



BOWES STREET, MOSS SIDE

DRAINAGE MANAGEMENT AND MAINTENANCE PLAN HAPPI SCHEME - PLANNING CONDITION 19

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Manchester,
M2 4JF*



Report Title: Bowes Street – HAPPI Scheme Management and Maintenance Plan

Client: Rowlinson Construction Ltd

Report Status: Version Rev VI

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Version	Date	Initials	Comments
-	13.01.2023	WC	First Issue

Limitations

All findings, recommendations and conclusions contained in this report are based on information provided to us during investigations. Shepherd Gilmour Infrastructure Ltd. has created the report based on the assumption that all the information is accurate and accepts no liability should additional information exist or become available.

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Shepherd Gilmour Infrastructure Ltd. makes no representation whatsoever concerning the legal significance of its findings or the legal matters referred to in the report. The information presented and conclusions drawn are based on statistical data and are for guidance purposes only. The study provides no guarantee against the flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates, and associated probabilities.

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SECTION I PLANNING APPLICATION INFORMATION

PLANNING APPLICATION

I.1. Application Number: I25776/FO/2019

Development Proposals

I.2. FULL APPLICATION - for the Erection of part 5, part 4 storey building to provide 40 No. apartment scheme with associated garden space, external drying area, refuse store, cycle store and car parking

CONDITION TO BE DISCHARGED

Planning Condition 19

1.3. 'No development hereby permitted shall be occupied until details of the implementation, maintenance and management of the sustainable drainage scheme have been submitted to and approved by the local planning authority. The scheme shall be implemented and thereafter managed and maintained in accordance with the approved details. Those details shall include: Verification report providing photographic evidence of construction as per design drawings; As built construction drawings if different from design construction drawings; Management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage scheme throughout its lifetime.'

DESIGNERS RESPONSE

I.4. The following report and supporting information satisfies the requirements of the above Planning Condition 19 and will permit the Local Planning Authority to discharge the condition.

- *Appendix A – As Built Drainage Drawings*
- *Appendix B – Photographs of Drainage Installation*
- *Appendix C – ACO Linear Channel Product Information*
- *Appendix D – SDS Attenuation Tank Detail & Product Guide*
- *Appendix E – AquaPump Mini Pump Chamber Product Information & Maintenance*

List of Appendix A

Appendix A1 - C1262-2001 C6 - HAPPI SCHEME DRAINAGE LAYOUT

Appendix A2 - C1262-1005.1-BLOCK A & HAPPI SCHEME TYPICAL DRAINAGE DETAILS

Appendix A3 - C1262-1005.2-BLOCK A & HAPPI SCHEME TYPICAL DRAINAGE DETAILS

List of Appendix C

Appendix C1 – ACO Multidrain MD Brochure

Appendix C2 - C1262-1006 ACO Multidrain M100D 20.0

Appendix C3 - C1262-1007 ACO Multidrain M200D 10.0

List of Appendix E

Appendix E1 - Klargester Pumping Stations Product Guide

Appendix E2 - Mini Pump Chamber Installation Instructions

SECTION 2 SURFACE WATER DRAINAGE STRATEGY

SITE WIDE SCHEME

- 2.1. The site drainage scheme has been designed to incorporate Sustainable Urban Drainage Systems (SuDS) wherever possible, in order to reduce the surface water runoff from the site and improve its quality.
- 2.2. The surface water and foul water generated from the site will be discharged into the United Utilities Combined Sewers located in the Avenues to the south of the site, due to a lack of other feasible options. These connections and flow rates have been approved in principle by United Utilities and will form part of the wider SI04 Agreement.
- 2.3. The system has been designed to ensure that there is no flooding onsite in the 1 in 100 year + 40% climate change rainfall event. Storm water in the 1 in 30-year event will be contained within the adoptable surface water sewers through the use of oversized pipes as per the request of United Utilities, with an attenuation tank in the car parking area designed to store the overflow in the 1 in 100 year + 40% climate change event.

Runoff from Apartment Blocks

- 2.4. The runoff from the roof areas and the immediate hardstanding externals will discharge into an underground pipe network around the perimeter of the buildings. The underground network will flow to the south-west of the site where all catchment will flow through a geocellular tank underneath the car parking area before discharging into the adopted surface water sewer.

Runoff from Car Parking Areas

- 2.5. All car parking areas and in curtilage parking bays will be constructed with porous asphalt, meaning that the runoff will pass through the pavement surface into the stone base underneath.

SECTION 3 RESPONSIBILITY OF DRAINAGE SYSTEMS

- 3.1. Drainage within the curtilage of the apartment blocks (including the car parking areas & public space) will be managed and maintained by one or more Maintenance Company. These have not yet been appointed but will be set up before first sale/occupation. This drainage includes filter drains, porous paving, attenuation tank, private pipe network, linear drainage channels and a pump station.

SECTION 4 MAINTENANCE REQUIREMENTS

GENERAL DRAINAGE MAINTENANCE

- 4.1. The end-users will be provided with as-built plans to ensure that the private development drainage within their responsibility undergoes a regular maintenance regime (either as required or every 2-5 years). This includes, jetting, vacuumation and a visual/CCTV surveys to check the structural condition of pipes and manholes.

SUDS MAINTENANCE

- 4.2. The required maintenance of the specific SuDS structures has been split into:
- Regular (weeding/inspections/sweeping/litter removal/grass cutting)
 - Occasional (sediment removal/vacuum brushing)
 - Remedial maintenance (repair and replacement)
- 4.3. All SuDS will be undertaken by a management company in accordance with the Operation and Maintenance (O&M) manuals which will be produced after construction of the drainage scheme.
- 4.4. These manuals will be in accordance with Ciria C753 and outline the location of any drainage infrastructure, detail what maintenance is required, the cost of this, and how often each activity should be carried out. Records should also be kept of any maintenance undertaken. The Maintenance companies will be assigned once the scheme has been completed. The O&M manuals and proformas will be available for inspection onsite.

Regular Maintenance (monthly)

- *Removal of litter, leaves, weeds and debris from the filter drain surface monthly or as required.*
- *Grass cutting around the trench where appropriate, so it does not exceed 150mm.*
- *Inspect and clear inlets, outlets and inspection points.*

Occasional Maintenance (as required)

- *Clear perforated pipework of blockages.*
- *Remove or control tree roots if they are encroaching on the drain.*

Remedial Maintenance

- *Remove and replace filter drain stone.*
- *Replace clogged geotextile and reinstate.*
- *Replacement of the drain as required or at the end of its design life as specified by the manufacturer.*

Porous Asphalt Paving

4.5. Porous paving will be utilised within car parking areas. This requires good maintenance as otherwise the top 25-75mm can clog up with silt and sediment.

Regular Maintenance (monthly)

- *Routine (non-aggressive) surface brushing to reduce silt accumulation monthly or as required.*
- *Visual inspections during and after heavy rainfall events to monitor if the paving is operating effectively- i.e. check if there is any surface water ponding.*

Occasional

- *Suction sweeping of the surface to remove silt and debris trapped to be undertaken yearly (recommended that this take place after leaf fall).*

Remedial Work (as required)

- *Replacement of surface layer if damage such as cracking or rutting occurs.*
- *Replacement at the end of design life as specified by the manufacturer.*

Geocellular Attenuation Tank

- 4.6. An underground attenuation tank is included within the scheme under the access road beside the parking bays. This tank will be formed using geo-cellular crates with a high void ratio, which will be designed to take the anticipated loadings. These tanks will store the overflow in the 1 in 100 year + 40% climate change storm event to prevent flooding downstream in the network.
- 4.7. Regular maintenance is required for these tanks, this is likely to be specific to the type of system used and based on the manufactures' specification and guidance, but some general guidelines are included below.

Regular maintenance

- 4.8. Check inlets and outlets monthly or annually as required or specified by the manufacturer to ensure they are in a good condition and operating effectively.

Occasional maintenance

- 4.9. Jetting and suction within the tank where silt has settled as required specified by the manufacturer.

Remedial Work

- 4.10. Replacement or reinstatement of tank as required or at the end of its design life as specified by the manufacturer.

Package Pump Station

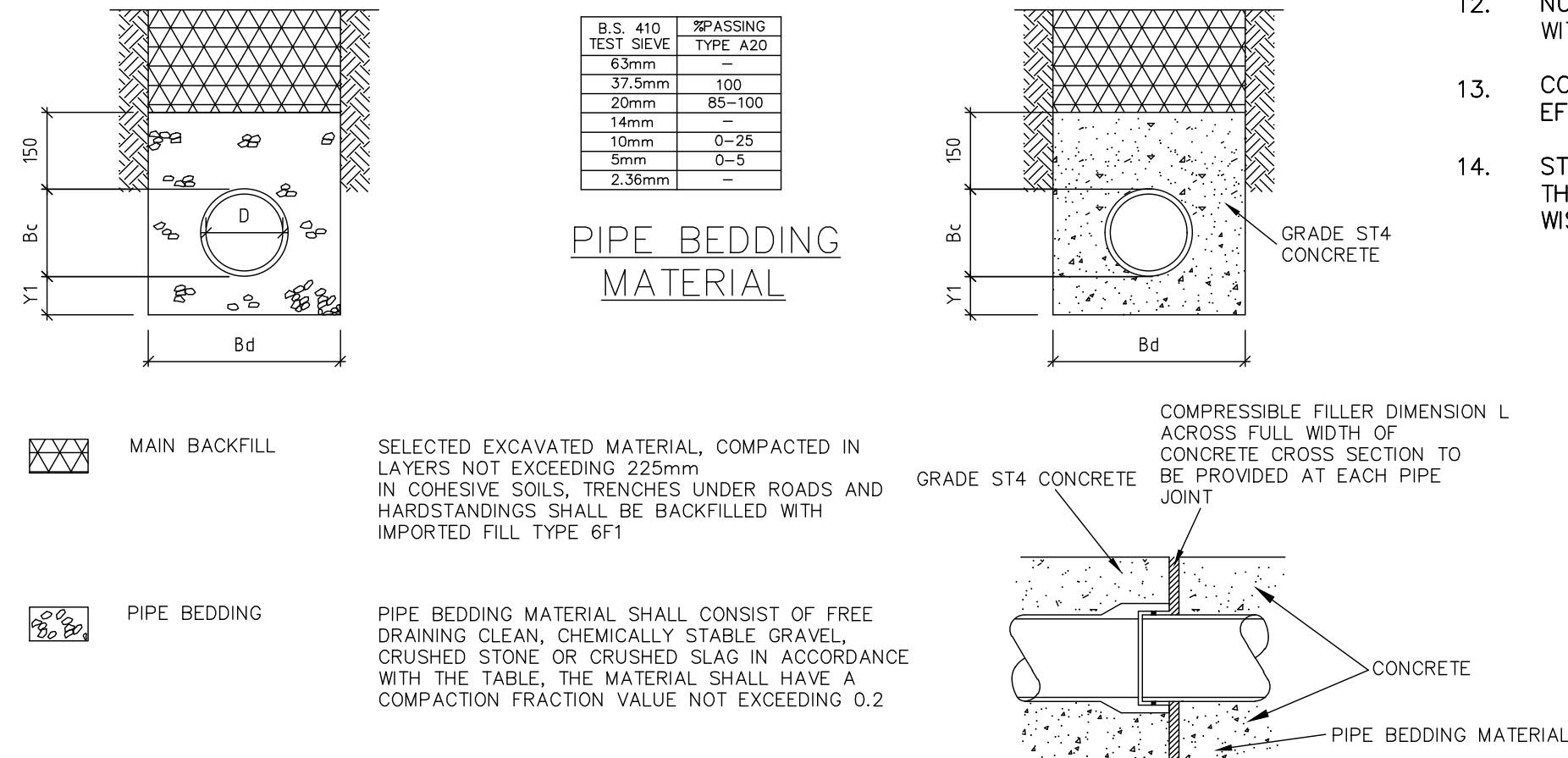
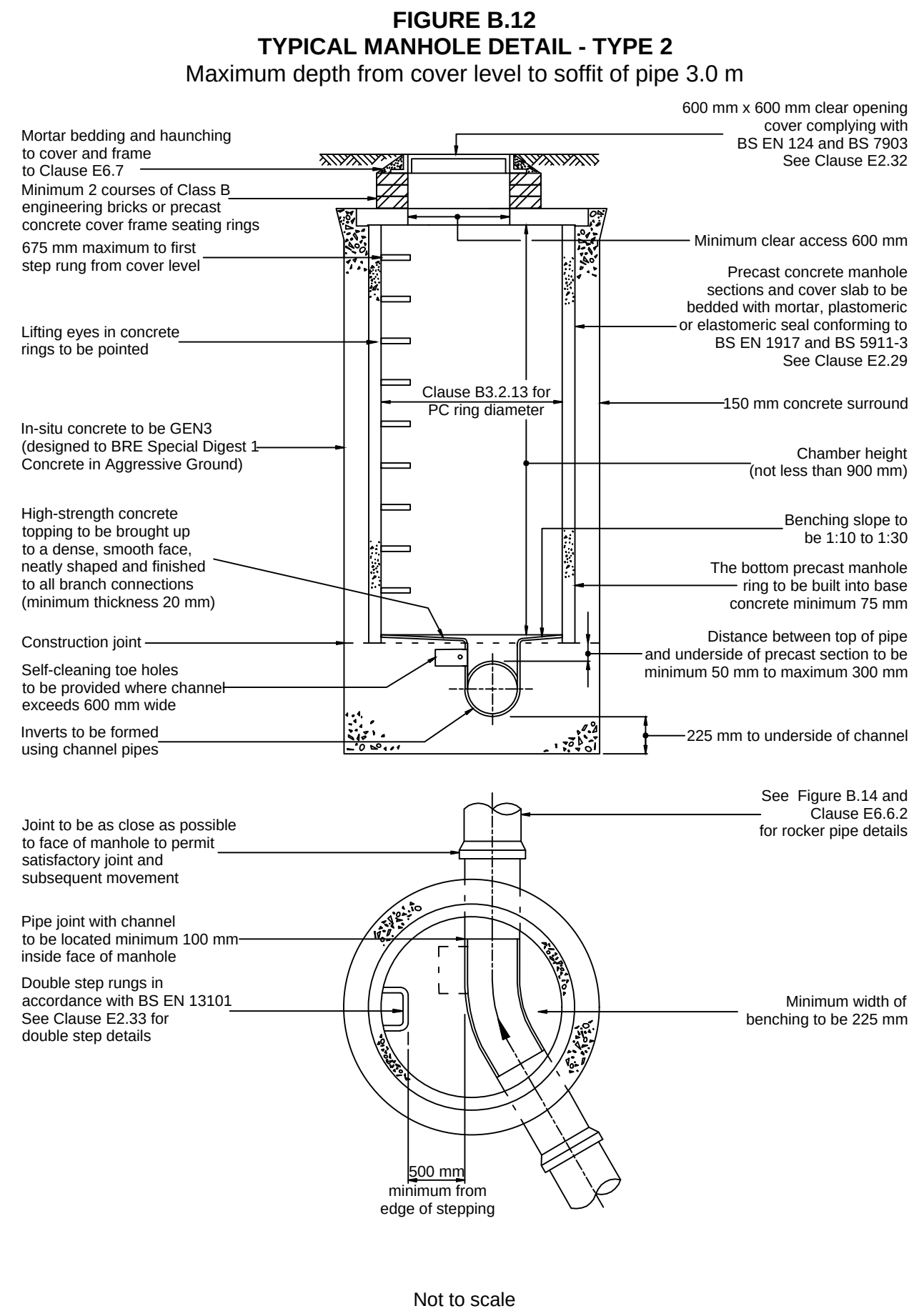
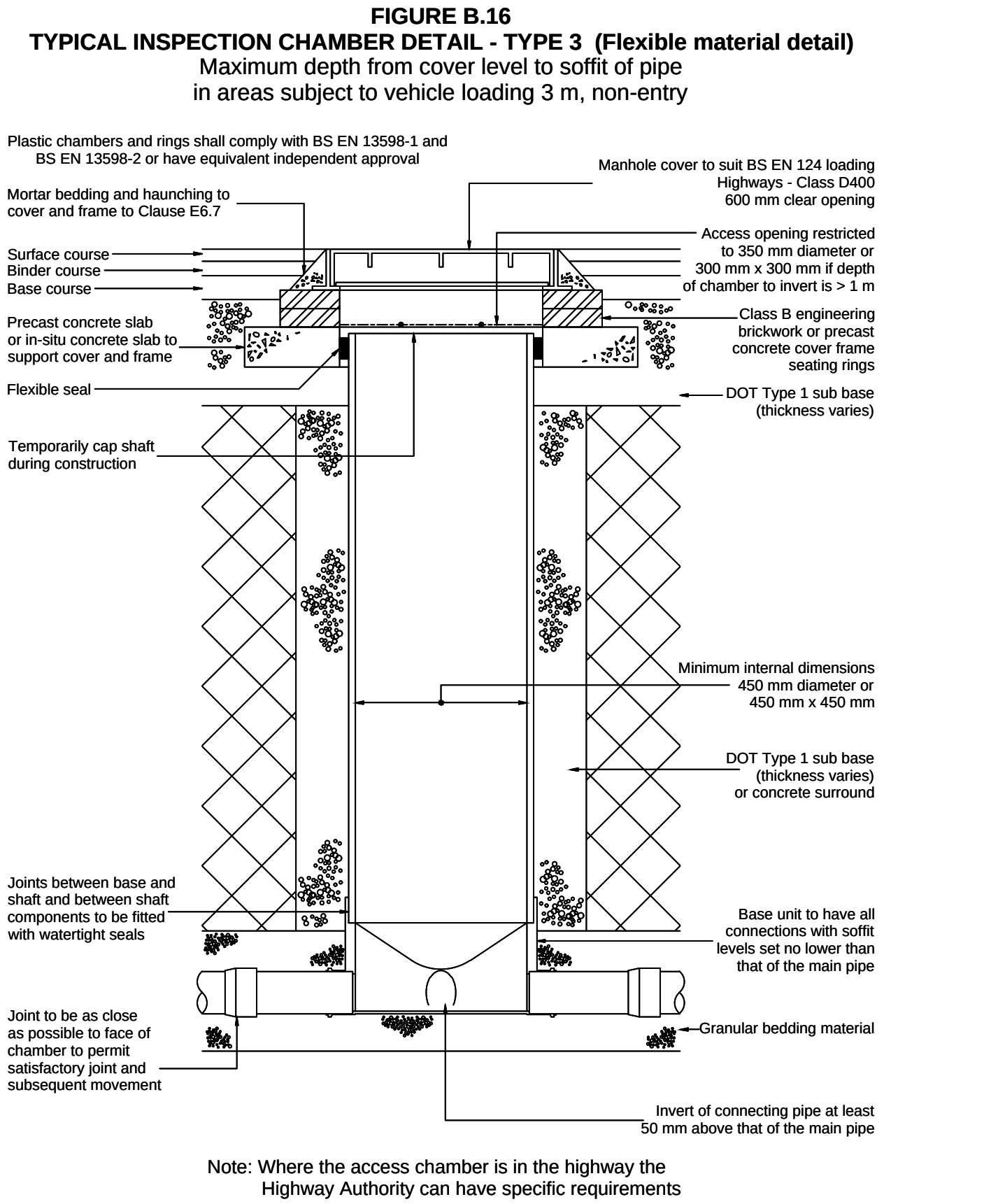
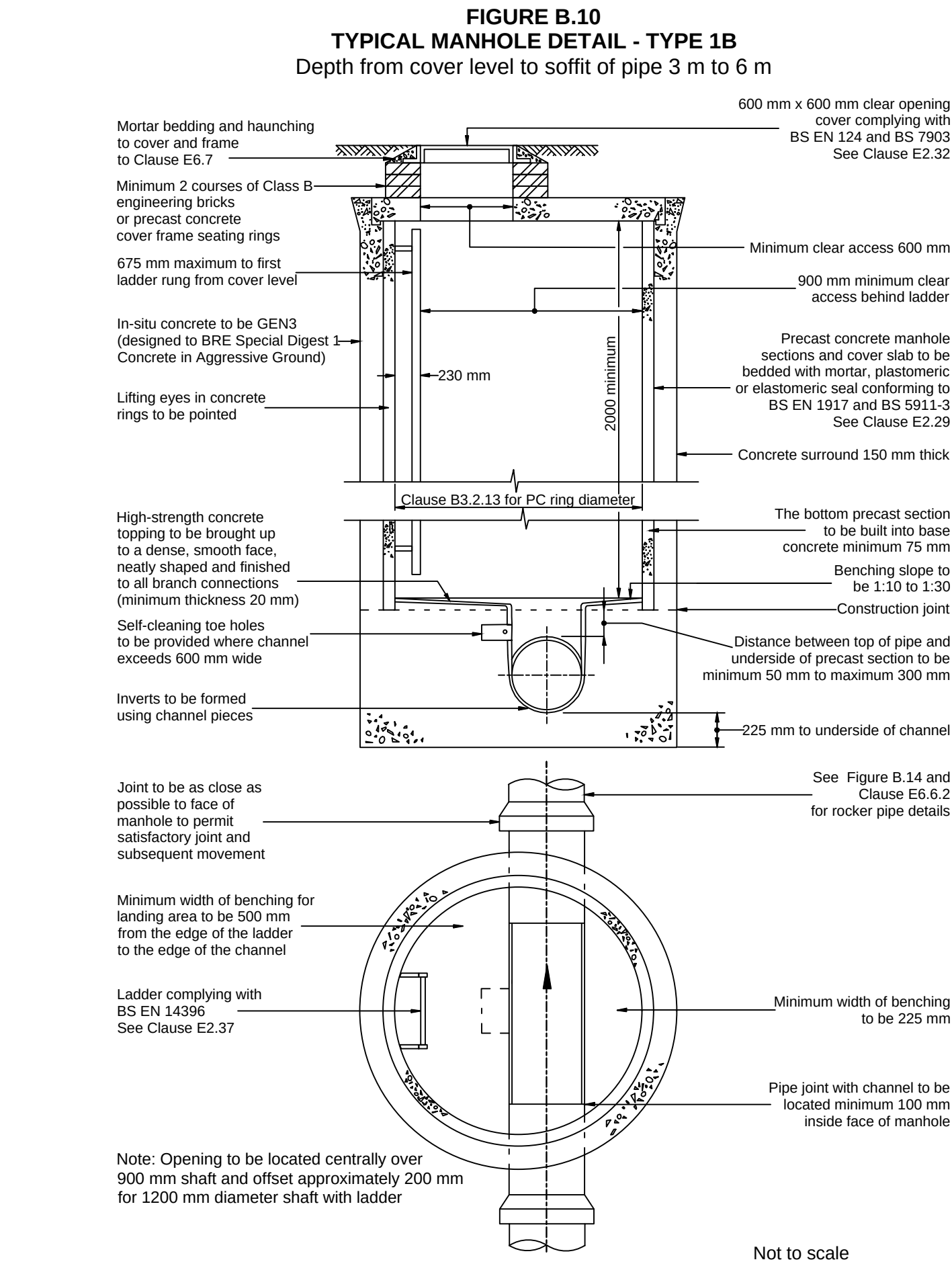
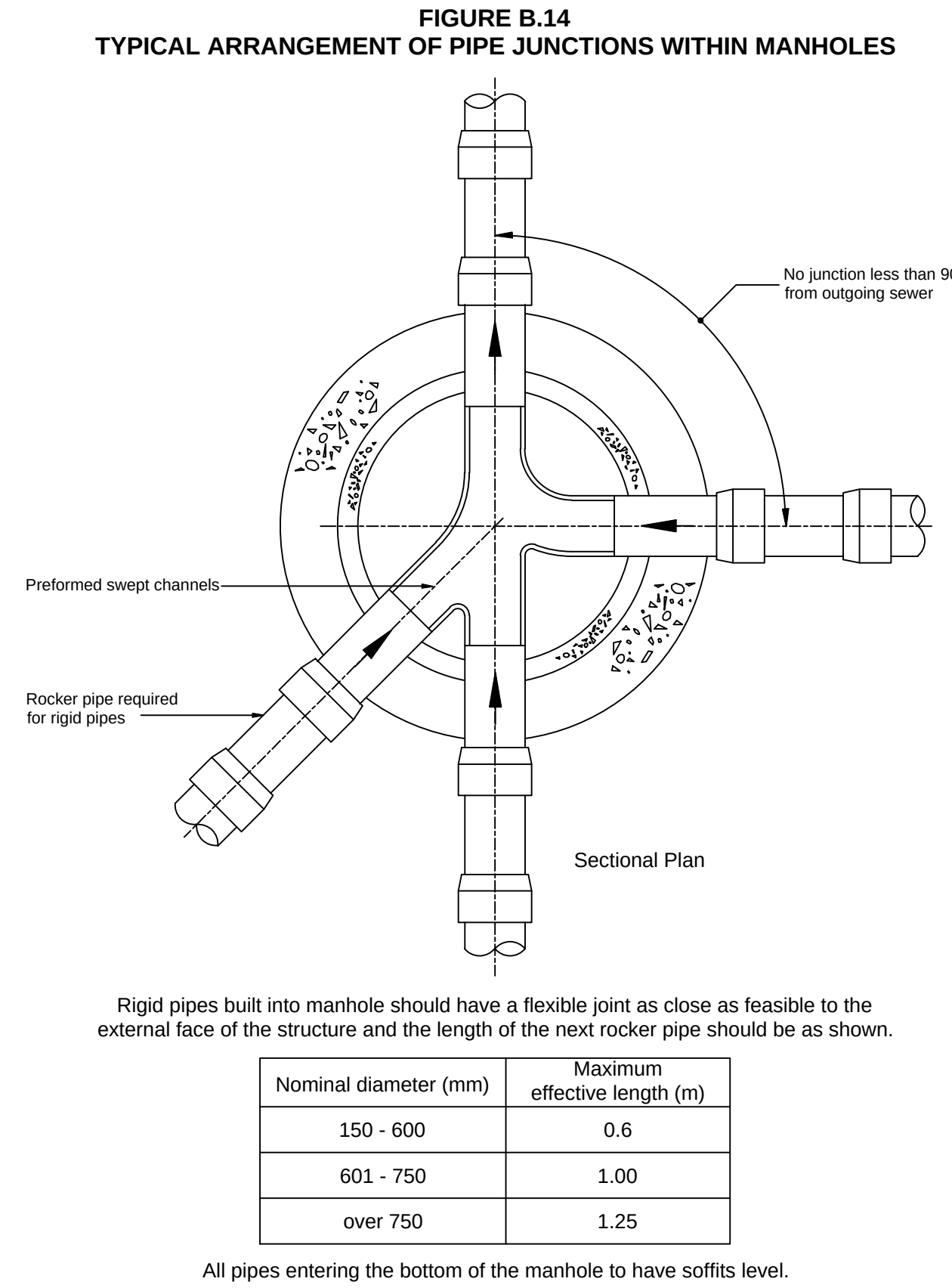
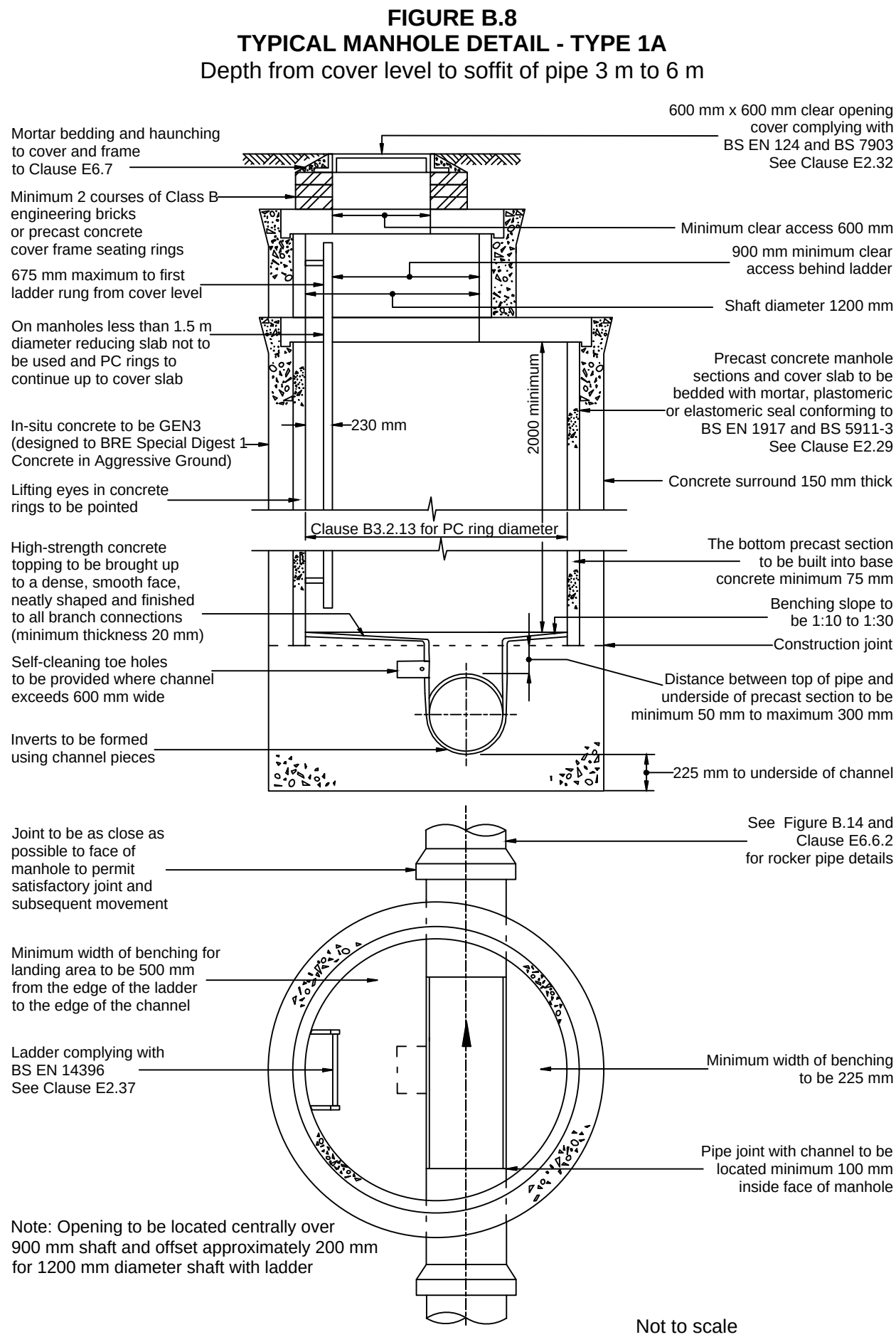
- 4.11. A package pump station is incorporated into the scheme in order to drain any excess from the lift pit. Flows going in the system will be very small so the *AquaPump - Mini Pump Chamber* has been used due to its quick installation time and simple maintenance
- 4.12. Pumping stations require little maintenance other than that required by the pump (See Appendix E2 for manufacturer's maintenance instructions).
- 4.13. In some situations, deposits of grease may accumulate, which can upset the operation of the level controller and cause blockages. Where this occurs, occasional cleaning may be necessary. Whenever maintenance or cleaning takes place, the pump should be lifted from the unit, cleaned, and serviced in accordance with manufacturer's instructions (Appendix E2).



Shepherd Gilmour
Consulting Engineers

APPENDIX A



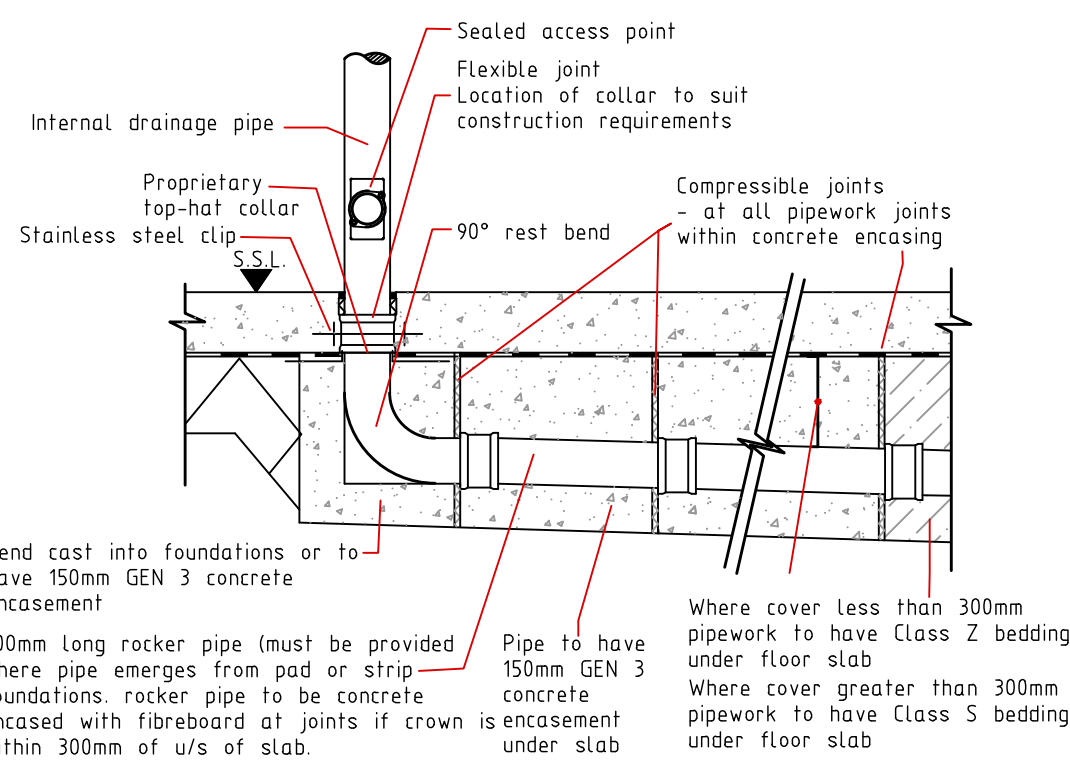


NOMINAL INT. PIPE DIA.	DIMENSION Y1, EVEN TRENCH BOTTOM (MM)	DIMENSION Y2, ROCK OR UNEVEN TRENCH BOTTOM (MM)	GRAVEL BEDDING SURROUND TYPE SINGLE SIZED	MAX. PERMITTED TRENCH WIDTH	DIMENSION L, THICKNESS OF COMPRESSIBLE FILLER
150	100	200	A 10	750	18
225	100	200	A 10	875	18
300	100	200	A 14	975	18
375	100	200	A 14	1050	18
450	150	200	A 14	1150	36
525	150	250	A 14	1200	36
600	150	250	A 20	1350	36
675	150	250	A 20	1450	36
750	225	300	A 20	1500	36
825	225	300	A 20	1600	36
900	225	300	A 20	1600	36
975	225	300	A 20	2000	36
1050	225	300	A 20	2100	36
1125	225	300	A 20	2200	36
1200	250	350	A 20	2300	36
1350	375	450	A 20	2500	54
1500	375	450	A 20	2700	54
1650	375	450	A 20	2800	54
1800	375	500	A 40	3100	54
1950	400	500	A 40	3200	54
2100	425	650	A 40	3400	54
2400	450	675	A 40	3700	54

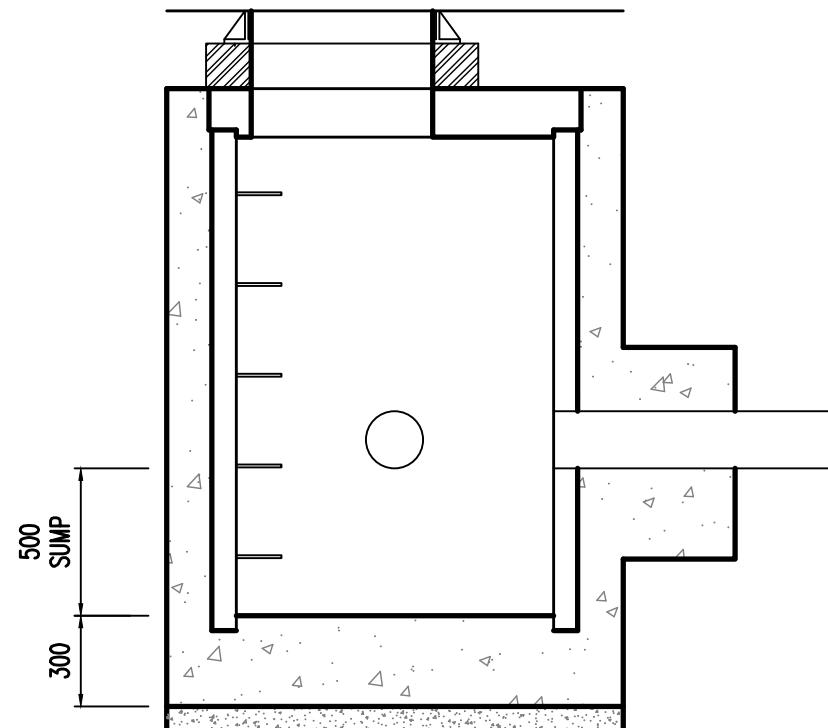
- NOTES**
- ALL TRENCH EXCAVATIONS TO BE UNDERTAKEN TO NARROW TRENCH CONDITIONS 2. Y1 SHALL BE USED ON ALL OCCASIONS EXCEPT WHERE Y2 IS SPECIFIED BY THE ENGINEER
 - DIMENSION Y1 SHALL BE INCREASED BY 40 FOR EACH ADDITIONAL 1000 COVER IN EXCESS OF 5000.
 - DIMENSION Y2 TO BE USED IN LIEU OF Y1 WHERE EXCAVATION IS IN ROCK OR MIXED SOILS
 - LIMESTONE PIPE BEDDING WILL NOT BE PERMITTED IN ACIDIC GROUND WATER CONDITIONS REFER TO CONTRACT SPECIFICATION FOR SPECIFIC DETAILS.

