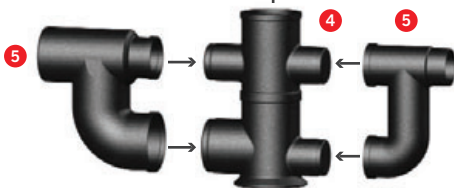


3 Outlet connector  
Ø160mm connector - 11288



4 Sump unit\* - 11386

5 Foul air traps  
Ø110mm foul air trap - 11191  
Ø160mm foul air trap - 11192



**ACO MultiDrain™ M200PPD**  
constant depth components

1 Closing end cap - 11098



2 Channel  
0.0J channel - 11158

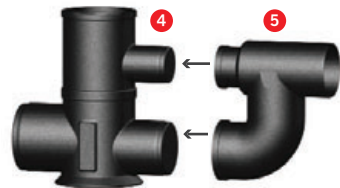


3 Outlet connector  
Ø200mm connector - 11289



4 Sump unit\*\* - 11387

5 Foul air trap  
Ø160mm foul air trap - 11192



6 ACO Universal Gully  
Gully assembly and bucket - 33601  
Gully assembly no bucket - 33602

For use on all ACO MultiDrain™ PPD systems.



# ACO MultiDrain™ PPD product selector

## Making the right product selection

ACO MultiDrain™ PPD is available in three width and depth configurations with two additional shallow channel options on the 100mm wide system.

In order to summarise the options available, the product selector below displays key features for each of the system widths.

Once product selection has been made based on the features required, the table will direct you to the appropriate page.

CHANNELS WITH TRADITIONAL GRATINGS			
	ACO MULTIDRAIN M100PPD	ACO MULTIDRAIN M150PPD	ACO MULTIDRAIN M200PPD
<b>KEY FEATURES</b>			
CHANNEL WIDTH			
CATCHMENT AREA	252m <sup>2*</sup>	671m <sup>2*</sup>	1440m <sup>2*</sup>
SHALLOW CONSTANT DEPTH CHANNELS	✓	✗	✗
CONSTANT DEPTH CHANNELS	✓	✓	✓
MAXIMUM LOAD CLASS			
GRATING CHOICE			
BRICKSLOT TOP	✓	✓	✗
	GO TO PAGE 11	GO TO PAGE 17	GO TO PAGE 23

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■■■

KEY	
<b>CATCHMENT AREA</b> *EXAMPLE RUN BASED ON 50m LENGTH TO OUTLET	<b>AVAILABILITY</b> ✓ AVAILABLE    ✗ NOT AVAILABLE
<b>GRATING CHOICE</b> LIMITED     SMALL     WIDE	<b>LOAD CLASS D 400</b> PARKING AREAS FOR ALL VEHICLE TYPES. NOT SUITABLE FOR CARRIAGEWAYS OF PUBLIC ROADS OR MOTORWAYS.


# ACO MultiDrain™ M100PPD



M100PPD



**ACO MULTIDRAIN M100PPD**

	Channel width <b>100mm</b>
<b>252m<sup>2</sup>*</b>	Catchment area
	Shallow constant depth channels
	Constant depth channels
	Load Class <b>D 400</b>
	Grating choice <b>WIDE</b>
	Brickslot top available

\*Example run based on 50m length to outlet

The ACO MultiDrain™ M100PPD channels are available in shallow and constant depths and have integral galvanised steel protective edge rails to give the channel optimum protection from vehicular traffic.

The channels are manufactured from recycled polypropylene, a robust lightweight material.

For the ACO MultiDrain™ M100PPD range of gratings to suit these channels please refer to pages 14 and 15.



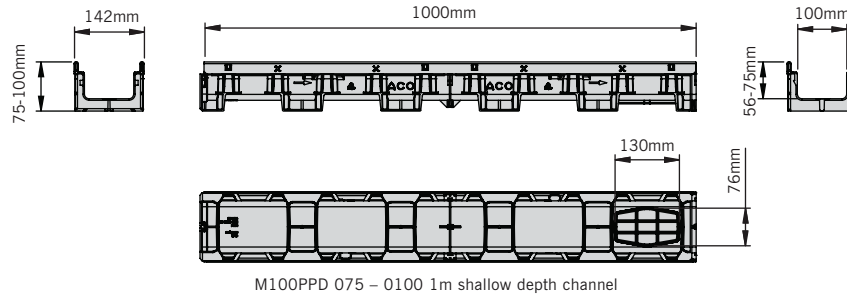
To compare the different features of the ACO MultiDrain™ PPD range, use the product selector on page 10.



# ACO MultiDrain™ M100PPD

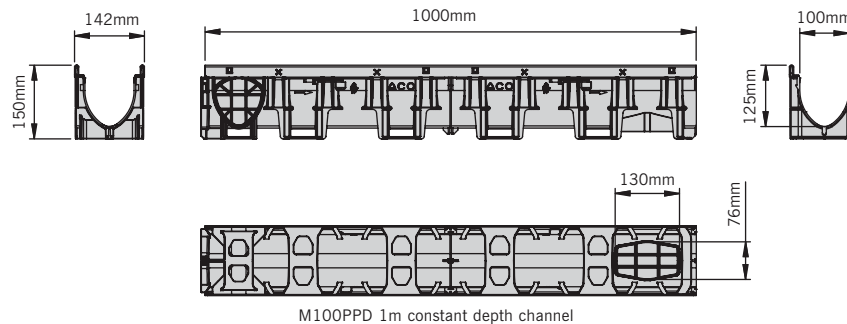
## Shallow constant depth channels with galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11144	M100PPD No. 075*	1000	142	75	56	2.63
11145	M100PPD No. 0100*	1000	142	100	75	2.90



## Constant depth channel with galvanised steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11140	M100PPD No. 0.0J*	1000	142	150	125	3.50

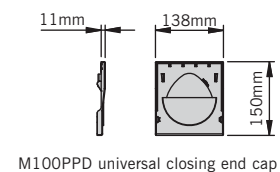
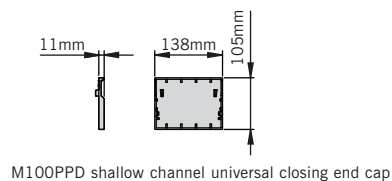


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## Universal closing end caps

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11085	M100PPD shallow channel universal closing end cap	11	138	105	-	0.10
11086	M100PPD universal closing end cap	11	138	150	-	0.10



J Indicates side knockout for 90° channel connection. Knockout on both sides of the channel.

\* Indicates channels supplied with vertical outlet knockout for use with Ø110mm and Ø160mm outlet connectors. Outlet connectors supplied separately, see opposite page for details.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*



# ACO MultiDrain™ M100PPD

## How to select the correct grating

The load class application of the channel system once installed is determined by the load class of the gratings fitted e.g. Load Class C 250 gratings fitted to a ACO MultiDrain™ PPD channel equals C 250 channel system.

All of the suitable gratings are shown here and are listed in load class order. Primary consideration should be given to the application load requirement when selecting a grating. Refer to the chart on page 7 for load class definitions and typical applications.

## ACO Drainlock™

Fitted as standard to all ACO MultiDrain™ PPD gratings, this fastening system simply clips into the channel for rapid installation.

A selection of the ACO Drainlock™ gratings is fitted with an anti shunt feature that restricts unwanted grating movement when installed. Please see grating tables for this option.

## Security locking option

In areas where unwanted grating removal needs to be restricted, such as schools and prisons, the ACO Drainlock™ security locking system can be used. Gratings suitable for use with this system are indicated by **6**.

This system is fitted to the gratings by two M6 security bolts and clamps the grating in place preventing removal. A key for removal is supplied separately. Instructions for fitting this system are included in the ACO MultiDrain™ PPD installation manual.



## Traditional gratings for Load Class A 15 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Intake area mm²/m	Anti shunt feature	Weight (kg)
12610	Slotted galvanised steel 400DL	1000	123	21	10	31200	n/a	2.20
12611	Slotted galvanised steel 402DL	500	123	21	10	31200	n/a	1.00
12666	Perforated galvanised steel 12666DL	1000	123	21	6	17800	n/a	2.20
12667	Perforated galvanised steel 12667DL	500	123	21	6	17800	n/a	1.00



400DL / 402DL  
Slotted galvanised steel



12666DL / 12667DL  
Perforated galvanised steel



## Traditional gratings for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Intake area mm²/m	Anti shunt feature	Weight (kg)
12680	Heelguard™ composite - black 522DL <b>6</b>	500	123	21	8	14250	Yes	1.20
12673	Intercept ductile iron 507DL	500	123	21	31 x 12	43000	Yes	3.50
12614	Slotted galvanised steel 423DL	1000	123	21	10	31200	n/a	4.30
12615	Slotted galvanised steel 424DL	500	123	21	10	31200	n/a	2.20
12656	Perforated galvanised steel 12656DL	1000	123	21	6	17800	n/a	2.20
12657	Perforated galvanised steel 12657DL	500	123	21	6	17800	n/a	1.00
12618	Mesh galvanised steel 410DL	1000	123	21	25 x 12	88000	Yes	3.10
12619	Mesh galvanised steel 412DL	500	123	21	25 x 12	88000	Yes	1.50



