

ACO Water Management: Civils + Infrastructure

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

ACO S Range



ACO S Range

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



To help architects, designers and contractors meet the legal requirements that now tightly control the way surface water is managed, ACO has created its unique system chain that combines a 'Surface Water Management Cycle' – Collect, Clean, Hold, Release, with the service support of Train, Design, Support and Care.

These processes enable ACO to offer a combination of product and service expertise necessary for the complete and sustainable management of surface water drainage.



Contents

Introduction to ACO S Range	4
Features overview	6
Channel range layout	8
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ACO S Range System	
ACO S100	10
ACO S100 gratings	14
ACO S150	15
ACO S200	17
ACO Universal Gully	18
ACO S300	20
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ACO S Range: Problem Solving Drainage Solutions	
Designing an ACO S Range drainage system	22
Design method	23
Hydraulic performance tables	24
Installation details	28
Chemical Resistance Chart	30
Specification Clause / CE Conformity	31



Introduction to ACO S Range

ACO S Range is an accessible grated channel drainage system, specifically designed for surface water management in heavy-duty and industrial applications such as petrol station forecourts, HGV parking and warehousing.

What is ACO S Range?

ACO S Range delivers high performance drainage for heavy-duty and industrial applications and is fully certified to BS EN 1433:2002 load class F 900*.

Manufactured from Vienite®, ACO's sustainable high strength polymer concrete material the S Range channels are available in four widths, 100mm, 150mm, 200mm and 300mm in a variety of depths and slopes.

Where a higher capacity drainage system is required the S150, S200 or S300 constant depth units are ideal for dealing with larger volumes of water. This keeps the water closer to the surface and reduces the need for costly underground pipe networks.

Depending on the application and anticipated traffic the S100 range is available with a choice of ductile iron grating and cover designs including Slotted, Heelguard™, Intercept and Solid.

The S150, S200 and S300 ranges are supplied assembled with slotted ductile iron gratings. All gratings are fastened with a secure bolt locking system.



Typical applications

- ▶ Car parking
- ▶ HGV parking
- ▶ Petrol station forecourts
- ▶ Industrial
- ▶ Distribution and warehouses
- ▶ Ports and docks
- ▶ Aircraft pavements



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

*Not suitable for carriageways of public roads or motorways

Why Choose ACO S Range?

Heavy-duty

S Range is specifically designed for heavy-duty and industrial applications fully certified to BS EN 1433:2002 for applications up to and including F 900*.

The polymer concrete's high strength characteristics means the material is four times stronger than traditional concrete.

All S Range channels are supplied with integral cast iron rails for channel body protection. The rails not only provide strength and wear resistance to the channels for long service life, but also ensure each heavy-duty grating can be fully secured from movement by our proven and reliable four point, M10 high tensile bolt locking system.

Durability & water tightness

Manufactured from Vienite® the S Range channel bodies have many benefits including excellent resistance to dilute acids and alkalis, is unaffected by road salts, fuels and oils typically encountered during service.

Having a water absorption level of only 0.01% by weight, Vienite® ensures water tight installations can be achieved to prevent unwanted contamination of surrounding soil or ground water in applications such as petrol stations.

Accessibility

The S Range has a full range of sumps and gullies to provide a complete solution for efficient drainage and long term silt management with maintenance by standard jet washing techniques.

Each heavy-duty grating is accessible by our proven and reliable four point, M10 high tensile bolt locking system.



System benefits:

- ▶ Range of constant and sloped depth channels
- ▶ Caters for extreme wheel loads such as aircraft pavements, ports and docks
- ▶ Strong and robust design
- ▶ CE Marked and BS EN 1433:2002 certified to Load Class F 900*
- ▶ Caters for a range of catchment depths
- ▶ Choice of slotted, Heelguard™, intercept and solid cover gratings on the 100mm wide system
- ▶ All gratings come complete with locking bolts
- ▶ Sump and gully outlets available for connection to underground drainage



NEW ACO QuAD Hydraulic Design Software

Register online for our free, secure online design software:

- ▶ 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



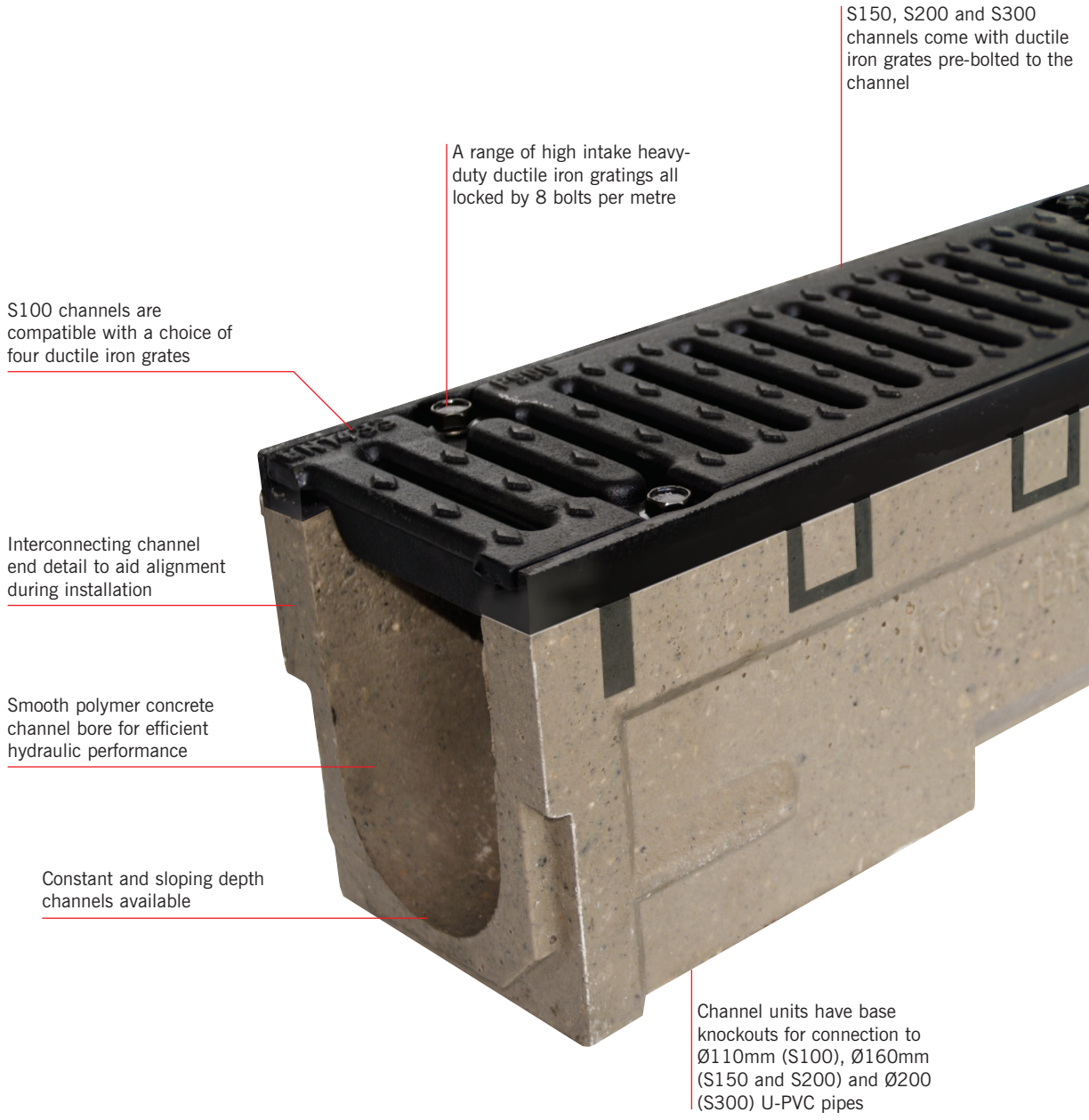
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ACO S RANGE FEATURES OVERVIEW