- NOTES:**
- CONSTRUCTION AND SPECIFICATION OF THE DRAINAGE NETWORK TO BE IN ACCORDANCE WITH THE CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY AND SEWERS FOR ADOPTION 7TH EDITION.
 - CONCRETE BASE AND PIPE SURROUND TO BE PLACED IN A SINGLE CONTINUOUS OPERATION FROM TOP OF BASE SLAB TO TOP OF BENCHING AND PIPE SURROUND.
 - CUT ENDS OF PIPES SHALL BE TREATED WITH EPOXY RESIN/PAINT/MORTAR APPROVED BY THE ENGINEER.
 - A JOINT SEALANT (HYDROTITE OR SIMILAR APPROVED) SHALL BE BONDED TO THE SEGMENT JOINT FACE PRIOR TO ERECTION.
 - IN ADDITION TO THE REQUIREMENTS OF THE SPEC. CLASS B ENGINEERING BRICKS SHALL NOT CONTAIN FROGS OR HOLES.
 - SAFETY LADDER TO BE TO SPECIFICATION AS SHOWN ON SHEPHERD GILMOUR INFRASTRUCTURES TYPICAL DETAIL.
 - STANDARD CONCRETE MIXES IN ACCORDANCE WITH BS 5328 SHALL BE USED WITH A 20mm NOMINAL MAXIMUM SIZE OF AGGREGATE AND A 75mm SLUMP.
 - SUITABLE APPLICATIONS OF CONCRETE MIXES ARE:
- | STANDARD MIX | GRADE OF CONC. | APPLICATION |
|--------------|----------------|--|
| ST1 | C7.5 | FILLINGS, BINDINGS, SOFT SPOTS AND DRAINAGE SUMPS. |
| ST4 | C20 | ALL OTHER APPLICATIONS. |
- HIGH STRENGTH CONCRETE TOPPING TO BENCHING SHALL BE PRODUCED, LAID AND FINISHED IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF BS 8204: PART 2 AND THE FOLLOWING APPROXIMATE MIX PROPORTIONS BY WEIGHT SHALL BE USED: 1 PART CEMENT, 1 PART NATURAL SAND AND 2 PARTS SINGLE SIZED COARSE AGGREGATE.
 - FIXINGS FOR METALWORK MILD STEEL BOLTS AND NUTS SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH BS EN ISO 1460 AND STAINLESS STEEL BOLTS AND NUTS SHALL BE MANUFACTURED FROM GRADE 316S31 STEEL COMPLYING WITH BS 970: PART 1 OR BS 1449: PART 2.
 - STAINLESS STEEL PROPRIETARY FIXINGS SHALL BE MANUFACTURED FROM GRADE 316S31 STEEL COMPLYING WITH BS 970: PART 1 OR BS 1449 PART 2. MILD AND HIGH TENSILE STEEL PROPRIETARY FIXINGS SHALL BE PROTECTED IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF THE APPROPRIATE BRITISH STANDARD AS PER 4.2.36 OF SEWERS FOR ADOPTION 5TH EDITION.
 - NUTS, SCREWS, WASHERS AND BOLTS TO BE IN ACCORDANCE WITH CL4.2.32 OF SEWERS FOR ADOPTION 7TH EDITION.
 - COVERS TO CHAMBERS SHOULD BE SUCH SO AS THE LIFTING EFFORT DOES NOT EXCEED 25kgf.
 - STEPS IN MANHOLES AND OTHER CHAMBERS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS 1247: PARTS 1, 2 AND 3 OR WIS 4-33-01.

Revisions			
Project Bowes Street, Moss Side			
Client			
Scale NTS	A(1) 10.09.2020	Date	Drawn by WC
Drawing Block A & HAPP I Scheme Typical Drainage Details Sheet 1			
Shepherd Gilmour Consulting Engineers Colchester House, 40 Peter Street, Manchester M2 5GP. Phone: 0161 837 1500. E-mail: sgi@sgiconsulting.co.uk Web: www.sgiconsulting.co.uk			
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Drawing No C1262 - 1005.1	Rev. C1		
Status CONSTRUCTION			



DRAINAGE UNDER BUILDINGS



CATCHPIT MANHOLE DETAIL
CONSTRUCTION AS PER TYPE 2 MANHOLE

COVER SCHEDULE

MANHOLE COVERS, GULLY GRATINGS AND FRAMES, TO BE IN ACCORDANCE WITH EN124

LOCATION	CLASS	DESCRIPTION
MANHOLES		
CARRIAGEWAYS & SERVICE YARDS TAKING ALL TYPES OF HEAVY GOODS VEHICLES	D-400	DUCTILE IRON 600mm MIN OPENING IN AREAS OF BLOCK/SLAB PAVING THE COVER IS TO BE A RECESSED UNIT
PARKING AREAS, AND AREAS OF SLOW MOVING LIGHT COMMERCIAL VEHICLES	C250	DUCTILE IRON 600mm MIN OPENING IN AREAS OF BLOCK/SLAB PAVING THE COVER IS TO BE A RECESSED UNIT
PEDESTRIAN PRECINCTS, LIGHT VEHICLES, PRIVATE CAR PARKS & DRIVES	B125	DUCTILE IRON 600mm MIN OPENING IN AREAS OF BLOCK/SLAB PAVING THE COVER IS TO BE A RECESSED UNIT
STRUCTURES INTERNAL	A15	ALL INTERNAL MANHOLES AND INSPECTION CHAMBERS SHALL HAVE MECHANICALLY DOUBLE SEALED AIRTIGHT RECESSED COVERS TO TAKE FLOOR FINISH AS SPECIFIED BY THE ARCHITECT
POLYPROPYLENE INSPECTION CHAMBERS		
PEDESTRIAN PRECINCTS, LIGHT VEHICLES, PRIVATE CAR PARKS & DRIVES	B125	CAST IRON 450mm MIN OPENING IN AREAS OF BLOCK/SLAB PAVING THE COVER IS TO BE A RECESSED UNIT
STRUCTURES INTERNAL	A15	ALL INTERNAL MANHOLES AND INSPECTION CHAMBERS SHALL HAVE MECHANICALLY DOUBLE SEALED AIRTIGHT RECESSED COVERS TO TAKE FLOOR FINISH AS SPECIFIED BY THE ARCHITECT
GULLIES		
CARRIAGEWAYS	D-400	STRAIGHT BAR, NOMINAL WIDTH 450mm MINIMUM WATERWAY 900 sq cm
CAR PARKS	D-400	CAST IRON, HINGED, STRAIGHT BAR FLAT SURFACE, NOMINAL WIDTH 355mm MINIMUM WATERWAY 650 sq cm
LINEAR DRAINAGE CHANNEL AND SUMPS		
CAR PARKS	BOLT DOWN C250	EXTERNAL LINEAR CHANNEL SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE MANUFACTURER. THE GRATING SHALL BE A CAST IRON SYSTEM & SUITABLE FOR PEDESTRIAN TO WALK ON SAFELY
SERVICE YARDS	BOLT DOWN D400	

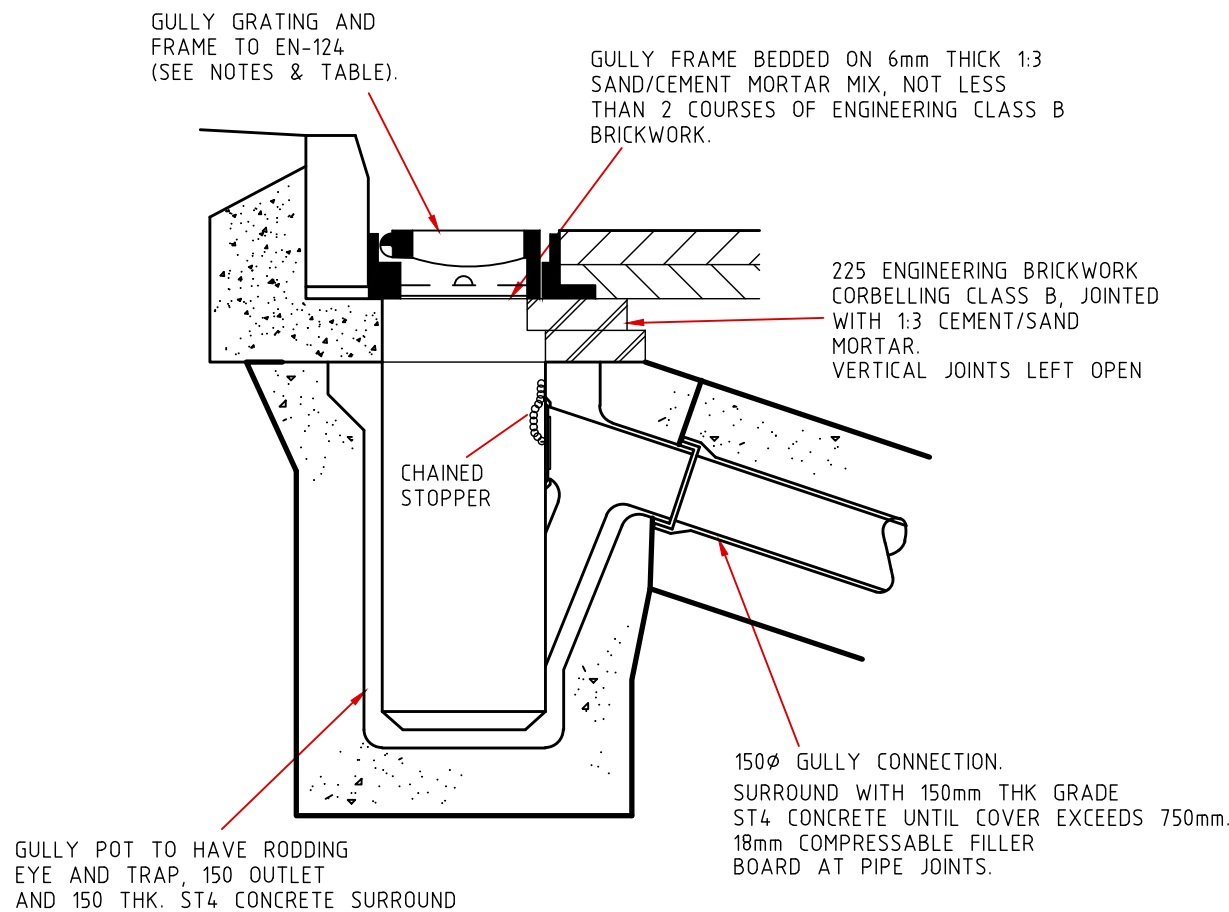
NOTES:

- CONSTRUCTION AND SPECIFICATION OF THE DRAINAGE NETWORK TO BE IN ACCORDANCE WITH THE CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY - CESWI SIXTH EDITION.
- CONCRETE BASE AND PIPE SURROUND TO BE PLACED IN A SINGLE CONTINUOUS OPERATION FROM TOP OF BASE SLAB TO TOP OF BENCHING AND PIPE SURROUND.
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- SUITABLE APPLICATIONS OF CONCRETE MIXES ARE:

STANDARD MIX	GRADE OF CONC.	APPLICATION
ST1	C7.5	FILLINGS, BLINDINGS, SOFT SPOTS AND DRAINAGE SUMPS.
ST4	C20	ALL OTHER APPLICATIONS.

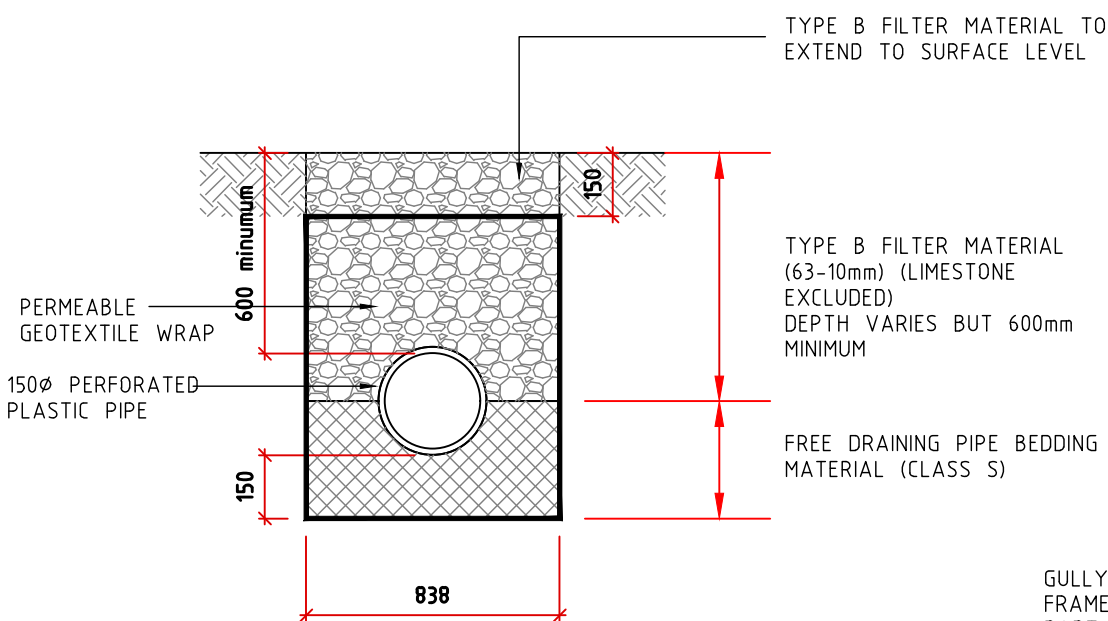
HIGH STRENGTH CONCRETE TOPPING TO BENCHING SHALL BE PRODUCED, LAID AND FINISHED IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF BS 8204: PART 2 AND THE FOLLOWING APPROXIMATE MIX PROPORTIONS BY WEIGHT SHALL BE USED: 1 PART CEMENT, 1 PART NATURAL SAND AND 2 PARTS SINGLE SIZED COARSE AGGREGATE.

- FIXINGS FOR METALWORK
MILD STEEL BOLTS AND NUTS SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH BS EN ISO 1460 AND STAINLESS STEEL BOLTS AND NUTS SHALL BE MANUFACTURED FROM GRADE 316S31 STEEL COMPLYING WITH BS 970: PART 1 OR BS 1449: PART 2.
- STAINLESS STEEL PROPRIETARY FIXINGS SHALL BE MANUFACTURED FROM GRADE 316S31 STEEL COMPLYING WITH BS 970: PART 1 OR BS 1449 PART 2. MILD AND HIGH TENSILE STEEL PROPRIETARY FIXINGS SHALL BE PROTECTED IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF THE APPROPRIATE BRITISH STANDARD AS PER 4.2.36 OF SEWERS FOR ADOPTION 5TH EDITION.
- NUTS, SCREWS, WASHERS AND BOLTS TO BE IN ACCORDANCE WITH CL4.2.32 OF SEWERS FOR ADOPTION 7TH EDITION.
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- STEPS IN MANHOLES AND OTHER CHAMBERS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS 1247: PARTS 1, 2 AND 3 OR WIS 4-33-01.

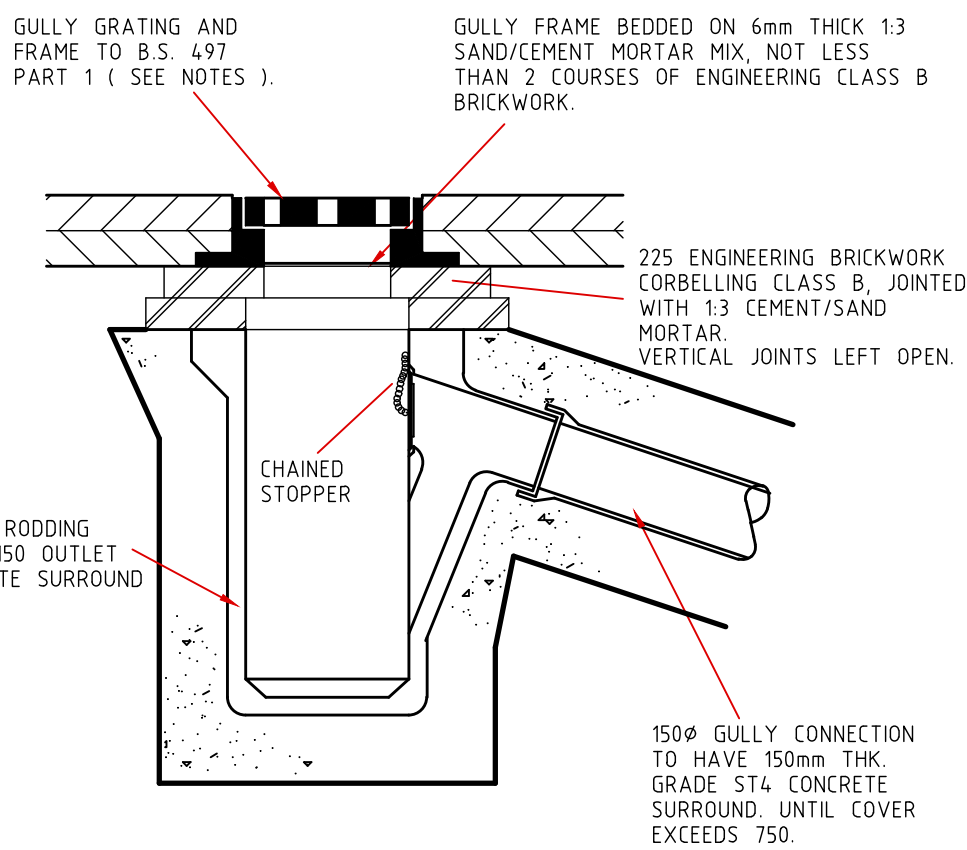


GULLY DETAIL AT KERB

GULLY CHAMBERS TO BE P.C.C. TO BS5911, 450Ø x 900 DEEP
GULLY GRATINGS TO BE CAST IRON TO EN124. (SEE NOTES AND TABLE)

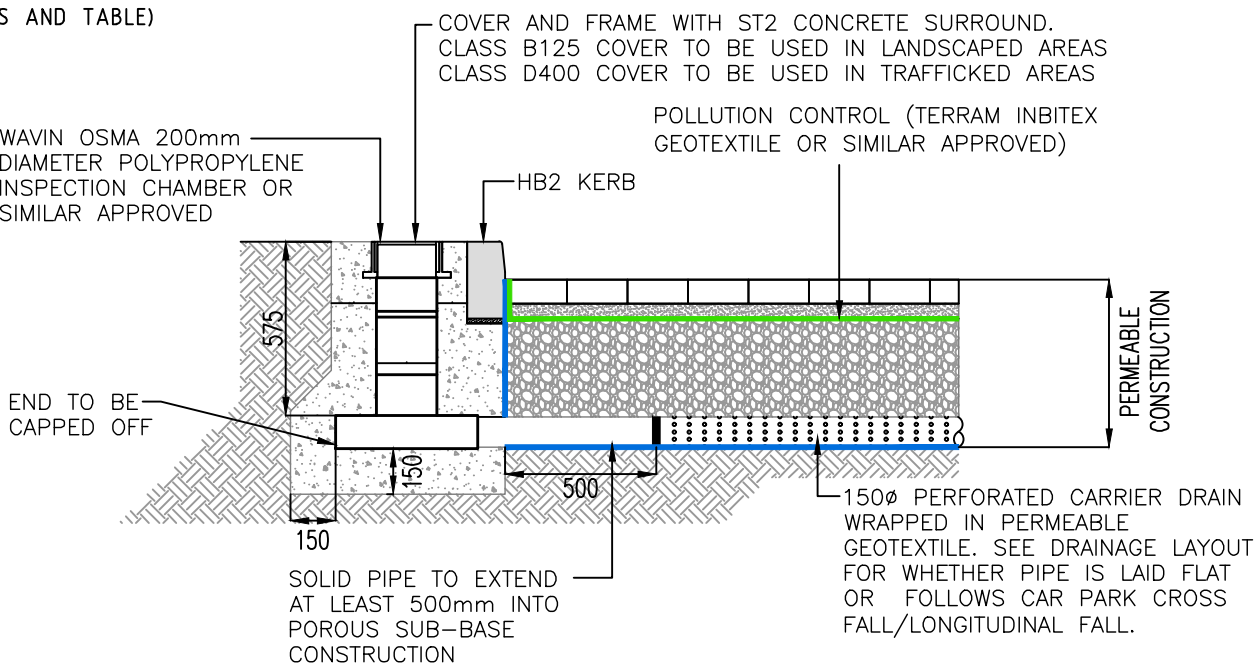


FILTER DRAIN DETAIL

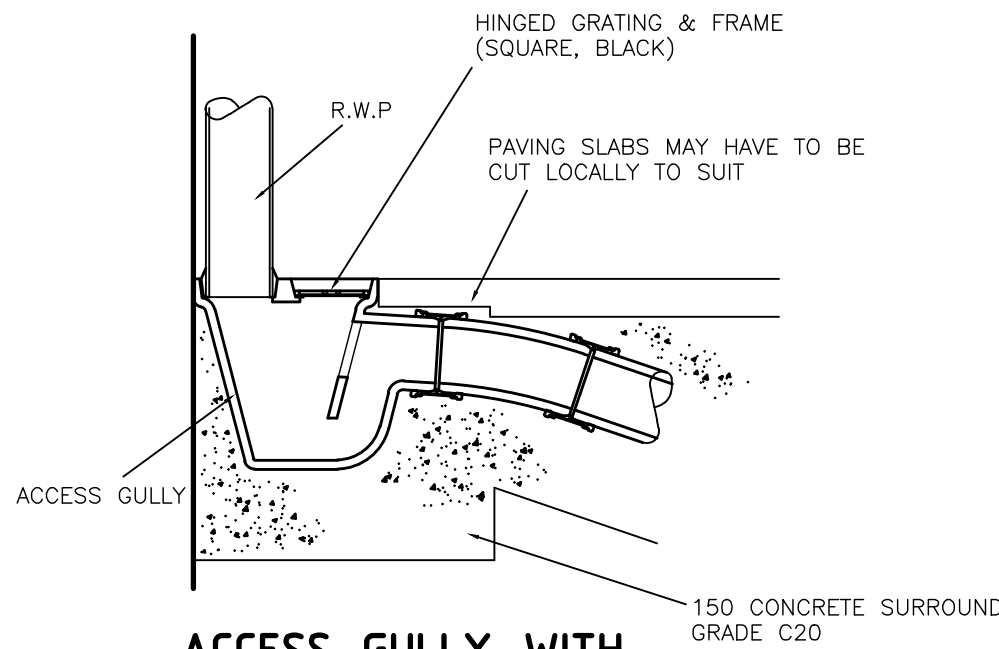


GULLY DETAIL
HARDSTANDINGS & CAR PARKS

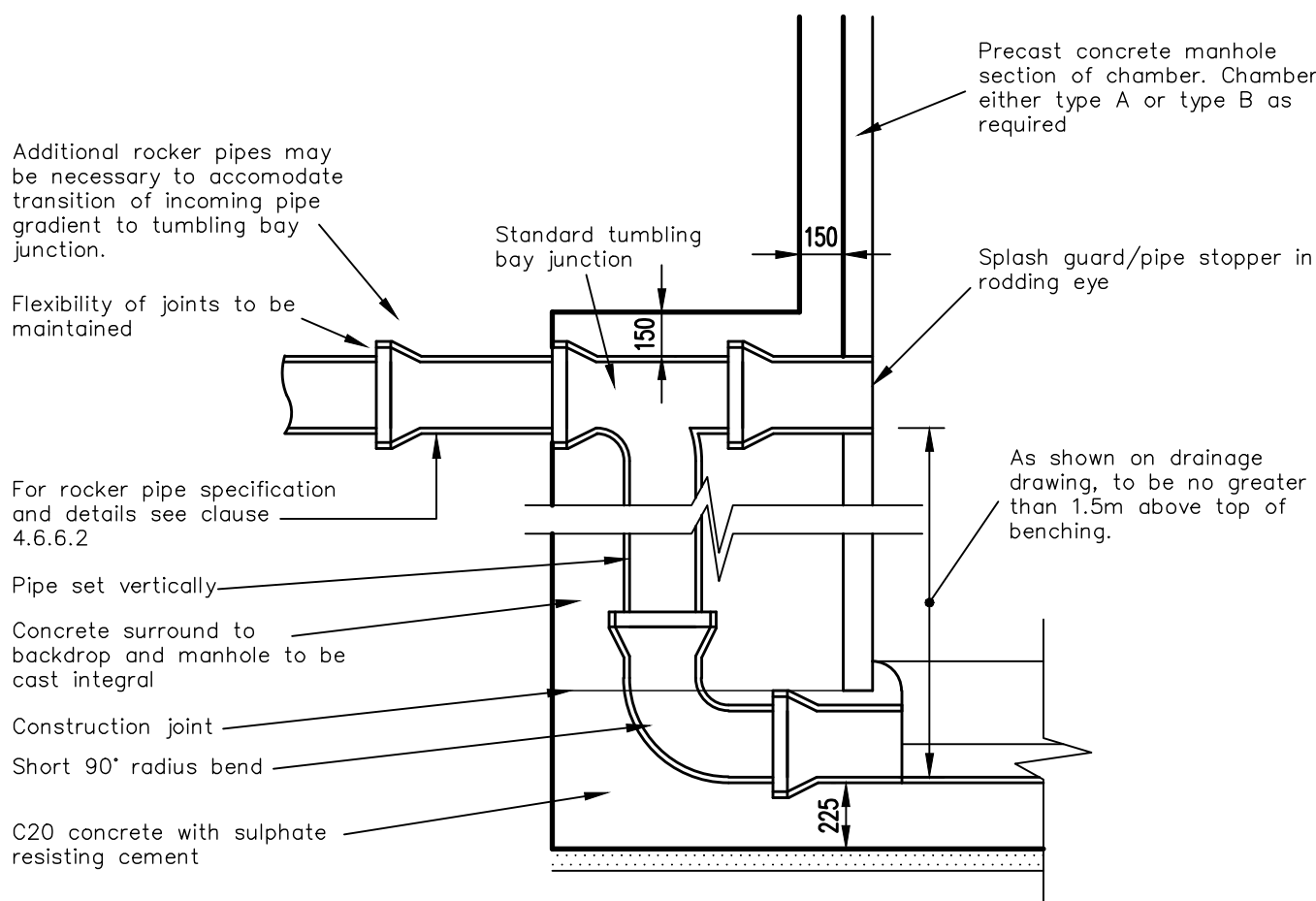
- NOTES
- GULLY CHAMBERS TO BE P.C.C. TO BS5911, 450Ø x 900 DEEP
 - GULLY GRATINGS TO BE CAST IRON TO BS497, GRADE A REF GA1-450



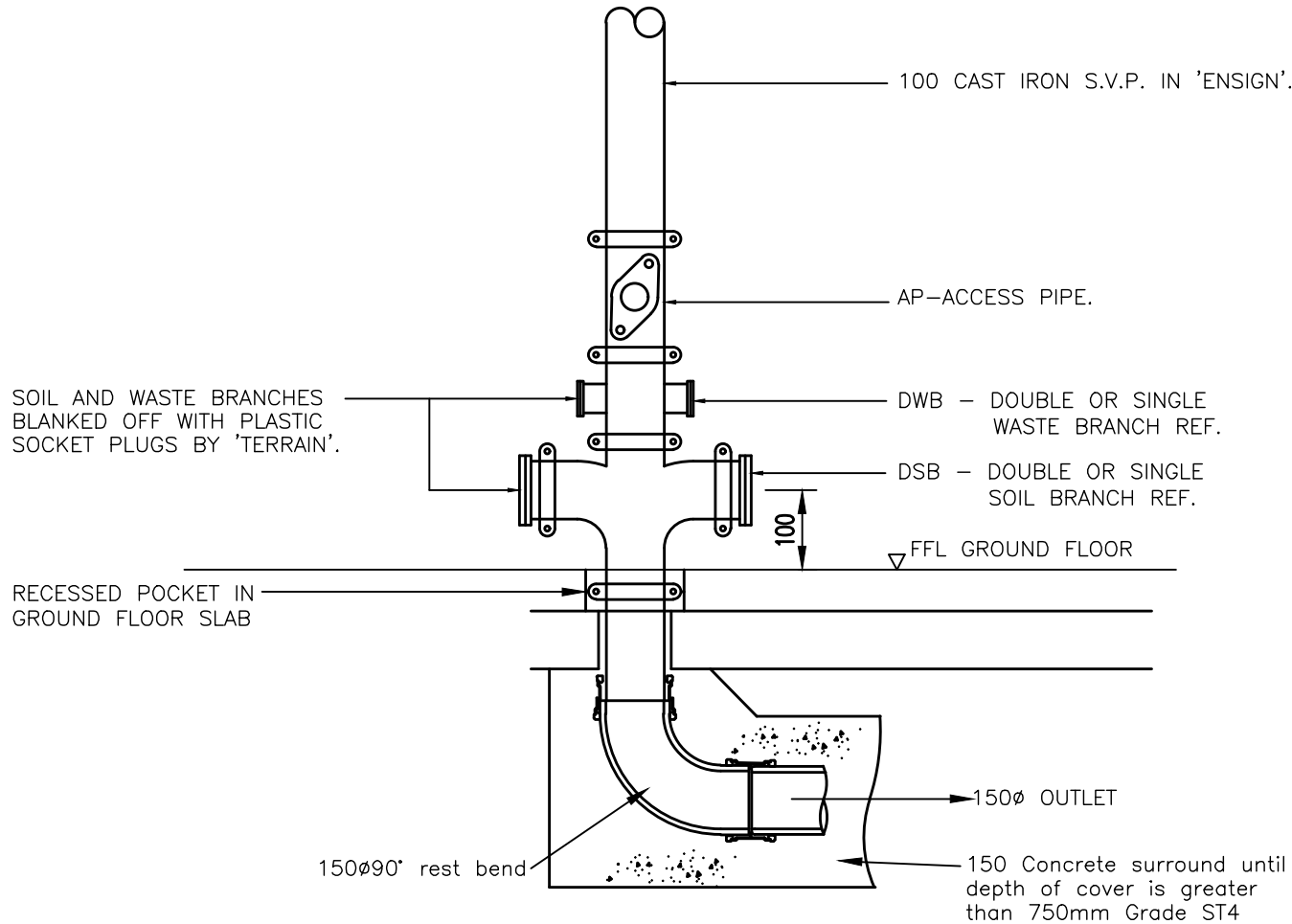
PERMEABLE PARKING INSPECTION CHAMBER DETAIL



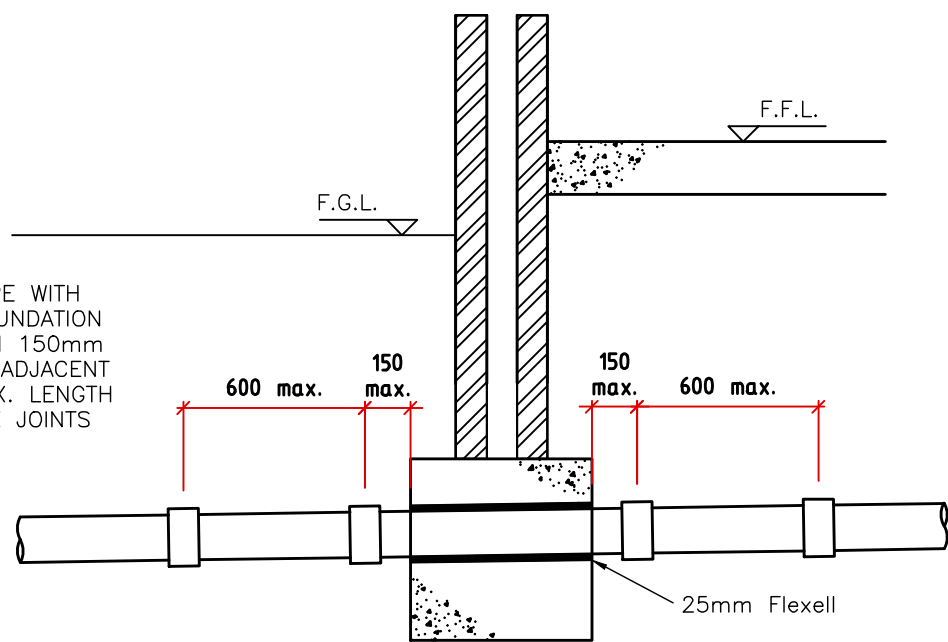
ACCESS GULLY WITH
INTEGRAL BACK INLET



BACKDROP MANHOLE DETAIL



TYPICAL FOUL CONNECTION



PIPE PASSING THROUGH WALL

Revisions			
Project			
Bowes Street, Moss Side			
Client			
Scale		A(1) Date	Drawn by:
NTS		10.09.2020	WC
Drawing			
Block A & HAPPI Scheme			
Typical Drainage Details Sheet 2			
 Shepherd Gilmour Consulting Engineers			
Colchester House, 40 Peter Street, Manchester M2 5GP. Phone: 0161 837 1500. E-mail: sgi@sgiconsulting.co.uk Web: www.sgiconsulting.co.uk			
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Drawing No			Rev:
C1262 - 1005.2			C1
Status			
CONSTRUCTION			



APPENDIX B



































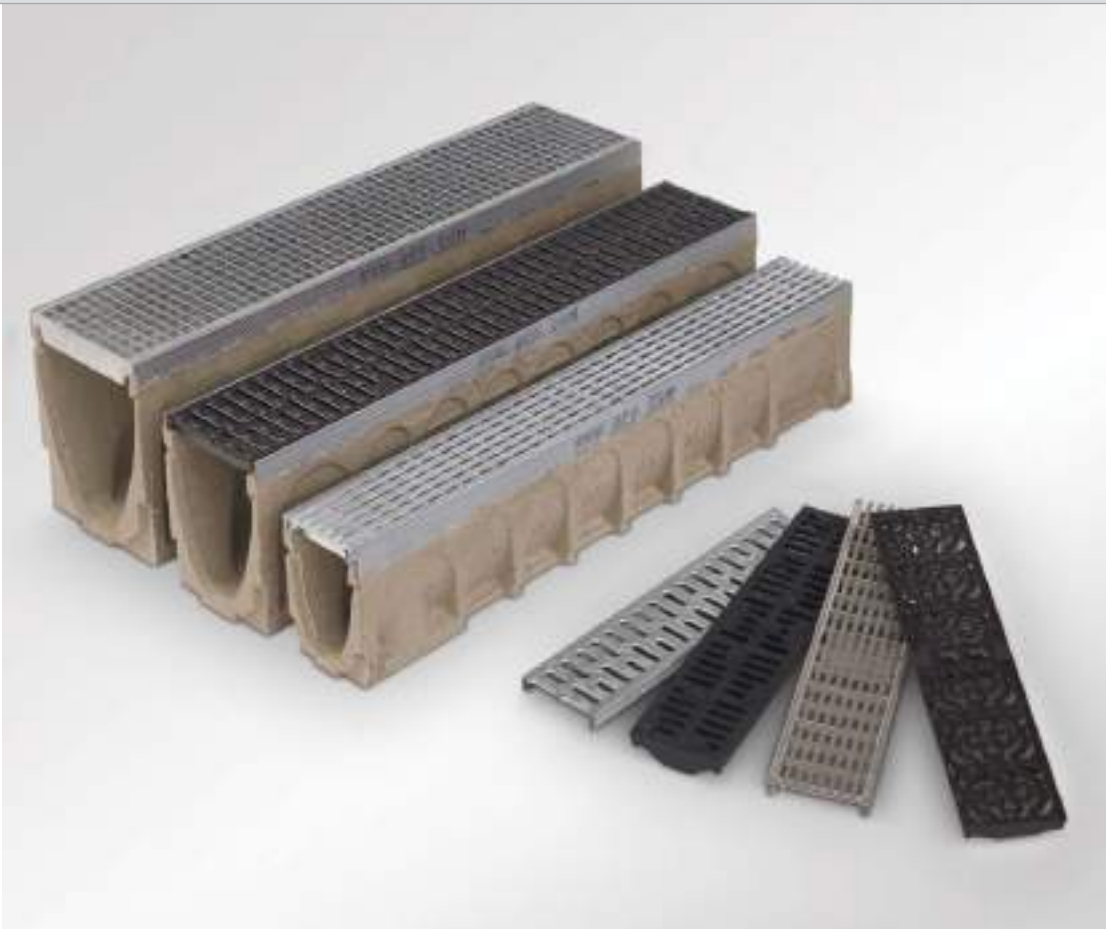
APPENDIX C

ACO Water Management:

Civils + Infrastructure

Uniclass L2123 + L7315	EPIC J3413
CI/SfB (52.5)	

ACO MultiDrain® MD



ACO MultiDrain® MD

Medium duty channel drainage system



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 core divisions, ACO Water management and ACO Building Drainage, 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® MD

ACO MultiDrain® MD benchmarks a new approach in the planning, delivery and installation of general purpose channel drainage systems. Designed to provide an effective solution for a wide variety of applications, ACO MultiDrain® MD system maximises functionality whilst using the minimum number of components.

What is ACO MultiDrain® MD?

ACO MultiDrain® MD channel drainage system is manufactured from Vienite®, ACO's sustainable high strength material. It is available in three widths; 100mm, 150mm and 200mm, and has a variety of depths and slopes.

The channel units are certified to BS EN 1433: 2002 Load Class D 400* and form the main components of the system.

Depending on the load class and application requirement, a wide range of gratings are available to complete the system. You can now choose from a range of traditional and discreet slot drainage gratings, solid covers and cross footpath drainage units to ensure all applications are catered for.

All gratings within the system are fitted with ACO Drainlock™, a bar-less locking device which reduces the risk of blockage and improves hydraulic capacity. The mechanism also provides for easy installation and maintenance of the system.

As standard, channels are manufactured with UltraSTEEL™ protective edge rails. The UltraSTEEL™ rails, with their unique patented design, provide optimum channel protection and improved bonding between channel sides and the surrounding pavement material.



ACO MultiDrain® MD System can provide a channel drainage solution for many applications by simply selecting the appropriate channel depth and grating type. Some of the applications that can be catered for are listed below.

- ▶ Threshold drainage
- ▶ Public landscaping
- ▶ Car parking
- ▶ Light industrial
- ▶ HGV parking
- ▶ Petrol station forecourts
- ▶ SuDS

Discreet slot drainage

Apply the ACO Brickslot grating to the channel unit to form an unobtrusive drainage system. The off-set grating can be used as a solution for threshold drainage and also against buildings eliminating difficult installations. The gratings are suitable for BS EN 1433: 2002 Load Class C 250 and D 400* applications.

ACO Brickslot gratings are available for 100mm, 150mm and 200mm wide channels, in both galvanised or stainless steel. See page 33 for further details.

Services ducts

The ACO MultiDrain® MD System includes a solid cover grating which when applied to the main channel unit provides a secure shallow trench with easy access to services and cabling.

Cross footpath drainage

Where roof drainage from down pipes is required to cross the footpath into the road gutter, a range of down pipes connectors, kerb outlets and shallow channels are available within the ACO MultiDrain® MD System range. See page 38 for further details.

This system is only available in the ACO MultiDrain® M100D System.

Threshold drainage

The ACO MultiDrain® MD System can be used to provide unobtrusive drainage around building entrances, compliant with the building regulations (England and Wales Part M, Scotland Section 4, Northern Ireland Part R). Simply select the appropriate grating to meet your aesthetic requirements.

Why choose ACO MultiDrain® MD?

Made from sustainable materials

ACO MultiDrain® MD channel elements are manufactured from Vienite®. Vienite® is ACO's new high strength sustainable material that meets environmental and sustainability targets for construction products.

Vienite® utilises high levels of post consumer recycled waste, but unlike some recycled materials does not compromise on strength or long term performance.

Vienite's high strength characteristics means the material is four times stronger than traditional concrete and has a low water absorption rate. It is also resistant to freeze thaw attack and has excellent chemical resistance.

At the end of the products operational life, Vienite® can be collected, processed and returned to production as a raw material.