522DL  
Heelguard™ composite



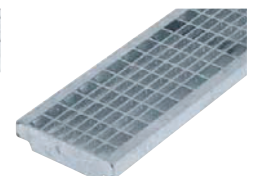
507DL  
Intercept ductile iron



423DL / 424DL  
Slotted galvanised steel



12656DL / 12657DL  
Perforated galvanised steel



410DL / 412DL  
Mesh galvanised steel

**6** Indicates security locking available.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*

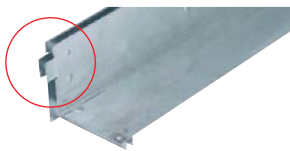


# ACO MultiDrain™ M100PPD

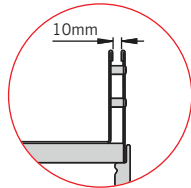


## Brickslot tops and access top for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area (mm <sup>2</sup> /m)	Weight (kg)
23460	Brickslot top galvanised steel 23460	1000	135	105	10	10000	6.54
23461	Brickslot top galvanised steel 23461	500	135	105	10	10000	3.40
23462	Brickslot access top galvanised steel 23462	500	135	105	10	10000	6.55



23460 / 23461  
Brickslot top galvanised steel



Slot detail



23462  
Brickslot access top galvanised steel.



## Traditional gratings for Load Class C 250 / D 400\* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Intake area mm <sup>2</sup> /m	Anti shunt feature	Weight (kg)
23405	Heelguard™ ductile iron 23405DL <b>Ⓢ</b>	500	123	21	8	25400	Yes	4.20
23406	Solid cover ductile iron 23406DL	500	123	21	n/a	n/a	Yes	4.50
23408	Slotted ductile iron 23408DL	500	123	21	12	36200	Yes	3.80



23405DL  
Heelguard™ ductile iron



23406DL  
Solid cover ductile iron

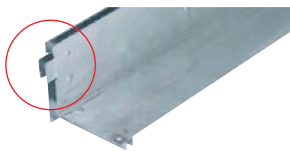


23408DL  
Slotted ductile iron

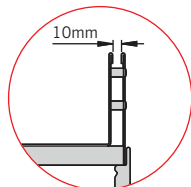


## Brickslot tops and access top for Load Class C 250 / D 400\* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area (mm <sup>2</sup> /m)	Weight (kg)
23465	Brickslot top galvanised steel 23465	1000	135	105	10	10000	6.70
23466	Brickslot top galvanised steel 23466	500	135	105	10	10000	3.43
23467	Brickslot access top galvanised steel 23467	500	135	105	10	10000	6.43



23465 / 23466  
Brickslot top galvanised steel



Slot detail



23467  
Brickslot access top galvanised steel.

## Grating accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
23415	Drainlock™ security locking system	n/a	n/a	n/a	n/a	0.10
23416	Drainlock™ security key	n/a	n/a	n/a	n/a	0.01
1367	Drainlock™ grating lifting tool 835	n/a	n/a	n/a	n/a	0.10

**Ⓢ** Indicates security locking available.

\*Not suitable for carriageways of public roads or motorways.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*

# ACO MultiDrain™ M100PPD hydraulic performance tables

## Hydraulic capacities

The table opposite shows the maximum capacity of the channel, assuming uniform lateral inflow to the channel. The capacity will depend on the length of channel to the outlet and on any slope along the channel.

Q (l/s) is the maximum total flow that the channel can carry.

q (l/s/m) is the maximum possible lateral inflow.

A (m<sup>2</sup>) is the maximum area that can be drained and will depend on the design rainfall intensity chosen. The tabulated areas are for a rainfall intensity of 50 mm/h (0.014 l/s/m<sup>2</sup>).

At other rainfall intensities, the area can be determined by proportion, e.g. at 75mm/h, the maximum area drained will be the tabulated area x 50/75.

## ACO Water Management Design Services Team

Please contact the ACO Water Management Design Services Team on 01462 816666 for advice on channels with non-uniform inflow, or channels receiving point inflows at the end or at intermediate locations. The ACO Water Management Design Services Team will be pleased to assist with any technical queries, scheme designs or parts schedules.

## Designing a drainage system

An example design method is provided on page 29 to help determine your drainage requirements.

This example will enable you to use the hydraulic performance tables on this page.

## ACO MultiDrain™ M100PPD 075 shallow depth channel

Length to Outlet (m)	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )
10	1.4	0.14	98	1.6	0.16	114	2.0	0.20	141
20	1.3	0.06	91	1.7	0.09	124	2.2	0.11	158
30	1.2	0.04	85	1.8	0.06	128	2.3	0.08	167
40	1.1	0.03	80	1.8	0.04	128	2.4	0.06	173
50	1.0	0.02	75	1.8	0.04	129	2.4	0.05	175
60	1.0	0.02	73	1.8	0.03	129	2.5	0.04	177

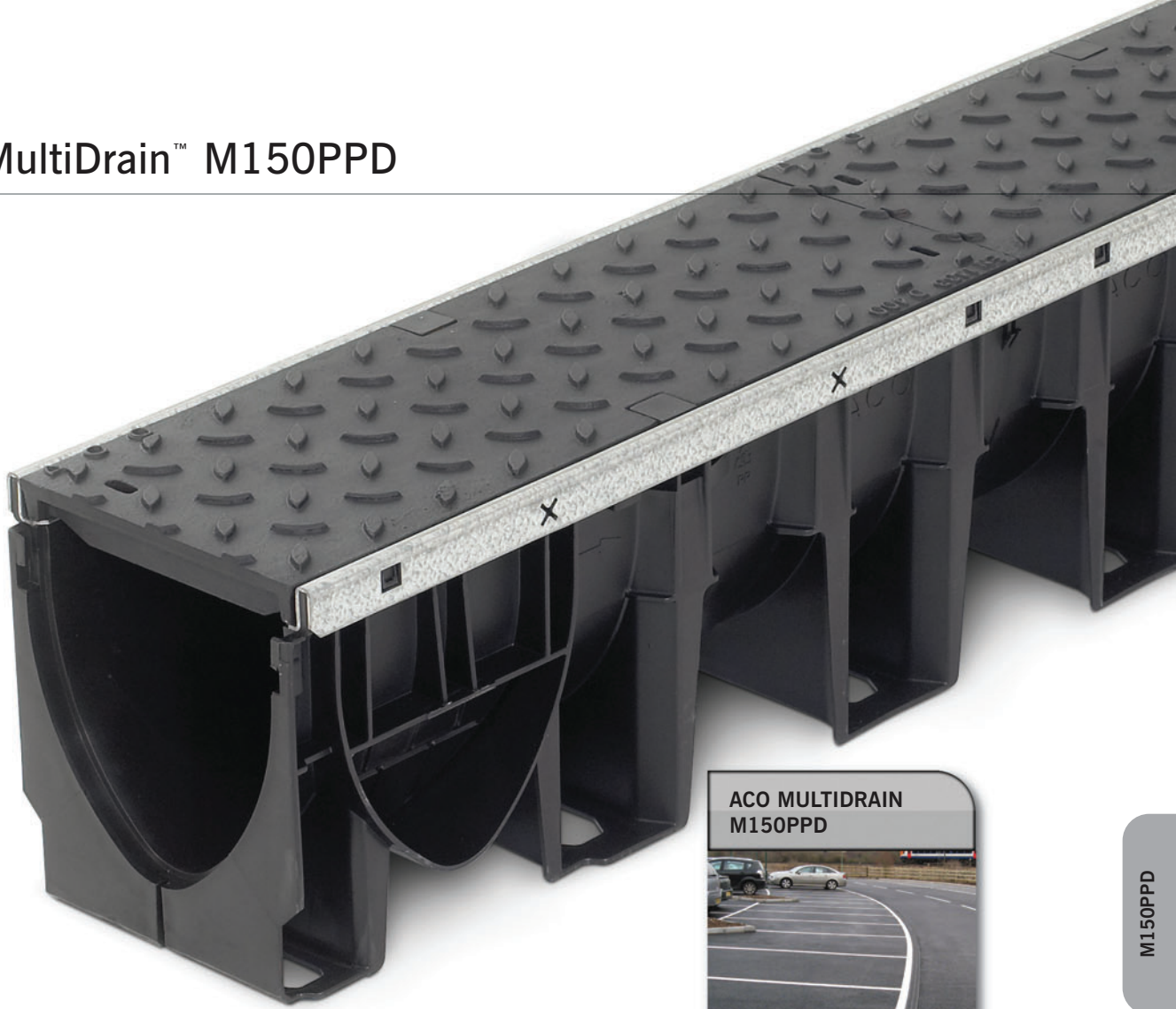
## ACO MultiDrain™ M100PPD 0100 shallow depth channel

Length to Outlet (m)	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )
10	2.2	0.22	161	2.7	0.27	194	3.1	0.31	224
20	2.1	0.11	152	2.9	0.15	210	3.6	0.18	259
30	2.0	0.07	144	3.0	0.10	216	3.8	0.13	275
40	1.9	0.05	138	3.0	0.08	218	3.9	0.10	280
50	1.8	0.04	129	3.0	0.06	219	4.0	0.08	285
60	1.7	0.03	121	3.1	0.05	220	4.0	0.07	289

## ACO MultiDrain™ M100PPD No 0.0J constant depth channel

Length to Outlet (m)	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )
10	4.7	0.47	338	5.2	0.52	375	6.2	0.62	446
20	4.2	0.21	302	5.6	0.28	403	7.0	0.35	504
30	3.9	0.13	281	5.9	0.20	423	7.5	0.25	539
40	3.7	0.09	264	6.0	0.15	432	7.7	0.19	556
50	3.5	0.07	252	6.1	0.12	437	7.9	0.16	569
60	3.3	0.06	238	6.1	0.10	441	8.1	0.13	582
70	3.1	0.04	224	6.2	0.09	443	8.2	0.12	590
80	2.9	0.04	212	6.2	0.08	445	8.3	0.10	595
90	2.8	0.03	204	6.2	0.07	447	8.3	0.09	598
100	2.8	0.03	200	6.2	0.06	448	8.3	0.08	599

# ACO MultiDrain™ M150PPD



M150PPD

The ACO MultiDrain™ M150PPD channel is available in one constant depth and has integral galvanised steel protective edge rails to give the channel optimum protection from vehicular traffic.