S150, S200 and S300 channels come with ductile iron grates pre-bolted to the channel

A range of high intake heavy-duty ductile iron gratings all locked by 8 bolts per metre

S100 channels are compatible with a choice of four ductile iron grates

Interconnecting channel end detail to aid alignment during installation

Smooth polymer concrete channel bore for efficient hydraulic performance

Constant and sloping depth channels available

Channel units have base knockouts for connection to Ø110mm (S100), Ø160mm (S150 and S200) and Ø200 (S300) U-PVC pipes

LOAD CLASSES



A 15
Pedestrian, cycleways, minimally trafficked area (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.

Traditional channel and grating drainage system

Integral cast iron edge rails provide maximum strength and protection for channel body

The ACO S Range system is available in four channel widths: 100mm, 150mm, 200mm and 300mm

Fully certified to
BS EN 1433: 2002
Load Class F 900*



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



ACO S100 channels come with a choice of intercept, slotted, Heelguard™ and solid cover grates in ductile iron. See page 14 for further details.



D 400*

Parking areas for all vehicle types, distribution yards.



E 600*

Industrial areas, heavy wheel loads, slow-moving HGV's and forklifts, service stations.



F 900*

Airport runways, very heavy industrial and military installations, service yards and lorry parks.

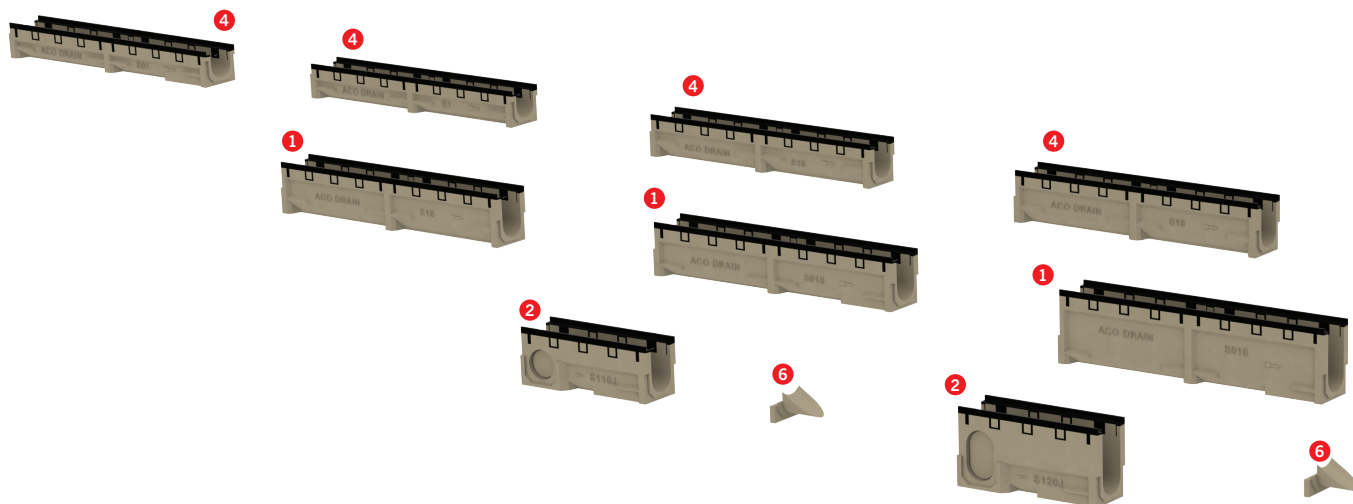
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ACO S Range Layout

To support a wide variety of catchment depths, hydraulic capacities and applications, the system is available in four channel widths, 100mm, 150mm, 200mm and 300mm and has a range of constant depths and sloping depth channels to suit the drainage design.

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

All ACO S Range channels are supplied with ductile iron edge rails.



1 Constant depth channels – 1m



- ▶ **100mm wide bore:** Five constant depth channel units are available in 1m lengths with overall depths ranging from 137mm to 311mm.
- ▶ **150mm wide bore:** Three constant depth channel units are available in 1m lengths with overall depth ranging from 220mm to 320mm.
- ▶ **200mm wide bore:** One constant depth channel unit available in a 1m length with overall depth of 309mm.
- ▶ **300mm wide bore:** One constant depth channel unit available in a 1m length with overall depth of 390mm.

These channels include a vertical knockout for connection to Ø110mm (100mm wide bore channels), Ø160mm (150mm and 200mm wide bore channels) and Ø200mm (300mm wide bore channel) pipework.

2 Constant depth channels – 0.5m



- ▶ **100mm wide bore:** Three 0.5m constant depth channel units are available with overall depths ranging from 191mm to 311mm
- ▶ **150mm wide bore:** Two 0.5m constant depth channels with overall depths ranging from 220mm to 270mm.
- ▶ **200mm wide bore:** One 0.5m constant depth channel with overall depth of 309mm.
- ▶ **300mm wide bore:** One constant depth channel unit available in a 1m length with overall depths of 390mm.

These channels include a vertical knockout for connection to Ø110mm (100mm wide bore channels), Ø160mm (150mm and 200mm wide bore channels) and Ø200mm (300mm wide bore channel) pipework and side knockout for 90° channel connections.

3 Sump



- ▶ **100mm wide bore:** One 0.5m sump for connection to each constant depth 0.5m channel.
- ▶ **150mm wide bore:** One 0.5m sump with a depth of 900mm.
- ▶ **200mm wide bore:** the Universal Gully is used with this range.
- ▶ **300mm wide bore:** One gully top with either shallow or deep base units with an overall depth of 655mm to 910mm

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.

4 Sloping depth channels



▶ **100mm wide bore:** Thirty 1m sloping channels with 0.6% fall in depths from 137mm to 317mm.