System benefits

- ▶ Provides an efficient drainage solution for a wide variety of applications
- ▶ Range of constant, sloped and shallow depth channels
- ▶ Caters for a range of catchment areas
- ▶ Strong and robust channel design
- ▶ Patented UltraSTEEL™ channel edge rail for improved strength and durability
- ▶ CE Marked and BS EN 1433: 2002 certificated to Load Class D 400*
- ▶ Extensive choice of gratings and accessories for many applications
- ▶ Choice of outlet options, gullies, sumps or channel knockouts
- ▶ Unique ACO Drainlock™ grating fixing improves hydraulic capacity
- ▶ Lightweight design is simple and fast to install
- ▶ 100% recyclable
- ▶ Ideal for use against building facades or as a Part M threshold drainage solution when used with ACO MultiDrain® Brickslot grating



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* Not suitable for carriageways of public roads or motorways.

ACO MultiDrain® MD range layout

To support a wide variety of catchment depths, hydraulic capacities and applications, the system is available in three channel widths, 100mm, 150mm and 200mm and has a range of constant depths, shallow depth and sloping depth channels to suit the drainage design.

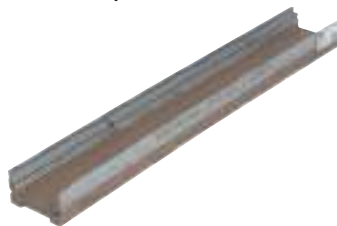
The layout below illustrates the channels and accessories available within the ACO MultiDrain® MD range and to aid product selection, a summary of the function and feature of each component is provided.

All ACO MultiDrain® MD channels can be purchased with galvanised or stainless steel edge rails.

Further details can be found on pages 12 – 38 of this brochure.



1 Shallow depth channels



- ▶ **100mm wide bore:** Four shallow channel units are available in 1m lengths with an overall depth of 75mm or 100mm.
- ▶ **150mm wide bore:** One shallow channel unit is available in 1m length with an overall depth of 100mm.
- ▶ **200mm wide bore:** One shallow channel unit is available in 1m lengths with an overall depth of 100mm.

Standard option available includes vertical cast-in TPE seal for connection to Ø110mm pipework.

2 Constant depth channels



- ▶ **100mm wide bore:** Four constant depth channel units are available in 1m lengths with overall depths ranging from 150mm to 300mm.
- ▶ **150mm wide bore:** Three constant depth channel units are available in 1m lengths with overall depths ranging from 210mm to 310mm.
- ▶ **200mm wide bore:** Three constant depth channel units are available in 1m lengths with overall depths ranging from 265mm to 365mm.

These channels include a vertical knockout for connection to Ø110mm (100mm wide bore channels) or Ø160mm (150mm and 200mm wide bore channels) pipework.

3 Constant depth channels – 0.5m



- ▶ **100mm wide bore:** Four 0.5m constant depth channel units are available with overall depths ranging from 150mm to 300mm.
- ▶ **150mm wide bore:** Three 0.5m constant depth channels with overall depths ranging from 210mm to 310mm.
- ▶ **200mm wide bore:** Three 0.5m constant depth channels with overall depths ranging from 265mm to 365mm.

These channels include vertical knockout for connection to Ø110mm (100mm wide bore) or Ø160mm (150mm and 200mm wide bore) pipework and side knockout for 90° channel connections.

4 Universal Sump



Each system width has one 0.5m universal sump for connection to all channels. Outlet options for Ø110mm and Ø160mm pipes and foul air traps. Plastic silt bucket provided with each unit.

5 Sloping depth channels

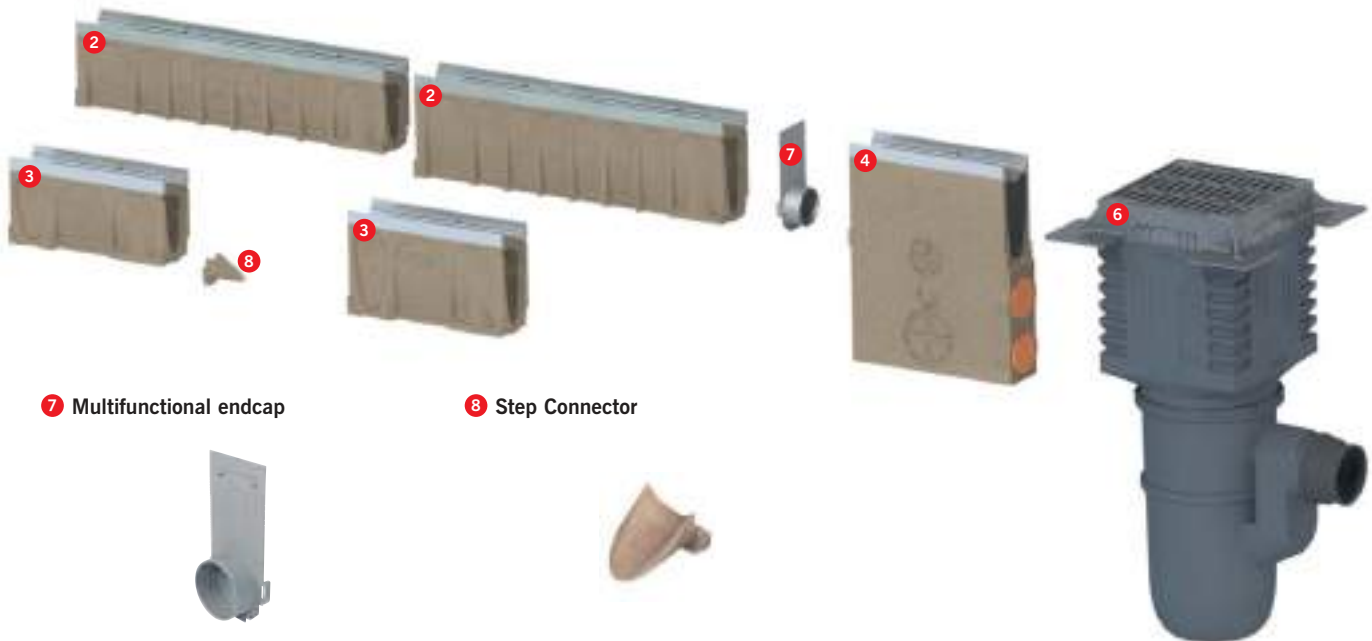


► **100mm wide bore:** Twenty 1m sloping channels with 0.5% fall in depths from 150mm to 250mm.

6 Universal gully



One universal gully for all applications and channel widths from Load Class A 15 to D 400. Standard features include ductile cast iron cover, silt bucket and roddable foul air trap for connection to Ø160mm PVC-U pipe.



7 Multifunctional endcap



One plastic universal endcap for each channel width. Provides a closing or outlet option to Ø110mm (100mm wide bore channels) or Ø160mm (150mm and 200mm wide bore channels) pipes.

8 Step Connector



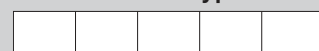
A polymer concrete unit which helps provide smooth water transition between constant depth channels when used in a stepped system design. The step connector is suitable for the 50mm step between each of the constant channel depths.

Guidance for using the ACO MultiDrain® MD parts tables

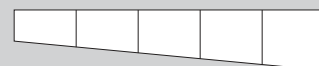
The ACO MultiDrain® MD parts tables are shown on the following pages. The product information is split down by channels widths and further by channel depth and edge rail type. This is to enable quick and simple product identification and selection.

The tables for ACO MultiDrain® MD channels list a number associated with the Invert Type. This number highlights the drainage design which can be achieved when using these channels. The key for the Invert Type is shown opposite.

Channel invert types



1 Constant Depth Invert



2 Sloping Invert



3 Stepped Invert

ACO MULTIDRAIN® FEATURES OVERVIEW



Anti-shunt prevents grating movement once installed.



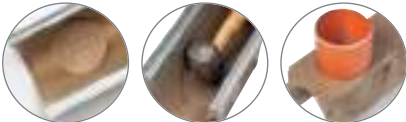
ACO Drainlock™ gratings - this bar-less locking device improves hydraulic capacity and provides for quick and simple installation of gratings.

Sealant groove for simple watertight installations.

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

Male and female channel connections to aid fast installation.

Improved knockout for connection to Ø110mm (for M100D channels) and Ø160mm (for M150D and M200D channels) PVC-U pipes.



LOAD CLASSES



A 15
Pedestrian, cycleways, minimally trafficked areas (light domestic vehicles only).



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 types of vehicles*

* Not suitable for carriageways of public roads or motorways.



Protective UltraSTEEL™ galvanised edge rails for improved strength and bonding between channel and surface materials. Also available in stainless steel.

Minimum concrete level markings to aid installation.

Manufactured from Vienite®, a polymeric based recycled material, strong and lightweight design, improves stability and anchors product into concrete surround.



The ACO MultiDrain® MD system is available in three channel widths; 100mm, 150mm and 200mm.

Internal channel marking for easy identification once installed.



Parking areas for all types of vehicles*



Gratings

ACO MultiDrain® MD System has a wide variety of gratings available that include cast iron, stainless steel and plastic slotted gratings, heelguard options (including the new ATec coated heelguard grating), solid covers and brickslot gratings. See pages 10 and 11 for further details.

EXPLORE THE WORLD'S LARGEST RANGE OF GRATING STYLES

Style, aesthetics, performance and reliability are all important factors when specifying surface water management systems. Globally recognised as the no. 1 choice in managing surface water, ACO provide designers with the widest range of channel and grating styles to choose from.

By using a range of different design options including light, form, texture, material and colour, ACO's grating and channel styles can be used to complement or enhance many landscape designs.



Multi applications provided for by ACO MultiDrain® MD

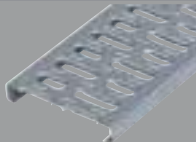
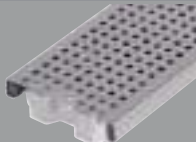
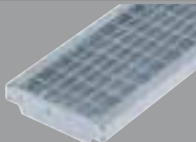
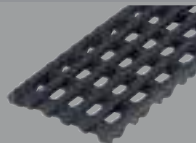
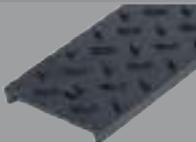
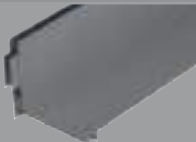
The breadth of the ACO MultiDrain® grating range provides designers with a wide choice of styles to complete their surface water drainage system.

Depending on the application requirement, Architects, Designers and Planners can choose from variety of popular, long establish designs in ductile iron, high tech composites, galvanised or stainless steel materials.

For applications which require discreet drainage to blend subtly with the design of the landscape, ACO Brickslot can provide an aesthetically-pleasing finish.

Supplied as standard with ACO Drainlock™ boltless locking, the range of grating styles is available in load classes A 15 – D 400 making them the idea choice for both pedestrian and vehicular applications.

To suit a range of hydraulic requirements, these grating styles are available for use with 100mm, 150mm and 200mm wide channels.

Slotted Steel Available in Galvanised and Stainless Steel. 	Perforated Steel Available in Galvanised and Stainless Steel. 	Mesh Steel Available in Galvanised and Stainless Steel. 
Heelguard™ Slotted Composite 	Intercept Ductile Iron 	Heelguard™ Slotted Ductile Iron 
Ductile Iron Solid Cover 	Slotted Ductile Iron 	Brickslot Available in Galvanised and Stainless Steel. 

Technical information for these gratings is provided on page 15 onwards

Lighting & bespoke solutions

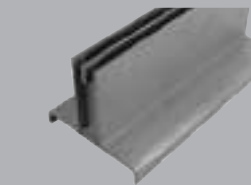
Lighting Solutions

Enhance and add definition to a space - see ACO Lighting Systems brochure for details.



Bespoke Slot Solutions

Our Brickslot gratings can be provided in a range of bespoke heights and widths. Contact our Design Services Team for details.



Bespoke Freestyle Solutions

Realise your own design ideas. ACO Freestyle cast iron gratings offer you individual solutions for every project. Contact our design services team for more details.



Surface + Grating Visualiser

A clever, yet easy to use software program that visualises how our range of grating designs could enhance your project.



To make specification easier, the software will suggest our most suitable ranges based on the project requirements.

You can then select from the available options and visualise how these may look in different surface finishes. Once a choice is made, a simple, yet detailed specification sheet provides full product information.



To launch the visualiser scan the QR code or visit www.aco.co.uk/gratingvisualiser

New grating styles

A new range of contemporary, elegant designs will add character and style to any landscape project.

Intercept Profile Stainless steel



High quality linear profile design provides a contemporary, long lasting finish to any prestigious landscaping project.

Intercept Profile Galvanised steel



High quality linear profile design provides a stylish option for those looking for an alternative to stainless steel.

Intercept Bar



The sleek and elegant intercept bar design provides a classic, high end finish to any project.

Mosaic



The unique pattern of the Mosaic design provides an ideal finish to heritage or traditional landscapes.

Leaf



The leaf grating can provide a pleasing alternative design to many urban landscape designs.

Flag



The unusual character of the Flag design provides a fun alternative to traditional slotted gratings.



ACO MultiDrain® M100D channels with UltraSTEEL™ galvanised edge rails.

ACO MultiDrain® M100D channels are manufactured from Vienite®, ACO's sustainable high strength material, which provides high chemical resistance. The channels are available in constant depth, sloping depth and shallow depth units.

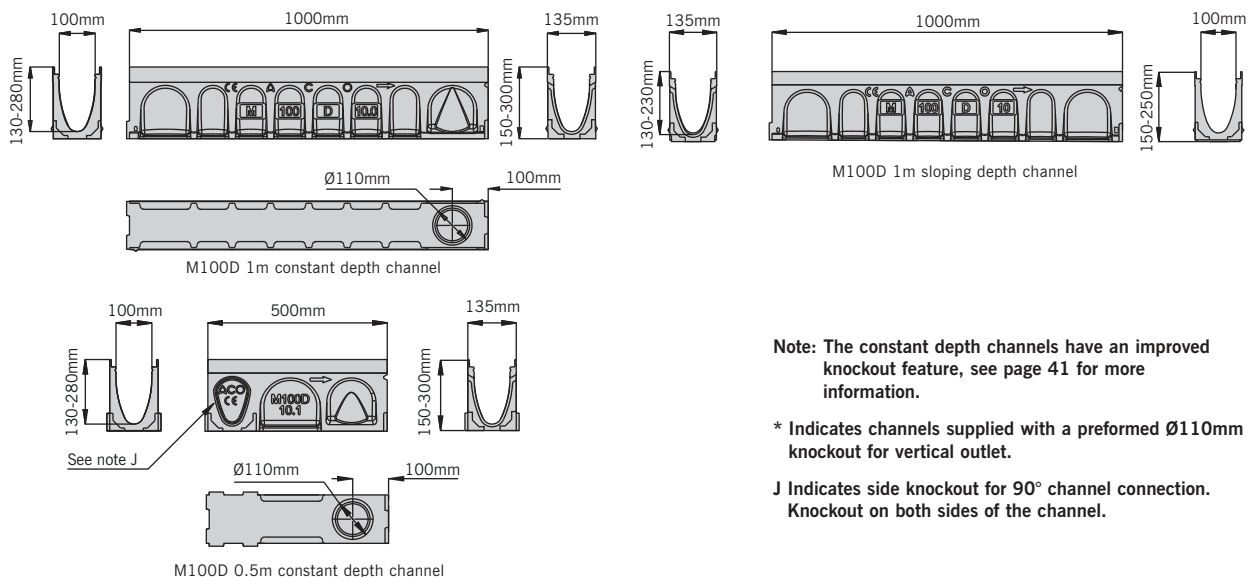
ACO MultiDrain® M100D channels listed below are provided with integral galvanised steel protective edge rails. For enhanced durability these rails are manufactured from UltraSTEEL™, a unique material that has improved strength over plain steel.

The added benefit of UltraSTEEL™ is that its greater surface area improves the bond between rail and adjacent material where a sealed system is required.

For the ACO MultiDrain® M100D range of gratings to suit these channels please refer to page 16.

Constant and sloping depth channels with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23000	M100D No. 0.0*	1000	135	150	130	1/3	12.9
23050	M100D No. 0.1J*	500	135	150	130	1/3	7.6
23001	M100D No. 1	1000	135	150/155	130/135	2	13.5
23002	M100D No. 2	1000	135	155/160	135/140	2	13.8
23003	M100D No. 3	1000	135	160/165	140/145	2	14.1
23004	M100D No. 4	1000	135	165/170	145/150	2	14.4
23005	M100D No. 5	1000	135	170/175	150/155	2	14.7
23006	M100D No. 6	1000	135	175/180	155/160	2	15.0
23007	M100D No. 7	1000	135	180/185	160/165	2	15.3
23008	M100D No. 8	1000	135	185/190	165/170	2	15.6
23009	M100D No. 9	1000	135	190/195	170/175	2	15.9
23010	M100D No.10	1000	135	195/200	175/180	2	16.2
23100	M100D No.10.0*	1000	135	200	180	1/3	15.9
23101	M100D No.10.1J*	500	135	200	180	1/3	9.2
23011	M100D No.11	1000	135	200/205	180/185	2	16.5
23012	M100D No.12	1000	135	205/210	185/190	2	16.8
23013	M100D No.13	1000	135	210/215	190/195	2	17.1
23014	M100D No.14	1000	135	215/220	195/200	2	17.4
23015	M100D No.15	1000	135	220/225	200/205	2	17.7
23016	M100D No.16	1000	135	225/230	205/210	2	18.0
23017	M100D No.17	1000	135	230/235	210/215	2	18.3
23018	M100D No.18	1000	135	235/240	215/220	2	18.6
23019	M100D No.19	1000	135	240/245	220/225	2	18.9
23020	M100D No.20	1000	135	245/250	225/230	2	19.2
23200	M100D No.20.0*	1000	135	250	230	1/3	21.8
23201	M100D No.20.1J*	500	135	250	230	1/3	10.8
23300	M100D No.30.0*	1000	135	300	280	1/3	25.4
23301	M100D No.30.1J*	500	135	300	280	1/3	12.5



Note: The constant depth channels have an improved knockout feature, see page 41 for more information.

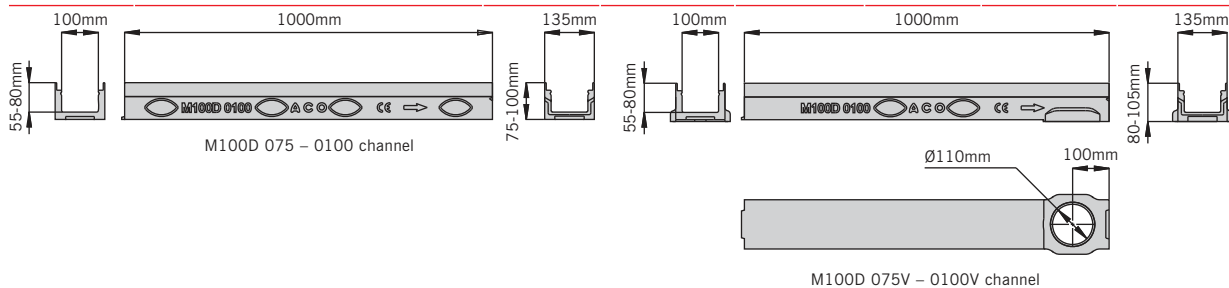
* Indicates channels supplied with a preformed Ø110mm knockout for vertical outlet.

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

ACO MultiDrain® MD components

Shallow depth channels with UltraSTEEL™ galvanised edge rails

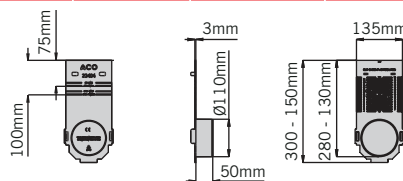
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23075	M100D No. 075	1000	135	75	55	1	9.2
23076	M100D No. 075V	1000	135	75*	55	1	8.9
23110	M100D No. 0100	1000	135	100	80	1	11.0
23111	M100D No. 0100V	1000	135	100*	80	1	10.7



Note: V Indicates channel with cast in TPE triple lipped seals for water tight connection. See page 40 for further information.
*075V and 0100V channels have a depth overall around the outlet of 80mm (075V) and 105 (0100V).

Multifunctional endcap (closing/inlet/outlet)

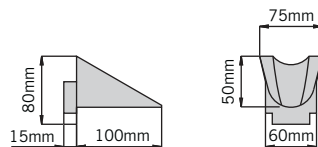
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Spigot length (mm)	Invert Type	Weight (kg)
23404	M100D No.306 multifunctional endcap	-	135	75/300	50	-	0.2



The multifunctional endcap can be cut down to suit all M100D channels. See page 42 for further information.

Step Connector

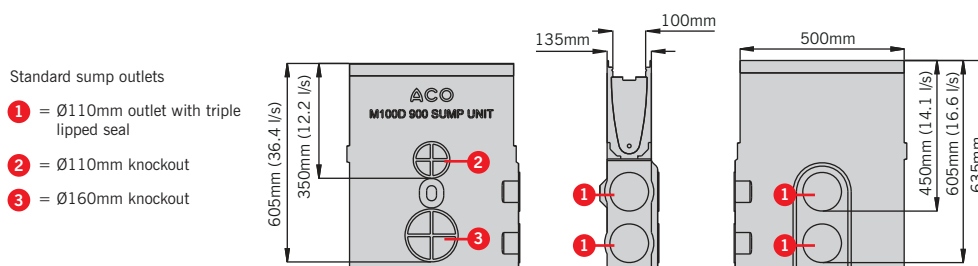
Product code	Description	Length (mm)	Width overall (mm)	Stepped depth (mm)	Invert depth (mm)	Invert Type	Weight (kg)
12601	M100D No.123 50mm step connector	100	75	50	-	-	0.4



Note: For information on the step connector functionality see page 42.

Sump unit with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23410	M100D universal sump with plastic silt bucket	500	135	635	615	-	32.8

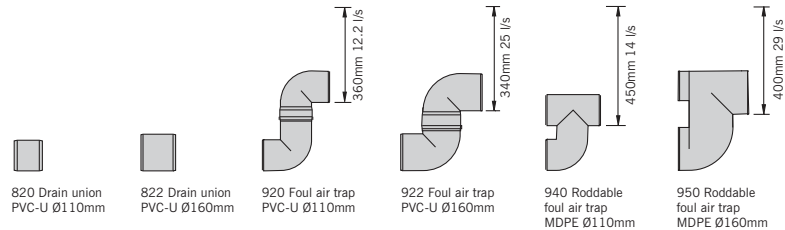


Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 43.

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

Drain unions and foul air traps

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Slot width (mm)	Invert Type	Weight (kg)
0056	820 Drain union PVC-U Ø110mm	100	110	-	-	-	-	0.1
0058	822 Drain union PVC-U Ø160mm	100	160	-	-	-	-	0.5
2640	920 Foul air trap PVC-U Ø110mm	-	110	-	-	-	-	0.5
2638	922 Foul air trap PVC-U Ø160mm	-	160	-	-	-	-	1.9
7931	940 Roddable foul air trap MDPE Ø110mm	-	110	-	-	-	-	0.4
7932	950 Roddable foul air trap MDPE Ø160mm	-	160	-	-	-	-	0.8



Accessories

Product code	Description	Weight (kg)
32599	Polymer concrete repair kit	1.0†

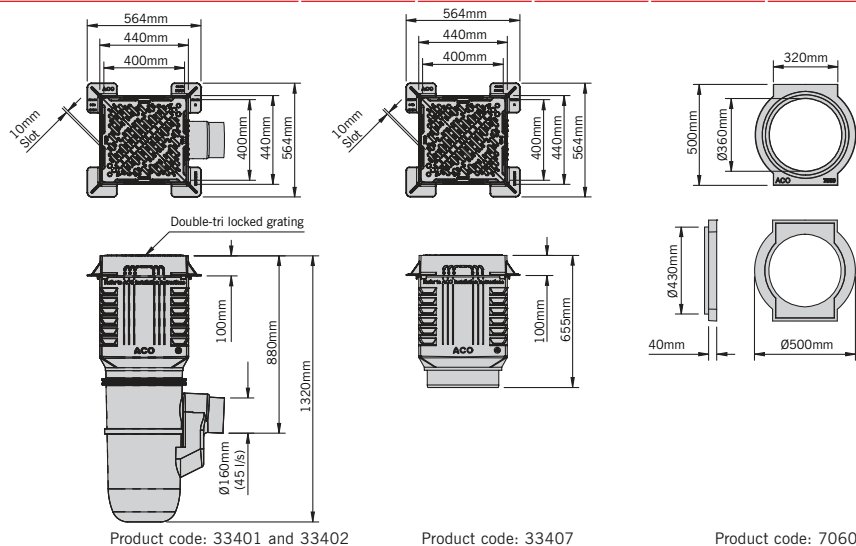


†Repair kit includes 0.5kg tin of natural colour polyester concrete repair resin, grey and black pigment, hardener paste, mixing instructions and material safety data sheets.

Universal gully and components



Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Slot width (mm)	Invert Type	Weight (kg)
33401	Gully assembly and bucket 601D	440	440	1315	870	10	-	52.5
33402	Gully assembly no bucket 602D	440	440	1315	870	10	-	51.0
33407	Gully top assembly 607D	440	440	655	-	10	-	45.0
33605	Gully base unit 605	-	Ø375	750	310	-	-	4.3
33603	Gully intermediate unit 603	440	440	515	-	-	-	5.1
44355	Gully grating and frame 600D	400*	564††	100	-	10	-	39.7
7060	Gully connector 615	500	Ø500	40	-	-	-	7.0
33606	Bucket polyethylene 606	-	Ø275	245	-	-	-	1.4



Note. Plain U-PVC 150mm - 160mm Supersleeve adaptor supplied with 601D, 602D and 605 assemblies.
For information on universal gully functionality see page 43. *Clear opening size. ††Over frame size.

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

ACO Drainlock™ Gratings

Grating selection

All channels within the ACO MultiDrain® MD range are certified to BS EN 1433: 2002 Load Class D 400. The system has a wide range of gratings suitable for use in a variety of applications from Load Class A15 to D 400. Refer to the chart on page 8 for load classes and typical applications. Please note when selecting a grating careful consideration should be given to the application requirement. Each grating has a certified load class which, once installed with the channel determines the system's load class.

ACO Drainlock™

Fitted as standard to ACO MultiDrain® MD gratings, this fast locking device removes the need for bolts and bars and improves the channels hydraulic capacity. The Drainlock™ mechanism simply clips into the channel edge rail for rapid installation. An installation guide is shown opposite.

Anti-shunt mechanism

A selection of the ACO Drainlock™ gratings are fitted with an anti-shunt mechanism that restricts unwanted grating movement when installed. This feature improves the durability and the aesthetics of the system. See figure 2 for details

Security Locking

In areas such as schools and prisons, where unwanted grating removal needs to be restricted, a security locking can be used in conjunction with the following gratings; on ACO M100D, 12680, 23405 and 23409 on ACO M150D 23161 and 23169 and on M200D 23221 and 23229. The system is fitted to the gratings by two M6 security screws and clamps the grating in place preventing removal. See figure 5 & 6 for details. Security locking key for installation and removal supplied separately.

Fitting the grating



To install, align the grating onto the channel



Align anti-shunt detail with recess



Push or stand on the grating until it clicks into place



ACO Drainlock™ locking mechanism fastens into channel

Security locking



Fix the M6 security screws and clamp the grating as shown.



Place grating into the channel and tighten the fixing using the security locking key

Removal of grating



Insert tool as shown.
Drainlock™ lifting tool available part no 1367



Pull upwards to unlock grating



Heelguard™ applies to ACOs range of 'Heel-friendly' products with slot widths up to and including 10mm. Suitable for most pedestrian applications and compliant to BS EN1433:2002. For specific widths please refer to grating details.

Gratings for use with ACO MultiDrain® M100D channels with UltraSTEEL™ galvanised edge rails.

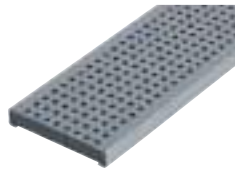
Gratings for Load Class A 15 applications



Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
12610	Slotted galvanised steel 400DL	1000	123	21	10	Yes	25300	n/a	2.0
12611	Slotted galvanised steel 402DL	500	123	21	10	Yes	25300	n/a	1.0
12666	Perforated galvanised steel 12666DL	1000	123	21	6	Yes	16300	n/a	2.6
12667	Perforated galvanised steel 12667DL	500	123	21	6	Yes	16300	n/a	1.3



400DL / 402DL
Slotted galvanised steel



12666DL / 12667DL
Perforated galvanised steel

Gratings for Load Class B 125 applications



Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
132555	Intercept Profile galvanised steel 132555DL	1000	123	21	29 x 8	Yes	44500	Yes	4.1
132550	Intercept Profile galvanised steel 132550DL	500	123	21	29 x 8	Yes	44500	Yes	2.0

NEW!



132555DL / 132550DL
Intercept Profile galvanised steel

Gratings for Load Class C 250 applications

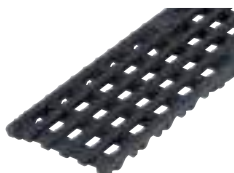


Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
132720	Heelguard™ composite - black 522DL 	500	123	21	8	Yes	28500	Yes	1.0
12673	Intercept ductile iron 507DL	500	123	21	31 x 12	No	40100	Yes	3.7
12614	Slotted galvanised steel 423DL	1000	123	21	10	Yes	25300	n/a	5.0
12615	Slotted galvanised steel 424DL	500	123	21	10	Yes	25300	n/a	2.5
12656	Perforated galvanised steel 12656DL	1000	123	21	6	Yes	16300	n/a	4.8
12657	Perforated galvanised steel 12657DL	500	123	21	6	Yes	16300	n/a	2.4
132880	Heelguard™ mesh galvanised steel grating 410DL	1000	123	21	29 x 9.5	Yes	79000	Yes	4.2
132881	Heelguard™ mesh galvanised steel grating 412DL	500	123	21	29 x 9.5	Yes	79000	Yes	2.1

NEW!



522DL
Heelguard™ composite Microgrip



507DL
Intercept ductile iron



423DL / 424DL
Slotted galvanised steel



12656DL / 12657DL
Perforated galvanised steel

NEW!



410DL / 412DL
Heelguard™ mesh galvanised steel

 Indicates security locking available.

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



Gratings for Load Class D 400* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
23405	Heelguard™ ductile iron 23405DL 6	500	123	21	8	Yes	23900	Yes	4.1
23406	Ductile iron solid cover 23406DL	500	123	21	n/a	No	n/a	Yes	4.5
23408	Slotted ductile iron 23408DL	500	123	21	12	No	35700	Yes	3.8
132042	Flag ductile iron 132042DL	500	123	21	8	Yes	30400	Yes	4.9
132043	Leaf ductile iron 132043DL	500	123	21	10	Yes	34700	Yes	4.7
132885	Heelguard™ mesh galvanised steel 132885DL	1000	123	21	28 x 8.5	Yes	69100	Yes	5.1
132886	Heelguard™ mesh galvanised steel 132886DL	500	123	21	28 x 8.5	Yes	69100	Yes	2.5



23405DL
Heelguard™ ductile iron



23406DL
Ductile iron solid cover



23408DL
Slotted ductile iron



132042DL
Flag ductile iron



123043DL
Leaf ductile iron



132885DL / 132886DL
Heelguard™ mesh galvanised steel

ACO ATec high performance finish



Gratings for Load Class D 400* applications with ACO ATec corrosion resistant coating

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
23409	ATec coated Heelguard™ ductile iron 23409DL 6	500	123	21	8	Yes	23900	Yes	4.1
23417	ATec coated Mosaic ductile iron 23417DL 6	500	123	21	10	Yes	28000	Yes	4.1



23409DL
Heelguard™ ductile iron



23417
Mosaic ductile iron



ACO ATec coating is a high performance finish designed for the most demanding of environments. The black corrosion resistant coating provides a strong durable finish which maintains the overall aesthetics of the grating. ACO ATec provides up to 10 times longer protection against corrosion than standard water-based surface coatings

Grating accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23415	Drainlock™ security locking assembly	n/a	n/a	n/a	n/a	n/a	0.1
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	0.2



23415
Drainlock™ security locking assembly



23416
Drainlock™ security key



1367
Drainlock™ grating lifting tool 835

6 Indicates security locking available.

*Not suitable for carriageways of public roads or motorways.

ACO MultiDrain® M100DS channels with stainless steel edge rails

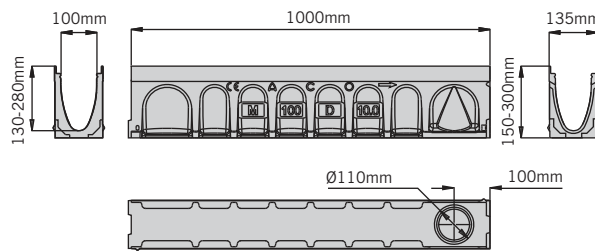
ACO MultiDrain® M100DS channels are manufactured from Vienite®, ACO's sustainable high strength material, which provides high chemical resistance. For improved aesthetics and performance, the channels listed below are provided with integral stainless steel (Grade 304) protective edge rails.

These channels are available in constant depth and shallow depth units.

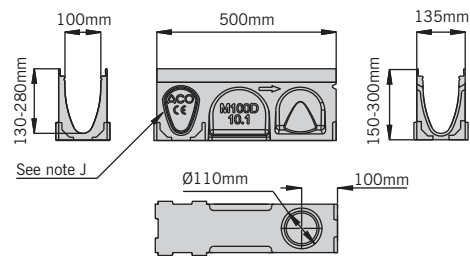
For the ACO MultiDrain® M100DS range of gratings to suit these channels please refer to page 20.

Constant depth channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24000	M100DS No. 0.0*	1000	135	150	130	1/3	14.9
24050	M100DS No. 0.1J*	500	135	150	130	1/3	8.6
24100	M100DS No.10.0*	1000	135	200	180	1/3	17.9
24101	M100DS No.10.1J*	500	135	200	180	1/3	10.2
24200	M100DS No.20.0*	1000	135	250	230	1/3	21.0
24201	M100DS No.20.1J*	500	135	250	230	1/3	11.8



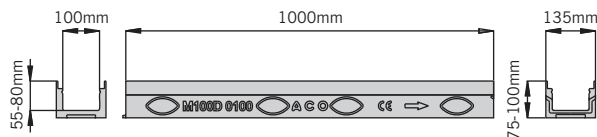
M100DS constant depth channel



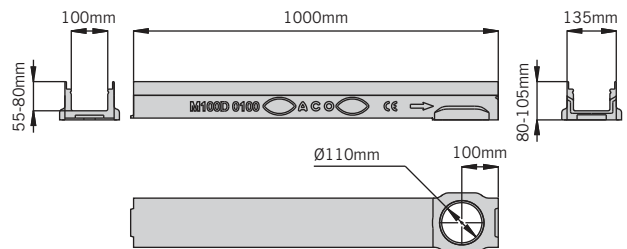
M100DS 0.5m constant depth channel

Shallow channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24075	M100DS No. 075	1000	135	75	55	1	10.9
24076	M100DS No. 075V	1000	135	75†	55	1	10.6
24110	M100DS No. 0100	1000	135	100	80	1	12.7
24111	M100DS No. 0100V	1000	135	100†	80	1	12.4



M100DS 075 - 0100 channel



M100DS 075V - 100V channel

Note: The constant depth channels have an improved knockout feature, see page 41 for more information.

* Indicates channels supplied with a preformed Ø110mm knockout for vertical outlet.

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

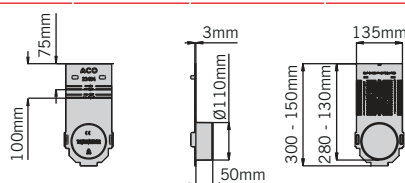
V Indicates channel with cast in TPE triple lipped seals for water tight connection. See page 41 for further information.

† 075V and 0100V channels have a depth overall around the outlet of 80mm (075V) and 105 (0100V).

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

Multifunctional endcap (closing/inlet/outlet)

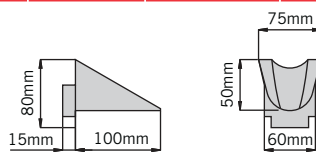
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Spigot length (mm)	Invert Type	Weight (kg)
23404	M100D No.306 multifunctional endcap	-	135	75/300	50	-	0.2



The multifunctional endcap can be cut down to suit all M100DS channels. See page 42 for further information.

Step Connector

Product code	Description	Length (mm)	Width overall (mm)	Stepped depth (mm)	Invert depth (mm)	Invert Type	Weight (kg)
12601	M100D No.123 50mm step connector	100	75	50	-	-	0.4



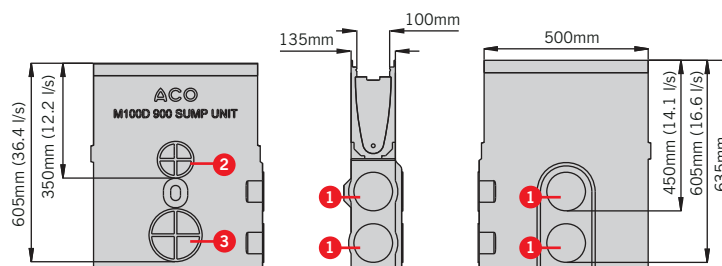
Note: For information on the step connector functionality see page 42.

Sump unit with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24410	M100DS universal sump with plastic silt bucket	500	135	635	615	-	33.9

Standard sump outlets

- ❶ = Ø110mm outlet with triple lipped seal
- ❷ = Ø110mm knockout
- ❸ = Ø160mm knockout



Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 43.

Note: For ACO Universal Gully and foul air trap details please refer to page 43. For repair kit information please see page 14.