The channel is manufactured from recycled polypropylene, a robust lightweight material.

For the ACO MultiDrain™ M150PPD range of gratings to suit these channels please refer to pages 20 and 21.

150mm



Channel width  
**150mm**

**671m<sup>2</sup>\***

Catchment area



Shallow constant depth channels



Constant depth channels



Load Class  
**D 400**



Grating choice  
**WIDE**



Brickslot top available

\*Example run based on 50m length to outlet

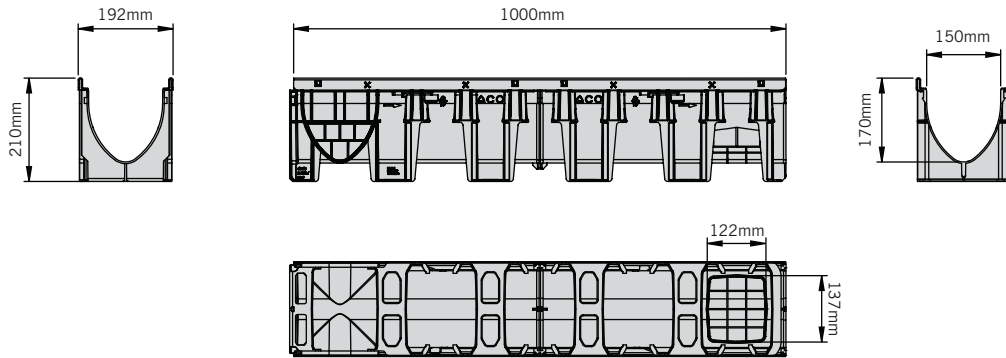


To compare the different features of the ACO MultiDrain™ PPD range, use the product selector on page 10.

# ACO MultiDrain™ M150PPD

## Constant depth channel with galvanised steel edge rails

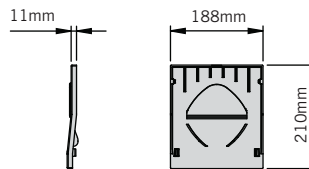
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11151	M150PPD No.0.0J*	1000	192	210	170	4.02



M150PPD 1m constant depth channel

## Universal closing end cap

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11093	M150PPD universal closing end cap	11	188	210	-	0.14



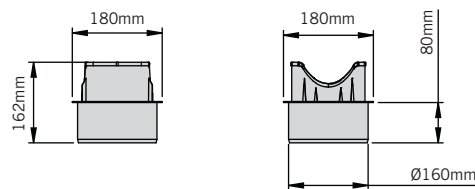
M150PPD universal closing end cap

18



## Outlet connector

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11288	Ø160mm vertical outlet connector	-	Ø160	80	-	0.30



M150PPD Ø160mm vertical outlet connector (max flow 18 l/s)

J Indicates side knockout for 90° channel connection. Knockout on both sides of the channel.

\* Indicates channels supplied with vertical outlet knockout for use with Ø160mm outlet connectors. Outlet connectors supplied separately, see table above for details.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*

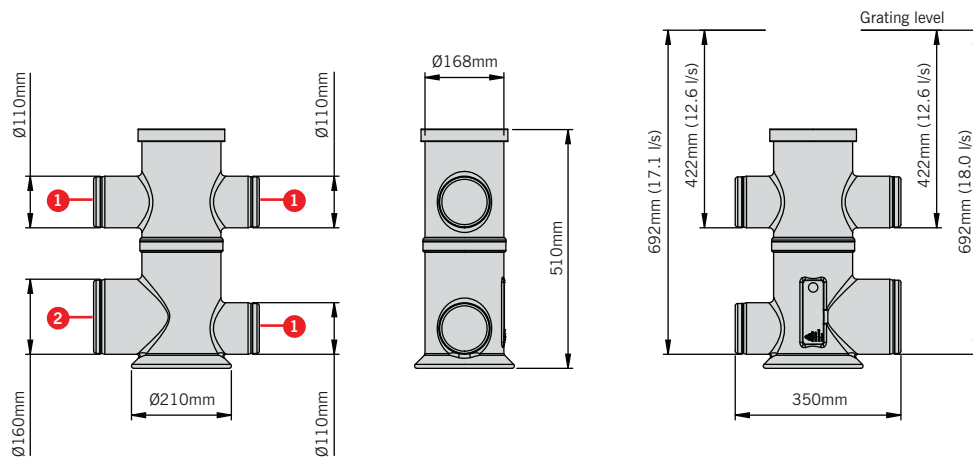
# ACO MultiDrain™ M150PPD

## M150PPD sump unit

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11386	Black plastic sump unit with galvanised steel silt bucket and Ø160mm outlet connector	350	Ø210	510	-	3.70

Standard sump outlets

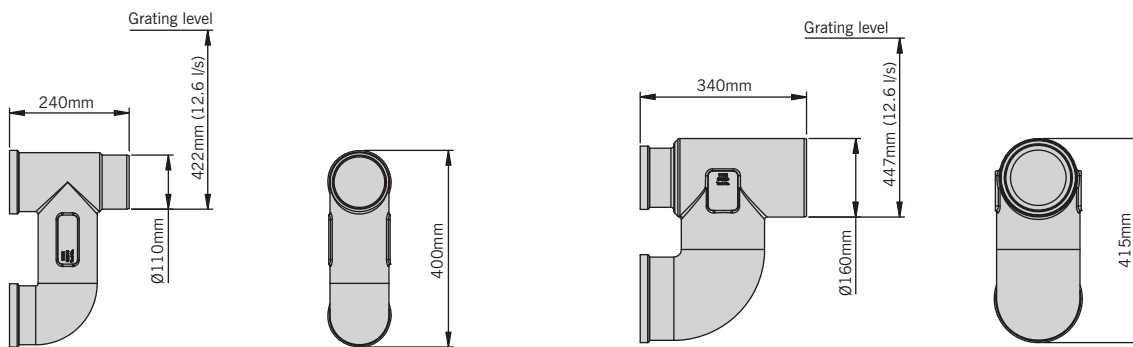
- 1 = Ø110mm outlet
- 2 = Ø160mm outlet



Note: For guidance on the installation of the sump unit please refer to the ACO MultiDrain™ PPD installation manual or visit [www.aco.co.uk](http://www.aco.co.uk).

## Foul air traps

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11191	Ø110mm foul air trap	240	Ø110	400	422	1.20
11192	Ø160mm foul air trap	340	Ø160	415	447	1.40



Rod-dable foul air trap LLDPE Ø110mm

Rod-dable foul air trap LLDPE Ø160mm

Note: For ACO Universal Gully details please refer to page 28.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*

# ACO MultiDrain™ M150PPD

## How to select the correct grating

The load class application of the channel system once installed is determined by the load class of the gratings fitted e.g. Load Class C 250 gratings fitted to a ACO MultiDrain™ PPD channel equals C 250 channel system.

All of the suitable gratings are shown here and are listed in load class order. Primary consideration should be given to the application load requirement when selecting a grating. Refer to the chart on page 7 for load class definitions and typical applications.

## ACO Drainlock™

Fitted as standard to all ACO MultiDrain™ PPD gratings, this fastening system simply clips into the channel for rapid installation.

A selection of the ACO Drainlock™ gratings is fitted with an anti shunt feature that restricts unwanted grating movement when installed. Please see grating tables for this option.

## Security locking option

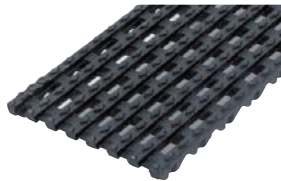
In areas where unwanted grating removal needs to be restricted, such as schools and prisons, the ACO Drainlock™ security locking system can be used. Gratings suitable for use with this system are indicated by **Ⓔ**.

This system is fitted to the gratings by two M6 security bolts and clamps the grating in place preventing removal. A key for removal is supplied separately. Instructions for fitting this system are included in the ACO MultiDrain™ PPD installation manual.