5 Universal Gully

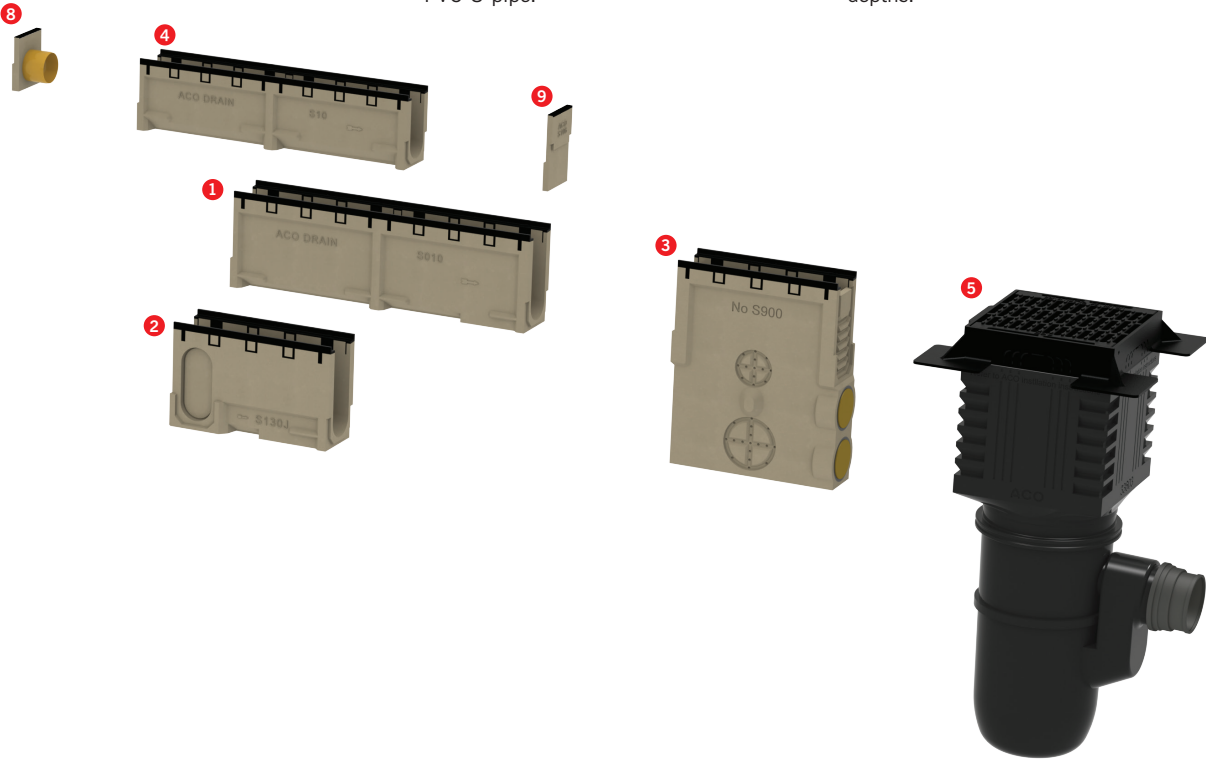


One universal gully for all applications compatible with S100, S150 and S200 ranges and certified up to Load Class F 900. Standard features include ductile cast iron cover, silt bucket and roddable foul air trap for connection to Ø160mm PVC-U pipe.

6 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 60mm step between each of the constant channel depths.



7 Inlet Endcap



Three depths of Polymer concrete Inlet Endcaps to be used at specific points in the channel run.

8 Outlet Endcap



Three depths of Polymer concrete Outlet Endcaps to be used at specific points in the channel run.

9 Closing Endcap



Three depths of Polymer concrete Closing Endcaps with integral cast iron edge to be used at specific points in the channel run.



ACO S100

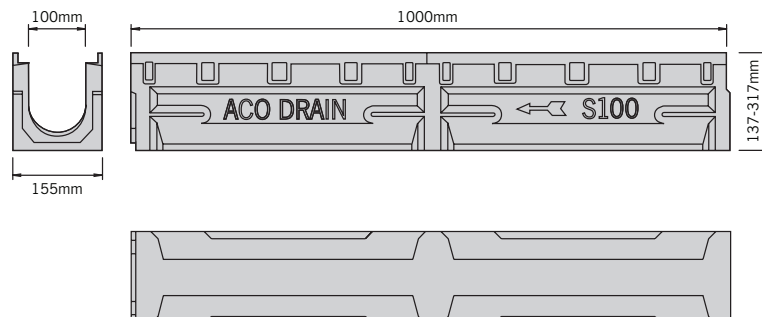
ACO S100 channels listed below are provided with integral cast iron edge rails.

Suitable for applications up to and including BS EN 1433:2002 load class F 900*. For the S100 range of gratings to suit these channels refer to page 14.

The ACO universal gully can be used with all S100 channels see page 18 for further details.

Sloping depth channels with cast iron edge rails

Product code	Description	Length (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)	Sump	Gully unit	Closing endcap	Outlet endcap	Inlet endcap
0270	S1	1000	137/143	112/118	20.0	-	601/602/607	S106	-	-
0271	S2	1000	143/149	118/124	20.3	-	601/602/607	S106	-	-
0272	S3	1000	149/155	124/130	20.4	-	601/602/607	S106	-	-
0273	S4	1000	155/161	130/136	20.9	S900	601/602/607	S106	-	-
0275	S5	1000	161/167	136/142	21.0	-	601/602/607	S106	-	-
0276	S6	1000	167/173	142/148	21.1	-	601/602/607	S106	-	-
0277	S7	1000	173/179	148/154	22.9	-	601/602/607	S106	-	-
0278	S8	1000	179/185	154/160	23.3	-	601/602/607	S106	-	-
0279	S9	1000	185/191	160/166	24.1	S900	601/602/607	S106	S108	-
0281	S10	1000	191/197	166/172	24.7	-	601/602/607	S106	-	S109
0282	S11	1000	197/203	172/178	24.8	-	601/602/607	S206	-	-
0283	S12	1000	203/209	178/184	24.9	-	601/602/607	S206	-	-
0284	S13	1000	209/215	184/190	25.0	-	601/602/607	S206	-	-
0285	S14	1000	215/221	190/196	25.7	S900	601/602/607	S206	-	-
0286	S15	1000	221/227	196/202	25.8	-	601/602/607	S206	-	-
0287	S16	1000	227/233	202/208	26.3	-	601/602/607	S206	-	-
0288	S17	1000	233/239	208/214	27.4	-	601/602/607	S206	-	-
0289	S18	1000	239/245	214/220	27.7	-	601/602/607	S206	-	-
0290	S19	1000	245/251	220/226	28.5	S900	601/602/607	S206	S208	-
0292	S20	1000	251/257	226/232	28.8	-	601/602/607	S206	-	S209
0293	S21	1000	257/263	232/238	29.2	-	601/602/607	S306	-	-
0294	S22	1000	263/269	238/244	29.3	-	601/602/607	S306	-	-
0295	S23	1000	269/275	244/250	30.0	-	601/602/607	S306	-	-
0296	S24	1000	275/281	250/256	31.1	S900	601/602/607	S306	-	-
0297	S25	1000	281/287	256/262	31.2	-	601/602/607	S306	-	-
0298	S26	1000	287/293	262/268	31.3	-	601/602/607	S306	-	-
0299	S27	1000	293/299	268/274	32.3	-	601/602/607	S306	-	-
0300	S28	1000	299/305	274/280	32.7	-	601/602/607	S306	-	-
0301	S29	1000	305/311	280/286	33.1	S900	601/602/607	S306	S308	-
0303	S30	1000	311/317	286/292	34.7	-	601/602/607	S306	-	S309