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

Gratings for use with ACO MultiDrain® M100DS channels with stainless steel edge rails

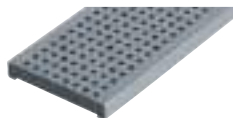


Gratings for Load Class A 15 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
12640	Slotted stainless steel 460DL	1000	123	21	10	Yes	25300	n/a	2.0
12641	Slotted stainless steel 461DL	500	123	21	10	Yes	25300	n/a	1.0
12664	Perforated stainless steel 12664DL	1000	123	21	6	Yes	16300	n/a	2.6
12665	Perforated stainless steel 12665DL	500	123	21	6	Yes	16300	n/a	1.3



460DL / 461DL
Slotted stainless steel



12664DL / 12665DL
Perforated stainless steel



Gratings for Load Class B 125 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
132557	Intercept Bar stainless steel 132557DL	1000	123	21	28 x 6	Yes	43000	Yes	3.8
132552	Intercept Bar stainless steel 132552DL	500	123	21	28 x 6	Yes	43000	Yes	1.9
132556	Intercept Profile stainless steel 132556DL	1000	123	21	29 x 8	Yes	44500	Yes	3.7
132551	Intercept Profile stainless steel 132551DL	500	123	21	29 x 8	Yes	44500	Yes	1.9



132557DL / 132552DL
Intercept Bar Stainless Steel



132556DL / 132551DL
Intercept Profile Stainless Steel

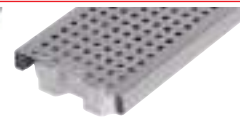


Gratings for Load Class C 250 applications

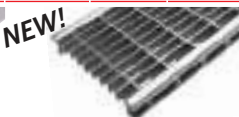
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
12644	Slotted stainless steel 470DL	1000	123	21	10	Yes	25300	n/a	5.0
12645	Slotted stainless steel 471DL	500	123	21	10	Yes	25300	n/a	2.5
12654	Perforated stainless steel 12654DL	1000	123	21	6	Yes	16300	n/a	4.8
12655	Perforated stainless steel 12655DL	500	123	21	6	Yes	16300	n/a	2.4
132882	Heelguard™ mesh stainless steel grating 430DL	1000	123	21	29 x 9.5	Yes	79000	Yes	4.2
132883	Heelguard™ mesh stainless steel grating 431DL	500	123	21	29 x 9.5	Yes	79000	Yes	2.1



470DL / 471DL
Slotted stainless steel



12654DL / 12655DL
Perforated stainless steel



430DL / 431DL
Heelguard™ mesh stainless steel



Gratings for Load Class D400* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
132887	Heelguard™ mesh stainless steel 132887DL	1000	123	21	28 x 8.5	Yes	69100	Yes	5.2
132888	Heelguard™ mesh stainless steel 132888DL	500	123	21	28 x 8.5	Yes	69100	Yes	2.5



132887DL / 132888DL
Heelguard™ mesh stainless steel

ACO MultiDrain® MD stainless steel gratings are manufactured from Grade 304 stainless steel and are fitted with ACO Drainlock™ as standard. See page 15 for installation details. For Drainlock grating lifting tool details please refer to page 17. *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® M150D channels with UltraSTEEL™ galvanised edge rails

ACO MultiDrain® M150D channels are manufactured from Vienite®, ACO's sustainable high strength material, which provides high chemical resistance. The channels are available in constant depth and shallow depth units.

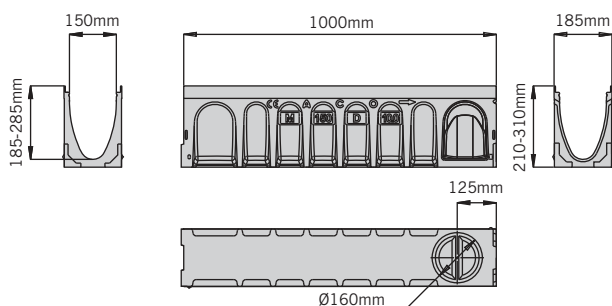
ACO MultiDrain® M150D channels listed below are provided with integral galvanised steel protective edge rails. For enhanced durability these rails are manufactured from UltraSTEEL™, a unique material that has improved strength over plain steel.

The added benefit of UltraSTEEL™ is that its greater surface area improves the bond between rail and adjacent material where a sealed system is required.

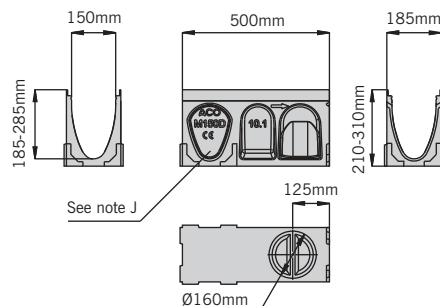
For the ACO MultiDrain® M150D range of gratings to suit these channels please refer to page 23.

Constant depth channels with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23150	M150D No. 0.0*	1000	185	210	185	1/3	23.4
23153	M150D No. 0.1J*	500	185	210	185	1/3	12.7
23151	M150D No. 10.0*	1000	185	260	235	1/3	26.2
23154	M150D No. 10.1J*	500	185	260	235	1/3	14.6
23152	M150D No. 20.0*	1000	185	310	285	1/3	30.3
23155	M150D No. 20.1J*	500	185	310	285	1/3	16.4



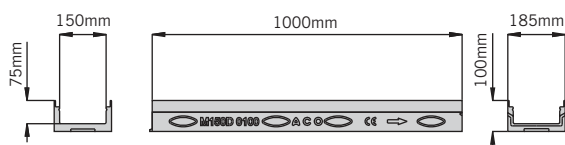
M150D 1m constant depth channel



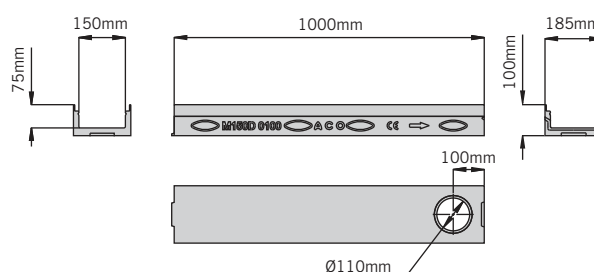
M150D 0.5m constant depth channel

Shallow depth channels with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23156	M150D No. 0100	1000	185	100	75	1	15.0
23157	M150D No. 0100V	1000	185	100	75	1	14.9



M150D 0100 channel.



M150D 0100V channel

Note: The constant depth channels have an improved knockout feature, see page 41 for more information.

* Indicates channels supplied with a preformed Ø160mm knockout for vertical outlet.

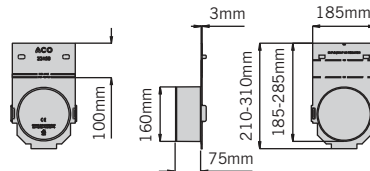
V Indicates channel with cast in TPE triple lipped seals for water tight connection. See page 41 for further information.

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

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

Multifunctional endcap (closing/inlet/outlet)

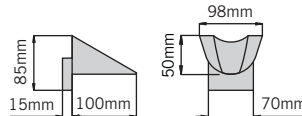
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Spigot length (mm)	Invert Type	Weight (kg)
23159	M150D No. 306 multifunctional endcap	-	185	310/100	75	-	0.3



The multifunctional endcap can be cut down to suit all M150D channels. See page 42 for further information.

Step Connector

Product code	Description	Length (mm)	Width overall (mm)	Stepped depth (mm)	Invert depth (mm)	Invert Type	Weight (kg)
13001	M150D No.123 50mm Step connector	100	98	50	-	-	0.5



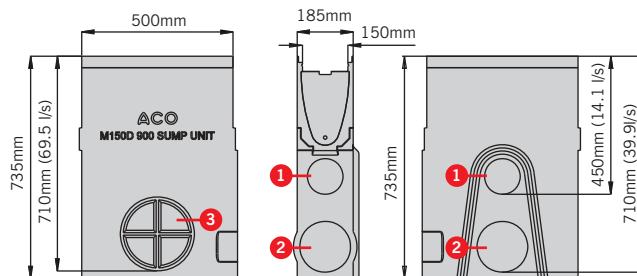
Note: For information on the step connector functionality see page 42.

Sump unit with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23158	M150D universal sump with plastic silt bucket	500	185	735	715	-	43.4

Standard sump outlets

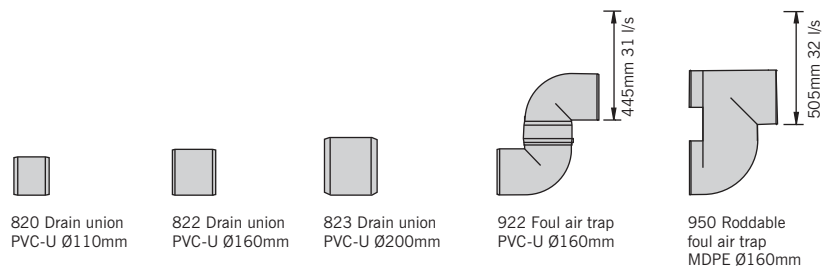
- 1 = Ø110mm outlet with triple lipped seal
- 2 = Ø160mm outlet
- 3 = Ø200mm knockout



Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 43.

Foul air traps

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
0056	820 Drain union PVC-U Ø110mm (max 14.1 l/s)	100	110	-	450	-	0.1
0058	822 Drain union PVC-U Ø160mm (max 39.9 l/s)	100	160	-	710	-	0.5
2723	823 Drain Union PVC-U Ø200mm (max 69.5 l/s)	200	200	-	710	-	0.6
2638	922 Foul air trap PVC-U Ø160mm (max 31 l/s)	-	160	-	445	-	1.9
7932	950 Roddable foul air trap MDPE Ø160mm (max 32 l/s)	-	160	-	505	-	0.8



Note: For ACO Universal Gully details please refer to page 14. For repair kit information please see page 14.

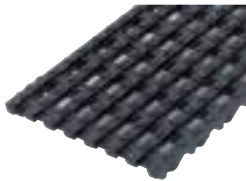
These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

Gratings for use with ACO MultiDrain® M150D channels with UltraSTEEL™ galvanised edge rail

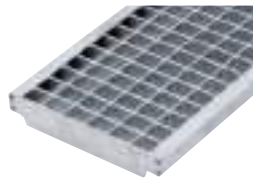


Gratings for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
13073	Intercept ductile iron 13073DL	500	173	21	30 x 12	No	59500	Yes	5.3
13018	Mesh galvanised steel 13018DL	1000	173	30	23 x 17	No	115100	Yes	7.4
13019	Mesh galvanised steel 13019DL	500	173	30	23 x 17	No	115100	Yes	3.7



13073DL
Intercept ductile iron



13018DL / 13019DL
Mesh galvanised steel



Gratings for Load Class D 400* applications

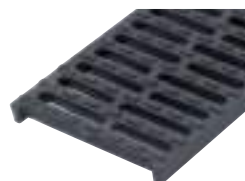
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
23161	Heelguard™ ductile iron 23161DL 	500	173	28	8	Yes	40000	Yes	6.8
23160	Ductile iron solid cover 23160DL	500	173	28	n/a	No	n/a	Yes	7.7
23164	Slotted ductile iron 23164DL	500	173	28	12	No	57664	Yes	6.4



23161DL
Heelguard™ ductile iron



23160DL
Ductile iron solid cover



23164DL
Slotted ductile iron

ACO ATec high performance finish

Gratings for Load Class D 400* applications with ACO ATec corrosion resistant coating



Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area mm²/m	Anti-shunt feature	Weight (kg)
23169	ATec coated Heelguard ductile iron 23169DL 	500	173	28	8	Yes	40000	Yes	6.8



23169DL
Heelguard™ ductile iron



ACO ATec coating is a high performance finish designed for the most demanding of environments. The black corrosion resistant coating provides a strong durable finish which maintains the overall aesthetics of the grating. ACO ATec provides up to 10 times longer protection against corrosion than standard water-based surface coatings

Grating accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23165	Drainlock™ security locking assembly	n/a	n/a	n/a	n/a	n/a	0.1
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	0.2

 Indicates security locking available.

*Not suitable for carriageways of public roads or motorways.

ACO MultiDrain® M150DS channels with stainless steel edge rails

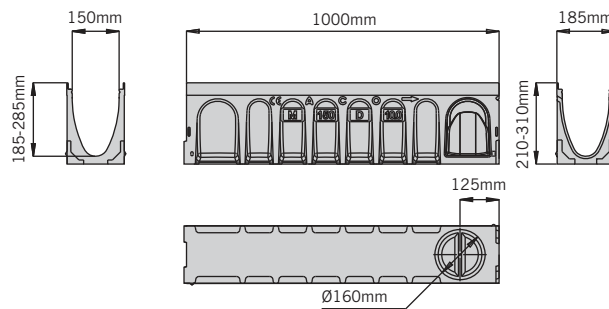
ACO MultiDrain® M150DS channels are manufactured from Vienite®, ACO's sustainable high strength material, which provides high chemical resistance. For improved aesthetics and performance, the channels listed below are provided with integral stainless steel (Grade 304) protective edge rails.

These channels are available in constant depth and shallow depth units.

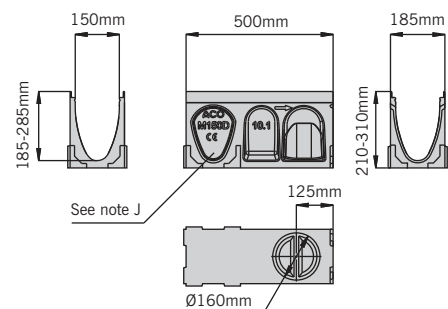
For the ACO MultiDrain® M150DS range of gratings to suit these channels please refer to page 26.

Constant depth channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24150	M150DS No. 0.0*	1000	185	210	185	1/3	25.4
24153	M150DS No. 0.1J*	500	185	210	185	1/3	13.7
24151	M150DS No. 10.0*	1000	185	260	235	1/3	28.0
24154	M150DS No. 10.1J*	500	185	260	235	1/3	15.6
24152	M150DS No. 20.0*	1000	185	310	285	1/3	32.1
24155	M150DS No. 20.1J*	500	185	310	285	1/3	17.4



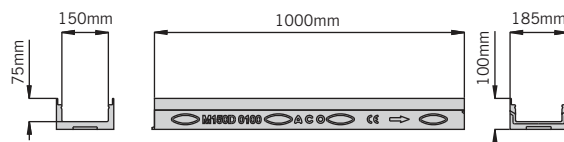
M150DS 1m constant depth channel



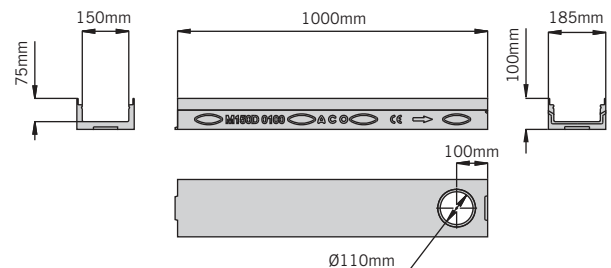
M150DS 0.5m constant depth channel

Shallow depth channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24156	M150DS No. 0100	1000	185	100	75	1	16.7
24157	M150DS No. 0100V	1000	185	100	75	1	15.9



M150DS 0100 channel.



M150DS 0100V channel

Note: The constant depth channels have an improved knockout feature, see page 41 for more information.

* Indicates channels supplied with a preformed Ø160mm knockout for vertical outlet.

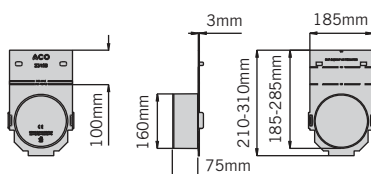
J Indicates side knockout for 90° channel connection. Knockout on both sides of the channel.

V Indicates channel with cast in TPE triple lipped seals for water tight connection. See page 41 for further information.

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

Multifunctional endcap (closing/inlet/outlet)

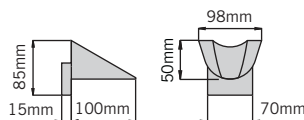
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Spigot length (mm)	Invert Type	Weight (kg)
23159	M150D No. 306 multifunctional endcap	-	185	310/100	75	-	0.3



The multifunctional endcap can be cut down to suit all M150DS channels. See page 42 for further information.

Step Connector

Product code	Description	Length (mm)	Width overall (mm)	Stepped depth (mm)	Invert depth (mm)	Invert Type	Weight (kg)
13001	M150D No.123 50mm Step connector	100	98	50	-	-	0.5



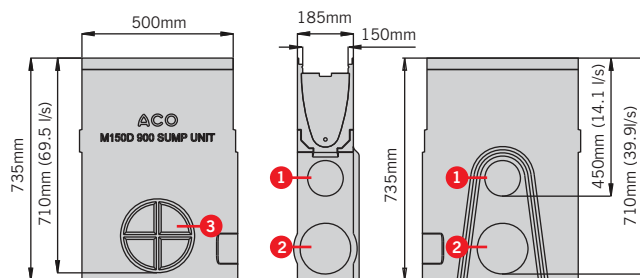
Note: For information on the step connector functionality see page 42.

Sump unit with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24158	M150DS universal sump with plastic silt bucket	500	185	735	715	-	44.5

Standard sump outlets

- ① = Ø110mm outlet with triple lipped seal
- ② = Ø160mm outlet
- ③ = Ø200mm knockout



Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 43.

Note: For ACO Universal Gully details please refer to page 14. For Foul air trap details please refer to page 43.
For repair kit information please see page 14.

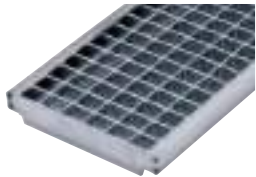
These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

Gratings for use with ACO MultiDrain® M150DS channels with stainless steel edge rails



Grating for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole Ø (mm)	Intake area mm²/m	Anti-shunt feature	Weight (kg)
13048	Mesh stainless steel 13048DL	1000	173	30	23 x 17	115100	Yes	7.4
13049	Mesh stainless steel 13049DL	500	173	31	23 x 17	115100	Yes	3.7



13048DL / 13049DL
Mesh stainless steel

Grating accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
1367	Drainlock™ grating lifting tool 835	n/a	n/a	n/a	n/a	n/a	0.2



1367
Drainlock™ grating lifting tool 835

ACO MultiDrain® M200D channels with UltraSTEEL™ galvanised edge rails

ACO MultiDrain® M200D channels are manufactured from Vienite®, ACO's sustainable high strength material, which provides high chemical resistance. The channels are available in constant depth and shallow depth units.

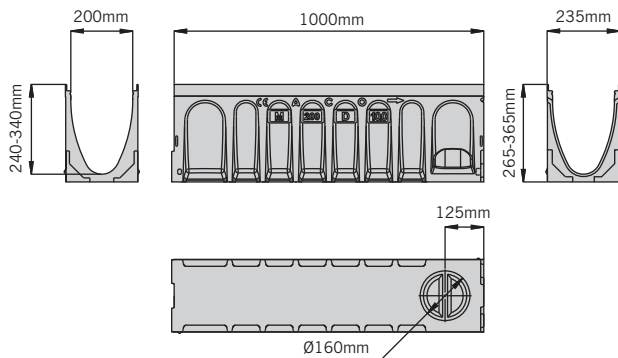
ACO MultiDrain® M200D channels listed below are provided with integral galvanised steel protective edge rails. For enhanced durability these rails are manufactured from UltraSTEEL™, a unique material that has improved strength over plain steel.

The added benefit of UltraSTEEL™ is that its greater surface area improves the bond between rail and adjacent material where a sealed system is required.

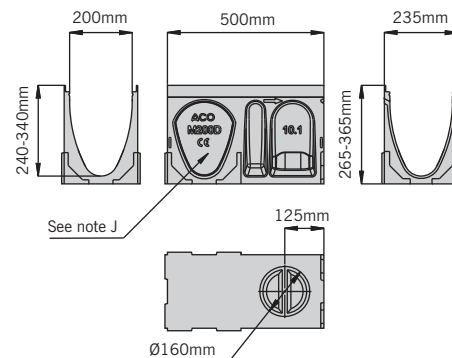
For the ACO MultiDrain® M200D range of gratings to suit these channels please refer to page 29.

Constant depth channels with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23210	M200D No. 0.0*	1000	235	265	240	1/3	33.0
23213	M200D No. 0.1J*	500	235	265	240	1/3	17.9
23211	M200D No.10.0*	1000	235	315	290	1/3	37.4
23214	M200D No. 10.1J*	500	235	315	290	1/3	19.9
23212	M200D No.20.0*	1000	235	365	340	1/3	40.4
23215	M200D No. 20.1J*	500	235	365	340	1/3	21.9



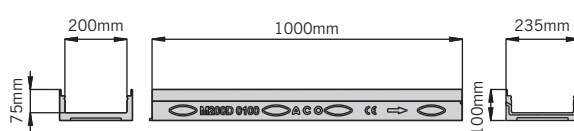
M200D 1m constant depth channel



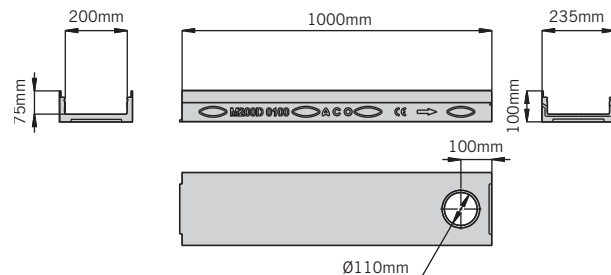
M200D 0.5m constant depth channel

Shallow depth channels with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23216	M200D No. 0100	1000	235	100	75	1	17.5
23217	M200D No. 0100V	1000	235	100	75	1	17.0



M200D 0100 channel



M200D 0100V channel

Note: The constant depth channels have an improved knockout feature, see page 41 for more information.

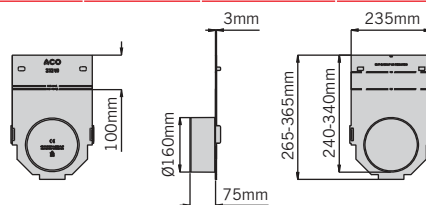
* Indicates channels supplied with a preformed Ø160mm knockout for vertical outlet.

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

V Indicates channel with cast in TPE triple lipped seals for water tight connection. See page 41 for further information.

Multifunctional endcap (closing/inlet/outlet)

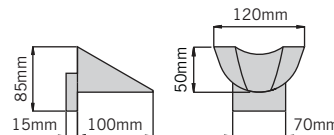
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Spigot length (mm)	Invert Type	Weight (kg)
23219	M200D No. 306 multifunctional endcap	-	235	365/100	75	-	0.4



The multifunctional endcap can be cut down to suit all M200D channels. See page 42 for further information.

Step Connector

Product code	Description	Length (mm)	Width overall (mm)	Stepped depth (mm)	Invert depth (mm)	Invert Type	Weight (kg)
13401	M200D No.123 50mm Step connector	100	120	50	-	-	0.6



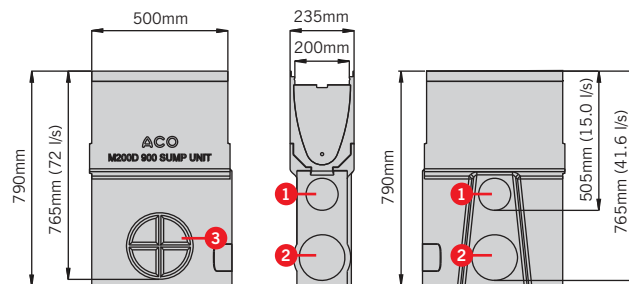
Note: For information on the step connector functionality see page 42.

Sump unit with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23218	M200D universal sump with plastic silt bucket	500	235	790	765	-	47.0

Standard sump outlets

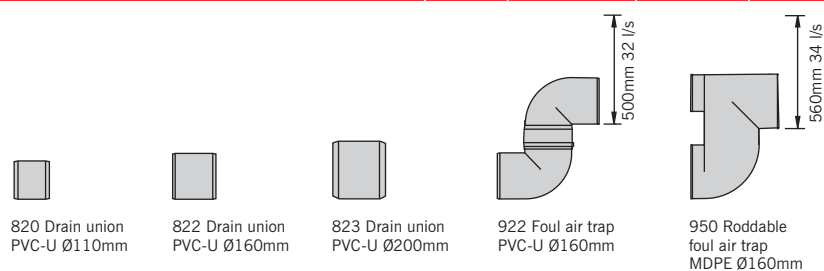
- 1 = Ø110mm outlet with triple lipped seal
- 2 = Ø160mm outlet
- 3 = Ø200mm knockout



Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 43.

Foul air traps

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
0056	820 Drain union PVC-U Ø110mm (max 15.0 l/s)	100	110	-	505	-	0.1
0058	822 Drain union PVC-U Ø160mm (max 41.6 l/s)	100	160	-	765	-	0.5
2723	823 Drain Union PVC-U Ø200mm (max 72 l/s)	200	200	-	765	-	0.6
2638	922 Foul air trap PVC-U Ø160mm (max 32 l/s)	-	160	-	500	-	1.9
7932	950 Roddable foul air trap MDPE Ø160mm (max 34 l/s)	-	160	-	560	-	0.8



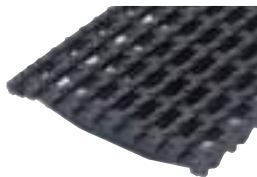
Note: For ACO Universal Gully details please refer to page 14. For repair kit information please see page 14.

Gratings for use with ACO MultiDrain® M200D channels with UltraSTEEL™ galvanised edge rails

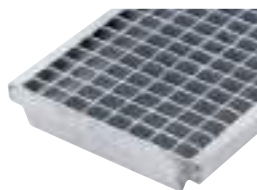


Gratings for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti-shunt feature	Weight (kg)
13473	Intercept ductile iron 13473DL	500	223	35	30 x 14	No	90500	Yes	7.5
13418	Mesh galvanised steel 13418DL	1000	223	40	23 x 17	No	154100	Yes	12.0
13419	Mesh galvanised steel 13419DL	500	223	40	23 x 17	No	154100	Yes	6.0



13473DL
Intercept ductile iron



13418DL / 13419DL
Mesh galvanised steel



Gratings for Load Class D 400* applications

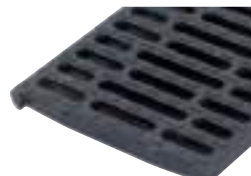
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti-shunt feature	Weight (kg)
23221	Heelguard™ ductile iron 23221DL 	500	223	32	8	Yes	47300	Yes	10.3
23220	Ductile iron solid cover 23220DL	500	223	32	n/a	No	n/a	Yes	11.0
23224	Slotted ductile iron 23224DL	500	223	32	12	No	72400	Yes	9.8



23221DL
Heelguard™ ductile iron



23220DL
Ductile iron solid cover



23224DL
Slotted ductile iron

ACO ATec high performance finish

Gratings for Load Class D 400* applications with ACO ATec corrosion resistant coating



Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti-shunt feature	Weight (kg)
23229	ATec coated Heelguard ductile iron 23229DL 	500	223	32	8	Yes	47300	Yes	10.3



23229DL
Heelguard™ ductile iron



ACO ATec coating is a high performance finish designed for the most demanding of environments. The black corrosion resistant coating provides a strong durable finish which maintains the overall aesthetics of the grating. ACO ATec provides up to 10 times longer protection against corrosion than standard water-based surface coatings

Grating accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23415	Drainlock™ security locking assembly	n/a	n/a	n/a	n/a	n/a	0.1
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	0.2

 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® M200DS channels with stainless steel edge rails

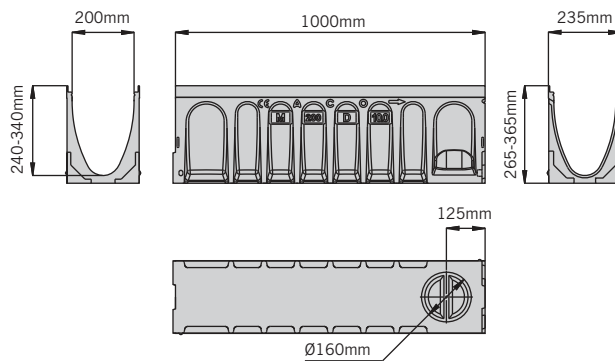
ACO MultiDrain® M200DS channels are manufactured from Vienite®, ACO's sustainable high strength material, which provides high chemical resistance. For improved aesthetics and performance, the channels listed below are provided with integral stainless steel (Grade 304) protective edge rails.

These channels are available in constant depth and shallow depth units.

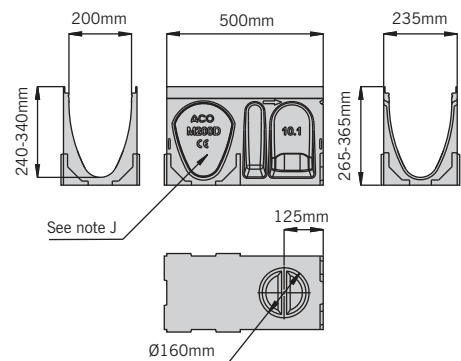
For the ACO MultiDrain® M200DS range of gratings to suit these channels please refer to page 32.

Constant depth channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24210	M200DS No. 0.0*	1000	235	265	240	1/3	34.8
24213	M200DS No. 0.1J*	500	235	265	240	1/3	18.9
24211	M200DS No. 10.0*	1000	235	315	290	1/3	39.2
24214	M200DS No. 10.1J*	500	235	315	290	1/3	20.9
24212	M200DS No. 20.0*	1000	235	365	340	1/3	42.2
24215	M200DS No. 20.1J*	500	235	365	340	1/3	22.9



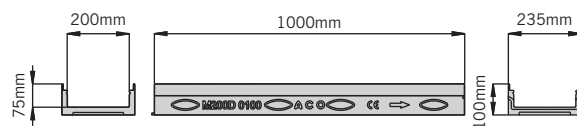
M200DS 1m constant depth channel



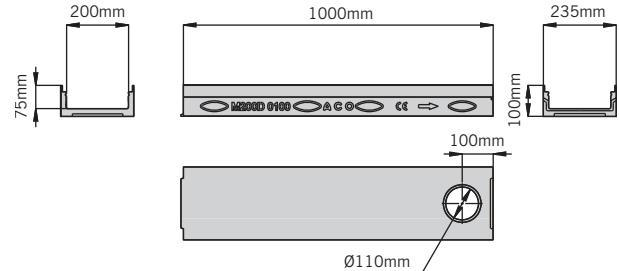
M200DS 0.5m constant depth channel

Shallow depth channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24216	M200DS No. 0100	1000	235	100	75	1	19.4
24217	M200DS No. 0100V	1000	235	100	75	1	18.7



M200DS 0100 channel



M200DS 0100V channel

Note: The constant depth channels have an improved knockout feature, see page 41 for more information.

* Indicates channels supplied with a preformed Ø160mm knockout for vertical outlet.

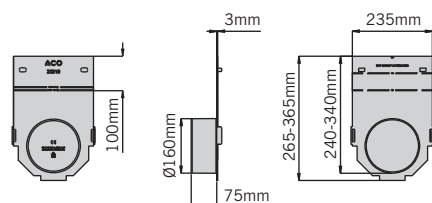
J Indicates side knockout for 90° channel connection. Knockout on both sides of the channel.

V Indicates channel with cast in TPE triple lipped seals for water tight connection. See page 41 for further information.

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

Multifunctional endcap (closing/inlet/outlet)

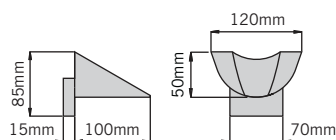
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Spigot length (mm)	Invert Type	Weight (kg)
23219	M200D No. 306 multifunctional endcap	-	235	365/100	75	-	0.4



The multifunctional endcap can be cut down to suit all M200DS channels. See page 42 for further information.

Step Connector

Product code	Description	Length (mm)	Width overall (mm)	Stepped depth (mm)	Invert depth (mm)	Invert Type	Weight (kg)
13401	M200D No.123 50mm Step connector	100	120	50	-	-	0.6



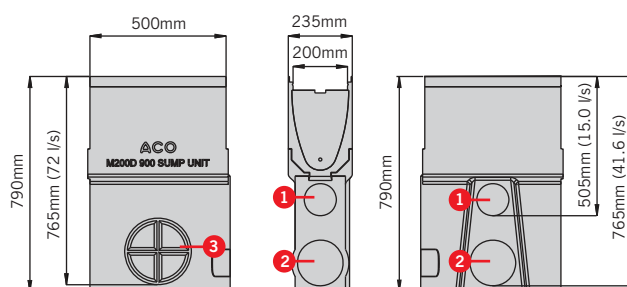
Note: For information on the step connector functionality see page 42.

Sump unit with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24218	M200DS universal sump with plastic silt bucket	500	235	790	765	-	48.0

Standard sump outlets

- ① = Ø110mm outlet with triple lipped seal
- ② = Ø160mm outlet
- ③ = Ø200mm knockout



Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 43.

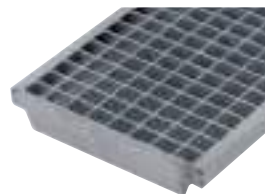
Note: For ACO Universal Gully details please refer to page 14. For repair kit information please see page 14.
For Foul air trap details please refer to page 43.

Gratings for use with ACO MultiDrain® M200DS channels with stainless steel edge rails



Grating for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole Ø (mm)	Intake area mm/m²	Anti-shunt feature	Weight (kg)
13448	Mesh stainless steel 13448DL	1000	223	40	23 x 17	154100	Yes	12.0
13449	Mesh stainless steel 13449DL	500	223	40	23 x 17	154100	Yes	6.0



13449DL / 13448DL
Mesh stainless steel

Grating accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
1367	Drainlock™ grating lifting tool 835	n/a	n/a	n/a	n/a	n/a	0.2



1367
Drainlock™ grating lifting tool 835

ACO MultiDrain® MD stainless steel gratings are manufactured from Grade 304 stainless steel and are fitted with ACO Drainlock™ as standard. See page 15 for installation details.

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

Problem solving drainage solutions: Discreet slot drainage



ACO MULTIDRAIN MD
BRICKSLOT



ACO MultiDrain® MD has a range of gratings to complement installations which require discreet slot drainage.

Designed as standard with a heelguard 10mm off set drainage inlet, ACO Brickslot is a subtle and unobtrusive grating which when combined with an ACO MultiDrain® MD channel, can be used as a solution to complement discreet drainage applications and is ideal for use against buildings facades.

Compatible with most paving materials, the vertical sides of the grating enable pavements to be laid directly to the unit's edge. Once installed the system is totally secure and not vulnerable to vandalism or loose grates making it a suitable for applications such as schools and playgrounds where grating removal can become a hazard.

The channel and ACO Brickslot grating together provide an unobtrusive continuous slot drainage system, with high hydraulic efficiency for fast removal of surface water. ACO Brickslot gratings are available in galvanised or stainless steel and suitable for use with the 100mm, 150mm and 200mm wide channels in the ACO MultiDrain® MD range.

The system includes an ACO Brickslot access unit to ensure easy maintenance and access to the drainage system, and is also fully compatible with the range of ACO MultiDrain® MD accessories.

The system is suitable for applications up to and including Load Class D400 (This product is not suitable for carriageways of public roads or motorways).

- ✓ Galvanised steel
- ✓ Stainless steel
- ✓ Access units



C 250



D 400

Load class

Applications

- Threshold drainage
- Public landscaping
- Car parking
- Light industrial
- HGV parking
- Petrol station forecourts
- SuDS

Discreet slot drainage gratings

The ACO Brickslot gratings are available in two material finishes, hot –dipped galvanised and stainless steel (Grade 304), to suit the ACO MultiDrain® M100D/M100DS, M150D/M150DS and M200D/M200DS wide channels.

The off set grating has a heelguard 10mm drainage inlet, which is compatible with most types of pavements, setts, block and flags up to a maximum of 100mm depth.

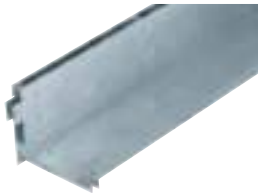
The ACO Brickslot gratings are listed in the charts below and are sold separately to the channel units. For information on the ACO MultiDrain® M100D/M100DS, M150D/M150DS and M200D/M200DS wide channels. Please refer to pages 12 and 30.

ACO Brickslot gratings suitable for use with ACO MultiDrain® M100D/M100DS

Gratings for Load Class C 250 applications



Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Weight (kg)
23460	Brickslot galvanised steel 23460	1000	123	105	10	Yes	10000	6.6
23461	Brickslot galvanised steel 23461	500	123	105	10	Yes	10000	3.4

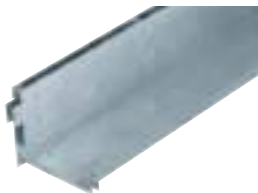


23460 / 23461
Brickslot galvanised steel

Gratings for Load Class D 400* applications



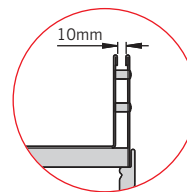
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Weight (kg)
23465	Brickslot galvanised steel 23465	1000	123	105	10	Yes	10000	6.7
23466	Brickslot galvanised steel 23466	500	123	105	10	Yes	10000	3.4
23475	Brickslot stainless steel 23475	1000	123	105	10	Yes	10000	6.6
23476	Brickslot stainless steel 23476	500	123	105	10	Yes	10000	3.5



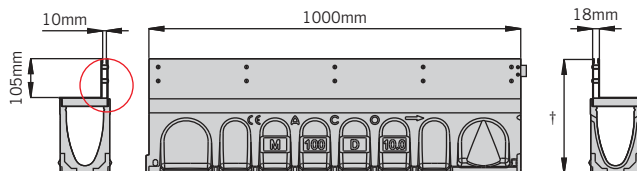
23465 / 23466
Brickslot galvanised steel



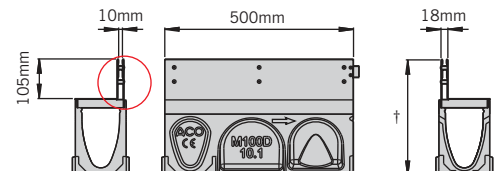
23475 / 23476
Brickslot stainless steel



Slot detail



M100D 1m constant depth channel with ACO Brickslot grating



M100D 0.5m constant depth channel with ACO Brickslot grating

Note: To obtain the overall height (marked †) add 105mm to the overall channel depth.
The overall depth of each channel can be found in the channel tables in this brochure.
*Not suitable for carriageways of public roads or motorways.