## Traditional gratings for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area mm <sup>2</sup> /m	Anti shunt feature	Weight (kg)
13073	Intercept ductile iron 13073DL	500	173	21	12 x 30	59500	Yes	5.30
13018	Mesh galvanised steel 13018DL	1000	173	30	23 x 17	115100	Yes	7.40
13019	Mesh galvanised steel 13019DL	500	173	30	23 x 17	115100	Yes	3.70



13073DL  
Intercept ductile iron



13018DL / 13019DL  
Mesh galvanised steel



## Traditional gratings for Load Class C 250 / D 400\* applications

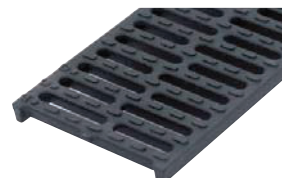
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area mm <sup>2</sup> /m	Anti shunt feature	Weight (kg)
23161	Heelguard™ ductile iron 23161DL <b>Ⓔ</b>	500	173	28	8	40000	Yes	6.80
23160	Solid cover ductile iron 23160DL	500	173	28	n/a	n/a	Yes	6.70
23164	Slotted ductile iron 23164DL	500	173	28	12	57664	Yes	6.40



23161DL  
Heelguard™ ductile iron



23160DL  
Solid cover ductile iron



23164DL  
Slotted ductile iron

**Ⓔ** Indicates security locking available.

\*Not suitable for carriageways of public roads or motorways.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*

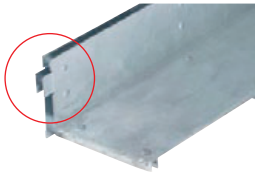


# ACO MultiDrain™ M150PPD

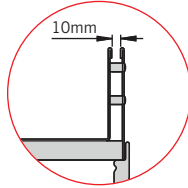


## Brickslot tops and access top for Load Class C 250 / D 400\* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area (mm <sup>2</sup> /m)	Weight (kg)
23175	Brickslot top galvanised steel 23175	1000	185	105	10	10000	8.20
23176	Brickslot top galvanised steel 23176	500	185	105	10	10000	4.20
23177	Brickslot access top galvanised steel	500	185	105	10	10000	7.50



23175 / 23176  
Brickslot top galvanised steel



Slot detail



23177 Brickslot access top  
galvanised steel.

## Grating accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23165	Drainlock™ security locking system	n/a	n/a	n/a	n/a	n/a	0.10
23416	Drainlock™ security key	n/a	n/a	n/a	n/a	n/a	0.01
1367	Drainlock™ grating lifting tool 835	n/a	n/a	n/a	n/a	n/a	0.10



\*Not suitable for carriageways of public roads or motorways.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*

# ACO MultiDrain™ M150PPD hydraulic performance tables

## Notes for ACO MultiDrain™ M150PPD hydraulic tables

Maximum capacities for each constant depth channel, assuming uniform lateral inflow to the channel.

Q (l/s) is the maximum total flow that the channel can carry.

q (l/s/m) is the maximum possible lateral inflow.

A (m<sup>2</sup>) is the maximum area that can be drained and will depend on the design rainfall intensity chosen. The tabulated areas are for a rainfall intensity of 50 mm/h (0.014 l/s/m<sup>2</sup>).

At other rainfall intensities, the area can be determined by proportion, e.g. at 75mm/h, the maximum area drained will be the tabulated area x 50/75.

## ACO MultiDrain™ M150PPD No 0.0J constant depth channel

Length to Outlet (m)	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )
10	11.6	1.16	835	12.9	1.29	929	15.2	1.52	1094
20	10.9	0.55	787	14.0	0.70	1008	17.4	0.87	1253
30	10.3	0.34	743	14.8	0.49	1066	18.8	0.63	1352
40	9.8	0.24	704	15.4	0.39	1110	19.6	0.49	1412
50	9.3	0.19	671	15.9	0.32	1141	20.3	0.41	1462
60	8.9	0.15	639	16.2	0.27	1165	20.8	0.35	1500
70	8.5	0.12	609	16.4	0.23	1183	21.3	0.30	1530
80	8.2	0.10	593	16.6	0.21	1196	21.6	0.27	1558
90	8.1	0.09	583	16.7	0.19	1205	21.9	0.24	1575
100	8.0	0.08	576	16.8	0.17	1210	22.0	0.22	1584

## ACO Water Management Design Services Team

Please contact the ACO Water Management Design Services Team on 01462 816666 for advice on channels with non-uniform inflow, or channels receiving point inflows at the end or at intermediate locations. The ACO Water Management Design Services Team will be pleased to assist with any technical queries, scheme designs or parts schedules.

## Designing a drainage system

An example design method is provided on page 29 to help determine your drainage requirements.

This example will enable you to use the hydraulic performance tables on this page.



# ACO MultiDrain™ M200PPD



**ACO MULTIDRAIN M200PPD**



 <p>200mm Channel width <b>200mm</b></p>	
<b>1440m<sup>2</sup>*</b>	Catchment area
	Shallow constant depth channels
	Constant depth channels
	Load Class <b>D 400</b>
	Grating choice <b>WIDE</b>
	Brickslot top not available

The ACO MultiDrain™ M200PPD channel is available in one constant depth and has integral galvanised steel protective edge rails to give the channel optimum protection from vehicular traffic.

The channel is manufactured from recycled polypropylene, a robust lightweight material.

For the ACO MultiDrain™ M200PPD gratings to suit these channels please refer to pages 26.

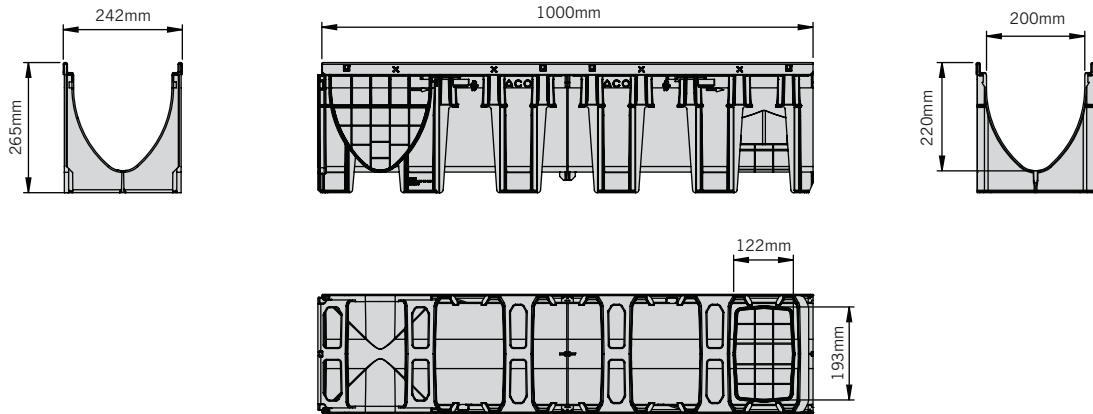
 To compare the different features of the ACO MultiDrain™ PPD range, use the product selector on page 10.

\*Example run based on 50m length to outlet

# ACO MultiDrain™ M200PPD

## Constant depth channel unit with galvanised steel edge rails

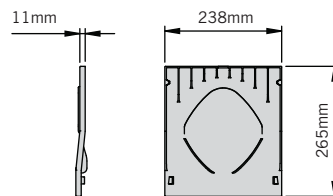
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11158	M200PPD No.0.0J*	1000	242	265	220	4.90



M200PPD 1m constant depth channel

## Universal closing end cap

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11098	M200PPD universal closing end cap	11	238	265	-	0.21



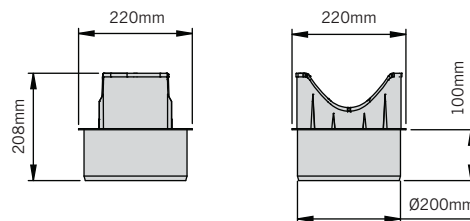
M200PPD universal closing end cap

24



## Outlet connector

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11289	Ø200mm vertical outlet connector	-	Ø200	100	-	0.40



M200PPD Ø200mm vertical outlet connector (max flow 26.7 l/s)

J Indicates side knockout for 90° channel connection. Knockout on both sides of the channel.

\* Indicates channels supplied with vertical outlet knockout for use with Ø200mm outlet connectors. Outlet connectors supplied separately, see table above for details.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*

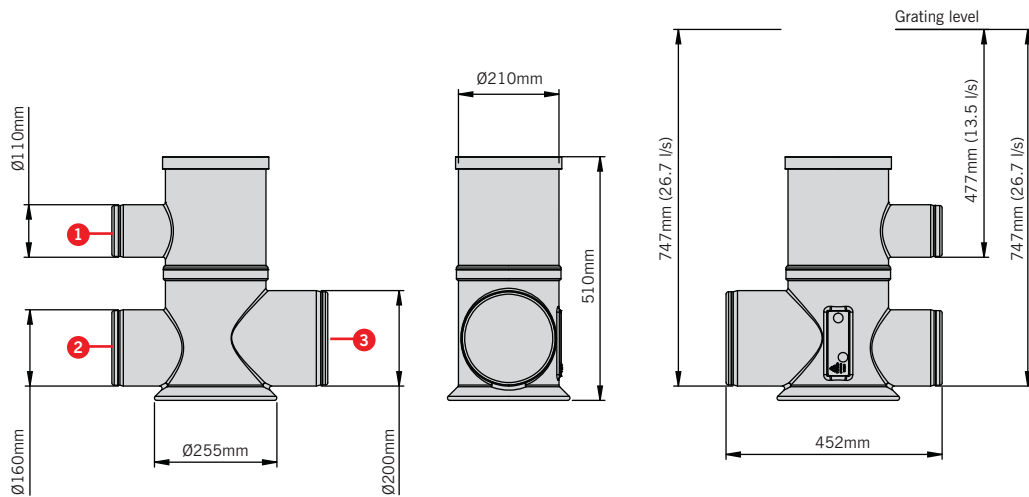
# ACO MultiDrain™ M200PPD

## M200PPD sump unit

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11387	Black plastic sump unit with galvanised steel silt bucket and Ø200mm outlet connector	452	Ø255	510	-	4.90

Standard sump outlets

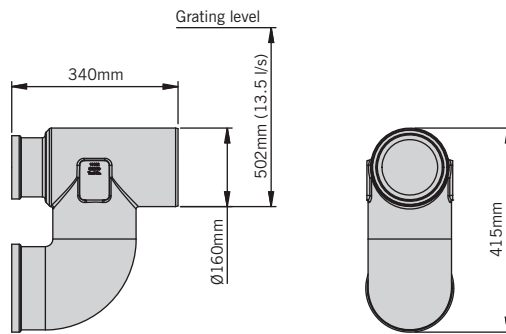
- 1 = Ø110mm outlet
- 2 = Ø160mm outlet
- 3 = Ø200mm outlet



Note: For guidance on the installation of the sump unit please refer to the ACO MultiDrain™ PPD installation manual or visit [www.aco.co.uk](http://www.aco.co.uk).