S100 1m sloping depth channel

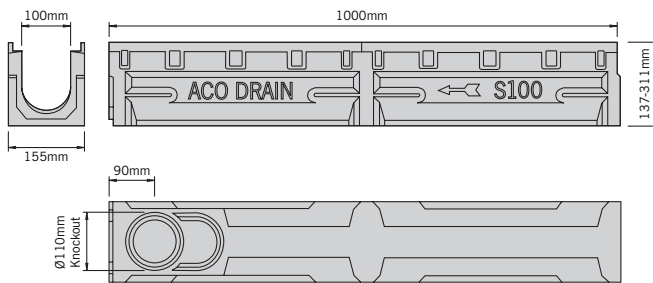
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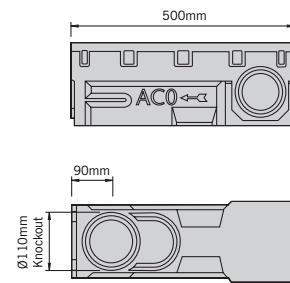
ACO S100

Constant depth channels with cast iron edge rails

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)	Knockout union	Sump	Gully unit	Closing endcap	Outlet endcap	Inlet endcap	Step connector
0269	S01*	1000	100	155	137	112	20.4	820/821	-	601/602/607	S106	-	-	-
0274	S05*	1000	100	155	161	136	21.9	820/821	S900	601/602/607	S106	-	-	-
0403	S010*	1000	100	155	191	166	25.3	820/821	S900	601/602/607	S106	S108	S109	123
0280	S110J*	500	100	155	191	166	13.7	820/821	S900	601/602/607	S106	S108	S109	123
0405	S020*	1000	100	155	251	226	28.9	820/821	S900	601/602/607	S206	S208	S209	123
0291	S120J*	500	100	155	251	226	17.4	820/821	S900	601/602/607	S206	S208	S209	123
0407	S030*	1000	100	155	311	286	33.3	820/821	S900	601/602/607	S306	S308	S309	-
0302	S130J*	500	100	155	311	286	19.7	820/821	S900	601/602/607	S306	S308	S309	-



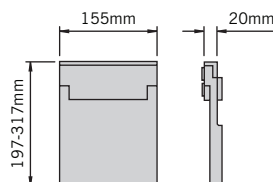
S100 1m constant depth channel



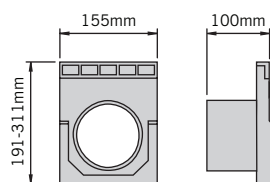
S100 0.5m constant depth channel

Closing outlet and inlet endcaps

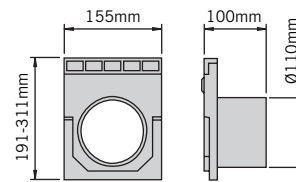
Product code	Description	Length (mm)	Spigot length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
0411	S106 - Closing	20	-	155	197	-	1.0
0413	S206 - Closing	20	-	155	257	-	1.3
0414	S306 - Closing	20	-	155	317	-	1.7
0415	S108 - Outlet	100	80	155	191	166	1.2
0416	S208 - Outlet	100	80	155	251	226	1.5
0418	S308 - Outlet	100	80	155	311	286	1.9
0419	S109 - Inlet	100	80	155	191	166	1.1
0420	S209 - Inlet	100	80	155	251	226	1.5
0421	S309 - Inlet	100	80	155	311	286	1.9



Closing endcaps



Outlet endcaps



Inlet endcaps

* These level invert channels have a vertical $\varnothing 110$ mm knockout.
J Indicates availability of side junction for 90° bends.

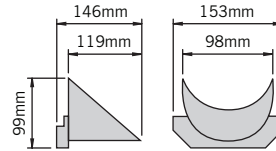
Note: Level invert channels can be inserted to extend a run. Please refer to the channel range layout on page 8. See channel parts table to match endcap with correct channel.

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

ACO S100

Step connector

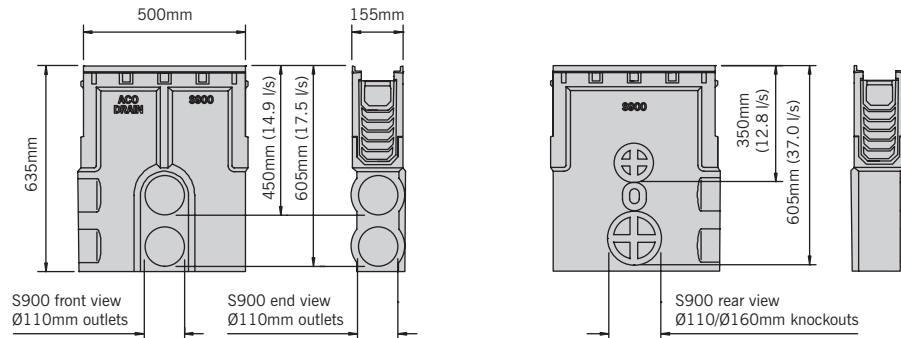
Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
0858	60mm step S123	119	98	153	99	60	1.1



Step connector

Sump unit with cast iron edge rails

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
4223	Sump unit and polypropylene bucket assembly S900	500	100	155	635	605	38.3



Sump unit

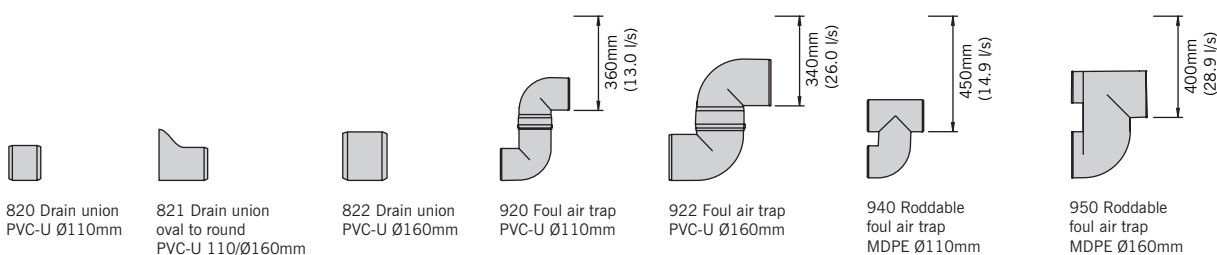


Note: For universal gully details please refer to page 18.