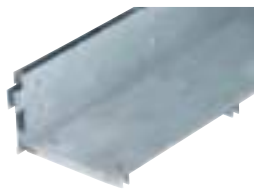
These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

ACO Brickslot gratings suitable for use with ACO MultiDrain® M150D/M150DS

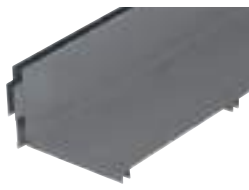


Gratings for Load Class D 400* applications

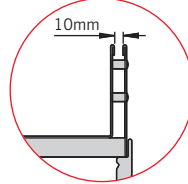
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Weight (kg)
23175	Brickslot galvanised steel 23175	1000	173	105	10	Yes	10000	7.7
23176	Brickslot galvanised steel 23176	500	173	105	10	Yes	10000	3.9
23185	Brickslot stainless steel 23185	1000	173	105	10	Yes	10000	8.0
23186	Brickslot stainless steel 23186	500	173	105	10	Yes	10000	4.1



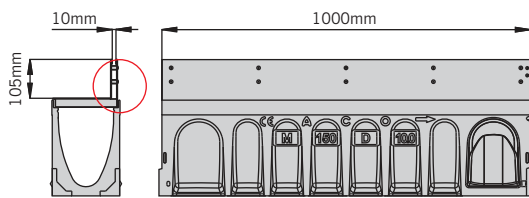
23175 / 23176
Brickslot galvanised steel



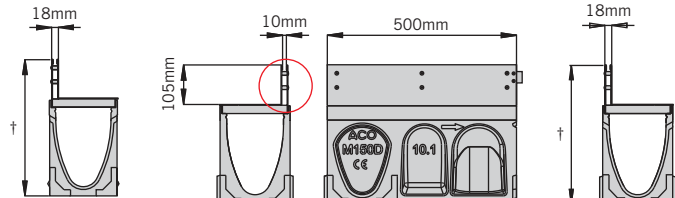
23185 / 23186
Brickslot stainless steel



Slot detail



M150D 1m constant depth channel with ACO Brickslot grating



M150D 0.5m constant depth channel with ACO Brickslot grating

ACO Brickslot grating suitable for use with ACO MultiDrain® M200D/M200DS



Gratings for Load Class D 400* applications

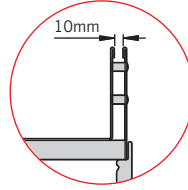
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Weight (kg)
408995	Brickslot galvanised steel	1000	223	105	10	Yes	10000	9.8
408996	Brickslot galvanised steel	500	223	105	10	Yes	10000	4.8
408998	Brickslot stainless steel	1000	223	105	10	Yes	10000	9.8
408999	Brickslot stainless steel	500	223	105	10	Yes	10000	4.8



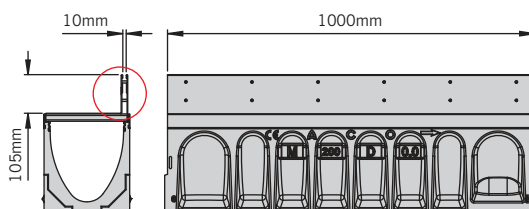
408995/408996 Brickslot
galvanised steel



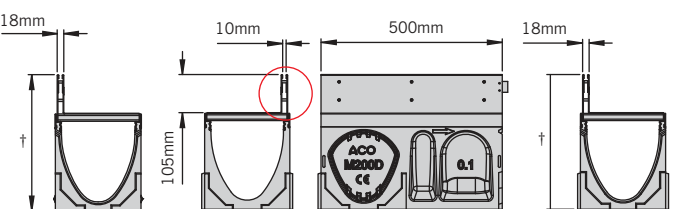
408998/408999 Brickslot
stainless steel



Slot detail



M200D 1m constant depth channel with ACO Brickslot grating



M200D 0.5m constant depth channel with ACO Brickslot grating

Note: To obtain the overall height (marked †) add 105mm to the overall channel depth.
The overall depth of each channel can be found in the channel tables in this brochure.
*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.

Discreet slot drainage access units

The ACO Brickslot grating system has an access unit for easy maintenance and cleaning of the drainage system.

The access unit is positioned within the channel; it has a removable tray section which is lifted out of the frame by a lifting tool to gain access to the system.

The access unit is 0.5m in length and is available in the galvanised and stainless steel finishes and is suitable for use with any ACO MultiDrain® M100D/M100DS, M150D/M150DS and M200D/M200DS wide channels.

The unit has a heelguard 10mm off set drainage inlet, providing continuous aesthetic and drainage performance once installed with the drainage system.

The ACO Brickslot access units are listed in the charts below and are sold separately to the channel units. For information on the ACO MultiDrain® M100D/M100DS, M150D/M150DS and M200D/M200DS wide channels. Please refer to pages 14 and 30.

ACO Brickslot Access covers suitable for use with ACO MultiDrain® M100D/M100DS

Access covers 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)	Weight (kg)
23462	Brickslot access unit galvanised steel 23462	500	123	105	10	10000	6.6



23462
Brickslot access unit
galvanised steel.

Access covers for Load Class D 400*



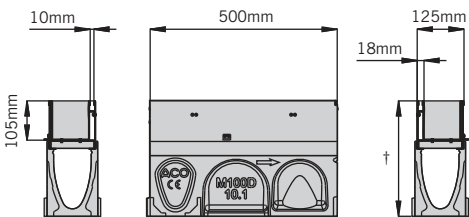
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area (mm²/m)	Weight (kg)
23467	Brickslot access unit galvanised steel 23467	500	123	105	10	10000	6.4
23477	Brickslot access unit stainless steel 23477	500	123	105	10	10000	6.2



23467
Brickslot access unit
galvanised steel.



23477
Brickslot access unit
stainless steel



M100D 0.5m constant depth channel with
ACO Brickslot access unit

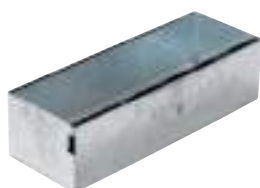
Note: To obtain the overall height (marked †) add 105mm to the overall channel depth.
The overall depth of each channel can be found in the channel tables in this brochure.
*Not suitable for carriageways of public roads or motorways.

ACO Brickslot access units for use with ACO MultiDrain® M150D/M150DS

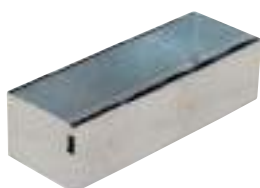


Access units for Load Class D 400* applications

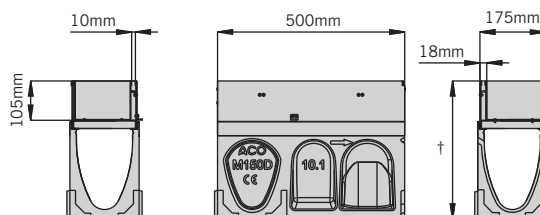
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area (mm²/m)	Weight (kg)
23177	Brickslot access unit galvanised steel 23177	500	173	105	10	10000	7.0
23187	Brickslot access unit stainless steel 23187	500	173	105	10	10000	7.2



23177
Brickslot access unit
galvanised steel.



23187
Brickslot access unit
stainless steel



M150D 0.5m constant depth channel with
ACO Brickslot access unit

ACO Brickslot access units for use with ACO MultiDrain® M200D/M200DS



Access units for Load Class D 400* application

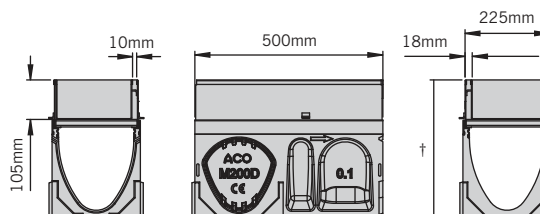
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area (mm²/m)	Weight (kg)
408997	Brickslot access unit galvanised steel 408997	500	223	105	10	10000	8.5
409000	Brickslot access unit stainless steel 409000	500	223	105	10	10000	8.5



408997
Brickslot access unit
galvanised steel.



409000
Brickslot access unit
stainless steel



M200D 0.5m constant depth channel with
ACO Brickslot access unit

Removal instructions.

To remove the ACO Brickslot access unit tray, insert the lifting tools as shown in figure 1. Then lift the tray vertically from the frame (figure 2). Details on the lifting tools can be found on page 17.



Figure 1



Figure 2

Note: To obtain the overall height (marked †) add 105mm to the overall channel depth.
The overall depth of each channel can be found in the channel tables in this brochure.
*Not suitable for carriageways of public roads or motorways.

Channel footpath drainage



CHANNEL FOOTPATH
DRAINAGE



Load class

Specifically for use where roof drainage from down pipes is required to cross the footpath into the road gutter, ACO MultiDrain® M100D/M100DS systems has a range of accessories to construct a footpath drainage system.

This system is suitable for Load Class D 400 applications.



The ACO MultiDrain® M100D/M100DS system includes a range of accessories which provide a drainage solution ideal for areas where down pipes from roofs and gutters exit on to the pavement. The ACO Channel Footpath drainage system effectively carries water away from paved areas and across into the adjacent carriageway.

The system uses ACO MultiDrain® M100D/M100DS shallow depth channels and has two types of kerb outlets and down pipe connectors to suit application requirements.

Shallow channels

ACO MultiDrain® MD shallow depth channels are available in two sizes, 75mm and 100mm total depths (ACO M100D / M100DS 075 and ACO M100D / M100DS 0100) and have the option of galvanised or stainless steel edge rails.

Downpipe connectors

Two down pipe connectors are available to suit channel depth. Manufactured from grey polymer concrete the down pipe connector has a clear opening of Ø75mm and connects to down pipes with outside diameters of up to 82mm.

Kerb outlets

Two outlets are available to suit the kerb profile of the application, a CFD half battered kerb outlet to suit standard HB kerbs and a CFD Bull nose kerb outlet to match BN kerbs. Manufactured from grey polymer concrete the kerb outlets allow rainwater to discharge into the road gutter from this system.

Gratings

Traditionally solid ductile iron covers are selected in channel footpath drainage applications but all ACO MultiDrain® M100D/M100DS gratings are suitable for use with this system. The system's load class rating is determined by the grating selected, further information of gratings within the range can be found on pages 16-20.



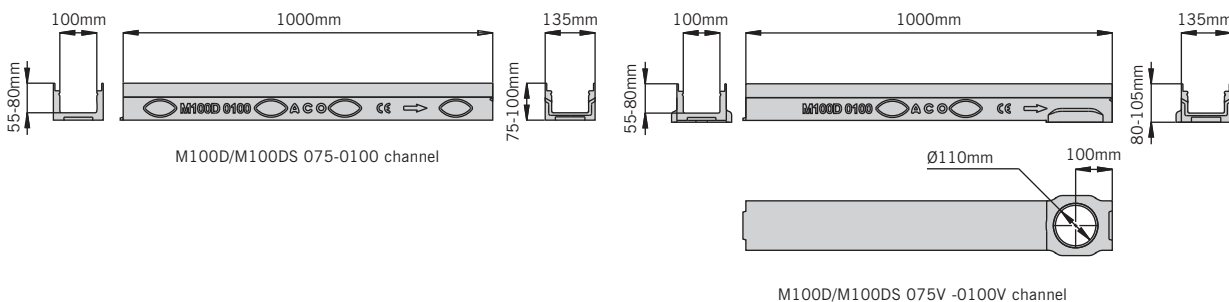
23406DL
Ductile iron solid cover

ACO MultiDrain® M100D shallow depth channels with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23075	M100D No. 075	1000	135	75	55	1	9.2
23076	M100D No. 075V	1000	135	75*	55	1	8.9
23110	M100D No. 0100	1000	135	100	80	1	11.0
23111	M100D No. 0100V	1000	135	100*	80	1	10.7

ACO MultiDrain® M100DS shallow depth channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24075	M100DS No. 075	1000	135	75	55	1	10.9
24076	M100DS No. 075V	1000	135	75*	55	1	10.6
24110	M100DS No. 0100	1000	135	100	80	1	12.7
24111	M100DS No. 0100V	1000	135	100*	80	1	12.4



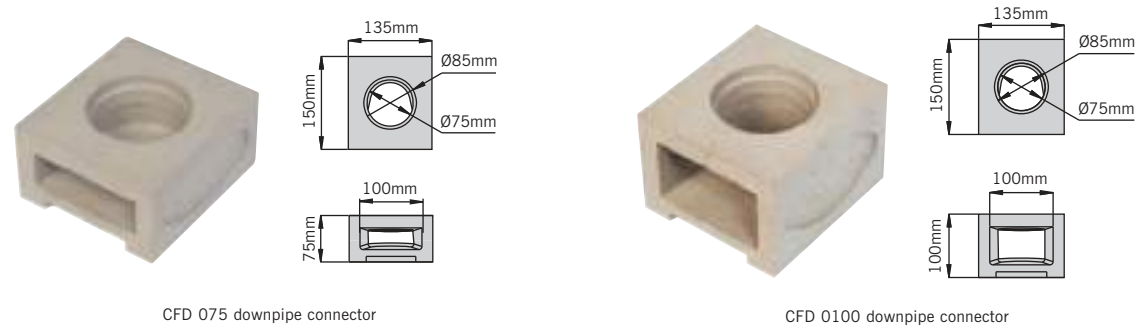
Note: V Indicates channel with cast in triple lipped seals for water tight connection. See page 41 for further details.

* 075V and 0100V channels have a depth overall around the outlet of 80mm (075V) and 105 (0100V).

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

Down pipe connectors

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23450	CFD075 downpipe connector grey	150	135	75	n/a	n/a	2.4
23451	CFD0100 downpipe connector grey	150	135	100	n/a	n/a	3.0

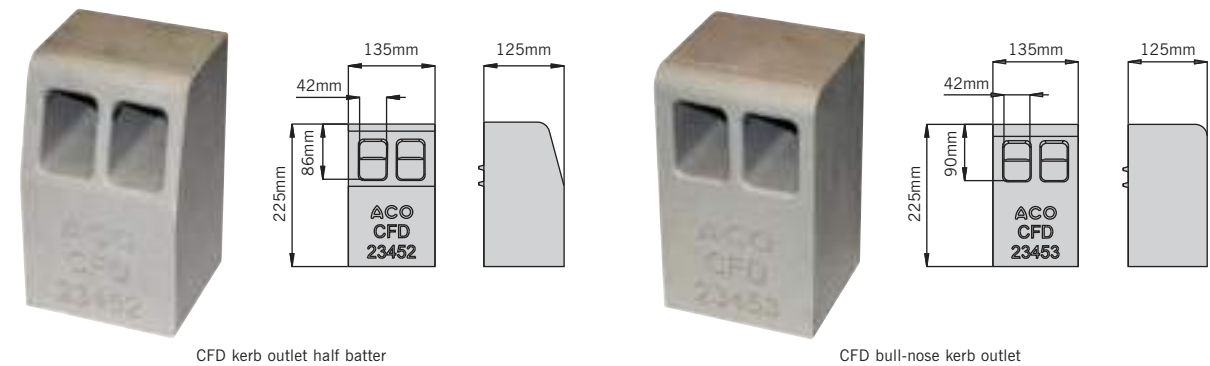


CFD 075 downpipe connector

CFD 0100 downpipe connector

Kerb outlet profiles

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23452	CFD kerb outlet half batter grey	125	135	225	n/a	n/a	6.7
23453	CFD kerb outlet bull nose grey	125	135	225	n/a	n/a	7.0



CFD kerb outlet half batter

CFD bull-nose kerb outlet

Preparing the system for installation

Channel base knockout details

All ACO MultiDrain® MD constant depth channels in the height range 0.0 to 30.0 are supplied with a pre formed knockout detail in the base of the channels. This knockout detail positioned at the male end of the channel allows a vertical connection to be made from the channel to a Ø110mm (100mm wide bore) or Ø160mm (150mm and 200mm wide bore) PVC-U pipe system. The knockout detail on the base of the channel is indicated by a "hammer" symbol. The method of removal and pipe connection is described below.



Knockout detail.

Channel side wall connection detail

An additional feature provided on all 500mm long channels are removable side wall panels, which allow channel runs to be connected together to form "T" or "L" junctions for continuous water flow through the system. Where channel connections are to be made to the side wall of these units a female joint detail is provided to aid alignment and fast installation.



Removable side wall panel.

Shallow Channels

The ACO MultiDrain® MD shallow channels are available in either 75mm or 100mm overall depths. These units are ideal for use where installation depths are restricted such as in structural slabs, bridge decks and roofs. All units can be sealed for watertight installations as each unit is supplied with a preformed sealant groove (see section headed watertight sealing for further details).

The shallow channels identified with a "V" such as the 075V and 0100V units have a cast-in triple lipped seal in their base for push fit watertight connections to Ø110mm PVC-U pipe. These triple lipped seals are manufactured from SEBS-TPE have excellent chemical, UV and weather resistance.



FUNCTIONS:

Step 1: Pre formed knockout detail



Step 2: Support channel around knockout detail by placing the channel on sand or soft earth for example. Tap the knockout panel from the side indicated by the Hammer symbol to remove panel.



Step 3: Push fit pipe into recess provided and seal as required. For recommended sealants refer to the section headed "watertight sealing".



FUNCTIONS:

Step 1: Using a disc cutter as shown, cut a cross into the panel provided. Ensure cuts extend to but not beyond the perimeter recess surrounding the removable panel.



Step 2: Tap segments of panel between the cuts to remove the panel.



Step 3: Use a chisel to tidy up any remaining material. Channel connection can now be made and sealed as required.



FUNCTIONS:

Step 1: Ensure Triple lipped seal and pipe spigot are clean and free from debris.



Step 2: Lubricate joint faces as required and push fit pipe into the seal. The pipe is fully fitted when the end of the pipe is flush with the internal base of the channel.



Step connector

Each width of MultiDrain® MD has available a step connector manufactured from polymer concrete. This unit is used between constant depth channel joints where a stepped fall channel installation is required and takes up the 50mm height difference between units. The step connector ensures a smooth water flow within the channel system.



FUNCTIONS:

Step 1: Place step connector into the base of the deeper channel to be joined as shown.



Step 2: Push channel joint together to lock step connector in place forming a smooth transition between units as shown.



Watertight sealing

ACO MultiDrain® MD channels are generally installed without a particular water seal. Once butt jointed and with a concrete surround a fairly watertight installation is achieved. If however a water tight system is required each MultiDrain® MD channel is provided with a sealant groove allowing the system to be sealed by the application of a flexible sealant either during or following installation. For rainwater applications we recommend a single component, polyurethane based elastomeric joint sealant such as BASF Masterflex 472 or Sika Sikaflex 11FC or similar.



Application of sealant to be in accordance with the sealant manufacturers recommendations, but for guidance a typical method of application is as follows.

FUNCTIONS:

Step 1: Jointing faces of the channels to be sound and cleaned to remove all loose material, dust, oil and grease. This can be done by the use of a wire brush.



Step 2: Butt joint the channels & install as per ACO installation instructions. Ensuring joints are still clean (surfaces can be damp but no water droplets should be evident) apply sealant with a cartridge gun approximately 5mm thick to the end face of the channel & completely fill the sealant groove. Note this type of channel can be sealed either at or following installation.

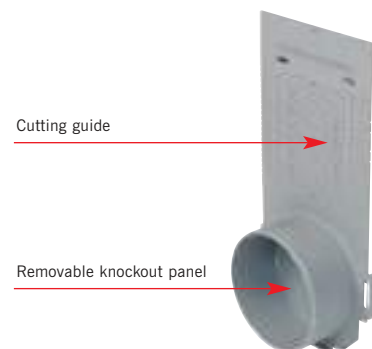


Step 3: Wipe excess sealant from the inside faces of the channel & inspect sealant groove to ensure it has been fully filled with sealant. Leave sealant to cure before use as per the sealant manufactures recommendations.



Multifunctional endcap

A Multifunctional endcap is provided for each channel width that is designed to be used with all channel heights in each range. Manufactured from polypropylene these versatile endcaps can be adjusted on site to perform the function of a closing endcap or as an inlet/outlet endcap for connection to Ø110mm (100mm wide bore) or Ø160mm (150mm and 200mm wide bore) PVC-U pipe.



FUNCTIONS:

Closing endcap: The endcap supplied fits directly to the deepest channel within the system. All other channel heights can be accommodated by simply cutting the endcap to suit. A cutting guide is printed on the front of the endcap plate. The endcap is fastened to the channel by two clips and can be connected to either male or female channel end.



Adjusting endcap.

Fitting endcap to channel

Inlet & Outlet endcap: The endcap has a knockout panel which can be removed with a hammer. Once fitted to the channel the endcap performs either an inlet or outlet function and is designed to provide a connection to Ø110mm (100mm wide bore) or Ø160mm (150mm and 200mm wide bore) PVC-U pipes.

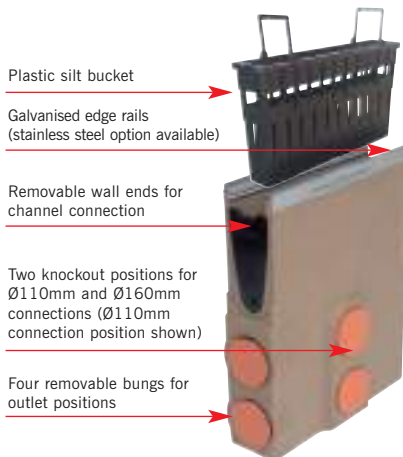


Removing knockout panel

Pipe connection to endcap

Sump unit

A polymer concrete chamber unit which provides the capacity to hold water and silt, and also provides an outlet for the channel system.



Roddable foul air traps

A drain connector available in Ø110mm and Ø160mm for connection to foul or combined drainage. Foul air traps come complete with removable bung for rodding and are manufactured from highly durable recyclable MDPE.



ACO Universal gully

A recycled plastic & ductile iron modular system purposely designed for use with ACO channel drainage systems up to 200mm internal width. The system provides a high capacity for retaining water and also an outlet for the drainage system.



FUNCTIONS:

Step 1: Triple lipped seals for watertight connections



Step 2: Unit wall ends can easily be removed using knife or saw



Step 3: Two knockouts for Ø110mm and Ø160mm pipe connections. For knockout removal refer to method stated on page 41 headed 'Channel side wall connection detail'.



FUNCTIONS:

Step 1: Push the foul air trap into place.



Step 2: Bung can be removed for rodding



FUNCTIONS:

Step 1: Once installed ACO Universal Gully can be cut to match channel depth



Step 2: The cut ACO Universal Gully matches the profile of the ACO MultiDrain® MD channel.



Note: Full installation details are available to download from www.aco.co.uk



ACO's Polymer concrete repair kit is available for bonding applications, for instance where a mitred channel joint is to be made or for the repair of small areas of aesthetic damage. For further product details please see page 14.



Designing an ACO MultiDrain® MD drainage system

ACO Technologies online Hydraulic Design Software has been developed to give specifying engineers the option of designing and selecting the most appropriate channel drainage system for themselves, or using the tool in partnership with our dedicated Technical and Design Service. Using differential equations for spatially varied flow, this free online tool calculates the hydraulic capacity of channels accepting flow along their entire length. The software accurately analyses flow in the selected channel to check it has sufficient capacity. Furthermore it can optimise the selection and potentially downsize all or part of a channel run if it is oversized.

Designing a drainage system

The designer must input the rainfall intensity and total catchment area draining to each run of channel to calculate inflow to that channel system.

For normal situations Building Regulations (Approved Document Part H, 2015) suggests a default value of 50 mm/hour rainfall intensity should be an appropriate for catchments <4,000m². For larger drainage areas the designer should refer to BS 752

Where a specifier seeks to design their project in accordance with National Planning Policy Framework and to Sewers for Adoption (7th edition) they will need to manage rainfall runoff at source, and consider incorporating a Sustainable Drainage System in their design. They will also need to consider the effects of climate change on changing rainfall patterns and intensities over the lifetime of the development.



It should be noted that other calculation methods will not give the correct results for channel drainage systems. In particular the use of equations of steady uniform flow, such as Manning's equation, is not appropriate for channel drainage design. They will not work with level channels and give grossly inaccurate results at shallow gradients.

Using Flood Studies Report procedures to analyse rainfall frequency, intensity and duration, the Design Software allows the specifier to change the selected storm intensity and duration to the required standard (e.g. to the 1 in 30 and 1 in 100 year return periods), and to make allowance for the effects of climate change on rainfall over the lifetime of the development.

The design software also allows the end user to estimate alternative storage requirements.

ACO can also provide specifiers with conduit files for use in proprietary software like Micro Drainage. Please contact the Design Services Team if you require any further information.

ACO Water Management Design Services Team

ACO has embraced the concept of value engineering as an approach to on-site construction that saves both time and money. ACO will review any design to minimise the total scheme and life cost of a proposal. By using ACO MultiDrain® MD water can be contained and conveyed close to the surface, which accords with the principles advocated for Sustainable Drainage (SuDS Manual, 2015), by removing the need for pumping.

For detailed designs using the ACO Hydraulic Design Software, 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.

To enable the designer to complete manual calculations ACO has published hydraulic performance tables within this document to facilitate a quick manual design method for the determination of your drainage requirements.

ACO Water Management Design Services Team

Tel: 01462 816666
Email: technical@aco.co.uk



ACO Hydraulic Design Software

Discover how our free design software allows you to create more effective hydraulic plans.

- ▶ All designs are securely stored and easily accessed online
- ▶ Data always up-to-date
- ▶ Proven calculation methodology - more accurate and efficient designs
- ▶ Flexible catchment design
- ▶ Integrated rainfall data
- ▶ Automated product optimisation
- ▶ PDF summary documents



Register Now - It's Free
www.acodesign.co.uk

Design method

ACO MultiDrain® MD channels are available in three widths (100mm, 150mm and 200mm) and each width is available in several depths of constant invert channel. The channels can be in runs of constant invert depth (Type 1) or in a stepped series of invert depths (Type 3). The 100mm wide M100D channel is also available with a pre-sloped invert to form channel runs of 0.5% invert slope at up to 20m length (Type 2). The run lengths of pre-sloped invert can be extended by incorporating lengths of constant invert channel.

Whilst channel can be laid flat, where longitudinal falls do exist the hydraulic capacity of the system will be increased, therefore allowing greater spacing between outfalls.

Analysis of channel hydraulic capacity requires the use of a proprietary software programme like ACO Hydro, or ACO Technologies new online Design Software. Our new Design Software enables users to develop an optimised design of stepped sizes of channels, increasing in size down the run of the channel. For more information visit www.aco.co.uk

For detailed designs using ACO Hydro or Design Software, please contact the ACO Water Management Design Services team. The team may also be consulted for advice where the inflow is not uniformly distributed along the channel and for channels with pre-sloped inverts.

The tables on the following page have been produced from the ACO Hydro software to facilitate a quick manual design method for the determination of the drainage requirements.

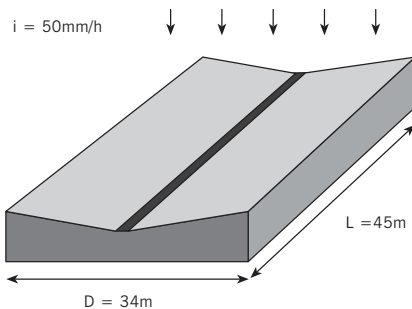
The columns of drainage catchment area ($A \text{ m}^2$) are based on a rainfall intensity of 50mm/h, but can be adapted for use at any rainfall intensity. The columns of maximum flow rate ($Q \text{ l/s}$) and maximum lateral inflow ($q \text{ l/s/m}$) can be used at any rainfall intensity. The table of sloping invert channel capacities can be used for the design of M100D sloping invert channels.

ACO Water Management Design Services Team

Tel: 01462 816666

Email: technical@aco.co.uk

DESIGN EXAMPLE



For a design of MultiDrain® M100D, assume the following figures:

$D = 34\text{m}$ (depth of catchment area)

$L = 45\text{m}$ (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 50mm/h for areas where some ponding could be tolerated for a few minutes after heavy rainfall, or 75mm/h where ponding cannot normally be tolerated.

1. Determine the area

Area = $L \times D = 45 \times 34 = 1530\text{m}^2$

For a quick analysis, see the tables and the columns for Area.

1530m² is too large for one 45m run of ACO MultiDrain® M100D

Try $1530 \times 1/2 = 765\text{m}^2$

$L \times 1/2 = 23\text{m}$

Estimating between the rows for 20m and 30m lengths

One 23m run of ACO MultiDrain® M100D 20.0 can drain approx 800m²

Hence two runs can drain the 1530m²

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

2. Determine total flow (Q)

$Q = (\text{Area} \times i) / 3600 = (1530 \times 50) / 3600 = 21.3 \text{ l/s}$

3. Determine lateral inflow (q)

$q = Q / L = 21.3 / 45 = 0.473 \text{ l/s/m}$

4. Determine suitable channel sizes and lengths

For example, would a sump at 1/3 length work with a lateral inflow of 0.473 l/s/m? 1/3 $L = 15\text{m}$, ACO MultiDrain® MD 10.0 will be adequate

2/3 $L = 30\text{m}$, ACO MultiDrain® MD 30.0 will be adequate

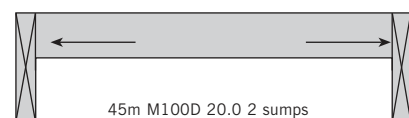
5. Check Outlet capacity

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

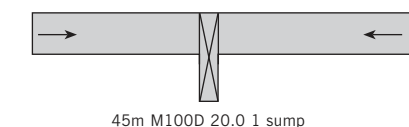
6. Solutions

Three options are sketched (right). There are other options, including M100D sloping invert channels or a 45m length run to an outfall using M150D 20.0 channels.

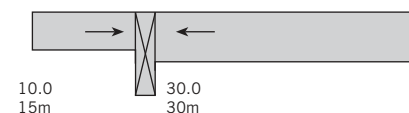
Option 1



Option 2



Option 3



X Denotes sump unit

Hydraulic Performance Tables (for lateral flow)

Notes for ACO MultiDrain® M100D 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.

The maximum possible catchment depth is $q \div i$, where i is the rainfall intensity in l/s/m².

A (m²) is the maximum area that can be drained at a rainfall intensity of 50mm/h (0.014 l/s/m²).

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 stepped or sloping inverts, 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.

ACO M100D constant depth channels

M100D 0.0 Overall depth 150mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)
5	5.3	1.05	378	5.3	1.05	378	5.9	1.18	425
10	4.9	0.49	353	5.5	0.55	396	6.6	0.66	475
15	4.8	0.32	346	5.7	0.38	410	7.1	0.47	508
20	4.5	0.23	324	5.9	0.30	425	7.4	0.37	533
25	4.3	0.17	307	6.1	0.24	437	7.8	0.31	558
30	4.2	0.14	302	6.2	0.21	449	8.0	0.27	572
35	4.0	0.12	290	6.3	0.18	454	8.1	0.23	580
40	4.0	0.10	285	6.4	0.16	461	8.2	0.21	590
45	3.8	0.09	275	6.4	0.14	463	8.3	0.19	599
50	3.8	0.08	270	6.5	0.13	468	8.5	0.17	612
55	3.6	0.07	261	6.5	0.12	471	8.5	0.15	612
60	3.6	0.06	261	6.5	0.11	471	8.5	0.14	612

M100D 10.0 Overall depth 200mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)
5	9.0	1.80	648	9.0	1.80	648	10.0	2.00	720
10	8.4	0.84	605	9.4	0.94	677	11.0	1.10	792
15	8.1	0.54	583	9.8	0.65	702	11.6	0.77	832
20	7.7	0.39	554	9.8	0.49	706	12.0	0.60	864
25	7.4	0.30	531	10.0	0.40	720	12.5	0.50	900
30	7.2	0.24	518	10.2	0.34	734	12.6	0.42	907
35	7.0	0.20	504	10.3	0.30	743	13.0	0.37	932
40	6.8	0.17	490	10.4	0.26	749	13.2	0.33	950
45	6.6	0.15	476	10.4	0.23	745	13.5	0.30	972
50	6.5	0.13	468	10.5	0.21	756	13.7	0.27	983
55	6.3	0.11	451	10.6	0.19	764	13.8	0.25	990
60	6.1	0.10	441	10.7	0.18	769	13.8	0.23	994

M100D 20.0 Overall depth 250mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)
5	13.3	2.65	954	13.3	2.65	954	14.6	2.92	1051
10	12.5	1.25	900	13.6	1.36	979	15.8	1.58	1138
15	11.9	0.79	853	14.0	0.93	1004	16.7	1.11	1199
20	11.4	0.57	821	14.2	0.71	1022	17.2	0.86	1238
25	11.0	0.44	792	14.8	0.59	1062	17.5	0.70	1260
30	10.5	0.35	756	14.7	0.49	1058	18.0	0.60	1296
35	10.2	0.29	733	14.7	0.42	1058	18.2	0.52	1310
40	10.0	0.25	720	14.8	0.37	1066	18.4	0.46	1325
45	9.7	0.22	697	14.9	0.33	1069	18.5	0.41	1328
50	9.5	0.19	684	15.0	0.30	1080	19.0	0.38	1368
55	9.4	0.17	673	15.1	0.28	1089	19.2	0.35	1385
60	9.2	0.15	661	15.1	0.25	1089	19.3	0.32	1386

For M100D 30.0 hydraulics tables see next page.

ACO M100D constant depth channels

M100D 30.0 Overall depth 300mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)
5	18.4	3.67	1321	18.4	3.67	1321	20.0	4.00	1440
10	17.0	1.70	1224	18.5	1.85	1332	21.0	2.10	1512
15	16.2	1.08	1166	18.8	1.25	1350	21.8	1.45	1566
20	15.6	0.78	1123	19.0	0.95	1368	22.6	1.13	1627
25	15.0	0.60	1080	19.3	0.77	1386	23.3	0.93	1674
30	14.4	0.48	1037	19.2	0.64	1382	23.7	0.79	1706
35	14.0	0.40	1008	19.3	0.55	1386	23.8	0.68	1714
40	13.6	0.34	979	19.3	0.48	1390	24.0	0.60	1728
45	13.1	0.29	946	19.4	0.43	1393	24.3	0.54	1750
50	12.9	0.26	925	19.5	0.39	1404	24.5	0.49	1764
55	12.7	0.23	911	19.8	0.36	1426	24.8	0.45	1782
60	12.3	0.21	886	19.8	0.33	1426	25.2	0.42	1814

ACO M100D Shallow Depth Channels

M100V 075 Overall depth 75mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)
5	1.3	0.25	91	1.3	0.25	91	1.3	0.25	91
20	1.0	0.05	75	1.3	0.06	91	1.5	0.08	108
40	0.9	0.02	63	1.3	0.03	92	1.9	0.05	137
60	0.8	0.01	56	1.3	0.02	92	1.9	0.03	137

M100D 0100 Overall depth 100mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)
5	2.4	0.48	171	2.4	0.48	171	2.6	0.51	184
20	2.0	0.10	144	2.6	0.13	187	3.4	0.17	242
40	1.7	0.04	124	2.8	0.07	199	3.5	0.09	251
60	1.5	0.03	108	2.8	0.05	203	3.5	0.06	252

ACO M100D sloping depth channels

Total Flow Rate (litres / sec)				
Length to outlet (m)	Start channel number			
	1	6	11	16
5	6.7	8.6	10.7	12.9
10	7.8	9.7	11.8	
15	8.9	10.9		
20	10.0			

NB Constant invert depth channels can be used to extend the channel length. Please contact ACO Design Services team.

Notes on table usage

This table may be used for MultiDrain® M100D sloping invert channels. The table shows capacities for runs outfalling to sumps through units 5, 10, 15 and 20, although any unit can connect to the sump and their capacities can be estimated by interpolation.

It is assumed that the gratings are laid level. Where the run is laid with a longitudinal ground slope, the capacities can be considerably increased, or the length to outfall extended. Please contact ACO Water Management Design Services team.

Notes for ACO MultiDrain® M150D 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.

The maximum possible catchment depth is q_{si} , where i is the rainfall intensity in l/s/m².

A (m²) is the maximum area that can be drained at a rainfall intensity of 50mm/h (0.014 l/s/m²).

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 M150D constant depth channels

M150D 0.0 Overall depth 210mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)
10	13.3	1.33	958	17.4	1.74	1253	20.2	2.02	1454
20	12.4	0.62	896	18.9	0.94	1359	22.9	1.15	1649
30	11.8	0.39	851	19.8	0.66	1423	24.7	0.82	1778
40	11.3	0.28	812	20.5	0.51	1475	25.8	0.65	1858
50	10.8	0.22	778	21.0	0.42	1508	26.6	0.53	1915
60	10.4	0.17	747	21.3	0.36	1534	27.4	0.46	1970
70	10.1	0.14	726	21.6	0.31	1552	27.9	0.40	2006
80	9.7	0.12	697	21.8	0.27	1572	28.3	0.35	2039
90	9.5	0.11	680	22.0	0.24	1581	28.6	0.32	2061
100	9.2	0.09	662	22.1	0.22	1591	29.0	0.29	2088

M150D 10.0 Overall depth 260mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)
10	19.6	1.96	1408	21.5	2.15	1548	24.8	2.48	1786
20	18.3	0.92	1319	23.1	1.15	1662	27.9	1.39	2007
30	17.5	0.58	1259	24.2	0.81	1743	29.8	0.99	2147
40	16.6	0.42	1198	25.0	0.62	1797	31.3	0.78	2255
50	16.1	0.32	1156	25.5	0.51	1836	32.3	0.65	2322
60	15.4	0.26	1110	25.9	0.43	1866	33.2	0.55	2389
70	15.0	0.21	1079	26.2	0.37	1885	33.7	0.48	2429
80	14.6	0.18	1048	26.6	0.33	1912	34.2	0.43	2460
90	14.0	0.16	1011	26.7	0.30	1925	34.6	0.38	2488
100	13.7	0.14	986	26.9	0.27	1937	34.9	0.35	2513

M150D 20.0 Overall depth 310mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)
10	26.6	2.66	1915	29.1	2.91	2095	33.1	3.31	2383
20	25.0	1.25	1800	30.8	1.54	2218	36.6	1.83	2635
30	23.9	0.80	1717	32.0	1.07	2300	39.0	1.30	2808
40	22.8	0.57	1639	33.0	0.82	2373	40.6	1.02	2926
50	22.0	0.44	1580	33.7	0.67	2423	42.0	0.84	3024
60	21.2	0.35	1525	34.0	0.57	2445	42.9	0.72	3089
70	20.4	0.29	1472	34.4	0.49	2480	43.8	0.63	3150
80	19.9	0.25	1434	34.6	0.43	2494	44.3	0.55	3191
90	19.3	0.21	1387	34.9	0.39	2514	44.8	0.50	3227
100	18.8	0.19	1354	35.1	0.35	2527	45.2	0.45	3254

For M150D Shallow channel hydraulics tables see next page.

ACO M150D shallow depth channels

M150D 0100 Shallow Channel - Overall depth 100mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)
10	3.8	0.38	274	4.0	0.40	288	5.0	0.50	360
20	3.5	0.17	250	4.4	0.22	317	5.8	0.29	419
30	3.3	0.11	234	4.7	0.16	339	6.6	0.22	475
40	3.1	0.08	222	4.9	0.12	351	7.2	0.18	518
50	2.9	0.06	207	5.0	0.10	360	7.8	0.16	561
60	2.7	0.04	193	5.1	0.08	366	8.2	0.14	590
70	2.6	0.04	184	5.2	0.07	371	8.5	0.12	610
80	2.5	0.03	177	5.3	0.06	378	8.7	0.11	628
90	2.4	0.03	175	5.3	0.06	380	8.9	0.10	638
100	2.4	0.02	169	5.3	0.05	382	8.9	0.09	644

Notes for ACO MultiDrain® M200D 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.

The maximum possible catchment depth is q_{si} , where i is the rainfall intensity in l/s/m².

A (m²) is the maximum area that can be drained at a rainfall intensity of 50mm/h (0.014 l/s/m²).