## Foul air trap

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
11192	Ø160mm roddable foul air trap	340	Ø160	415	502	1.40



Roddable foul air trap LLDPE Ø160mm

Note: For ACO Universal Gully details please refer to page 28.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*



# ACO MultiDrain™ M200PPD

## How to select the correct grating

The load class application of the channel system once installed is determined by the load class of the gratings fitted e.g. Load Class C 250 gratings fitted to a ACO MultiDrain™ PPD channel equals C 250 channel system.

All of the suitable gratings are shown here and are listed in load class order. Primary consideration should be given to the application load requirement when selecting a grating. Refer to the chart on page 7 for load class definitions and typical applications.

## ACO Drainlock™

Fitted as standard to all ACO MultiDrain™ PPD gratings, this fastening system simply clips into the channel for rapid installation.

A selection of the ACO Drainlock™ gratings is fitted with an anti shunt feature that restricts unwanted grating movement when installed. Please see grating tables for this option.

## Security locking option

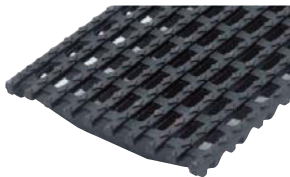
In areas where unwanted grating removal needs to be restricted, such as schools and prisons, the ACO Drainlock™ security locking system can be used. Gratings suitable for use with this system are indicated by **6**.

This system is fitted to the gratings by two M6 security bolts and clamps the grating in place preventing removal. A key for removal is supplied separately. Instructions for fitting this system are included in the ACO MultiDrain™ PPD installation manual.

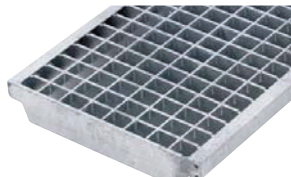


## Traditional gratings for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
13473	Intercept ductile iron 13473DL	500	223	35	30.5 x 4	90500	Yes	7.50
13418	Mesh galvanised steel 13418DL	1000	223	40	23 x 17	154100	Yes	12.00
13419	Mesh galvanised steel 13419DL	500	223	40	23 x 17	154100	Yes	6.00



13473DL  
Intercept ductile iron



13418DL / 13419DL  
Mesh galvanised steel



## Traditional gratings for Load Class C 250 / D 400\* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
23221	Heelguard™ ductile iron 23221DL <b>6</b>	500	223	32	8	47300	Yes	10.30
23220	Solid cover ductile iron 23220DL	500	223	32	n/a	n/a	Yes	11.00
23224	Slotted ductile iron 23224DL	500	223	32	12	36200	Yes	9.80



23221DL  
Heelguard™ ductile iron



23220DL  
Solid cover ductile iron



23224DL  
Slotted ductile iron

## Grating accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23225	Drainlock™ security locking system	n/a	n/a	n/a	n/a	n/a	0.10
23416	Drainlock™ security key	n/a	n/a	n/a	n/a	n/a	0.01
1367	Drainlock™ grating lifting tool 835	n/a	n/a	n/a	n/a	n/a	0.10

**6** Indicates security locking available.

\*Not suitable for carriageways of public roads or motorways.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*



# ACO MultiDrain™ M200PPD hydraulic performance tables

## Notes for ACO MultiDrain™ M200PPD Hydraulic tables

Maximum capacities for each constant depth channel, assuming uniform lateral inflow to the channel.

Q (l/s) is the maximum total flow that the channel can carry.

q (l/s/m) is the maximum possible lateral inflow.

A (m<sup>2</sup>) is the maximum area that can be drained and will depend on the design rainfall intensity chosen. The tabulated areas are for a rainfall intensity of 50 mm/h (0.014 l/s/m<sup>2</sup>).

At other rainfall intensities, the area can be determined by proportion, e.g. at 75mm/h, the maximum area drained will be the tabulated area x 50/75.

## ACO Water Management Design Services Team

Please contact the ACO Water Management Design Services Team on 01462 816666 for advice on channels with non-uniform inflow, or channels receiving point inflows at the end or at intermediate locations. The ACO Water Management Design Services Team will be pleased to assist with any technical queries, scheme designs or parts schedules.

## Designing a drainage system

An example design method is provided on page 29 to help determine your drainage requirements.

This example will enable you to use the hydraulic performance tables on this page.

## ACO MultiDrain™ M200PPD No 0.0J constant depth channel

Length to Outlet (m)	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )	Q (l/s)	q (l/s/m)	A (m <sup>2</sup> )
10	22.5	2.25	1620	24.2	2.42	1740	25.8	2.58	1860
20	22.0	1.10	1584	27.8	1.39	2000	32.6	1.63	2350
30	21.3	0.71	1530	29.6	0.99	2130	35.6	1.19	2560
40	20.8	0.52	1498	30.6	0.76	2200	37.5	0.94	2700
50	20.0	0.40	1440	31.5	0.63	2270	39.0	0.78	2810
60	19.5	0.33	1406	32.4	0.54	2335	39.9	0.66	2870
70	18.8	0.27	1350	33.1	0.47	2380	40.8	0.58	2940
80	17.9	0.22	1288	33.5	0.42	2410	42.5	0.53	3057
90	17.4	0.19	1250	33.9	0.38	2440	42.9	0.48	3090
100	17.2	0.17	1235	34.4	0.34	2480	43.8	0.44	3150
120	16.3	0.14	1175	35.3	0.29	2540	45.1	0.38	3249
140	15.5	0.11	1118	35.8	0.26	2574	46.1	0.33	3320
160	14.9	0.09	1075	36.3	0.23	2616	47.1	0.29	3390
180	14.4	0.08	1040	36.5	0.20	2625	47.6	0.26	3430
200	14.2	0.07	1022	36.6	0.18	2635	47.9	0.24	3450



# ACO Universal Gully

## ACO Universal Gully

The ACO Universal Gully provides fast and simple connection between any channel size up to 200mm width in the ACO channel drainage range. It also provides an outlet to connect to traditional underground drainage.

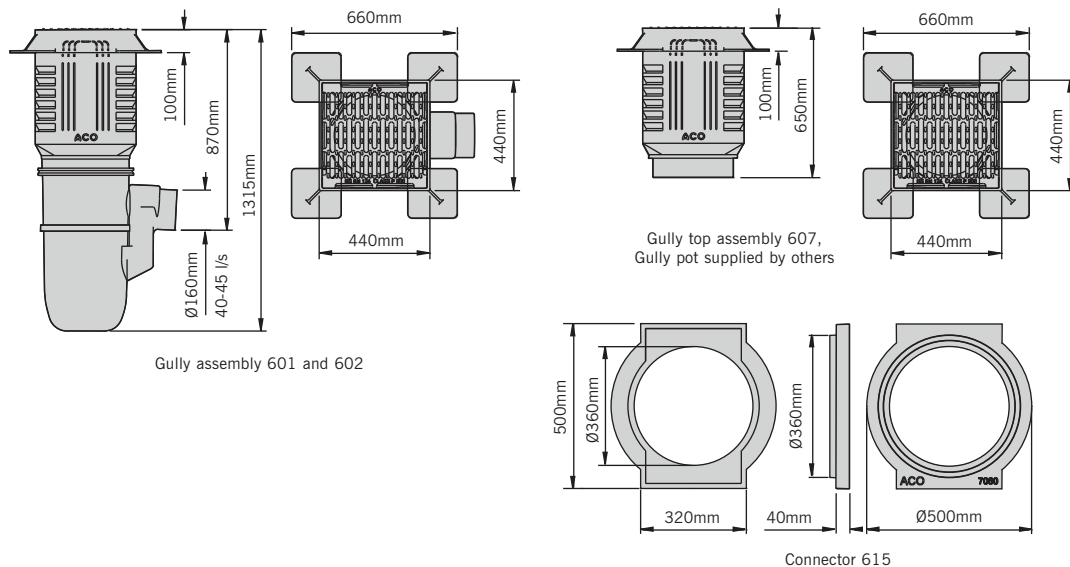
The ACO Universal Gully is a recycled plastic modular system with a ductile iron grating and frame.

Instructions for installing this gully are included in the ACO MultiDrain™ PPD installation manual.



## ACO Universal Gully and accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
33601	Gully assembly and bucket 601	440	440	1315	870	-	78.80
33602	Gully assembly no bucket 602	440	440	1315	870	-	77.40
33607	Gully top assembly 607	440	440	650	-	-	73.10
33605	Base unit 605	Ø375	Ø375	750	310	-	4.30
33603	Intermediate unit 603	440	440	515	-	-	5.10
33604	Grating and frame 604	440	440	100	-	-	69.50
7060	Connector 615	500	Ø500	40	-	-	7.00
33606	Bucket polyethylene	Ø275	Ø275	250	-	-	1.40



Note: Plain U-PVC 150mm – 160mm SuperSleeve adaptor supplied with 601, 602 and 605 assembly. Grating slot width 19mm.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*

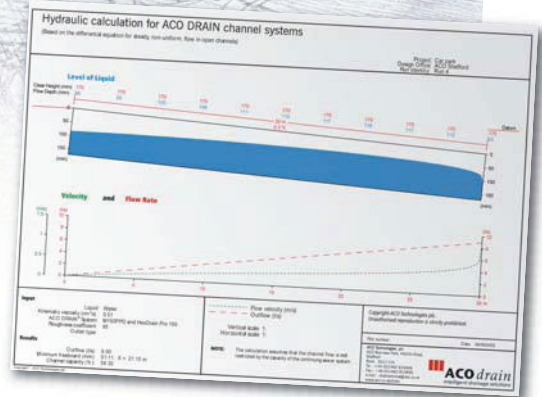
# Designing a drainage system

The hydraulic capacity of channels accepting lateral inflow all along their length can be calculated by the analysis of the differential equations for spatially varied flow, a procedure that requires a computer program such as the proprietary ACO Hydro software.