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 bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
0056	820 Drain union PVC-U Ø110mm	100	100	110	-	-	0.1
0057	821 Drain union oval to round PVC-U 110/Ø160mm	175	150	160	-	-	0.5
0058	822 Drain union PVC-U Ø160mm	150	150	160	-	-	0.5
2640	920 Foul air trap PVC-U Ø110mm	-	100	110	-	360	0.5
2638	922 Foul air trap PVC-U Ø160mm	-	150	160	-	340	1.9
7931	940 Roddable foul air trap MDPE Ø110mm	-	100	110	-	450	0.6
7932	950 Roddable foul air trap MDPE Ø160mm	-	150	160	-	400	0.8



Polymer repair kit

Product code	Description	Weight (kg)
32599	Polymer concrete repair kit	1kg†



Polymer repair kit

Note: For universal gully details please refer to page 18.

†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.

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 S100 channels complete with four locking bolts

Gratings for Load Class E 600 applications



Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Intake area mm ² /m	Anti-shunt feature	Weight (kg)
0776	Intercept heavy-duty ductile iron ref. 776	500	139	15	10	29000	n/a	6.8



Intercept heavy-duty ductile iron grating

Gratings for Load Class F 900 applications



Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Intake area mm ² /m	Anti-shunt feature	Weight (kg)
4604	Slotted heavy-duty ductile iron ref 772	500	139	15	10	32000	n/a	5.6
0774	Heelguard™ heavy-duty ductile iron ref 774	500	139	15	5	16100	n/a	6.7
7626	Solid cover ductile iron ref 778	500	139	15	n/a	n/a	n/a	6.7



Slotted heavy-duty ductile iron grating



Solid cover ductile iron



Heelguard™ heavy-duty ductile iron grating

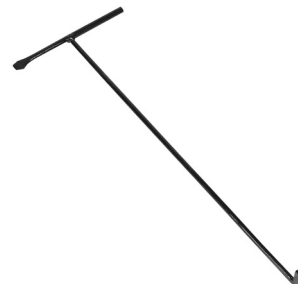
Note: All ACO S Range gratings come complete with bolts to ensure the system can be locked and accessed when required.

Grating accessories

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width / hole dia (mm)	Intake area mm ² /m	Anti-shunt feature	Weight (kg)
2324	Spare S100 bolt	30	10	-	-	-	-	0.03
1367	Grating lifting tool 835	n/a	n/a	n/a	n/a	n/a	n/a	0.1



S100 bolt



835 grating lifting tool



ACO S150

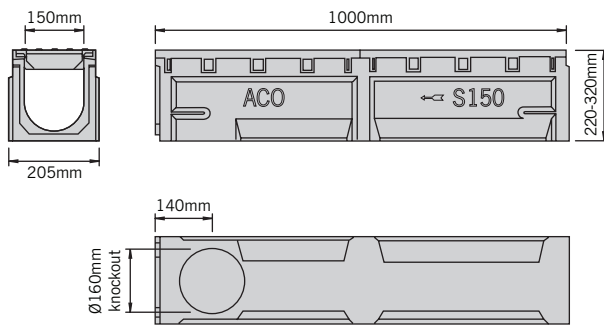
ACO S150 channels listed below are provided with integral cast iron edge rails complete with slotted ductile iron gratings and locking bolts.

Suitable for applications up to and including BS EN 1433:2002 load class F 900*. Gratings have 14mm wide slots providing an intake area of 63400mm²/m.

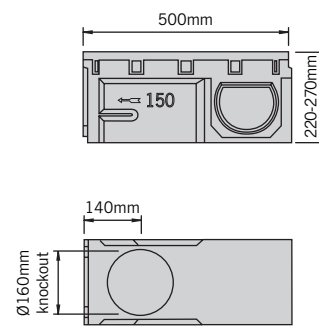
The ACO universal gully can be used with all S150 channels see page 18 for further details.

Constant depth channels complete with ductile iron gratings

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)	Knockout union	Sump	Gully unit	Closing endcap	Outlet endcap	Inlet endcap	Step connector
1151	S150 1501**	1000	150	205	220	195	44.1	822	0875	601/602/607	1130	1131	-	1159
1152	S150 1502**	1000	150	205	270	245	52.8	822	0875	601/602/607	1130	1132	-	1159
1153	S150 1503**	1000	150	205	320	295	57.2	822	0875	601/602/607	1130	1133	-	1159
1176	S150 1504J**	500	150	205	220	195	26.1	822	0875	601/602/607	1130	1131	-	1159
1154	S150 1505J**	500	150	205	270	245	28.6	822	0875	601/602/607	1130	1132	-	1159



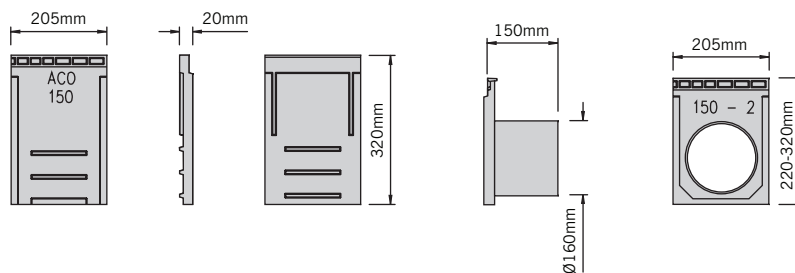
S150 1m constant depth channel



S150 0.5m constant depth channel

Endcaps

Product code	Description	Length (mm)	Spigot length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
1130	Closing S150**†	20	-	205	320	-	2.6
1131	Outlet S150 1131	150	130	205	220	195	2.4
1132	Outlet S150 1132	150	130	205	270	245	2.7
1133	Outlet S150 1133	150	130	205	320	295	3.0



Closing endcap

Outlet endcaps

*Not suitable for carriageways of public roads or motorways
 **These Level Invert Channels have a vertical Ø160mm knockout
 J Indicates availability of side junction for 90° bends
 † Can be cut on site to suit invert depth

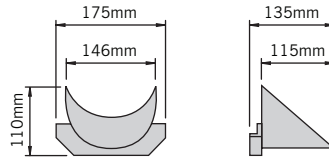
Note: As with all pre-cast products, polymer concrete units are subject to weight and dimensional tolerances.