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 M200D constant depth channels

M200D 0.0 Overall depth 265mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)
20	25.5	1.27	1835	32.2	1.61	2318	38.9	1.94	2799
40	23.5	0.59	1693	35.4	0.89	2552	44.4	1.11	3197
60	22.1	0.37	1590	37.3	0.62	2687	47.6	0.79	3426
80	21.0	0.26	1515	38.6	0.48	2776	49.8	0.62	3588
100	19.9	0.20	1433	39.3	0.39	2830	51.1	0.51	3679
120	19.1	0.16	1374	40.1	0.33	2886	52.1	0.43	3750
140	18.3	0.13	1320	40.5	0.29	2913	52.6	0.38	3790
160	17.6	0.11	1267	41.0	0.26	2949	52.8	0.33	3802
180	16.7	0.09	1205	41.2	0.23	2968	52.9	0.29	3810
200	16.4	0.08	1181	41.4	0.21	2981	53.0	0.27	3816

M200D 10.0 Overall depth 315mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)
20	34.5	1.73	2485	42.8	2.14	3082	50.9	2.55	3666
40	32.1	0.80	2313	46.6	1.16	3352	58.0	1.45	4176
60	30.2	0.50	2173	49.0	0.82	3529	61.7	1.03	4441
80	28.6	0.36	2062	50.3	0.63	3623	64.3	0.80	4631
100	27.3	0.27	1966	51.3	0.51	3694	66.3	0.66	4774
120	26.0	0.22	1875	52.1	0.43	3750	67.7	0.56	4873
140	24.9	0.18	1794	52.8	0.38	3800	69.0	0.49	4969
160	24.3	0.15	1751	53.3	0.33	3836	69.8	0.44	5023
180	23.4	0.13	1685	53.6	0.30	3862	70.7	0.39	5093
200	22.6	0.11	1627	53.8	0.27	3874	71.4	0.36	5141

M200D 20.0 Overall depth 365mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)
20	44.6	2.23	3213	54.3	2.71	3907	63.7	3.19	4589
40	41.4	1.04	2984	58.6	1.46	4216	71.8	1.79	5167
60	39.1	0.65	2812	61.1	1.02	4398	76.4	1.27	5504
80	37.0	0.46	2667	63.0	0.79	4533	79.6	1.00	5731
100	35.3	0.35	2542	64.3	0.64	4630	81.7	0.82	5882
120	33.8	0.28	2436	65.0	0.54	4683	83.8	0.70	6031
140	32.4	0.23	2330	65.5	0.47	4717	85.1	0.61	6129
160	31.5	0.20	2269	66.1	0.41	4758	86.2	0.54	6209
180	30.4	0.17	2190	66.4	0.37	4782	87.1	0.48	6273
200	29.6	0.15	2131	66.8	0.33	4810	87.8	0.44	6322

For M200D Shallow channel hydraulics tables see next page.

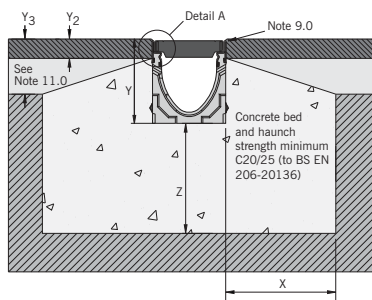
ACO M200D shallow depth channels

M200D 0100 Shallow Channel - Overall depth 100mm									
Length to outlet (m)	Slope %								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)	Q (l/s)	q (l/s/m)	A (m²)
20	4.8	0.24	346	6.1	0.31	439	8.0	0.40	576
40	4.2	0.11	302	6.6	0.17	475	9.5	0.24	684
60	3.8	0.06	276	7.0	0.12	505	10.4	0.17	748
80	3.5	0.04	254	7.3	0.09	522	10.9	0.14	786
100	3.3	0.03	238	7.4	0.07	533	11.2	0.11	806
120	3.1	0.03	225	7.4	0.06	536	11.4	0.09	820
140	2.9	0.02	210	7.4	0.05	536	11.6	0.08	835
160	2.8	0.02	200	7.4	0.05	536	11.7	0.07	840
180	2.7	0.01	193	7.4	0.04	536	11.7	0.07	844
200	2.6	0.01	187	7.4	0.04	536	11.7	0.06	844

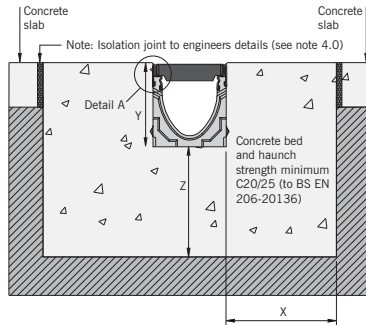
Installation detail

CHANNELS WITH TRADITIONAL GRATINGS

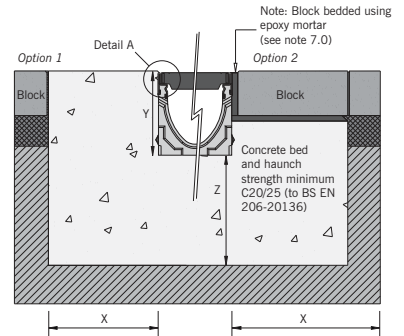
Asphalt pavement



Concrete pavement



Block pavement



1.0 Load Class

Installation recommendations shown are ACO minimum recommendations for BS EN 1433:2002 load class requirements.

2.0 Ground Conditions

The long term performance of a channel installation to sustain vertical and lateral loads depends upon a) ground conditions, b) stability of the adjacent pavement and c) a durable concrete bed and surround. The recommended installation detail may require the minimum dimensions to be revised to achieve site specific load class requirements (referred to in 1.0 above).

3.0 Cutting and Jointing

Mitre joints are formed by cutting the channels to the required angle and butting them together with the appropriate sealant (e.g. Sikaflex 11FC or similar) or ACO Repair Kit. Where possible 90° joints and T's should be formed so that gratings do not have to be cut. Angles can be formed by connecting them using proprietary PVCu pipework attached to the ACO inlet/outlet endcaps. For further details please contact ACO Design Services Team. Note: For load classes higher than C 250, mitred joints are not recommended in vehicular areas. Where requested ACO can custom manufacture angled joints to order.

4.0 Isolation Joints

The channel must be isolated from the surrounding environment. An isolation joint must be positioned up to 1500mm from the channel wall. Any dowel bars must be located no nearer than 150mm from the channel wall. Other isolation joints in surrounding slab must be continued through the channel. Additional crack control may be required to comply with specifier requirements.

5.0 installation into in-situ slab

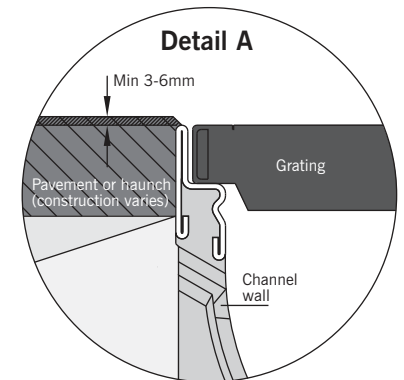
Where a channel is to be installed into an existing concrete slab it is necessary to cut a suitably sized pocket in the slab. The channel will then need to be bedded in polymer modified mortar of 25mm minimum thickness (this may vary depending on the type of mortar used). Engineering advice may be necessary.

6.0 Temporary installation

A channel installation is not complete until the final surfacing is laid. In any temporary condition, i.e., the channel walls projecting above adjacent ground, site traffic should not cross channels. Loose boards, stone fill or cover plates will not protect the channel walls or grating. A temporary channel crossing should be formed by raising the ground level locally, to 3-6mm above top of edge rail, either side of a channel for a distance of 750 to 1000mm, to form ramps. Note that the channel load class should be adequate to carry the site traffic.

7.0 Block pavements

The channel must be supported laterally. Blocks laid directly against the channel must be laid as a soldier course and restrained from movement by bedding securely on the concrete haunch e.g. by using a polymer modified mortar for bed and perpendicular joints (e.g., RONAFIX mortar mix C or similar). Blocks or slabs bedded on sand remote from the channel should be set at a higher level to compensate for possible settlement of the paving in service.



8.0 Grate locking system

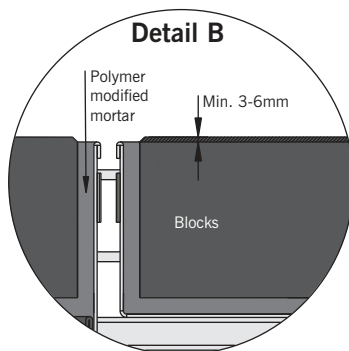
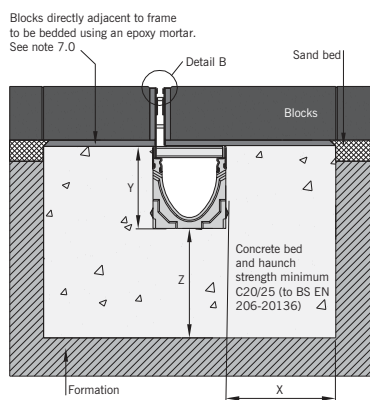
Gratings should be securely fixed to the channel, where required, using an appropriate grate lock system (where available).

9.0 Channel protection

Avoid contact between compaction equipment and top of ACO channel edge rail. The installer must ensure that the finished surface level lies above the top of the edge rail (by at least 3-6mm). Covering or protecting the grating, before concreting the haunch or laying blocks, removes the time and cost associated with cleaning the channel and grating of cement material and embedded stones. (Please note that ACO channels must be installed with the grating in place to prevent deformation of the channel.)

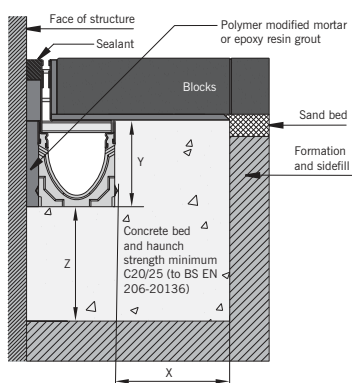
CHANNELS WITH BRICKSLOT GRATINGS

Block pavement

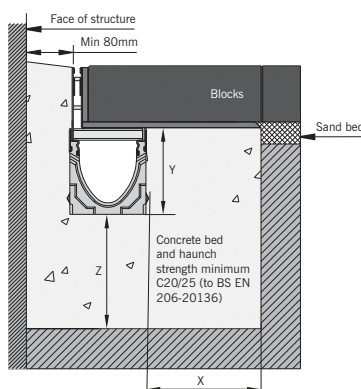


An electronic version of the ACO MultiDrain® MD installation detail is available to download from the ACO website. Visit www.aco.co.uk.

Adjacent to a structure - option 3



Adjacent to a structure - option 4



10.0 Watertight installation to BS EN 1433:2002

Where ACO channel joints/fittings and channel/pavement interfaces are to be sealed, an appropriate sealant must be used (e.g., Sikaflex 11FC or similar). Guidance on the necessary surface preparation and/or priming should be sought from the sealant manufacturer.

See page 42 for typical method of watertight sealing.

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® MD range. ACO MultiDrain® MD 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.

Note: Galvanised iron and steel products have good corrosion resistance to concrete and mortar products but may experience corrosion if high chloride an/or sulphate content is present. Use only good quality concrete and consider using corrosion inhibitors where necessary. The use of protective coatings, such as paint, can minimise the risk of corrosion.

11.0 Minimum Dimensions of Concrete Surround

Load Class		A 15	B 125	C 250	D 400*
Minimum Dimensions (mm)	x	100	150	150	200
	y	Full channel height (less Y2 where necessary)			
	z	100	150	150	200
	Y2**	35	35	35	35
Asphalt pavement only	Y3	100	60	60	60

**Note dashed line printed on edge rails 35mm below top.

*E.g., Parking areas for all types of road vehicle. Not suitable for carriageways of public roads or motorways.

Chemical resistance chart

Vienite®, ACO's sustainable high strength material, has a high resistance to dilute acids and alkalis, and are 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 polymer concrete can be supplied to customers for their own testing. The chemical resistance will also depend on the temperature of the effluent. Clean water should not exceed 80°C.

The resistance of the gratings and edge rails should also be considered, and stainless steel gratings and edge rails are available in the ACO MultiDrain® MD system for aesthetically pleasing installations and for specific chemical resistance.

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

Chemical medium	% conc	Resistance: Polyester concrete
Acetic acid, glacial	100	No
Acetic acid	10	Yes
Acetic anhydride	100	No
Acetone	10	No
Acetone	100	No
Alum	100	Yes
Aluminium sulphate	100	Yes
Ammonium chloride	100	Yes
Ammonium nitrate	100	Yes
Ammonium phosphate	65	Yes
Ammonium sulphate	100	Yes
Aniline (aminobenzene)	100	No
Barium chloride	100	Yes
Benzaldehyde	100	No
Benzene	100	No
Benzyl alcohol	100	Yes
Benzyl chloride	100	No
Borax	100	Yes
Boric acid	100	Yes
Bromine	100	No
Bromine water	Saturated	No
Butyl acetate	100	No
Butyric acid	100	Yes
Calcium carbonate	100	Yes
Calcium chloride	100	Yes
Calcium chlorate	8	Yes
Calcium hydroxide	100	Yes
Calcium nitrate	100	Yes
Carbon disulphide	100	No
Carbon tetrachloride	100	Yes
Castor oil	100	Yes
Chlorine gas, wet	100	No
Chlorine water	Saturated	No
Chlorobenzene	100	Yes
Chloroform (trichloro-methane)	100	No
Chromic acid	12	Yes
Citric acid	100	Yes
Copper chloride	100	Yes
Copper nitrate	100	Yes
Cyclohexane	100	Yes
Diesel fuel (DERV)	100	Yes
Dimethyl formamide	100	No
Dimethyl phthalate	100	Yes
Diethyl phthalate	100	Yes
Ethanol	95	No
Ethanolamine	100	Yes
Ethyl acetate	100	No
Ethylene glycol	100	Yes
Ferrous chloride	100	Yes
Ferric chloride	100	Yes
Ferrous sulphate	100	Yes
Formaldehyde	30	Yes
Formic acid	10	Yes
Formic acid	100	No
Fuel oil	100	Yes
Gasoline	100	Yes
Glycerine	100	Yes
Hydrazine	50	No

Chemical medium	% conc	Resistance: Polyester concrete
Hydrobromic acid	48	Yes
Hydrochloric acid	10	Yes
Hydrofluoric acid	10	No
Hydrogen peroxide	30	Yes
Lactic acid	100	Yes
Lead acetate	100	Yes
Magnesium chloride	100	Yes
Magnesium sulphate	100	Yes
Maleic acid	100	Yes
Methyl ethyl ketone (MEK)	100	No
Motor oil	100	Yes
Nickel chloride	100	Yes
Nickel sulphate	100	Yes
Nitric acid	5	No
Nitrobenzene	100	No
Oleic acid	100	Yes
Oxalic acid	100	Yes
Perchloric acid	10	Yes
Perchloroethylene	100	Yes
Phosphoric acid	20	Yes
Phosphorus trichloride	100	No
Potassium carbonate	50	Yes
Potassium chloride	100	Yes
Potassium dichromate	100	Yes
Potassium hydroxide	10	Yes
Potassium nitrate	100	Yes
Potassium permanganate	10	No
Potassium sulphate	100	Yes
Pyridine	100	No
Sodium acetate	100	Yes
Sodium bromide	100	Yes
Sodium carbonate	35	Yes
Sodium chlorate	100	Yes
Sodium chloride	100	Yes
Sodium hydroxide (caustic soda)	50	No
Sodium hypochlorite	18	No
Sodium nitrate	100	Yes
Sodium nitrite	100	Yes
Sodium phosphate	10	Yes
Sodium sulphate	100	Yes
Sodium sulphide	100	Yes
Sodium sulphite	100	Yes
Sodium thiosulphate	100	Yes
Stearic acid	100	Yes
Styrene	100	No
Sulphuric acid	75	No
Sulphuric acid	50	Yes
Sulphuric acid at up to 40°C	10	Yes
Tetrachloroethylene	100	Yes
Thioglycolic acid	80	Yes
Thionyl chloride	100	No
Toluene	100	Yes
Toluene sulphonic acid (aqueous solution)	Saturated	Yes
Trichloroacetic acid	50	Yes
Turpentine	100	Yes
Water	100	Yes
Xylene	100	Yes
Zinc sulphate	100	Yes

Specification clause

The surface drainage system shall be ACO MultiDrain® (Insert channel description as appropriate e.g. ACO M100D) channel system as supplied by ACO Technologies plc; all materials and components within the scope of this channel system shall be obtained from this manufacturer. The system shall be CE marked and fully compliant with BS EN 1433:2002, certificated to Load Class (*) as defined in BS EN 1433:2002.

Declarations of Performance (DoP) shall be supplied to the Supervising Officer upon request. The system shall be of (100mm[†], 150mm[†], 200mm[†]) nominal internal width, manufactured in Vienite®, ACO's sustainable high strength material with cast-in (galvanised/stainless[†]) steel edge rails. The channels shall be installed with manufacturer's grating appropriate to the specified Load Class and locked securely in place using the manufacturer's Drainlock® boltless locking system.

The system shall be installed in accordance with the manufacturer's printed instructions, and the work carried out as specified in 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.

† delete non-appropriate information.

* insert information C 250 or D 400 as appropriate.

Recycled content

ACO Technologies aim to incorporate as much recycled material or waste material as is practicable in their 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 each product in the ACO MultiDrain® MD system will vary as the proportion of the different materials (in channels, edge rails, gratings etc) varies. As an example, ACO MultiDrain® MD channels with Heelguard™ ductile iron gratings will contain approximately 27% by weight recycled material.

The ACO MultiDrain® MD 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.

NBS Specifications

ACO MultiDrain® MD should be specified in section Q10:180. Assistance in completing this clause can be found in the ACO Water Management entry in NBS Plus, or please contact the ACO Water Management Design Services Team.

Note: A specification in NBS format is available to download from www.thenbs.com or www.aco.co.uk

Conformity

The ACO MultiDrain® MD System is fully certified to BS EN 1433:2002 and CE marked in accordance with the Construction Products Regulation.

Declarations of Performance are available via the CPR Zone on our website (www.aco.co.uk/DoP.php), or on request. Please contact ACO Water Management Design Services Team on 01462 816666 for further information.

BS EN 1433:2002



General information

ACO products are subject to weight and dimensional tolerances. The weights and dimensions shown in this document are for guidance purposes only. ACO products are made from naturally occurring materials and may be subject to variations in colour, texture and marking. These aesthetic variations do not affect the performance or functionality of our Goods. The appearance of products shown in our company documentation are for illustration purposes only.

ACO Technologies plc

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

ACO Water Management: Civils + Infrastructure

A division of ACO Technologies plc
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e-mail Technical: technical@aco.co.uk
website: www.aco.co.uk

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

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ACO CARES ABOUT THE ENVIRONMENT

Printed on material approved by the Forest Stewardship Council (FSC) who provide a means of assuring that products come from responsibly managed forest.



ISO 9001
FM 13502



ISO 14001
EMS 538781



OHSAS 18001
OHS 524145



1.0 Load Class

Installation recommendations shown are ACO minimum recommendations for BS EN 1433:2002 load class requirements.

2.0 Ground Conditions

The long term performance of a channel installation to sustain vertical and lateral loads depends upon A) ground conditions B) stability of the adjacent pavement and C) a durable concrete bed and surround. The recommended installation detail may require the minimum dimensions to be revised to achieve site specific load class requirements (referred to in 1.0 above).

3.0 Cutting and Jointing

Mitre joints are formed by cutting the channels to the required angle and butting them together with appropriate sealant (e.g. Sikaflex 11FC or similar) or ACO Repair Kit. Where possible 90° joints and T's should be formed so that gratings do not have to be cut. Angles can be formed by connecting them using proprietary PVCu pipework attached to ACO inlet/outlet endcaps. For further details please contact ACO Design Services Team.

Note: For Load Classes higher than C 250, mitred joints are not recommended in vehicular areas. Where requested ACO can custom manufacture angled junctions to order.

4.0 Isolation Joints

The channel must be isolated from the surrounding environment. An isolation joint must be positioned up to 1500mm from the channel wall. Any dowel bars must be located no nearer than 150mm from the channel wall. Other isolation joints in surrounding slab must be continued through the channel. Additional crack control may be required to comply with specifier requirements.

5.0 Installation into in-situ Slab

Where a channel is to be installed into an existing concrete slab it is necessary to cut a suitably sized pocket in the slab. The channel will then need to be bedded in polymer modified mortar of 25mm minimum thickness (this may vary depending on the type of mortar used). Engineering advice may be necessary.

6.0 Temporary Installation

A channel installation is not complete until the final surfacing is laid. In any temporary condition, i.e. with the channel walls projecting above adjacent ground, site traffic should not cross channels. Loose boards, stone fill or cover plates will not protect the channel walls or grating. A temporary channel crossing should be formed by raising the ground level locally, to 3 - 6mm above top of edge rail, either side of a channel for a distance of 750 to 1000mm, to form ramps. Note that the channel load class should be adequate to carry the site traffic.

7.0 Block Pavements

The channel must be supported laterally. Blocks laid directly against a channel must be laid as a soldier course and restrained from movement by bedding securely on the concrete haunch e.g. by using a polymer modified mortar for bed and perpendicular joints (e.g. RONAFIX mortar mix C or similar). Blocks or slabs bedded on sand remote from the channel

should be set at a higher level to compensate for possible settlement of the paving in service.

8.0 Grate Locking System

Gratings should be securely fixed to the channel, where required, using an appropriate grate lock system (where available).

9.0 Channel Protection

Avoid contact between compaction equipment and top of ACO channel edge rail. The installer must ensure that the finished surface level lies above the top of the edge rail (by at least 3-6mm). Covering or protecting the grating, before concreting the haunch or laying blocks, removes the time and cost associated with cleaning the channel and grating of cement material and embedded stones. (Please note that ACO channels must be installed with the grating in place to prevent deformation of the channel).

10.0 Watertight Installation to BS EN 1433:2002

Where ACO channel joints/fittings and channel/pavement interfaces are to be sealed, an appropriate sealant should be used (e.g. Sikaflex 11FC or similar). Guidance on the necessary surface preparation and/or priming should be sought from the sealant manufacturer.

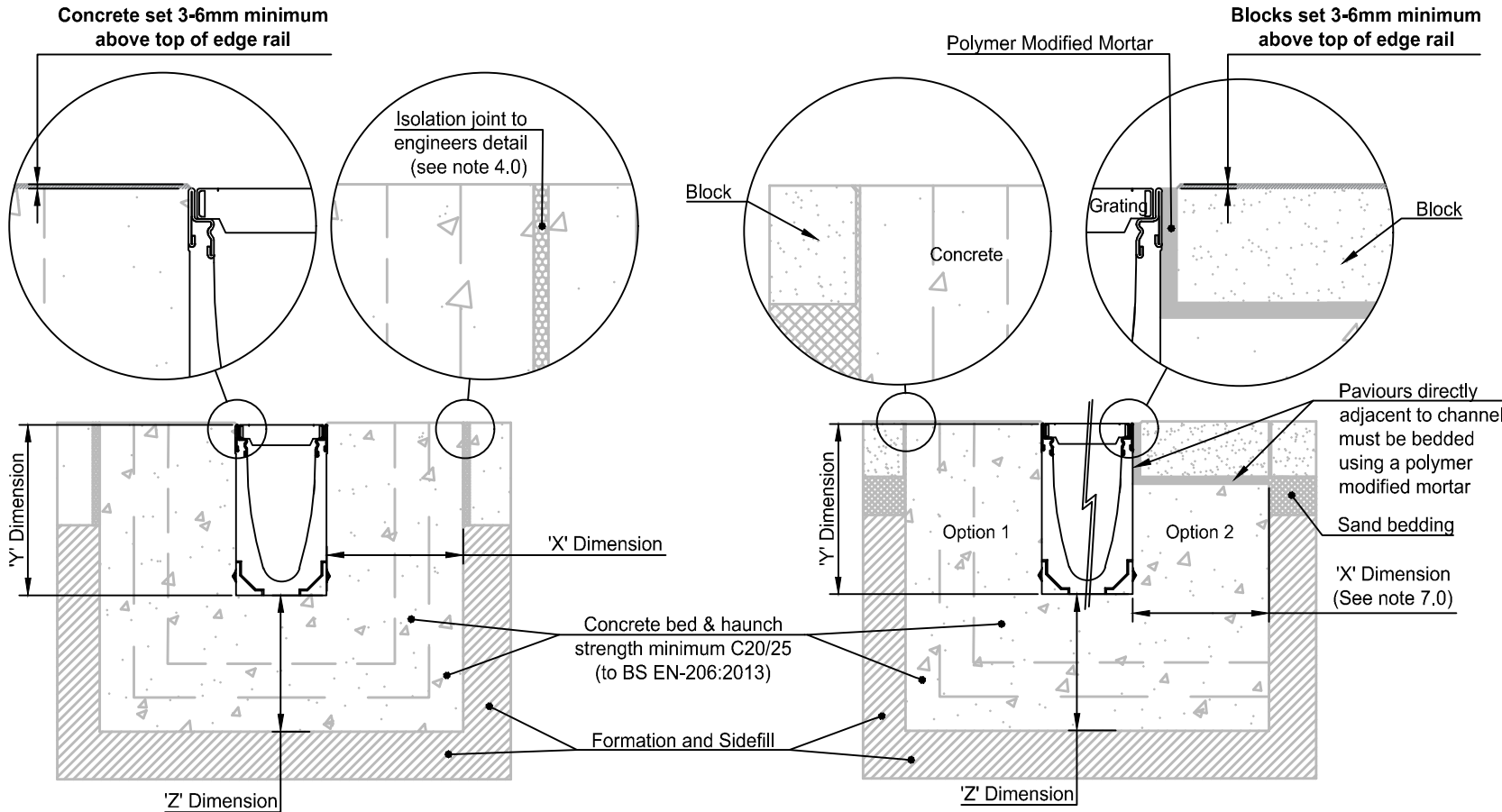
For Guidance a typical method of application follows:

- The end faces of the channels are to be sound and free from dust, oil, and grease, with any loose material or dirt removed, e.g. by mechanical wire brush. No water drops should be evident.
- Using a standard cartridge gun, apply the sealant evenly and with no flaws. The detail on the ends of a channel varies from one product to another:
- Products with a basically flat face - apply the sealant in a layer approximately 5mm thick to one face of the joint.
- Products with a sealing groove within the end face - apply the sealant in a bead of approximately 10mm diameter into the sealing groove.
- Products with a sealing groove following the inside shape of the channel - apply the sealant to the end face of the channel and to the sealant groove, such that when the joint is completed, the sealant will both cover the end face and fill the groove.
- The channel unit should be placed on the prepared concrete bedding and pressed against the previously placed channel unit. A sealed joint of approximately 1-2mm width should be formed between adjacent channel units.
- Excess sealant should be wiped from the inside face of the channel to leave a smooth finish.
- The sealant is to be left to cure for 24 hours, during which time the sealant should be kept as dry as possible.

Note: Galvanised steel and iron products have good corrosion resistance to concrete and mortar products but may experience corrosion if high chloride and/or sulphate content is present. Use only good quality concrete and consider using corrosion inhibitors where necessary. The use of protective coatings, such as paint, can minimise the risk of corrosion.

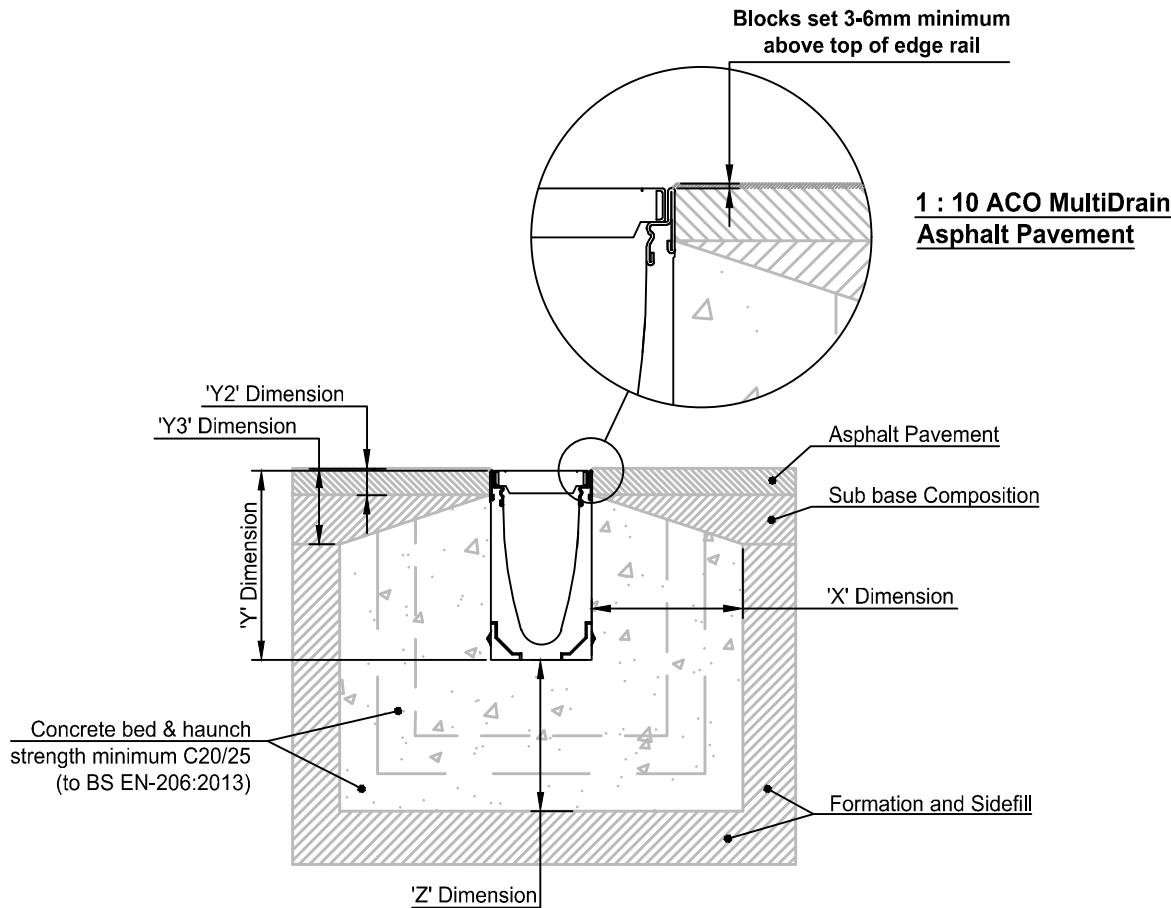
Load Class		A 15	B 125	C 250	D 400*
Minimum	X	100	150	150	200
Dimensions (mm)	Y	Full Channel Height (Less Y2 where applicable)			
	Z	100	150	150	200
Maximum	Y2	35	35	35	35
Dimensions (mm)	Y3	100	60	60	60

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



1 : 10 ACO MultiDrain Concrete Pavement

1 : 10 ACO MultiDrain Block Pavement (Option 1 and 2)



1 : 10 ACO MultiDrain Asphalt Pavement

Revisions

Project BOWES STREET, MOSS SIDE

Client ROWLINSONS CONSTRUCTION LTD

Scale 1:10 A3 Date 01.10.2020 Drawn by: WC

Drawing

ACO MULTIDRAIN M100D/DS 20.0 CHANNEL
INSTALLATION DETAIL DRAWING



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Web: www.sgiiconsulting.co.uk

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Drawing No C1262-1006

Rev: C1

Status CONSTRUCTION

1.0 Load Class

Installation recommendations shown are ACO minimum recommendations for BS EN 1433:2002 load class requirements.

2.0 Ground Conditions

The long term performance of a channel installation to sustain vertical and lateral loads depends upon A) ground conditions B) stability of the adjacent pavement and C) a durable concrete bed and surround. The recommended installation detail may require the minimum dimensions to be revised to achieve site specific load class requirements (referred to in 1.0 above).

3.0 Cutting and Joining

Mitre joints are formed by cutting the channels to the required angle and butting them together with appropriate sealant (e.g. Sikaflex 11FC or similar) or ACO Repair Kit. Where possible 90° joints and T's should be formed so that gratings do not have to be cut. Angles can be formed by connecting them using proprietary PVCu pipework attached to ACO inlet/outlet endcaps. For further details please contact ACO Design Services Team.

Note: For Load Classes higher than C 250, mitred joints are not recommended in vehicular areas. Where requested ACO can custom manufacture angled junctions to order.

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The channel must be isolated from the surrounding environment. An isolation joint must be positioned up to 1500mm from the channel wall. Any dowel bars must be located no nearer than 150mm from the channel wall. Other isolation joints in surrounding slab must be continued through the channel. Additional crack control may be required to comply with specifier requirements.

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Where a channel is to be installed into an existing concrete slab it is necessary to cut a suitably sized pocket in the slab. The channel will then need to be bedded in polymer modified mortar of 25mm minimum thickness (this may vary depending on the type of mortar used). Engineering advice may be necessary.

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Gratings should be securely fixed to the channel, where required, using an appropriate grate lock system (where available).

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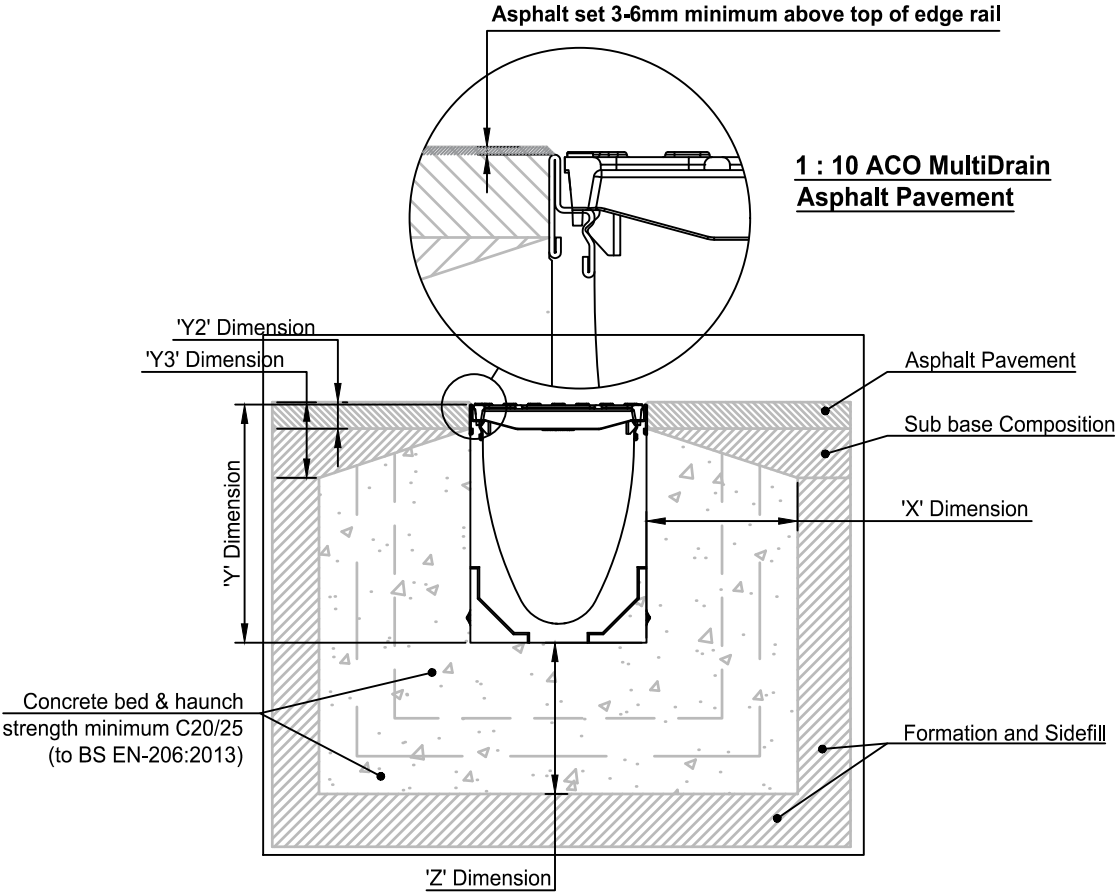
10.0 Watertight Installation to BS EN 1433:2002

Where ACO channel joints/fittings and channel/pavement interfaces are to be sealed, an appropriate sealant should be used (e.g. Sikaflex 11FC or similar). Guidance on the necessary surface preparation and/or priming should be sought from the sealant manufacturer.

For Guidance a typical method of application follows:

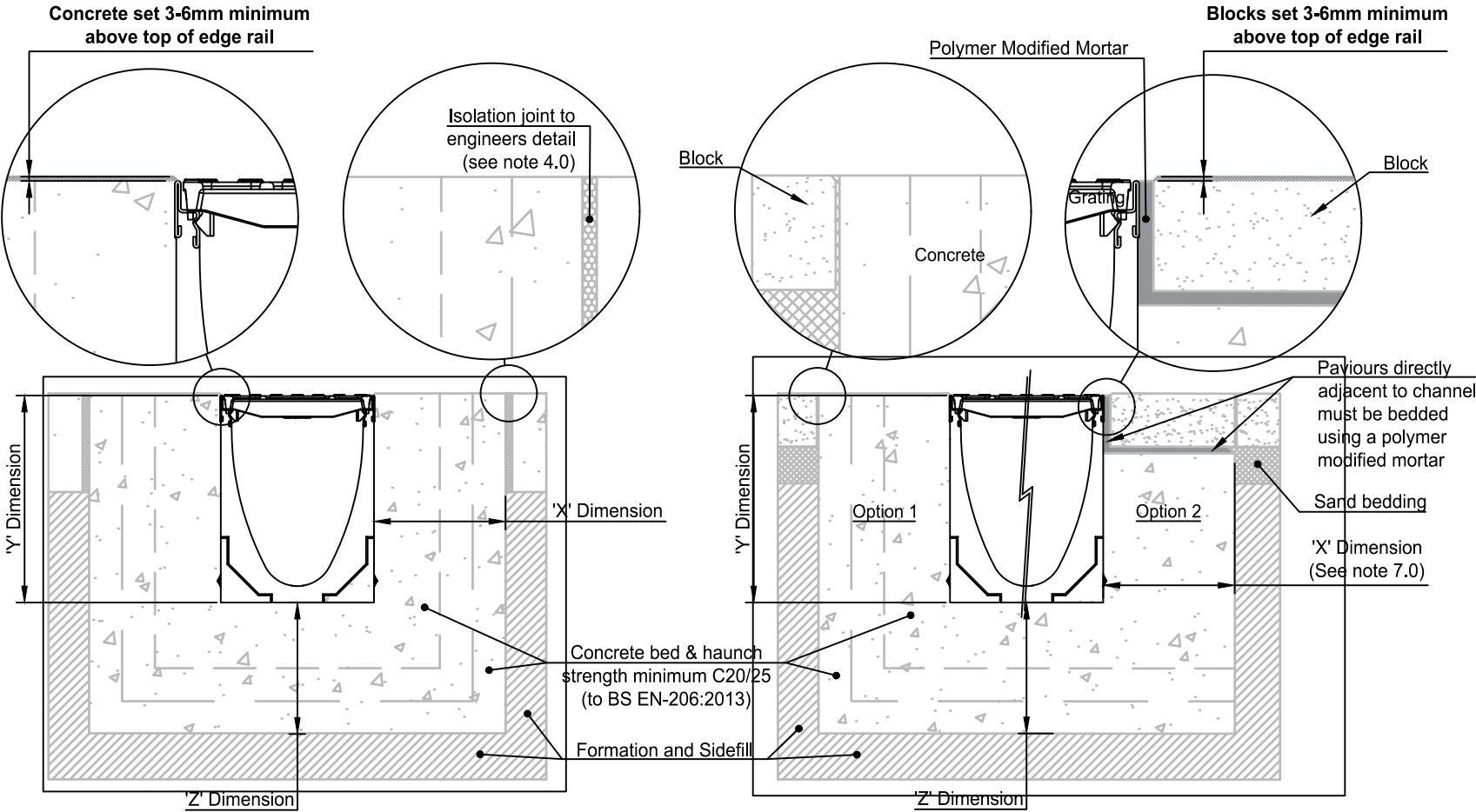
- The end faces of the channels are to be sound and free from dust, oil, and grease, with any loose material or dirt removed, e.g. by mechanical wire brush. No water drops should be evident.
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- The channel unit should be placed on the prepared concrete bedding and pressed against the previously placed channel unit. A sealed joint of approximately 1-2mm width should be formed between adjacent channel units.
- Excess sealant should be wiped from the inside face of the channel to leave a smooth finish.
- The sealant is to be left to cure for 24 hours, during which time the sealant should be kept as dry as possible.