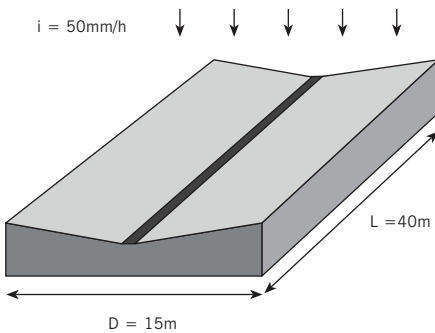
For detailed designs using Hydro, please contact the ACO Water Management Design Services Team. The team should also be consulted for advice where the inflow is not uniformly distributed along the channel.

The hydraulic performance tables within the relevant sections have been produced from the ACO Hydro software to facilitate a quick manual design method for the determination of the drainage requirements.

The columns of drainage catchment area ( $A \text{ m}^2$ ) are based on a rainfall intensity of  $50\text{mm/h}$ , but can be adapted for use at any rainfall intensity. The columns of maximum flow rate ( $Q \text{ l/s}$ ) and maximum lateral inflow ( $q \text{ l/s/m}$ ) can be used at any rainfall intensity.



## DESIGN EXAMPLE



For a design of ACO MultiDrain™ M100PPD, assume the following figures:

$D = 15\text{m}$  (depth of catchment area)

$L = 40\text{m}$  (length of channel run = length of catchment)

$i = 50\text{mm/h}$  (design rainfall intensity)

Ground slope = 0%

Note that any other rainfall intensity may be used. Typical intensities (from BS EN 752) are  $50\text{mm/h}$  for areas where some ponding could be tolerated for a few minutes after heavy rainfall, or  $75\text{mm/h}$  where ponding cannot normally be tolerated.

### 1. Determine the area

$$\text{Area} = L \times D = 40 \times 15 = 600\text{m}^2$$

For a quick analysis, see the tables and the columns for area on page 16.

$600\text{m}^2$  is too large for one  $40\text{m}$  run of ACO MultiDrain™ M100PPD.

However a  $20\text{m}$  run can drain  $302\text{m}^2$ , so one central outlet will work, with  $20\text{m}$  of channel each side, each draining  $300\text{m}^2$ .

Or for a more detailed analysis, determine the total flow rate, as follows:

### 2. Determine total flow (Q)

$$Q = (\text{area} \times i) / 3600 = (600 \times 50) / 3600 = 8.33 \text{ l/s}$$

### 3. Determine lateral inflow (q)

$$q = Q / L = 8.33 / 40 = 0.208 \text{ l/s/m}$$

### 4. Determine suitable channel sizes and lengths

For ACO MultiDrain™ M100PPD interpolation between the value at  $20\text{m}$  and  $30\text{m}$ , a maximum length of  $21\text{m}$  could carry  $0.208 \text{ l/s/m}$ . Alternatively use ACO MultiDrain™ M150PPD to an end outlet, where the tables show that  $40\text{m}$  can carry  $9.8 \text{ l/s}$  and drain  $704\text{m}^2$ .

### 5. Check Outlet capacity

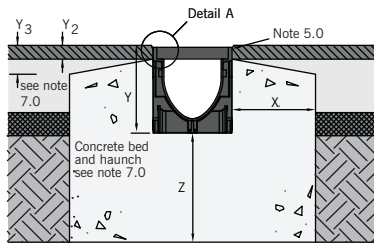
Ensure that the proposed outlet has sufficient hydraulic capacity by reference to the product technical pages.



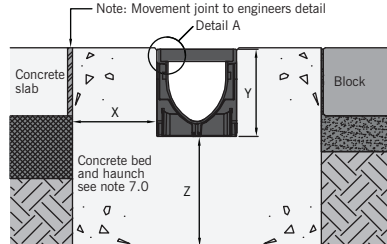
# Installation detail

## CHANNELS WITH TRADITIONAL GRATINGS

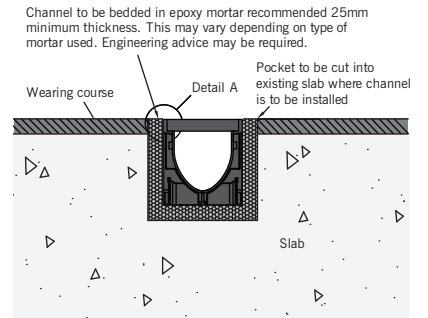
### Asphalt pavement



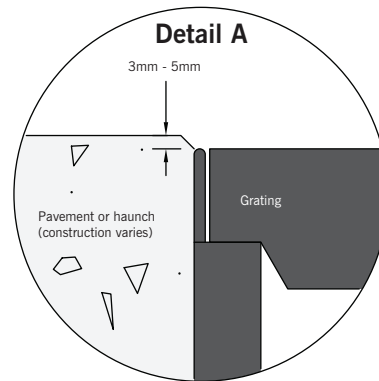
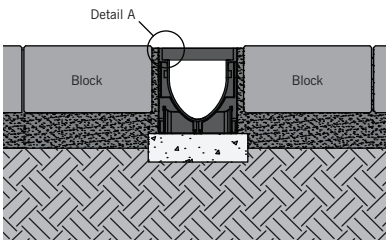
### Concrete pavement or block paving



### Installation within existing slab



### Load Class A 15



30



#### 1.0 Ground conditions:

The customer should ensure that the minimum dimensions shown are suitable for the existing ground conditions. Engineering advice may be required.

#### 2.0 Block pavements:

The channels must be supported laterally and therefore blocks must be restrained from movement by bedding securely. e.g. by using an Epoxy or Polymer Modified Mortar for bed and perpendicular joints (for example RONAFIX Mortar Mix C or similar). Engineering advice may be required.

#### 3.0 Surface cracks:

Alternate crack control and movement joints transversely within bed and haunch may reduce unsightly surface cracking. Engineering advice may be required.

#### 4.0 Joint sealant:

Where ACO channel joints and fittings are to be sealed (where used in foul water applications or where impermeability is required, for example) contact a sealant specialist for guidance on the most appropriate sealing compound to use.

#### 5.0 Surface protection:

In asphalt pavements avoid contact between compaction equipment and channel/grating. This may be achieved by ensuring that the finished surface level lies above the grating level (by at least 3mm). Stones should be removed from grating prior to laying/rolling wearing course.

#### 6.0 General installation notes:

See ACO drawing E1-E01-003 for further notes on installation. This information is available on request or is available for download from [www.aco.co.uk](http://www.aco.co.uk). Gratings must be fitted before concreting.

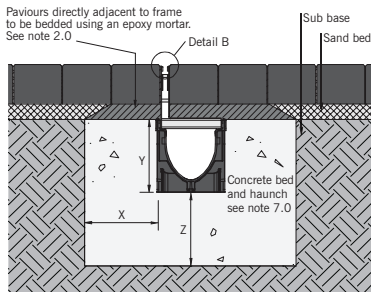
#### Best practice and workmanship

ACO can give guidance with respect to the most suitable methods of installation for each of the products in the ACO MultiDrain™ PPD range. ACO MultiDrain™ PPD range should be installed using acceptable levels of workmanship and according to the National Code of Practice (UK: BS8000: Part 14: 1989) in keeping with EN 1433:2002 (Drainage channels for vehicular and pedestrian areas).

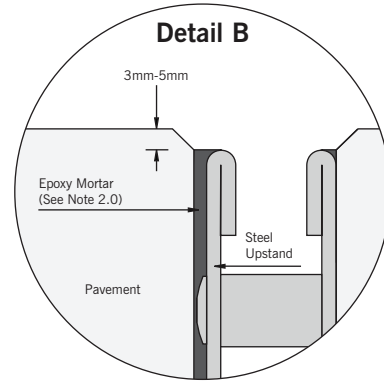
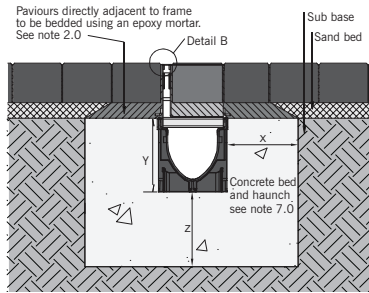
Detailed installation statements and methodologies will vary for all sites as each will have different aspects deserving particular consideration, consequently the relevant approvals should be sought from the consulting engineer and/or the installer.

## CHANNELS WITH BRICKSLOT GRATINGS

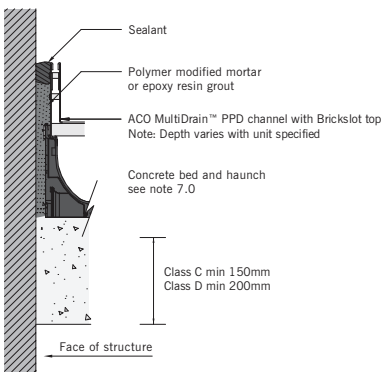
### Standard Brickslot top



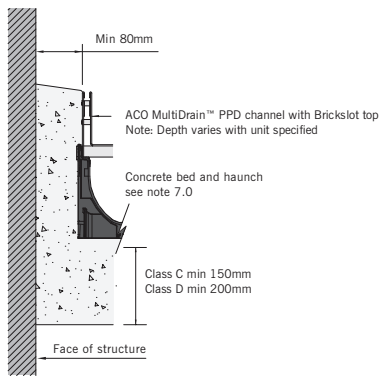
### Access / sump top



### Adjacent to a structure - option 1



### Adjacent to a structure - option 2



An electronic version of the ACO MultiDrain™ PPD installation detail is available to download from the ACO website. Visit [www.aco.co.uk](http://www.aco.co.uk).