ACO S150

Step connector

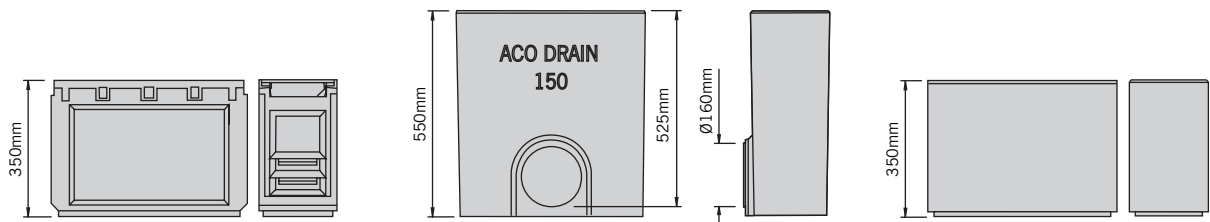
Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
1159	50mm step connector	115	146	175	110	50	1.0



Step connector

Sump units

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
0875	Sump assembly top and base*	500	150	205	900	875	62.7
1168	Raising piece	500	150	205	350	240	18.5



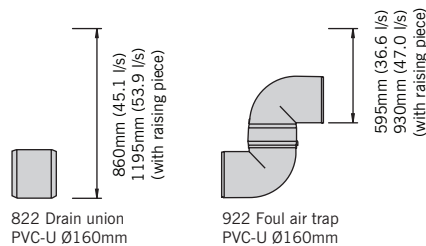
Sump top unit

Sump base unit

Sump raising piece

Drain unions & foul air trap

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
0058	822 Drain union PVC-U Ø160mm	150	150	160	-	-	0.5
2638	922 Foul air trap PVC-U Ø160mm	-	150	160	-	Varies	1.9



822 Drain union
PVC-U Ø160mm

922 Foul air trap
PVC-U Ø160mm

*Note: For a deeper sump, the raising piece may be inserted between the top and base units. For universal gully details please refer to page 18. For repair kit information please see page 13. As with all pre-cast products, polymer concrete units are subject to weight and dimensional tolerances.



ACO S200

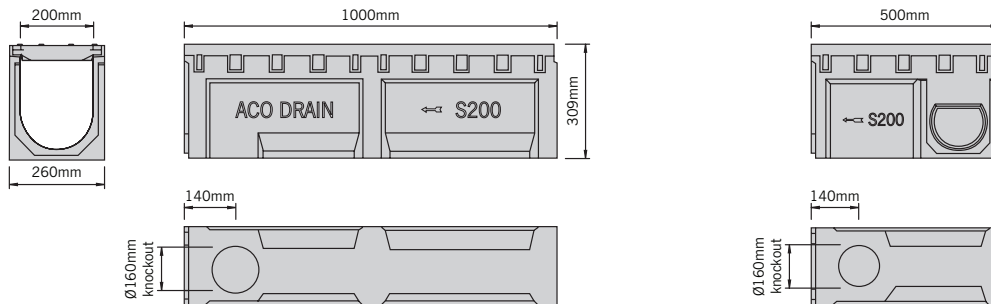
ACO S200 channels listed below are provided with integral cast iron edge rails complete with slotted ductile iron gratings and locking bolts.

Suitable for applications up to and including BS EN 1433:2002 load class F 900*. Gratings have 16mm wide slots providing an intake area of 90900mm²/m.

The ACO universal gully can be used with all S200 channels see page 18 for further details.

Constant depth channels with ductile iron gratings

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)	Knockout union	Sump	Gully unit	Closing endcap	Outlet endcap	Inlet endcap
1427	S200 2300**	1000	200	260	309	279	82.5	822	n/a	601/602/607	1516	1517	-
2847	S200 2310J**	500	200	260	309	279	40.0	822	n/a	601/602/607	1516	1517	-

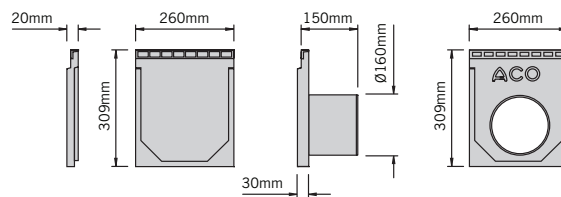


S200 1m constant depth channel

S200 0.5m constant depth channel

Endcaps

Product code	Description	Length (mm)	Spigot length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
1516	Closing S200	20	-	260	309	-	3.7
1517	Outlet S200 Ø160mm	150	130	260	309	274	3.5



Closing endcap

Outlet endcap

Drain union

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
0058	822 Drain union PVC-U Ø160mm	150	150	160	-	-	0.5



822 Drain union PVC-U Ø160mm

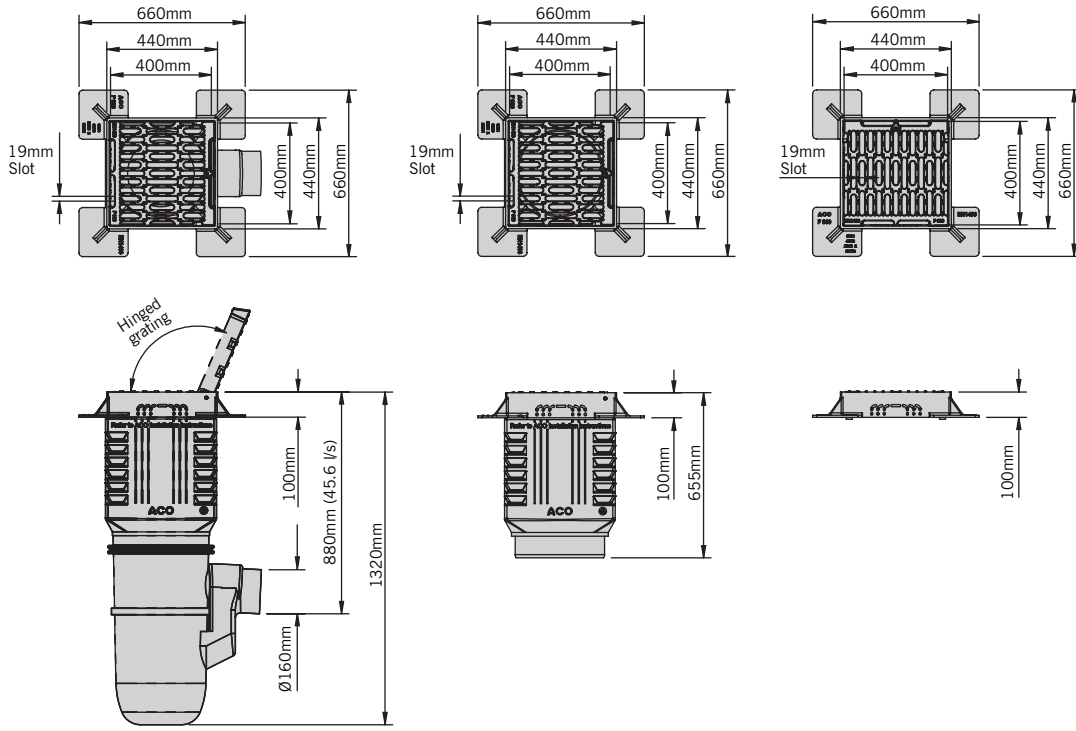
*Not suitable for carriageways of public roads or motorways
 **All Level Invert Channels have a vertical Ø160mm knockout.
 J Indicates availability of side junction for 90° bends.