Note: Galvanised steel and iron products have good corrosion resistance to concrete and mortar products but may experience corrosion if high chloride and/or sulphate content is present. Use only good quality concrete and consider using corrosion inhibitors where necessary. The use of protective coatings, such as paint, can minimise the risk of corrosion.



Load Class		A 15	B 125	C 250	D 400*
Minimum Dimensions (mm)	X	100	150	150	200
	Y	Full Channel Height (Less Y2 where applicable)			
	Z	100	150	150	200
Maximum Dimensions (mm)	Y2	35	35	35	35
	Y3	100	60	60	60

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



1 : 10 ACO MultiDrain Concrete Pavement

1 : 10 ACO MultiDrain Block Pavement (Option 1 and 2)

NBS Specification:
ACO MultiDrain® MD should be specified in section Q10:180. Assistance in completing this clause can be found in ACO Technologies product entries in NBS Plus, or a model specification can be downloaded from www.aco.co.uk. For further assistance, contact the ACO Water Management Design Services Team.

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® MD range. ACO MultiDrain® MD should be installed using levels of workmanship that accord with the National Code of Practice (UK: BS8000-0:2014) and in keeping with BS 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.

Revisions			
Project			
BOWES STREET, MOSS SIDE			
Client			
ROWLINSONS CONSTRUCTION LTD			
Scale	A3	Date	Drawn by:
1:10		01.10.2020	WC
Drawing			
ACO MULTIDRAIN M200D/DS 10.0 CHANNEL INSTALLATION DETAIL DRAWING			
Shepherd Gilmour Consulting Engineers			
Colchester House, 40 Peter Street, Manchester M2 5GP. Phone: 0161 837 1500. E-mail: sgl@sgiconsulting.co.uk Web: www.sgiconsulting.co.uk			
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Drawing No	C1262-1007		Rev: C1
Status	CONSTRUCTION		

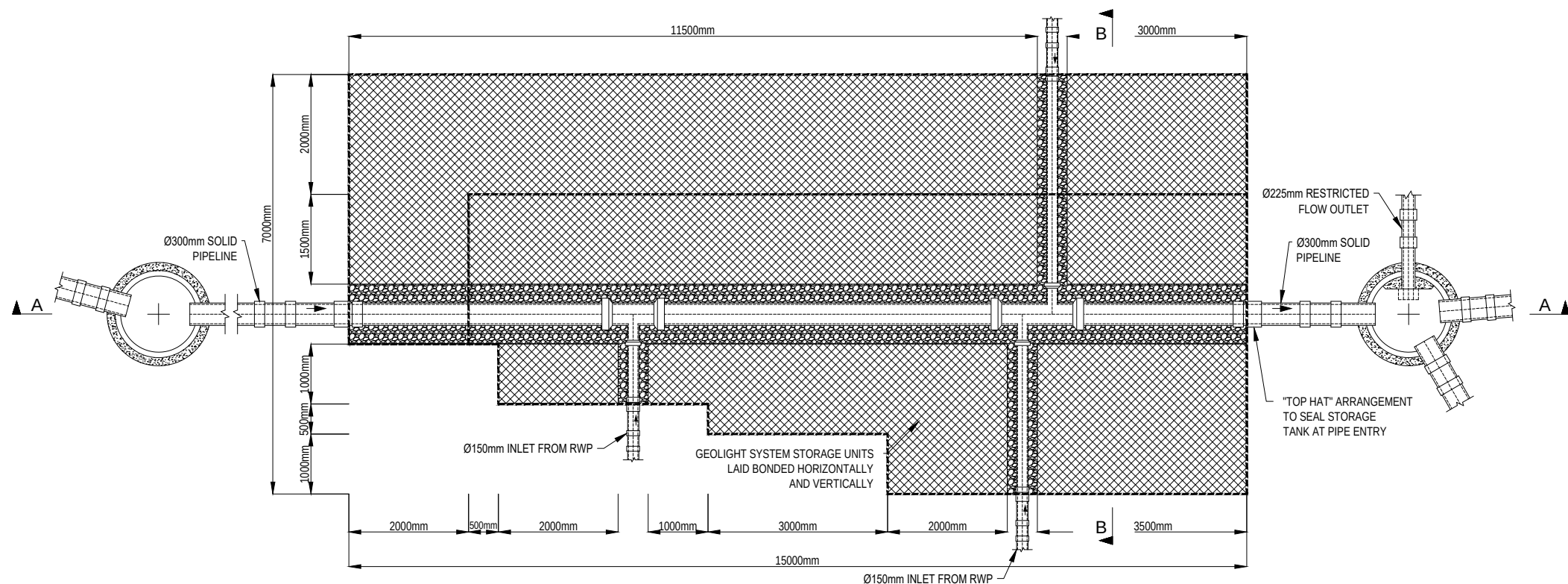
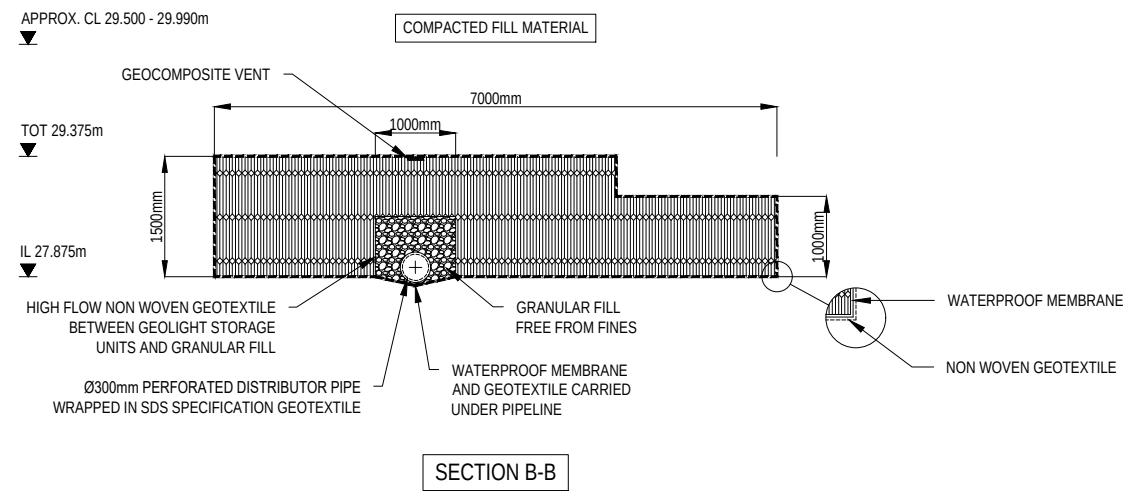
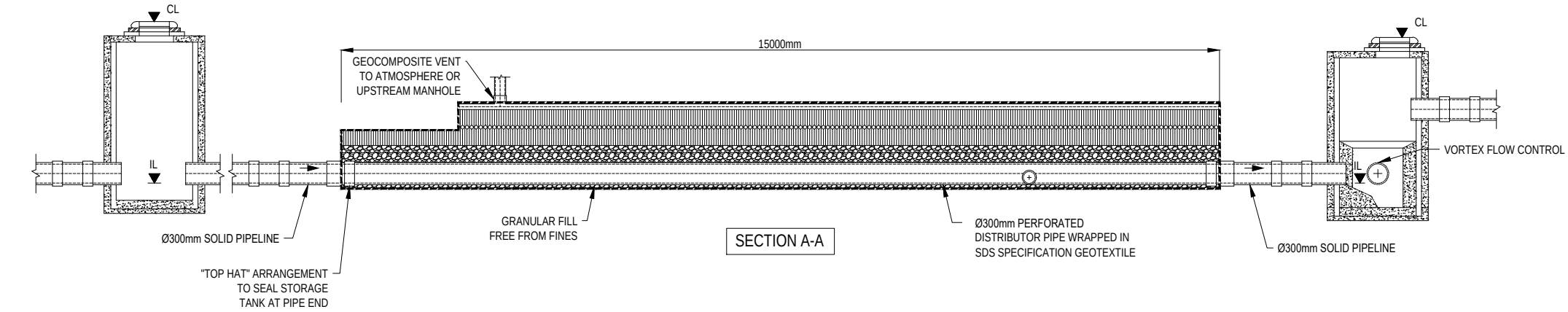


Shepherd Gilmour
Consulting Engineers

APPENDIX D

CATCHPIT MANHOLE WITH SUMP
REF: SW MH S300
MANHOLE CL: 29.425m
IL: 27.875m

FLOW CONTROL MANHOLE
REF: SW MH S101
MANHOLE CL: 30.170m
IL: 27.850



REFERENCE DRAWINGS:			
Drawing Number	Revision	Drawing Title	Date
C1131-200.2	R	PROPOSED DRAINAGE LAYOUT BASEMENT LEVEL BACKGROUND SHEET 2 of 3	05.04.18

Notes:

This Drawing is to be read in conjunction with all relevant Architect's Engineer's and specialists' drawings and specifications.

Do not scale from this drawing in either paper or digital form. Use written dimensions only.

SDS to leave solid stub only, exiting tank for connection by others.

All external Manholes, Access Points, Junctions & Pipe are shown for guidance only and not part of the SDS program unless otherwise agreed.

Rev	Comments	Date
A	CORRECTED PER COMMENTS	03.09.18
GM	SP	31.08.18
ISSUED FOR APPROVAL		31.08.18
GM	SP	31.08.18
Rev	Comments	Date
DRW	CHK	



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Biddisham
Somerset
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sdslimited.com

ELLESMERE STREET
MANCHESTER

ADANA CONSTRUCTION

ATTENUATION TANK 1 DETAIL

Scale	Date
NTS	31.08.18
Drawing No	Rev
E134518_01_A	A

SDS GEOLight®

Stormwater Management System

Product Profile

SDS GEOLight® is an ultra lightweight honeycombed modular structure made from recycled PVC. The ready to install units are preformed to provide an underground stormwater storage facility, for the application of stormwater attenuation or infiltration.

The high void rate (>95%), high compressive strength (to 1000KN/m²) and low resistance to water flow makes

SDS GEOLight® an ideal material for cost efficient and maintainable underground water storage during storm conditions.

SDS GEOLight® Benefits

- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m³ reservoir, completed in one week.
- Light and easy to handle.
- Excellent hydraulic characteristics.
- The honeycomb structure is highly permeable, offering low resistance to water flow.
- SDS GEOLight®'s unique lateral and vertical filling arrangement requires a minimum amount of pipework and stone.
- Depth of tank invert reduced by using patented lateral supply.
- Simplified distribution pipe network, easy maintenance – dispensing with costly and complicated pipework configurations.
- Modular format offers design flexibility to overcome topographical constraints and architectural requirements.
- Greatly reduces the risk of flooding when used as stormwater storage.
- Can also be used for water recycling and combining with irrigation systems.
- Can virtually eliminate pollution when used in combination with specialist separation and filtration technology such as SDS Aqua-Swirl™ and SDS Aqua-Filter™.
- Design service available, including calculations.



APPLICATIONS



RETAIL



INFRASTRUCTURE



INDUSTRIAL



RESIDENTIAL



COMMERCIAL



PUBLIC SECTOR

SDS GEOLight®

Cellular Block structure manufactured from recycled PVC.



APPLICATIONS

- Stormwater Management
- Attenuation/Infiltration
- Bacterial filter-bed for biological treatment
- Hydrocarbon Separation
- Filtration and Separation Units

SPECIFICATIONS

Material	Recycled Rigid PVC
Colour	Dark grey to black
Standard length of a block	2000mm
Standard width of a block	500mm
Standard height of a block	750 mm
Other block sizes available on request	
Void Ratio	> 95%
Specific surface area	160 m ² /m ³ ± 5%
Compressive Strength	400kN/m ²

ADVANTAGES

- Highly cost effective
- Reduced excavation costs
- High void capacity
- Good UV resistance
- Good hydrocarbon resistance

SDS GEOLight®

Cellular Block structure manufactured from recycled PVC.



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- Good UV resistance
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GEO DS/0516

SDS

Water
Infrastructure
Systems

INNOVATORS IN
WATER TECHNOLOGY

SDS GEOLight®

Stormwater Management System



SDS GEOLight® is an ultra lightweight honeycombed modular structure, made from recycled PVC, that provides an underground storage facility for the application of stormwater attenuation or infiltration.

SDS
Water
Infrastructure
Systems

Stormwater Management

The Environment Agency is keen to promote the wider use of sustainable drainage systems, which reduce the impact of surface water runoff. There are two main ways of storing surface water for stormwater management:

- Stormwater attenuation tanks
- Soakaway infiltration systems

Stormwater Attenuation Systems

This consists of underground water storage facilities that hold excess water during periods of peak rainfall.

The stored water is gradually released in a controlled manner into the surface water drainage system or directly into watercourses, reducing the risk of upstream and downstream flooding.

Soakaway Infiltration Systems

Soakaways are designed to store surface water runoff until it can be gradually absorbed by the surrounding ground.

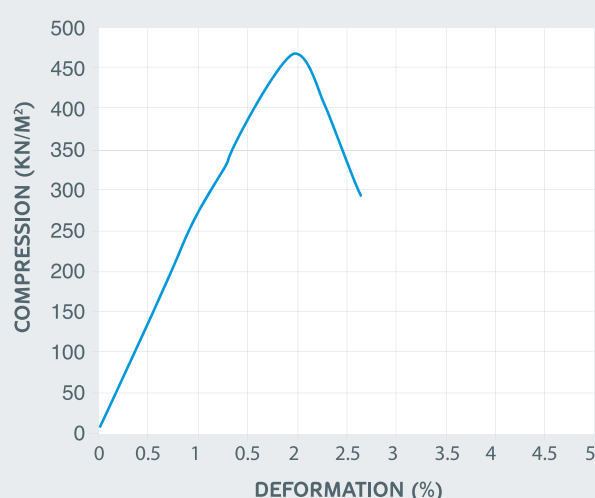
SDS GEOLight® – an efficient and economic solution for stormwater management.

SDS GEOLight® Attenuation

SDS GEOLight® has been specifically designed to form underground water storage reservoirs in stormwater management schemes. Its honeycombed structure gives it certain unique characteristics that make it ideal for this purpose:

- The high void rate (95%) of GEOLight® means that the maximum volume of water is stored in the minimum volume of storage unit.
- High compressive strength. GEOLight® is available in two strengths as standard: 200 and 400kN/m². Note: Higher compressive strengths available from 600 to 1000 kN/m². The graph on the right shows the results of a compression test, where samples of GEOLight® 400 were compressed at the rate of 1mm per minute. The deformation at 400kN/m² is about 1.6%.

RESULTS OF COMPRESSION TEST ON SDS GEOLIGHT® 400



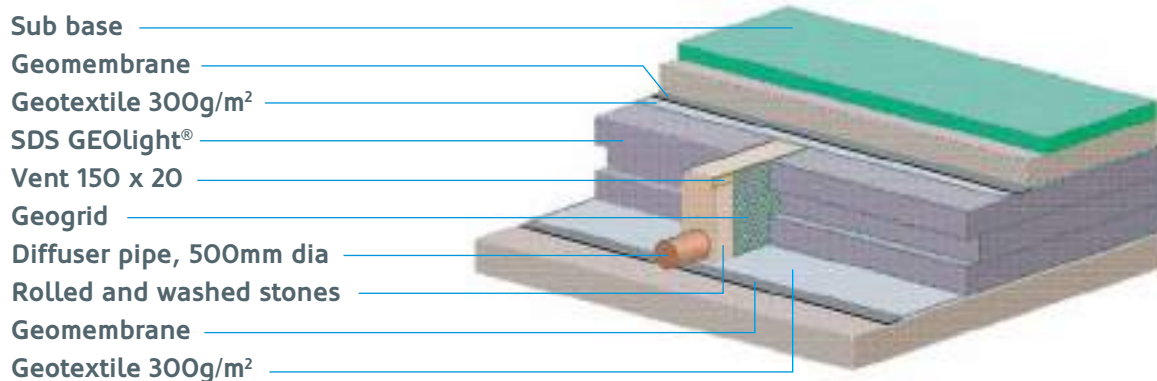
The GEOLight® Stormwater Attenuation System consists of two manholes (inspection chambers) connected by a length of perforated distribution pipe which feeds the stormwater storage reservoirs on either side formed from GEOLight®.

The distribution pipe is normally from 225mm up to 500mm diameter, generally covered in a trench that is filled with draining material such as 15/25 clean graded stone, free from fines.

The reservoirs and distribution pipe are wrapped in a waterproof membrane, such as butyl, to prevent seepage of water into the surrounding ground. The top of each GEOLight® reservoir has a vent which is connected back to the upstream manhole.

A geotextile or 10mm mesh geogrid is laid between the distribution pipe and GEOLight® to prevent the GEOLight® units being clogged by the draining materials.

SDS GEOLight® Attenuation



How does it work?

- 1. In normal conditions, water enters a back drop manhole. This is the upstream manhole and any silt or sediment will collect in the bottom of the chamber. The water then flows along the distribution pipe into the downstream manhole. The upstream pipework is sized to cope with normal flow conditions. The distribution pipe and attenuation tank are sized to cope with storm conditions. The outflow pipe is sized to cope with the permissible discharge.
- 2. In storm conditions the flow restrictor (vortex flow control or orifice plate) in the downstream manhole limits the amount of water flowing out of the manhole. This causes the water level in the distribution pipe to rise and water to spill into the GEOLight® reservoirs on either side. As the water level rises in the reservoirs, air is forced out of the high level vents into the upstream manhole.

- 3. Once the storm has passed, the water level in the GEOLight® reservoirs gradually falls as water passes through the flow restrictor in the downstream manhole. The vents now allow air to return into the GEOLight® reservoirs. Gradually the reservoirs empty. The flow restrictor prevents excess surges of flood water to pass downstream and uses the storage reservoirs to store the water for the period of the storm.

Calculating the storage capacity

The storage capacity of the GEOLight® reservoirs is determined by the maximum outflow permitted, (set by the water company or Environment Agency), the impermeable area of the site and the rainfall return period – normally 1 in 30 years, but again can be dictated by the water company. A full design service, including calculations, can be supplied via a third party consultant.

Please contact SDS for details.

Other uses

The water storage ability of SDS GEOLight® lends itself to a number of other uses:

- Water recycling combines with irrigation systems – this is increasingly popular: GEOLight® is used to retain stormwater which is then pumped as required to a network of standpipes for irrigation.
- Drainage channels – the natural permeability of GEOLight® lends itself for use as an underground drainage channel that collects and drains away groundwater.
- Pollution control – improved water runoff quality. When used in combination with oil / petrol separators, GEOLight® can replenish groundwater without the risk of contamination from oil, chemicals or suspended solids.
- To form lightweight embankments (slope stabilisation) – GEOLight® can be used to quickly form the base of embankments that only weigh a fraction of earth embankments.

Stormwater Attenuation System

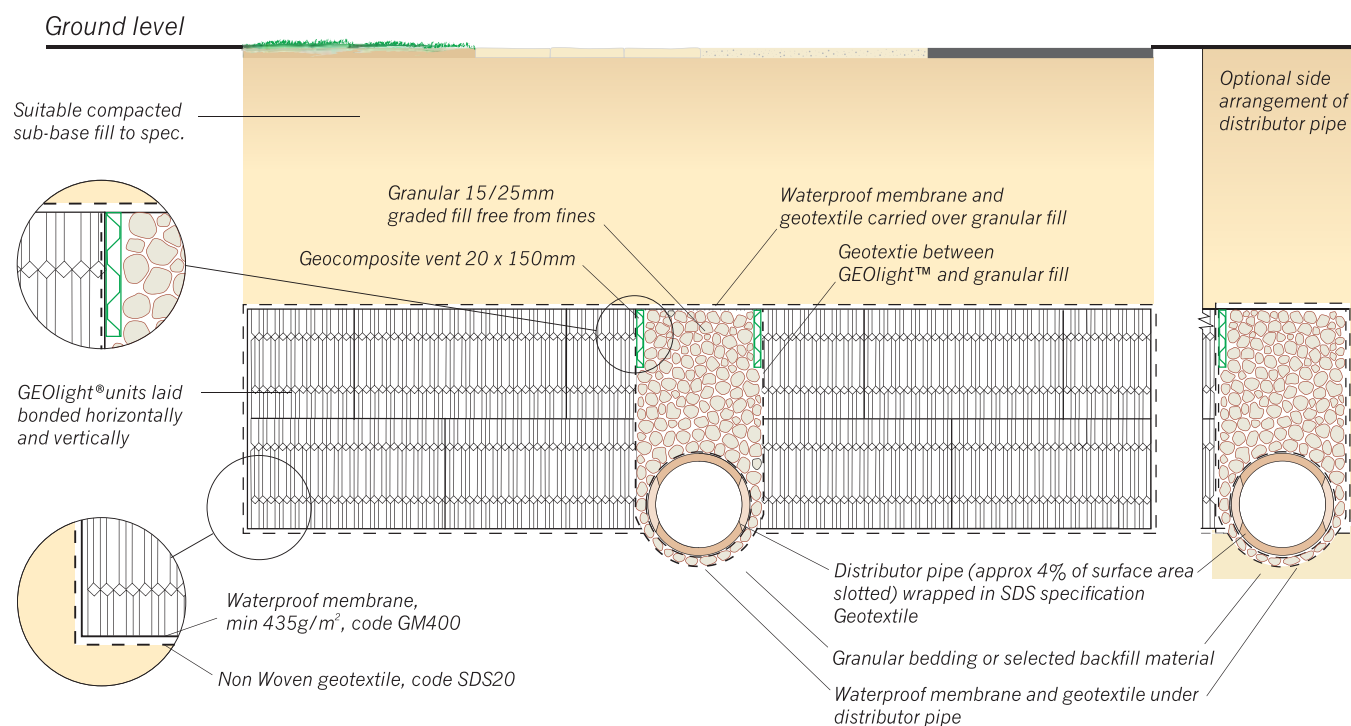
Design Details

The details on these two pages illustrate the construction of a typical SDS GEOLight® Stormwater Attenuation System. The length and height of the GEOLight® reservoirs is determined by the quantity of water to be stored.

The layout of each scheme is specifically designed to suit the characteristics and limitation of the site. Typically the distributor pipe would be arranged in the centre of the reservoir, but can alternatively be placed at the side where topographical constraints dictate.

The high performance waterproof membrane should be sealed continuously to encapsulate the GEOLight® reservoirs, distributor pipe and granular fill. It is protected by a heavyweight needle punched, non woven geotextile. To help with maintenance a high flow geotextile is placed between the granular fill and GEOLight® attenuation units to prevent silt and particles being washed into the reservoir. GEOLight® can be used under a range of surfaces e.g. grass, porous paving, standard paving block, tarmac and concrete.

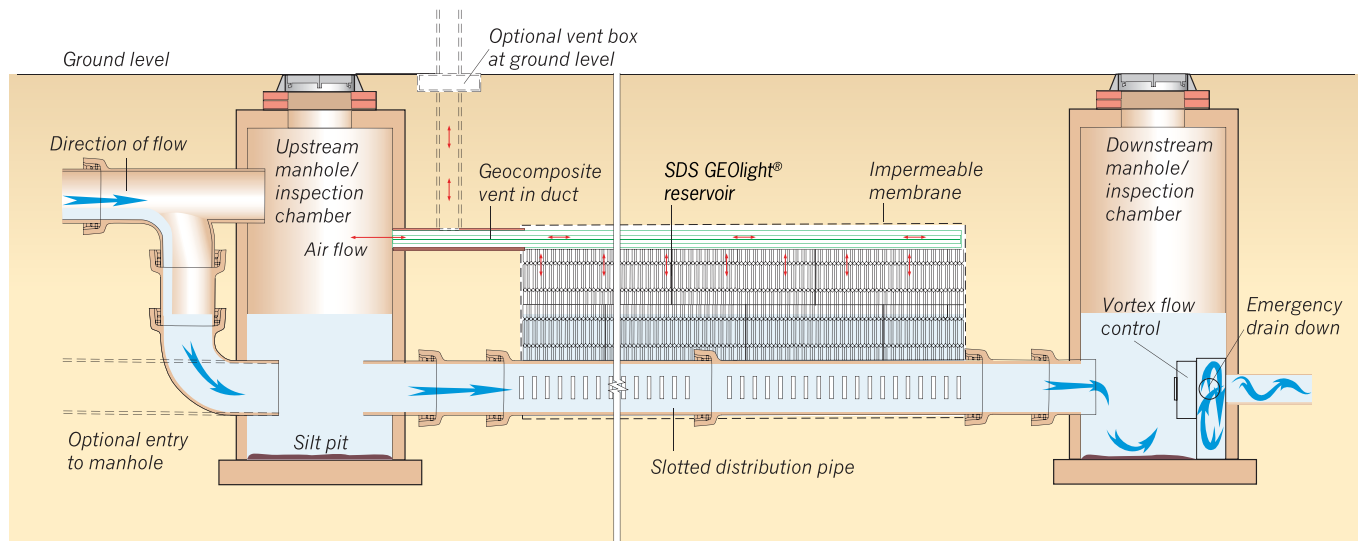
Cross Section



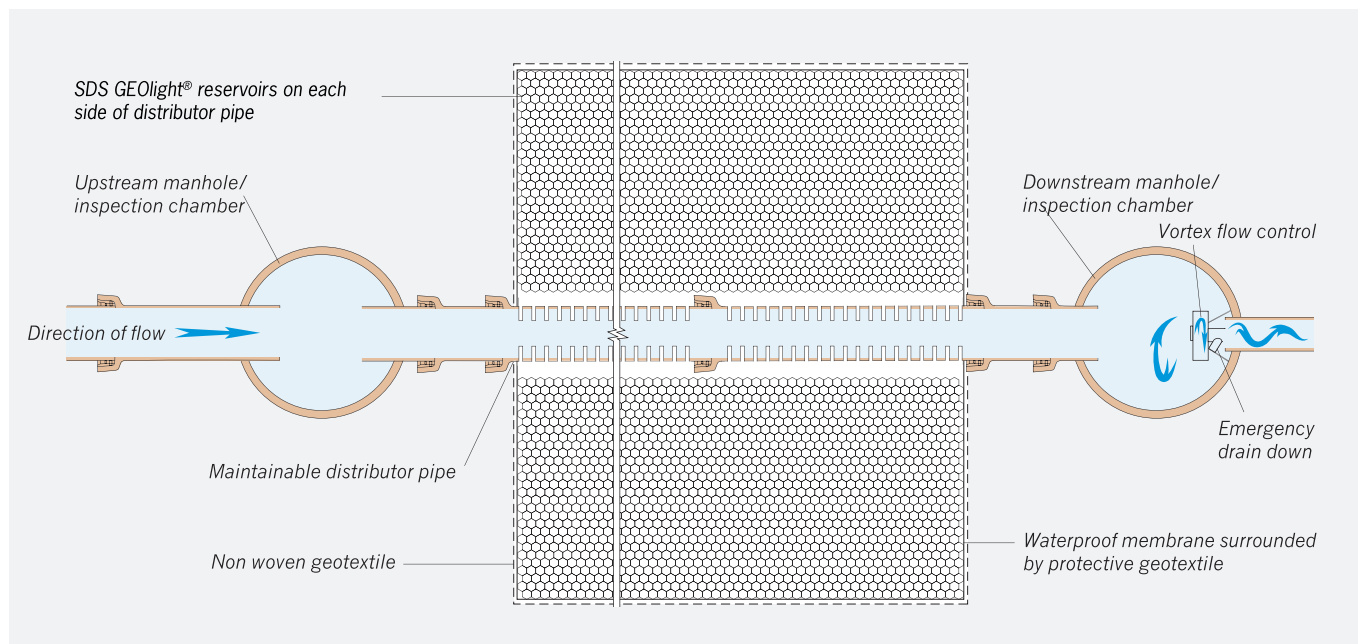
Stormwater Attenuation System

Design Details

Long Section



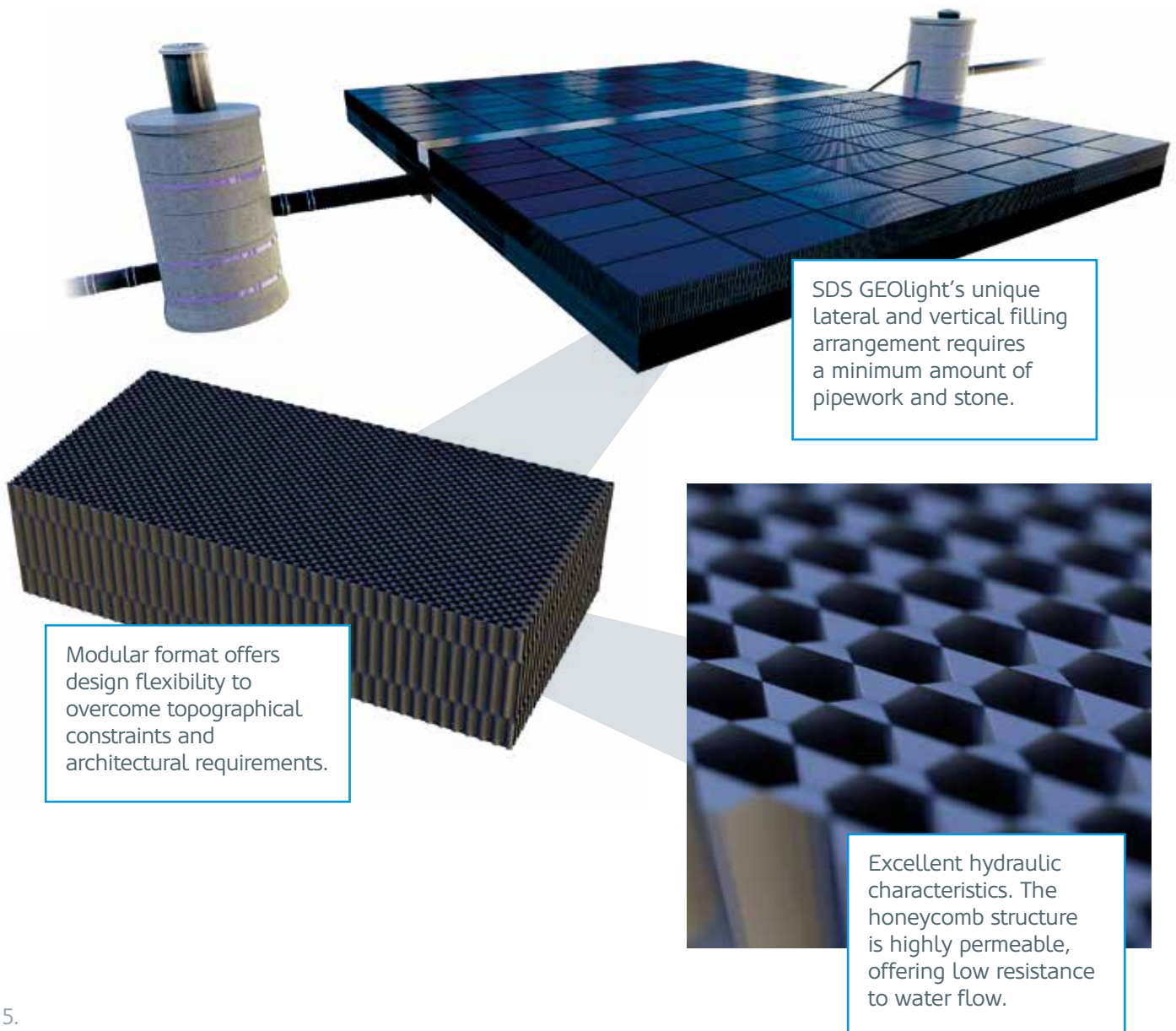
Plan



Benefits

- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m³ reservoir, completed in one week.
- Light and easy to handle.
- Depth of tank invert reduced by using patented lateral supply.
- Simplified distribution pipe network, easy maintenance – dispensing with costly and complicated pipework configurations.
- Greatly reduces the risk of flooding when used as stormwater storage.
- Can also be used for water recycling and combining with irrigation systems.
- Can virtually eliminate pollution when used in combination with specialist petrol / oil separators.
- Design service available, including calculations.

GEOLight® block



COSHH and Handling Information

1. COMPOSITION/INFORMATION ON INGREDIENTS:

Hazardous ingredients:

None as finished goods or products.

Types of materials:

Polyvinyl chloride (PVC)
MEK

2. HAZARDS IDENTIFICATION

Nature of hazard:

There are no health risks from the products during normal use. The products may contain various pigment colours and stabilisers that may be toxic. The chemicals are, however, bound within the product material and not easily extracted.

3. FIRST-AID MEASURES

Eye contact:

Plastic materials may cause physical irritation in the eyes. Wash out with large amounts of water. If irritation persists, seek medical advice.

Skin contact:

Not applicable.

Inhalation:

Not applicable.

Ingestion:

Not expected to have any toxic effects.

4. FIRE-FIGHTING MEASURES

Extinguishing media:

On small fires use any hand-held extinguisher type.
On large fires use water.

Fire and explosion hazards:

Melting plastics may flow and spread in a large fire.
Products of fire will be thick black toxic smoke.

Material characteristics:

PVC products will burn in the presence of a flame but are classed as self-extinguishing.

Protective equipment:

Wear self-contained breathing apparatus and protective clothing.

5. HANDLING AND STORAGE

Handling:

There are no hazards associated with the finished products. However, when cutting SDS GEOLight®, we recommend that the correct tools are used e.g. Handsaw or Alligator saw. When cutting, dust may be created; avoid inhaling these dusts. Take care of heat build-up within materials during cutting etc. The pallets of SDS GEOLight® units should be placed on level ground and should not be stacked on site. The maximum weight of the pallet of SDS GEOLight® units as delivered to site is 650kg (700kg on one copy), including packaging. Machines used to lift the pallet should be able to lift this weight safely. Loose individual units should not be stored more than three units high. SDS GEOLight® units are lightweight ranging from 23kg to 55kg and can be easily handled – one or two person lift.

Storage:

SDS GEOLight® units will resist the effects of UV light for up to six months; however, prolonged storage in direct sunlight should be avoided. SDS GEOLight® units should not be stored near to any fuel storage areas or any other solvents. SDS GEOLight® units are very robust and resistant to damage during normal handling; however, they should be secured in areas where impacts from vehicles or construction plant will be avoided.

Material characteristics:

PVC products will burn in the presence of a flame but are classed as self-extinguishing.

Protective equipment:

Wear self-contained breathing apparatus and protective clothing.

6. EXPOSURE CONTROLS / PERSONAL PROTECTION

Respiratory protection:

Not required under normal conditions of use. Where cutting etc. creates dust, wear a disposable half-mask to the standard FFP2S.

Hand protection:

Wear impervious strong gloves to prevent cuts to the hands while handling, cutting etc.

Eye protection:

Wear safety glasses when cutting etc.

Skin protection:

Wear overalls.

7. SITE HAZARDS

Other hazards for consideration:

Working in excavations and trenches – SDS GEOLight® may be designed with a shallow invert for infiltration (soakaway) or attenuation (storage) system. This negates the need for deep excavations or trenches, excavation near services e.g. gas, electricity or contaminated soil areas. N.B. All risk assessments should be undertaken by the main contractor for forklift, access to and working in excavations and trench support.

8. STABILITY AND REACTIVITY

Decomposition products:

Major thermal decomposition products are oxides of carbon. Relevant differences are (in addition): PVC may produce amounts of Hydrogen Chloride.

Stability:

These materials are stable at temperatures up to normal operating limits (moulding parameters).

9. ECOLOGICAL INFORMATION

Biodegradability:

Plastic products are not readily biodegradable but are not detrimental to terrestrial wildlife.

Aquatic toxicity:

Non-toxic to marine life.

10. DISPOSAL CONSIDERATIONS

Method:

The preferred method of disposal is collection and recycling. Plastics can safely be placed with regular industrial or household wastes where recycling is not available.

11. OTHER INFORMATION

As the handling, storage, use and disposal of the product are beyond our control SDS disclaims all liability for loss, damage, injury or expense in any way connected with such activities and further makes no warranties, expressed or implied, as to the suitability of the product for any particular use.

The preferred method of disposal is collection and recycling. Plastics can safely be placed with regular industrial or household wastes where recycling is not available.

SDS

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Infrastructure
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APPENDIX E

Klargester Pumping Stations Product Guide

Complete Wastewater and
Surface Water Pumping Solutions



Table of Contents

03	Klargester Pumping Station Solutions
04	Why Choose a Klargester Pumping Station?
05	Easy Guide to Typical Applications for the Kingspan range of Klargester Pumping Stations
06	Klargester Compact Pumping Stations
07	Klargester Domestic & Domestic+ Pumping Stations
08	Vertical Pumping Stations
10	Klargester Horizontal Pumping Stations
11	Klargester Adoptable and High Specification Pumping Stations
12	Selecting the Correct Pumping Station
13	Sizing Chart

Klargester Pumping Station Solutions

Experience



Trusted wastewater treatment solutions across a wide range of domestic and commercial applications.



Typical Grundfos Pump

The Trusted Water Management Experts

About Kingspan

Kingspan have been leading specialists in the design and manufacture of an industry leading range of complete off-mains wastewater management solutions for more than 60 years. Our dedicated technical team works closely with regulatory authorities and industry bodies to ensure total compliance in every component design and installation practice.