## 7.0 Minimum dimensions of concrete surround:

For Load Class A 15, the channel is to be bedded on a suitable base according to the ground conditions. For Load Classes B 125 to D 400\*, a concrete bed and surround is required. Unless otherwise stated, all units in mm.

Dimension	Load Class			
	A 15	B 125	C 250	D 400*
x	-	Min 150	Min 150	Min 200
y	-	Full depth of channel (Less Y <sub>2</sub> if necessary)		
Y <sub>2</sub> (Asphalt pavement only)	-	Max 80	Max 25	Max 25
Y <sub>3</sub> (Asphalt pavement only)	-	Max 105	Max 60	Max 60
z	-	Min 150	Min 150	Min 200
Minimum concrete compressive strength		25 N/mm <sup>2</sup>	25 N/mm <sup>2</sup>	30 N/mm <sup>2</sup>

\*e.g. parking areas for all types of road vehicle. Not suitable for carriageway of roads or motorways.

## 8.0 Security locking:

All the gratings are held in the channel units by the ACO Drainlock™ fastening system. In addition, certain gratings can be locked into place with the use of an optional security locking system. Please see grating charts for this option.

See installation drawing E1-E01-040-3 for further notes on the installation of this system. This information is available on request or is available for download from [www.aco.co.uk](http://www.aco.co.uk).

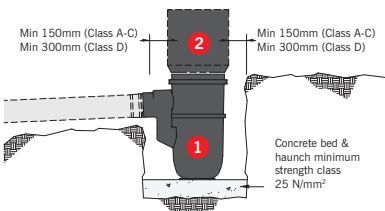


Guidance on the preparation, installation and maintenance of this system is given in the ACO MultiDrain™ PPD Installation manual. This document is available to download from [www.aco.co.uk](http://www.aco.co.uk) or contact [marketing@aco.co.uk](mailto:marketing@aco.co.uk) to request your printed copy.

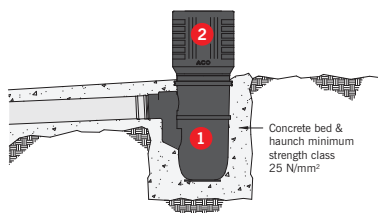
**ACO UNIVERSAL GULLY**

**Installation notes:**

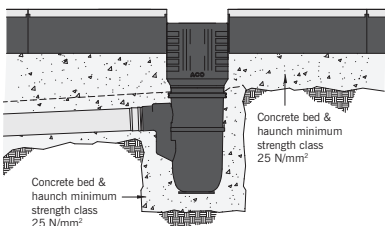
**A.** Excavate a 150mm bed and surround, blind where necessary. Form concrete\* bed for base unit **1** and set on a mortar (or similar) levelling bed. Make pipe connections (PVCu or SuperSleve) as appropriate.



**B.** Concrete\* surround base unit **1** and pipes if required. Position gully intermediate unit **2** to level.



**C.** Concrete\* bed for channels allowing levelling mortar bed if required. Extend concrete bed around **2** (see fig. 1). Install channels (see separate channel installation recommendations) with taped external joints at junction of unit **2** and end of channels.



**D.** Complete concrete\* surround to unit **2** allowing for frame levelling bed. Cut out knock outs on gully frame **3** and cut profile of the channel from inside of unit **2**. Install gully and haunch concrete\* to the sides of channels as recommended in separate channel installation recommendations.

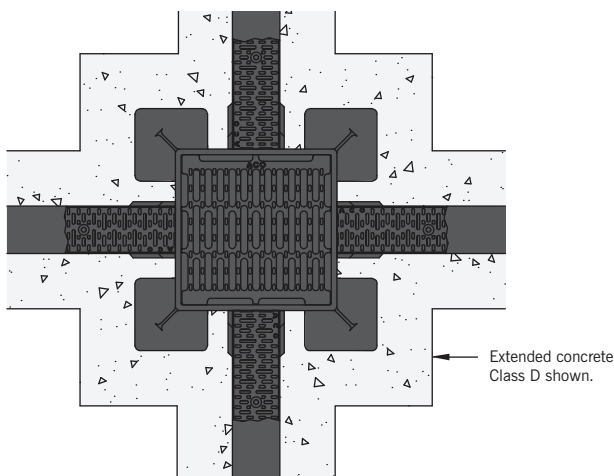
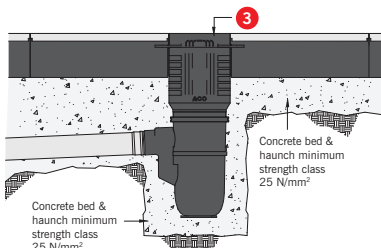


Fig 1:  
Shutter around gully top 200mm (Class D) or 150mm (Class A-C). Concrete\* the supporting surround for the gully frame.

**General notes:**

**1.0 Ground conditions:**

The customer should ensure that the minimum dimensions shown are suitable for the existing ground conditions. Engineering advice may be necessary.

**2.0 Block pavements:**

The channel must be supported laterally and therefore blocks must be restrained from movement by bedding securely, e.g. by using an Epoxy or Polymer Modified Mortar for bed and perpendicular joints (for example RONAFIX Mortar Mix C or similar from Ronacrete, tel 01279 638700). Engineering advice may be required.

**3.0 Surface cracks:**

Alternate crack control and movement joints transversally within bed and haunch may reduce unsightly surface cracking. Engineering advice may be required.

**4.0 Joint sealant:**

Where ACO channel joints and fittings are to be sealed (where used in foul water applications or where impermeability is required, for example) contact a sealant specialist for guidance on the most appropriate sealing compound to use.

**5.0 Surface protection:**

In asphalt pavements avoid contact between compaction equipment and channel/grating. This may be achieved by ensuring that the finished surface level lies above the grating level (by at least 3mm). Stones should be removed from grating prior to laying/rolling wearing course.

**6.0 General installation notes:**

See ACO drawing E1-E01-003 for further notes on installation. This information is available on request or is available for download from [www.aco.co.uk](http://www.aco.co.uk). Gratings must be fitted before concreting.

**Best practice and workmanship.**

ACO can give guidance with respect to the most suitable methods of installation for each of the products in the ACO MultiDrain™ PPD range. ACO MultiDrain™ PPD range should be installed using acceptable levels of workmanship and according to the National Code of Practice (UK: BS8000: Part 14: 1989) in keeping with EN 1433:2002 (Drainage channels for vehicular and pedestrian areas).

Detailed installation statements and methodologies will vary for all sites as each will have different aspects deserving particular consideration, consequently the relevant approvals should be sought from the consulting engineer and/or the installer.

\* Refer to note 7.0 on page 31



An electronic version of the ACO Universal Gully installation detail is available to download from the ACO website. Visit [www.aco.co.uk](http://www.aco.co.uk).

# Chemical resistance chart

ACO polypropylene has a high resistance to dilute acids and alkalis, and is unaffected by road salt, fuel and oil, and other commonly encountered chemicals. Further details of the chemical resistance can be obtained from the ACO Water Management Design Services Team or for particular chemicals, samples of the polypropylene channels can be supplied to customers for their own testing. The chemical resistance will also depend on the temperature of the effluent.

The resistance of the gratings and edge rails should also be considered.

This chemical resistance chart refers to chemical at ambient temperatures (20°C) and the results are for general guidance only.

## Important considerations for chemical environments

When reviewing potential applications for ACO MultiDrain™ PPD in chemical environments, the following issues should be considered;

- ▶ Type(s) & mixture of chemical(s).
- ▶ Concentration percentages.
- ▶ Contact time with drainage system.
- ▶ Temperatures of chemicals flowing into the drainage system (82°C max).
- ▶ Flushing system employed to clear chemicals from the drainage system.
- ▶ Cleaning agents should be checked for compatibility with channel materials.
- ▶ ACO samples can be used for final determination of chemical resistance.
- ▶ Grating, locking mechanism, edge rail, outlet and sump unit materials should be checked for chemical resistance.
- ▶ Check sealant for compatibility.