For universal gully details please refer to page 18. For repair kit information please see page 13. These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

ACO Universal Gully

ACO Universal Gully for S100, S150 and S200 channels

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Slot width (mm)	Weight (kg)
33601	Gully assembly and bucket 601F	440	440	1315	870	19	78.8
33602	Gully assembly no bucket 602F	440	440	1315	870	19	77.4
33607	Gully top assembly only 607F	440	440	655	-	19	73.1
33604	Grating and frame 604F	400*	660††	100	-	19	69.5



Gully assembly No 601F and No 602F

Gully top assembly No 607F
(Gully pot supplied by others)

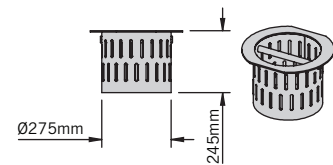
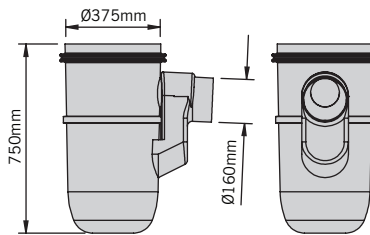
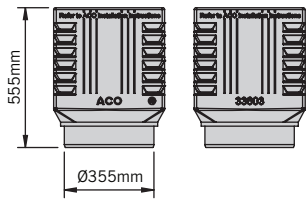
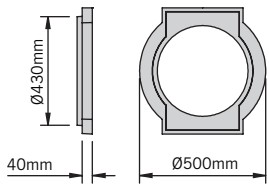
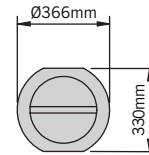
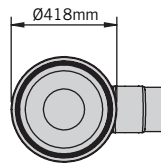
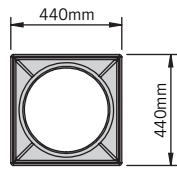
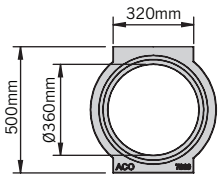
Gully grating and frame only No 604F



* Clear opening size
†† Over frame size

ACO Universal Gully components

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert (mm)	Weight (kg)
7060	Gully connector 615	500	Ø500	40	-	7.0
33603	Gully intermediate unit 603	440	440	555	-	5.1
33605	Gully base unit 605	-	Ø375	750	310	4.3
33606	Bucket polyethylene 606	-	Ø275	245	-	1.4



Gully connector No 615

Gully intermediate unit No 603

Gully base unit No 605

Gully bucket No 606



ACO S300

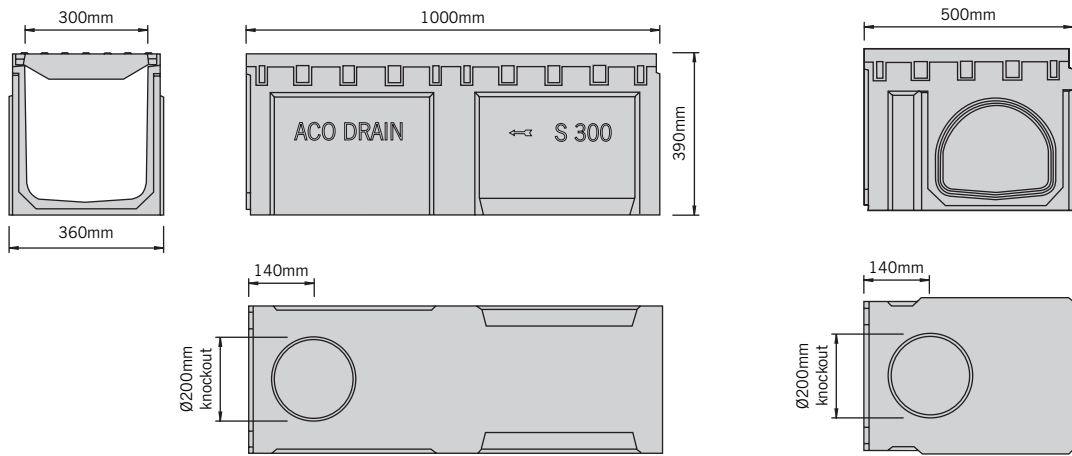
ACO S300 channels listed below are provided with integral cast iron edge rails complete with slotted ductile iron gratings and locking bolts.

Suitable for applications up to and including BS EN 1433:2002 load class F 900*.

Gratings have 16mm wide slots providing an intake area of 137100mm²/m.

Constant depth channels complete with ductile iron gratings

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)	Knockout union	Closing endcap	Outlet endcap	Inlet endcap
2632	S300 2400**	1000	300	360	390	360	132.5	823	2573	2574	-
1766	S300 1766J**	500	300	360	390	360	62.83	823	2573	2574	-



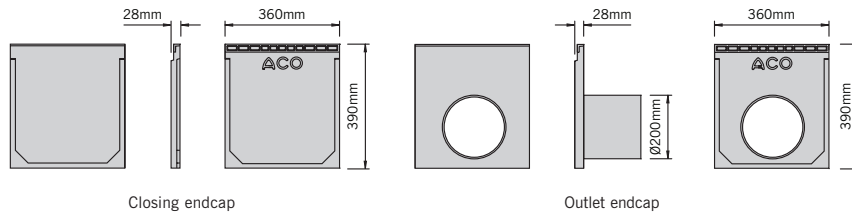
S300 1m constant depth channel

S300 0.5m constant depth channel



Endcaps

Product code	Description	Length (mm)	Width bore (mm)	Width invert (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)
2573	Closing S300	28	-	-	360	390	6.3
2574	Outlet S300 Ø200mm	205	190	358	360	390	3.0

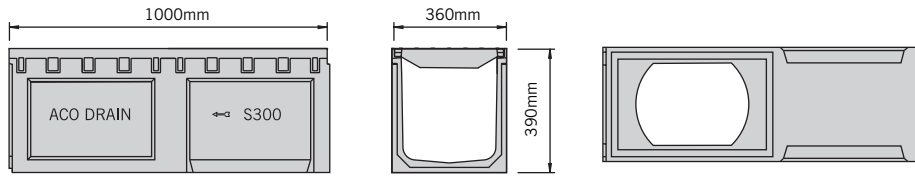


*Not suitable for carriageways of public roads or motorways
 **All Level Invert Channels have a vertical Ø200mm knockout.
 J indicates availability of side junction for 90° bends.

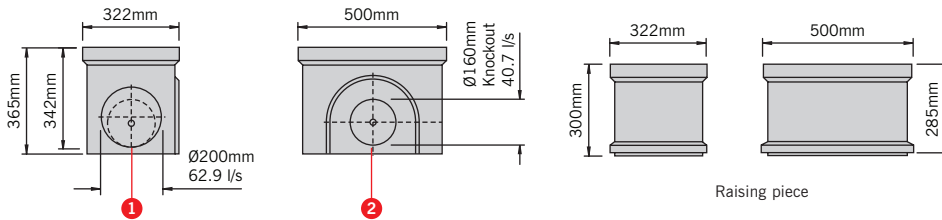
Note: As with all pre-cast products, polymer concrete units are subject to weight and dimensional tolerances.