Providing solutions for all types of domestic, commercial or industrial build projects, the well-respected Klargester product range, includes sewage treatment plants, oil/water separators, packaged pumping stations and rainwater harvesting solutions.

Klargester Pumping Stations

If your domestic or commercial property is not connected to the sewer, or if it is below the sewer line, our range of Klargester pumping stations will take care of all your water, sewage and effluent.

The quality of our pumping station solutions is further enhanced by incorporating pumps supplied by Grundfos, the world's largest dedicated pump manufacturer. The Grundfos wastewater pumps used in Kingspan products form part of a range that are all made with sustainability, long life and customer value at their core.

For expert advice, contact:

Email: water@kingspan.com

Tel: 01296 633000

Why choose a Klargester Pumping Station solution?

Fully Compliant



Reliable, efficient, high quality pumping stations solutions.

Installed in thousands of domestic and commercial applications, the range of Klargester pumping stations provide easy to install and economical pumping solutions.

They are used in connection with sewage treatment plants, septic tanks, rainwater harvesting systems and surface water attenuation.

They are made with the highest quality materials and fittings and all are manufactured under the quality procedures of BS ISO 9001:2000 and HS ISO 18001, require little or no maintenance and, importantly, comply with Building Regulations Document H1 Foul Drainage and British Standards BS EN752, including options for 24-hour waste storage.

This product guide provides an overview of the solutions available and we are here to help in guiding you through the decision making process. Just get in touch to arrange a FREE site survey or to discuss your requirements in more detail with our technical experts, simply call 01296 633000.

FREE SITE
SURVEYS
01296 633000

After Sales Service and Support.

We recognise the importance of after sales service and support and are proud of our nationwide Kingspan Service network, which comprises our Kingspan in-house Service team and Accredited Installer network in support of the Klargester Product Range.

With expertise across the entire Klargester product range, our local support networks provide the highest standards of after sales service and support you would expect from a global organisation including:

- First class technical engineering advice.
- Day to day technical support.
- 24 hour breakdown repair.
- Preventative maintenance plans.
- Installation and commissioning.
- Asset monitoring.
- Consultancy and advice.

For enquiries about any aspect of installation, commissioning or service simply contact:

Tel: 0333 240 6868

Email: helpingyou@kingspan.com

Expert Technical
Advice

Typical Applications for Klargester Pumping Stations

Applications for Domestic Pumping Stations Range:

From basements to caravans, extensions to courtyards. If your property isn't connected to the sewer, or if it's below the sewer line, our pumping stations will take care of all your water, sewage and effluent.

Domestic Properties



Small Commercial Offices



Remote Buildings



Roof and Surface Water



Applications for Commercial Pumping Stations Range:

Whether you run a pub, shop or hotel, our range of commercial pumping stations make it easy to manage your sewage and wastewater, safely and efficiently.

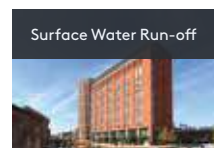
Caravan/Camping Sites



Schools



Surface Water Run-off



Housing Developments



Commercial Developments



Nursing Homes



Large Commercial Developments



Klargester Compact Pumping Stations



Our proven range of compact pumping stations can be used for effluent or sewage and are easy to install.

Klargester compact pumping stations provide the perfect solution for managing effluent or sewage, depending on the pump, distance and height.

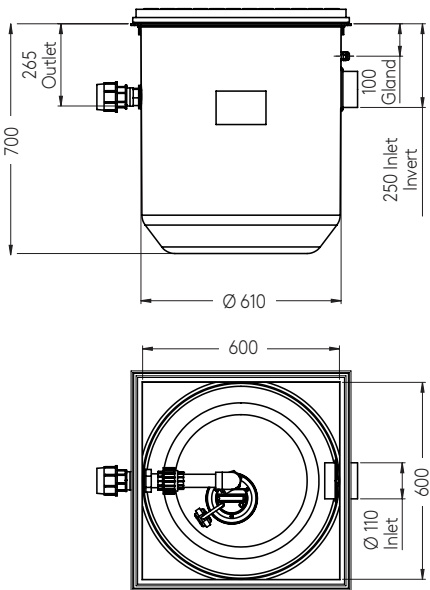
Quick and easy to install and maintain the compact range is ideal for use in outbuildings, extensions, cellars, pool houses and external WC applications.



Typical Grundfos Unilift

- Product Benefits**
- Non-return valves and outlet pipe compression coupling as standard.
 - 3 pump options; effluent low head, effluent high head and sewage vortex.
 - Service and maintenance plans available to prolong the life of the pump systems.
 - Complete pre-fabricated solution ready for installation.
 - Fully automatic.
 - Robust, durable and corrosion free, stainless steel submersible Grundfos pumps.

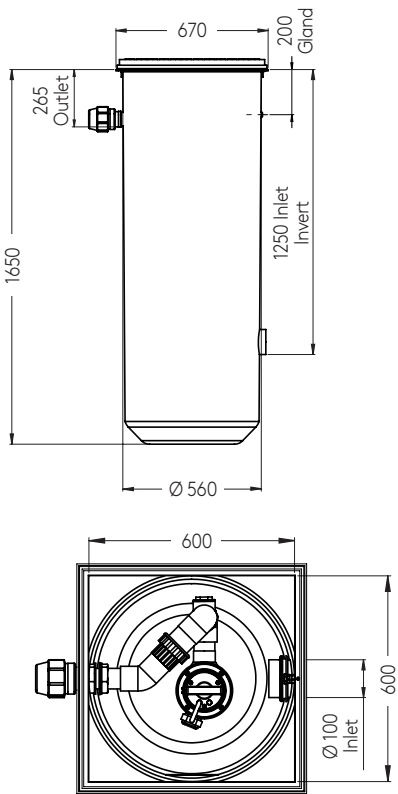
Mini Pump Chamber - 200 Litre



Technical Specification

Chamber Size (mm)	Capacity (Ltrs)	Tank Material	Control Panel	Alarm	Pump Type
610 x 700	200	GRP	N/A	Optional	Single

Mini Pump Chamber Assembly - 400 Litre



Technical Specification

Chamber Size (mm)	Capacity (Ltrs)	Tank Material	Control Panel	Alarm	Pump Type
560 x 1,650	400	GRP	N/A	Optional	Single

Klargester Domestic and Domestic+ Pumping Stations

Our domestic pumping stations are ideal for homes or properties with up to 13 people.

Supplied with single or twin pumps, Klargester domestic pumping stations are suitable for sewage, surface water and effluent applications. They are also appropriate where 24 hour storage requirements need to be maintained.



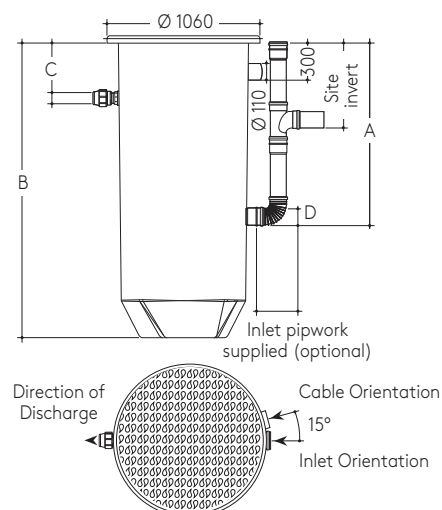
Typical Grundfos AP Pump



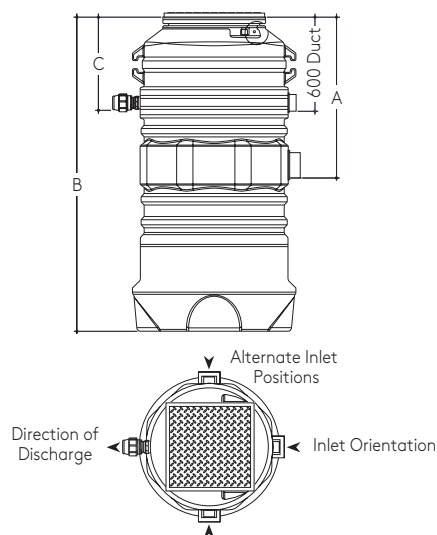
Product Benefits

- Made with super-tough, low maintenance GRP and high quality polyethylene for guaranteed durability.
- Supplied with control panel with options for remote monitoring system.
- Designed with easy access features for maintenance.
- Choose from either 110mm or 160mm inlet connections.
- Lockable covers for optimum security.
- Quick connection outlet couplings.
- Reliable performing stainless steel submersible Grundfos pumps.

Domestic - GRP Construction



Domestic+ - Polyethylene Construction



Technical Specification

Chamber Size	Capacity (Ltrs)	Tank Material	Alarm
900 x 2080	1,250	GRP	Optional
900 x 2580	1,600	GRP	Optional

Case Diam.l (mm)	Outlet Invert 'C' (mm)	Chamber Dept 'B'		Inlet Invert 'A'		Inlet Size 'D' (mm)
		A (2.08m)	B (2.58m)	A (1.3m)	B (1.8m)	
Ø900	450	•		•		Ø110
			•		•	Ø160

Technical Specification

Chamber Size	Capacity (Ltrs)	Tank Material	Alarm
1000 x 2000	1450	Polyethylene	Standard
1000 x 2500	2200	Polyethylene	Standard

Case Diam.l (mm)	Outlet Invert 'C' (mm)	Chamber Dept 'B'		Inlet Invert 'A' Standard		Inlet Size 'E' (mm)
		20 (2.0m)	25 (2.5m)	A (1.0m)	B (1.5m)	
Ø1000	600	•		•		Ø110
			•		•	Ø160

Klargester Vertical Pumping Stations

Klargester vertical pumping solutions are ideal for commercial developments and premises, where drainage by gravity is not an option.

Manufactured from robust GRP, Klargester vertical pumping stations are designed as a single-piece chamber, ready for installation with no man-entry required.

Available in a range of sizes and suitable for commercial applications from small roof run offs, to large SuDS schemes, Klargester vertical pumping stations deliver up to 70 litres/second and have a 24-hour storage capacity for foul waste to comply with Building Regulations.

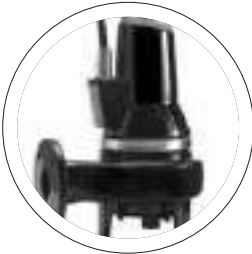
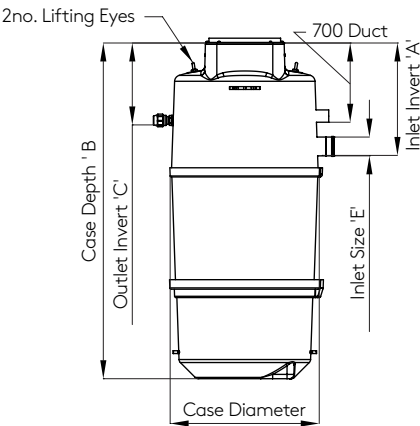


- Product Benefits**
- High-level alarm.
 - Internal lifting chains and guide rails (as specified).
 - Wide range of pump options including macerators/vortex.
 - Range of emergency overflow tanks, if required.
 - Inlet connection sizes to suit site.
 - Various invert depths and positions.
 - GRP chambers with internal pipework in plastic, galvanised or cast iron.
 - Optional kiosks with warning beacons and optional telemetry systems.
 - Service and maintenance plans available to prolong the life of the pump systems.
 - Grundfos SL pump for submerged installation.

Technical Specification

Vertical Tank Size (mm)	Capacity (Ltrs)	Tank Material	Control Panel	Alarm	Pump Type
1250 Diameter	Up to 4,800	GRP	Included	Standard	Single/Twin
1800 Diameter	Up to 10,000	GRP	Included	Standard	Single/Twin
2600 Diameter	Up to 22,000	GRP	Included	Standard	Single/Twin

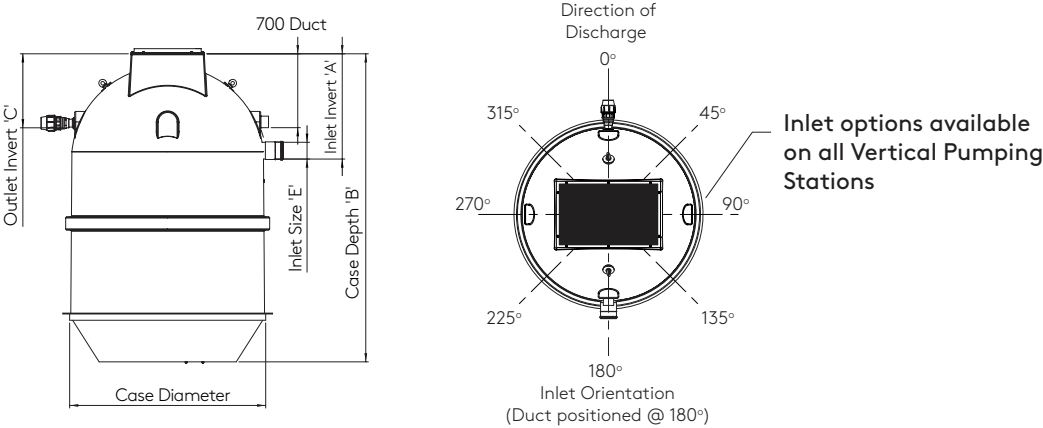
Ø1.2



Full range of Grundfos Pumps available for all Vertical Pumping Stations

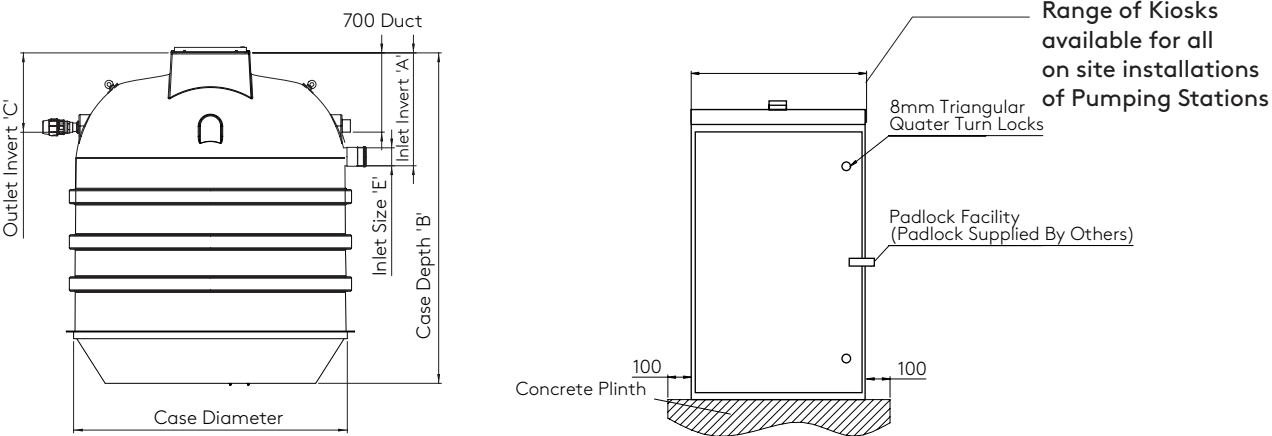
Case Diameter	Outlet Invert 'C'	Case Depth 'B'					Standard Inlet Invert 'A' - Others Available If Required Contact Technical Team					Inlet Size 'E'
		20 (2.0m)	25 (2.5m)	30 (3.0m)	35 (3.5m)	40 (4.0m)	10 (1.0m)	15 (1.5m)	20 (2.0m)	25 (2.5m)	30 (3.0m)	Pump Type
1.25m	0.7m	•					•					110mm 160mm
			•				•	•				
				•			•	•	•			
					•		•	•	•	•		

Ø1.8



Case Diameter	Outlet Invert 'C'	Case Depth 'B'						Standard Inlet Invert 'A' - Others Available If Required Contact Technical Team						Inlet Size 'E'
		20 (2.0m)	25 (2.5m)	30 (3.0m)	35 (3.5m)	40 (4.0m)	45 (4.5m)	10 (1.0m)	15 (1.5m)	20 (2.0m)	25 (2.5m)	30 (3.0m)	35 (3.5m)	Pump Type
1.8m	0.7m	•						•						110mm 160mm 200mm 250mm 315mm
			•					•	•					
				•				•	•	•				
					•			•	•	•	•			
						•		•	•	•	•	•		

Ø2.6



Case Diameter	Outlet Invert 'C'	Case Depth 'B'			Standard Inlet Invert 'A' - Others Available If Required Contact Technical Team						Inlet Size 'E'
		33 (3.3m)	40 (4.0m)	45 (4.5m)	10 (1.0m)	15 (1.5m)	20 (2.0m)	25 (2.5m)	30 (3.0m)	35 (3.5m)	Pump Type
2.6m	0.7m	•			•	•	•				110mm 160mm 200mm 250mm 315mm
			•		•	•	•	•	•		
				•	•	•	•	•	•	•	

Klargester Horizontal Pumping Stations



If power supplies fail, Klargester horizontal pumping stations respond instantly, separating liquids and solids into a separate chamber, storing waste for up to 24 hours.

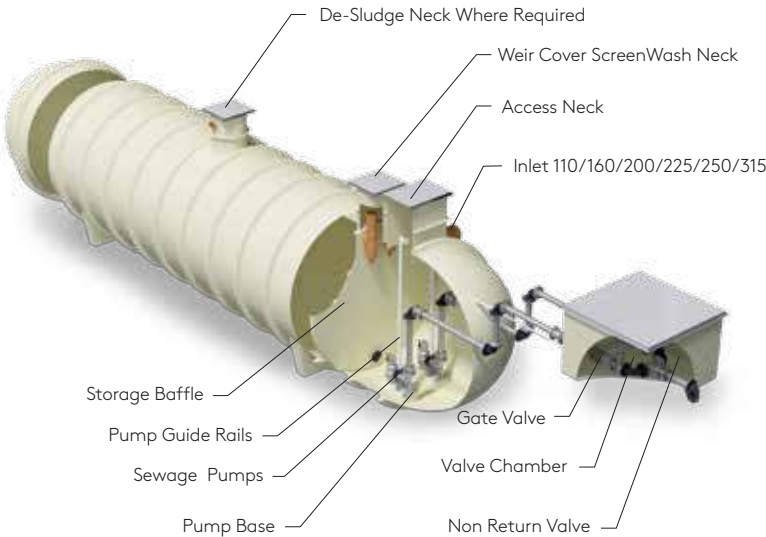
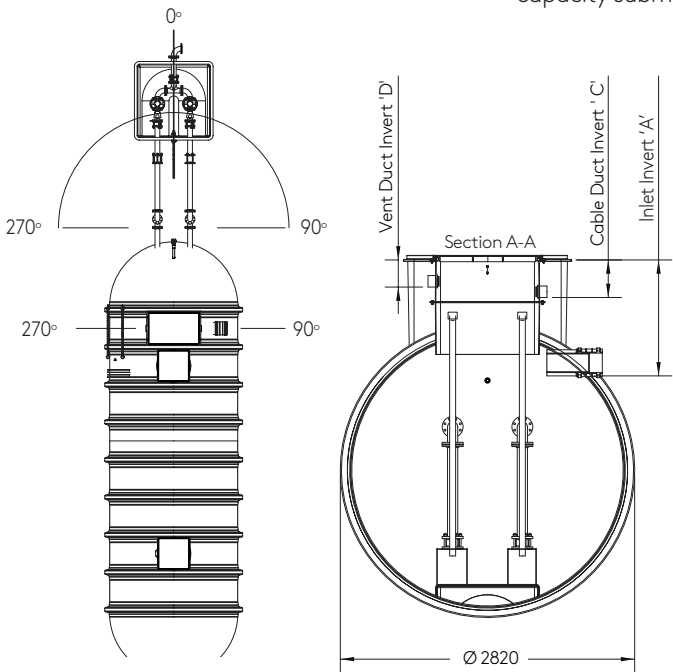
Once power is restored, the pumps will work normally again without further maintenance.

Product Benefits

- Single-tank installation up to 79m³ (multiple tank systems available).
- Multiple valve chamber location and invert options.
- Weir screen features innovative removable filters, so there's no need to access the chamber during maintenance.
- High-level alarm.
- Totally sealed system.
- One-piece tank chamber for easy installation.
- Minimal on-site assembly.
- Less crange and shallower excavation than concrete pumping stations.
- On-site Health & Safety issues are minimised – no requirement for personnel to enter the tank.
- Grundfos industrial pump for high capacity submerged installation.

Klargester horizontal pumping stations are designed as a single piece chamber with two separate sections - one for normal operation and one for emergency storage.

Typical Grundfos Industrial Pump



Technical Specification

Tank Size (mm)	Capacity (Ltrs)	Tank Material	Control Panel	Alarm	Pump Type
2,600 Diameter	18000-79000	GRP	Included	Standard	Single/Twin

Klargester Adoptable and High Specification Pumping Systems

The adoptable and high specification pumping stations are designed to meet the requirements of 'Sewers for Adoption 7th Edition' and the 'Water Industry Standard' (WIS). They also meet NI Water Standard Specification (May 2016).

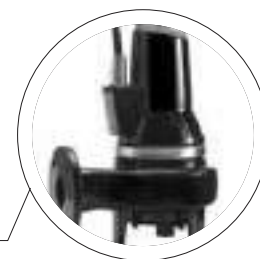
Product Benefits

- GRP single piece wet well delivered to site ready to install.
- Pre-fitted internal pipework, pump guide rails and overflow filters.
- Approved control panel and kiosk.
- All necessary drawings supplied.
- NI Water specified Controls and Hygiene unit.
- Grundfos pumps for submerged installation.

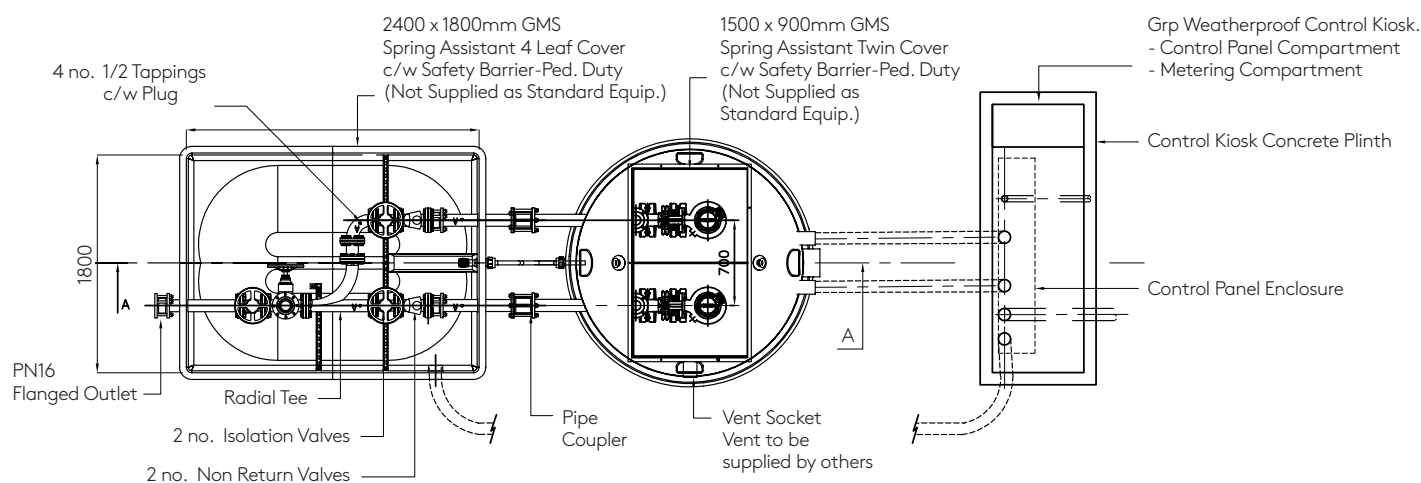
Manufactured as a ready to install single piece, prefabricated unit for Type 1 and Type 2 installations for up to 20 dwellings, please contact our specialist team for further advice on this high specification product.



Typical Grundfos SL Pump



Typical Layout



Selecting the Correct Pumping Station

Free expert advice at every stage.

All Klargester pumping stations are suitable for pumping wastewater effluent and sewage in accordance with BS 756-2. They are also designed in line with Building Regulations for Foul Drainage.

System size requirements will depend on the type of waste you need to manage, distance from the sewer and the difference in levels.

The Klargester pumping station range will require less craneage and shallower excavations than concrete pumping systems and there is no need for anyone to enter the tank during excavation and installation.

Prior to installation, there is a legal requirement to obtain permission from the appropriate agencies (including connection to a public sewer).

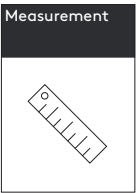
For expert advice, to help you select the correct system, please contact our specialist team on **01296 633000** or email **water@kingspan.com**

The key factors to size your system are as follows:

- Application: domestic, residential or commercial
- Material application: sewage, effluent or surface water.
- Inlet depth (below ground level).
- Pumping distance and lift.
- Electrical supply.



Sizing Chart



Please use the chart below to help correctly size and select your Klargester Pumping Station solution.

Pumping Distance (A)	Meters		
Pumping Lift (B)	Meters		
Discharge Height (C) (if different to Lift)	Meters		
Proposed Inlet Depth (D)	Meters		
Inlet Size	110mm ☐	160mm ☐	
Type of Application ie. 1 House, 2 Houses , pub, etc			
Number of Users			
Material Application	Sewage ☐	Surface Water ☐	Elffuent ☐
Power Supply	Single ☐	There Phase ☐	
New Lay or Existing Rising Main	New ☐	Existing ☐	
If Existing - Size of Rising Main			
Pumping to: Public/Private Sewer, Treatment Plant, etc.			
24 Hours Storage Required	Yes ☐	No ☐	



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INSTALLATION, OPERATING & MAINTENANCE GUIDELINES
FOR PACKAGE MINI PUMPCHAMBERS
EFFLUENT & SEWAGE APPLICATIONS



Kingspan Water & Energy Service Contact Numbers:

GB Tel: +44 (0) 844 846 0500

NI Tel: +44 (0) 28 3025 4077

IRL Tel: +44 (0) 48 3025 4077

ENCLOSED DOCUMENTS			
		TANK SIZE	
EFFLUENT APPLICATIONS		A	B
		Ø0.6m x 0.7m	Ø0.55m x 1.65m
DS1207P	Single Effluent - Low Head Pump Chamber Sales Drawing	●	
DS1208P	Single Effluent - High Head Pump Chamber Sales Drawing		
DS1210P	Single Effluent - Low Head Pump Chamber Sales Drawing		●
DS1211P	Single Effluent - High Head Pump Chamber Sales Drawing		
SEWAGE APPLICATIONS			
DS1206P	Single Sewage Pump Chamber Sales Drawing	●	
DS1209P	Single Sewage Pump Chamber Sales Drawing		●

Issue	Description	Date
02	Revision – ECN 1600	February 2022

HEALTH & SAFETY

THESE WARNINGS ARE PROVIDED IN THE INTEREST OF SAFETY. YOU MUST READ THEM CAREFULLY BEFORE INSTALLING OR USING THE EQUIPMENT.

It is important that this document is retained with the equipment for future reference. Should the equipment be transferred to a new owner, always ensure that all relevant documents are supplied in order that the new owner can be acquainted with the functioning of the equipment and the relevant warnings.

INSTALLATION SHOULD ONLY BE CARRIED OUT BY A SUITABLY EXPERIENCED CONTRACTOR, FOLLOWING THESE GUIDELINES. ELECTRICAL WORK SHOULD BE CARRIED OUT BY A QUALIFIED ELECTRICIAN.

Sewage and sewage effluent can contain substances harmful to human health. Any person carrying out maintenance on the equipment should wear suitable protective clothing, including gloves. Good hygiene practice should also be observed.

When covers are removed precautions must be taken against personnel falling into the unit.

Should you wish to inspect the operation of the equipment, please observe all necessary precautions, including those listed below, which apply to maintenance procedures.

Ensure that you are familiar with the safe working areas and accesses & that the working area is adequately lit.

Take care to maintain correct posture, particularly when lifting. Use appropriate lifting equipment when necessary. Keep proper footing and balance at all times. Avoid any sharp edges.

The removal of sediment should be carried out by a contractor holding the relevant permits to transport and dispose of such waste. The contractor must refer to the guidelines in this document.

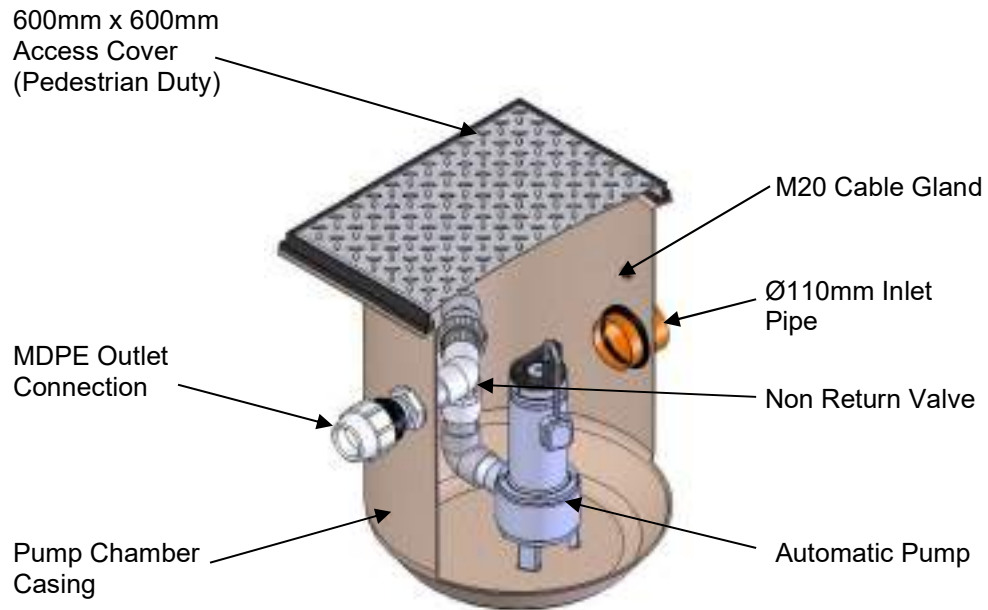
AS WITH ALL SITE WORK, THE DANGERS OF WORKING WITH WATER AND ELECTRICITY POSE SEVERE THREATS TO HEALTH, IF OBVIOUS AND FUNDAMENTAL PRECAUTIONS ARE NOT TAKEN. THEREFORE IF YOU ARE IN ANY DOUBT REGARDING ANY OF THE FOLLOWING, PLEASE DO NOT HESITATE TO CONTACT US.

CONTENTS

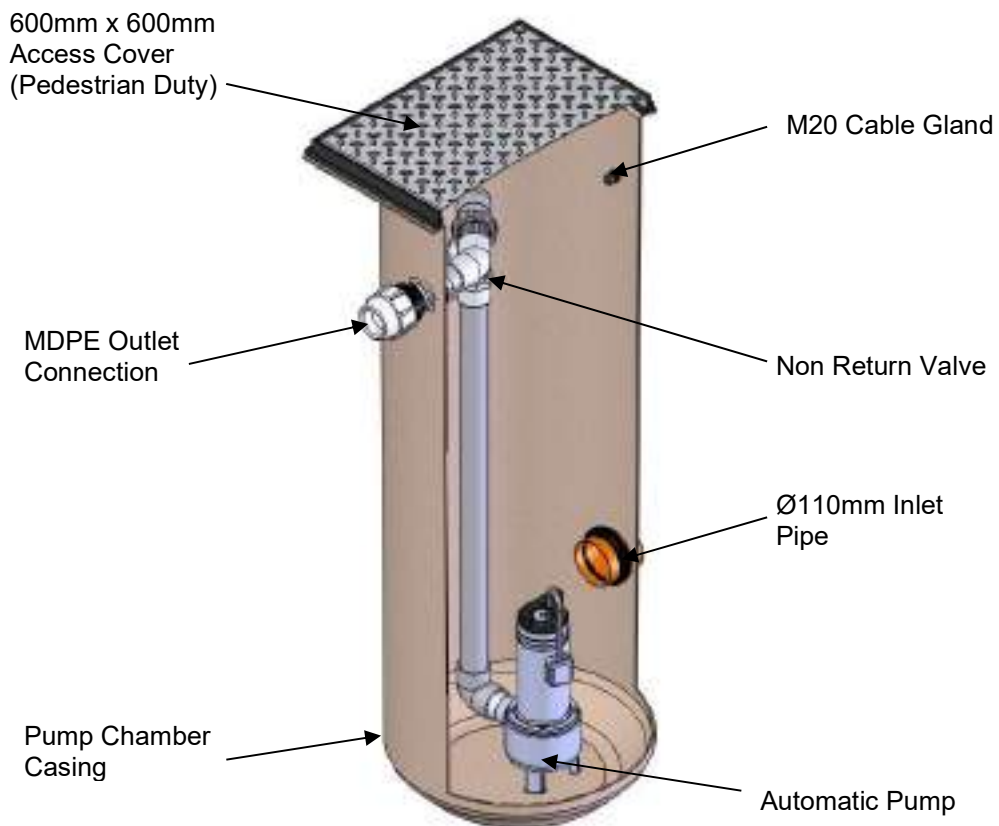
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1 System Overview.

Pictorial representation below indicates basic requirements for a standard system, please note not all of the items required are supplied from us as standard.



Tank 'A' – Ø0.6m x 0.7m



Tank 'B' – Ø0.55m x 1.65m

1.1 Site Delivery Check List.

The delivery ticket will have 1 no. item listed. A brief description of the product will be included on the delivery ticket.

	 Tank 'A' – Ø0.6x0.7m
<u>PACKAGED MINI PUMP CHAMBER</u> Unit will be fitted with a pedestrian rated cover. M20 cable gland supplied for pump cable exit. Ø110mm inlet fitted. Internal pipework fitted including rising main compression fitting.	 Tank 'B' Ø0.55x1.65m

2.0 Checks

- i.) Ensure that the pump and pipework are secure and undamaged.
- ii.) The pump has a built in level control float. Ensure that the float can operate freely and will not become tangled with rising pipework/cable during operation.

3.0 Installation.

At this stage consideration should be given to the location of the pumpstation, Suitable conduit / cable should be laid during installation for the power supply for the pump.

- i.) Excavate hole to dimensions specified on relevant drawing attached at back of this manual ensuring that a further 100mm is allowed all around the pumpstation for concrete.
- ii.) Ensure that the excavation is kept completely free of water.
- iii.) Lay a concrete slump at the base of the excavation to provide an adequate foundation. Refer to concrete specification below.

GENERAL CONCRETE SPECIFICATION IN ACCORDANCE WITH BS EN 206-1 (BS 8500-1)		
TYPE OF MIX		(DC) DESIGN
PERMITTED TYPE OF CEMENT		BS 12 (OPC); BS 12 (RHPC); BS 4027 (SRPC)
PERMITTED TYPE OF AGGREGATE (coarse & fine)		BS 882
NOMINAL MAXIMUM SIZE OF AGGREGATE		20 mm
GRADES: C25 /30 C25 /30 C16 /20		REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)
MINIMUM CEMENT CONTENT	C30	270 - 280 Kg/M ³
	C20	220 - 230 Kg/M ³
SLUMP CLASS		S1 (25mm)
RATE OF SAMPLING		READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS EN 12350-1
1.1.1 NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES		
1.1.2 OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER		

- i.) Lower the unit onto the slump at the base of the excavation, orientate and set to the correct invert levels for both inlet and outlet pipe work. Ensure that the unit is level in all directions and adjust with suitable struts around the top of the tank.
- ii.) Ballast the tank with water to a level approximately 400mm from the base. Re-check the tank position, paying particular attention to invert levels and unit orientation.
- iii.) Carefully backfill the unit with concrete, maintaining an internal water level of at least 300mm above the level of the external backfill, continually checking that the unit remains correctly positioned.
- iv.) Continue to backfill until just below the level of the inlet pipe and connect pipe work.

Continue to backfill until just below the level of the outlet pipe and connect pipe work. The pump cable should be drawn through the cable gland (positioned 250mm from the top of the tank).

- v.) Continue to backfill up to just below the top flange.

4.0 Start up Operation

The pump cable must be wired to a suitability sized isolator, to enable the power supply to pump to be isolated for maintenance purposes. Overload protection is provided internally within the pump.

- i.) The pump will only run when the liquid level is sufficiently high enough in the pump well to activate the float switch.
- ii.) As the pump discharges the liquid the level will fall and the float switch will switch off the pump automatically.
- iii.) It is advisable to witness this cycle several times to ensure correct operation of the float switch.

5.0 Maintenance

Pumping stations require little maintenance other than that required by the pump (see manufacturer's maintenance instructions).

In some situations, deposits of grease may accumulate, which can upset the operation of the level controller and cause blockages. Where this occurs, occasional cleaning may be necessary. Whenever maintenance or cleaning takes place, the pump should be lifted from the unit, cleaned and serviced in accordance with manufacturer's instructions. Do not use the electrical cable to lift the pump. On completion of the cleaning process, refit the pump by lowering the pump into the pumpwell using the attached riser pipe as a handle, secure in place with socket union. Check for correct operation as described in section 4.0.

6.0 Fault Finding

In the event of a pump failure, refer to the manufacturer's instructions supplied with the pump.

How to Keep your Pump Station Running Sweetly.

If a Pump Station serves your property, the likelihood is that the property is not connected directly to the mains sewer system.

Sewage pump systems are designed to handle foul water, natural human waste and biodegradable products. Other household waste and non-biodegradable products should never be disposed of through the drainage system.

Disposal of non bio-degradable products will affect the reliability of all pumping stations, causing pumps to block and storage chambers to become congested with non-pumpable waste.

Bear in mind too that it isn't only the toilet that is connected to the station; anything that goes down the sink, bath etc. also ends up there.

THE FOLLOWING MUST NOT BE DISCHARGED INTO THE DRAINS

- **Cleaning Rags**
- **Cloths**
- **Syringes & Hypodermic Needles**
- **Medicines & Medical Equipment.** Take unused medicines to a pharmacist for safe disposal.
- **Grease & Fat.** These products tend to cool down, separate from the water and coagulate within the pump chamber. Fat & grease encase the pump and floats, causing blockages and failure of pumps.
- **Nappies, sanitary towels, incontinence materials, soft toys, tennis balls etc.** It may seem a bit obvious to say this, but it is amazing what gets flushed down the loo from time to time. Causing blockages of the drains and pumps
- Even so-called **disposable nappies and sanitary towels** often do not degrade fully and can lead to malfunction, so it is best to dispose of them by other means. Fabric cleansing wipes & nappy liners can block pipework. They should not be flushed into the drainage system.

ROUTINE DE-SLUDGING AND SERVICING

Pump Stations over time accumulate settled solids. It is good practice to check and if necessary empty/desludge these at the same time as any treatment unit.

It is vital to the systems ongoing operation and should be carried out regularly.

Mechanical and electrical servicing, particularly, must be performed by properly trained personnel suitably qualified and experienced in this type of work.