Chemical medium	% conc	Resistance: Polypropylene
Acetic acid, glacial	100	Fair
Acetic acid	80	Yes
Acetic anhydride	100	Fair
Acetone	100	Yes
Aluminium sulfate	100	Yes
Ammonium chloride	100	Yes
Ammonium nitrate	100	Yes
Ammonium phosphate	100	Yes
Ammonium sulfate	100	Yes
Aniline (aminobenzene)	100	Yes
Aniline hydrochloride	100	No
Aromatic hydrocarbons		No
Aqua regia		Yes
Barium chloride	100	Yes
Beer	100	Yes
Benzene	100	No
Benzyl alcohol	100	Yes
Benzyl chloride	100	Fair
Bleaching liquors		Yes
Borax	100	Fair
Butanol (butyl alcohol)	100	Yes
Butyl acetate	100	Fair
Butyric acid	100	Fair
Calcium carbonate	100	Yes
Calcium chloride	100 (48°C)	Yes
Calcium hydroxide	100 (48°C)	Yes
Calcium nitrate	100 (48°C)	Yes
Carbon disulfide		No
Carbon tetrachloride		No
Carbonic acid		Yes
Castor oil	100	Yes
Chlorine water	Saturated	No
Chlorobenzene	100	Poor
Chloroform (trichloro-methane)	100	Poor
Chromic acid	5	No
Citric acid	100	Yes
Copper chloride	100	Yes
Copper nitrate	100	Yes
Copper sulfate		Yes
Cyclohexane		No
Diesel fuel (DERV)	100	Yes
Dimethyl formamide	100	No
Ethanol (Ethyl Alcohol)	95	Yes
Ethanolamine	100	No
Ethyl acetate	100	Yes
Ethyl ether		No
Ethylene glycol	100	Yes
Fatty acids		Yes
Ferrous chloride	100	Yes
Ferrous sulfate	100	Yes
Ferric chloride	100	Yes
Ferric sulfate		Yes
Formaldehyde	40	Yes
Formic acid	100	Yes
Fruit juice		Yes
Fuel oil	100	Yes
Gasoline (petrol)	100	Fair
Glycerine	100	Yes
Hydrazine	50	Fair
Hydrobromic acid	20 / 100	Yes / Fair

Chemical medium	% conc	Resistance: Polypropylene
Hydrochloric acid	100	Yes
Hydrofluoric acid	20 / 100	Yes / Fair
Hydrogen peroxide	100	Yes
Lactic acid	100	Yes
Lead acetate	100	Yes
Magnesium chloride	100 (48°C)	Yes
Magnesium sulfate	100	Yes
Maleic acid	100	Yes
Methyl ethyl ketone (MEK)	100	Yes
Motor oil	100	Yes
Nickel chloride	100	Yes
Nickel sulfate	100	Yes
Nitric acid	50 / 100	Yes / No
Nitrobenzene	100	Yes
Oleic acid	100	Yes
Oxalic acid	100	Fair
Perchlorethylene	100	No
Perchloric acid	10	Yes
Phosphoric acid	40	Yes
Plating liquors		Yes
Potassium carbonate (Potash)	100	Yes
Potassium chloride	100	Yes
Potassium dichromate	100	Yes
Potassium hydroxide	10	Yes
Potassium nitrate	100	Yes
Potassium permanganate	10	No
Potassium sulfate	100	Yes
Pyridine	100 (48°C)	Yes
Sodium acetate	100	Yes
Sodium benzoate	100 (48°C)	Yes
Sodium carbonate	35	Yes
Sodium chlorate	100	Yes
Sodium chloride	100	Yes
Sodium hydroxide (caustic soda)	80	Yes
Sodium hypochlorite	100	Fair
Sodium nitrate	100	Yes
Sodium peroxide	100	Yes
Sodium silicate	100	Yes
Sodium sulfate	100	Yes
Sodium sulfide	100	Yes
Sodium sulfite	100 (48°C)	Yes
Sodium thiosulfate	100 (48°C)	Yes
Stearic acid	100 (48°C)	Yes
Sulfur dioxide	100	Yes
Sulfuric acid	75	Yes
Sulfuric acid	>75	No
Sulfuric acid at up to 48°C	10	Yes
Tetrachloroethylene	100	Yes
Tannic acid	100	Yes
Tanning liquors		Yes
Toluene	100	Fair
Trichloroacetic acid		Yes
Turpentine	100	No
Urea		Yes
Urine		Yes
Water	(at 100°C)	Yes
Xylene	100	Yes
Zinc sulfate	100	Yes



## Frequently Asked Questions

### Q1 WHAT LOAD CLASS DO I REQUIRE?

**Answer:**

The answer to this question is dependent on where the drainage system will be used. There are six load classes recognised in BS EN 1433:2002. For further information on load classes and applications relevant to this system, please refer to page 7.

Please note that all channels within the ACO MultiDrain™ PPD system are certified to BS EN 1433: 2002 Load Class D 400\*. The system has a wide range of gratings with varying load classes which, once installed with the channel, determines the system's load class. Careful consideration should be given to the application requirement when selecting a grating.

\* Not suitable for carriageways of public roads or motorways

### Q2 DO I NEED A SUMP UNIT/UNIVERSAL GULLY?

**Answer:**

This is dependent on the requirements for sediment collection or a foul air trap. If either of these are required then a sump or gully is necessary. If not you can use any of the other outlet options available. The ACO Universal Gully (33601) has a roddable foul air trap built into the side of the unit. Note that the hydraulic capacity of end outlets and bottom outlets will be much less than the capacity of a sump or gully.

### Q3 ARE ACO CHANNELS SUITABLE FOR USE WITH CHEMICALS?

**Answer:**

This is entirely dependent on the chemicals being used along with their temperature and concentration. For more information, please refer to the ACO MultiDrain™ PPD chemical resistance chart provided on page 33.

### Q4 WHICH PRODUCTS ARE SUITABLE FOR USE WITH LEVEL ACCESS THRESHOLDS?

**Answer:**

Most ACO channels are suitable for level thresholds and are Part M compliant. ACO recommend systems such as ACO MultiDrain™ PPD, ACO MultiDrain™ MD or ACO ParkDrain® are used for public thresholds where security of the gratings needs to be taken into account.

These systems are all available with "Heelguard™" gratings which limit the possibility of stiletto heels being caught.

### Q5 IS THERE A REGULATION REGARDING "HEELGUARD"?

**Answer:**

No. "Heelguard™" is name created by ACO for gratings where the slot width is around 8mm. ACO MultiDrain™ PPD has a choice of Heelguard gratings and also a selection of wider 10mm slot gratings. The standard for surface water drainage BS EN 1433:2002, states that the maximum slot width in most pedestrian situations is 10 - 18mm.

### Q6 HOW MANY OUTLETS ARE REQUIRED IN A RUN?

**Answer:**

This depends entirely on the length of channel and the catchment area expected. A design example is provided in the hydraulics guide on page 29. If a specific hydraulic calculation is required, please contact the ACO Water Management Design Services Team on 01462 816666.

### Q7 DO YOU MANUFACTURE PRE-CURVED CHANNELS?

**Answer:**

No. ACO do not provide pre-curved units. However our sister division, ACO Building Drainage manufacture a stainless steel pre-curved product called ACO Radius channel and the ACO Sport product range includes channels to the 36.5m radius of an athletics track. For information on these products please call 01462 816666 or refer to [www.aco.co.uk](http://www.aco.co.uk).

### Q8 ARE ACO CHANNELS SELF CLEANSING?

**Answer:**

Not entirely, but the V shaped channel bore improves speed of water flow and promotes a degree of self cleansing. If there is a significant ground slope, for instance in excess of 2%, self cleansing could be achieved. We recommend any channel system is cleaned at least once a year to ensure optimum performance.

### Q9 ARE PRE SLOPED CHANNELS AVAILABLE WITHIN THE ACO MULTIDRAIN™ PPD RANGE?

**Answer:**

No, but pre sloped channels are available within the ACO MultiDrain™ MD range.

### Q10 HOW DO I MAKE THE ACO MULTIDRAIN PPD SYSTEM WATER TIGHT?

**Answer:**

Instructions are provide in the ACO MultiDrain™ PPD Installation manual. This brochure is available to download from [www.aco.uk](http://www.aco.uk) or contact [marketing@aco.co.uk](mailto:marketing@aco.co.uk) to request your copy.

### Q11 ARE RECYCLED MATERIALS USED IN THE PRODUCTION OF ACO MULTIDRAIN PPD?

**Answer:**

Yes, ACO MultiDrain™ PPD channels are manufactured using recycled polypropylene. All other components within the range also contain recycled materials. For more information on the recycled content, see opposite.



## Model specification clause

The surface drainage system shall be ACO MultiDrain™ PPD system as supplied by ACO Technologies plc; all materials and components within the scope of this system shall be obtained from this manufacturer. The system shall be CE marked and fully compliant with BS EN 1433:2002, certified to Load Class (\*). A declaration of conformity shall be supplied to the Supervising Officer upon request.

All units shall be manufactured from recycled polypropylene with galvanised steel edge rails. The grating shall be BS EN 1433: 2002 marked and tested to Load Class (\*). The system shall be installed in accordance with the manufacturer's printed recommendations, and the work carried out as specified on the Supervising Officer's drawing no. (†) and in accordance with recognised good practice. Standards of workmanship shall generally be as specified in BS EN 752 and BS 8000:Part 14:1989.

\* insert information A 15, C 250 or D 400 as appropriate

† Please insert drawing number relevant to the project

## NBS Specifications

ACO MultiDrain™ PPD should be specified in section Q10:180. Assistance in completing this clause can be found in the ACO Technologies product entries on NBS Plus or a model specification can be downloaded from [www.aco.co.uk](http://www.aco.co.uk). For further assistance, contact the ACO Water Management Design Services Team.

## Recycled content

ACO Technologies aims to incorporate as much recycled material or waste material as is practicable in its manufactured products. Typically, cast iron materials contain 40% to 90% recycled iron, and steel products contain 25% to 33% recycled steel. The total recycled content of the ACO MultiDrain™ PPD system will vary as the proportion of different materials (in the channel, edge rails, gratings etc) varies. As an example the ACO MultiDrain™ PPD channel with Heelguard™ ductile iron gratings will contain at minimum approximately 35% by weight recycled material.

The ACO MultiDrain™ PPD products are themselves intended for a long life with low maintenance, to reduce the need to recycle, but when eventually they are no longer needed, much of their content can be readily recycled with a very low risk of pollution to the environment.



## Conformity

The ACO MultiDrain™ PPD system is CE marked and fully certified to BS EN 1433:2002.

Test certificates and a declaration of conformity are available on request. Please contact the ACO Water Management Design Services Team on 01462 816666 for further information.

**BS EN 1433:2002**



## ACO Technologies plc

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

### ACO Water Management: Civils + Infrastructure

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### The ACO Group: A strong family you can depend on.

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