ACO S300 gully units and accessories

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)	Knockout union	Closing endcap	Outlet endcap
3102	S300 Gully top 2410	1000	300	360	390	360	133.2	-	2573	2574
1614	Shallow base unit	500	-	320	365	-	25.4	822/823	-	-
4520	Deep base unit only	500	-	320	520	-	37.2	822/823	-	-
1697	Raising piece	500	-	320	300	-	24.0	822	-	-
1616	Silt bucket	-	-	-	-	-	4.7	-	-	-

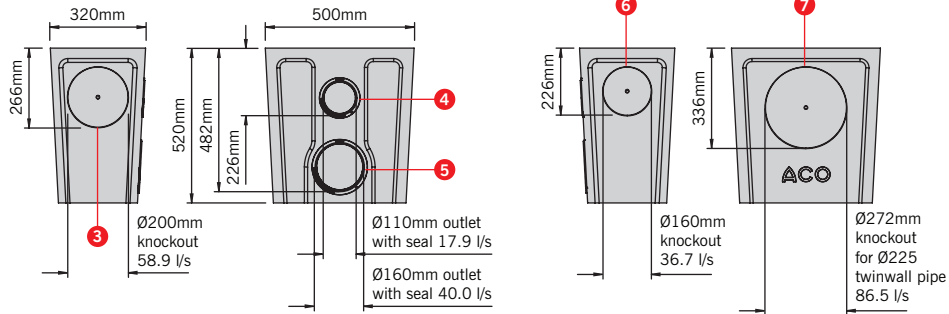


S300 Gully top 2410



Invert Depths (without raising piece)

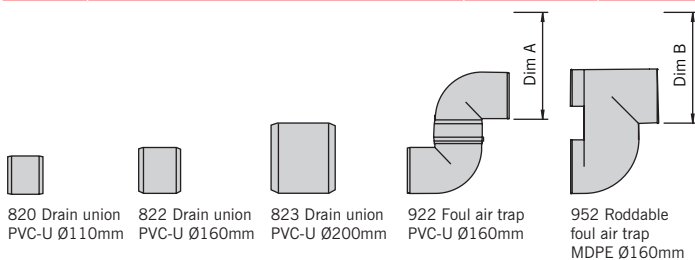
- 1 717mm
- 2 717mm
- 3 641mm
- 4 631mm
- 5 857mm
- 6 601mm
- 7 711mm



Deep base unit only

Drain unions and foul air traps

Product code	Description	Length (mm)	Width bore (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Weight (kg)
0056	820 Drain union PVC-U Ø110mm	100	-	-	-	-	0.1
0058	822 Drain union PVC-U Ø160mm	150	150	160	-	-	0.5
2723	823 Drain union PVC-U Ø200mm	200	190	200	-	-	0.7
2638	922 Foul air trap PVC-U Ø160mm	-	150	160	-	Varies	1.9
7932	950 Roddable foul air trap PVC-U Ø160mm	-	160	-	-	-	0.8



Units	Dim A	Dim B
1614/3102	452mm (33.91 l/s)	509mm (36.41 l/s)
1614/1697/3102	737mm (45.11 l/s)	660mm (42.31 l/s)
4520/3102	592mm (39.81)	649mm (41.91)
4520/1697/3102	877mm (49.61 l/s)	800mm (47.21 l/s)

Note: Inverts shown are related to S300 grating level. For repair kit information please see page 13. As with all pre-cast products, polymer concrete units are subject to weight and dimensional tolerances.



Designing an ACO S Range 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, the requirements of a Sustainable Drainage System and to Sewers for Adoption (7th edition) criteria, rainfall runoff will need to be managed at source and an allowance made for the effects of climate change over the lifetime of the development.

i 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 QuAD Hydraulic Design 2.0. 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 S Range water can be contained and conveyed close to the surface conforming to the National Standards of Sustainable Drainage Systems.

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.

The hydraulic performance tables within the relevant sections have been produced from the ACO QuAD Hydraulic Design 2.0 software, to facilitate a quick manual design method for the determination of the drainage requirements.

ACO Water Management Design Services Team

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

i **NEW ACO QuAD Hydraulic Design Software**
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- ▶ Flexible catchment design
- ▶ Integrated rainfall data
- ▶ Automated product optimisation
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Design method

ACO S Range channels are available in four widths (100mm, 150mm, 200mm and 300mm). Whilst channel can be laid flat, where longitudinal falls exist the hydraulic capacity of the system will be increased, allowing greater spacing between outfalls.

Channel systems can be provided with constant invert depth (Type 1) as a series or stepped invert depths (Type 3) or for the 100mm wide system as a pre-sloped channel invert system able to provide a fall of 0.6% over a 30m length (Type 2). The extent of pre-sloped invert systems can be extended further by incorporating lengths of constant invert channel.

Analysis of channel hydraulic capacity requires the use of a proprietary software programme like ACO Technologies QuAD Hydraulic Design 2.0 Software. Our 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 Technologies QuAD Hydraulic Design 2.0 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.

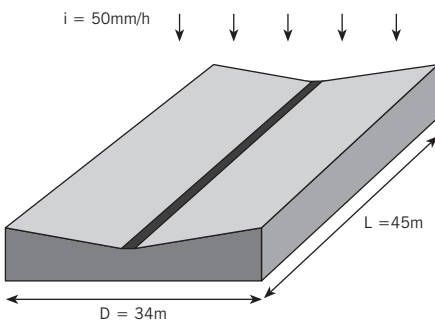
The tables on the following page have been produced from the ACO Hydro software to facilitate a quick manual design method for the determination of the drainage requirements.

The columns of drainage catchment area (A m²) 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 l/s) and maximum lateral inflow (q l/s/m) can be used at any rainfall intensity. The table of sloping invert channel capacities can be used for the design of ACO S100 sloping invert channels.

ACO Water Management Design Services Team

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DESIGN EXAMPLE



For a design of ACO S Range S100, assume the following figures:

- D = 34m (depth of catchment area)
- L = 45m (length of channel run = length of catchment)
- i = 50mm/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

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

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

1530m² is too large for one 45m run of ACO S Range S100 (S020)

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

$$L \times 1/2 = 22.5\text{m}$$

Estimating between the rows for 20m and 30m lengths

One 22.5m run of ACO S Range S100 (S020) can drain approx 765m²

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/m²

1/3 L = 15m, ACO S Range S100

(S010) will be adequate

2/3 L = 30m, ACO S Range S100

(S030) will be adequate

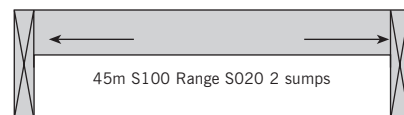
5. Check Outlet capacity

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

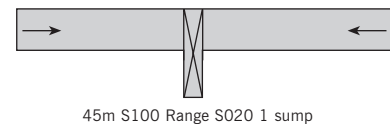
6. Solutions

Three options are sketched (right). There are other options, including S100 sloping invert channels or a 45m length run to an outfall using S150 (S1503) channels.

Option 1



Option 2



Option 3



ACO S100 Range hydraulic performance tables

Notes for ACO S100 hydraulic tables

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

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

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

A (m²) is the maximum area that can be drained and will depend on the design rainfall intensity chosen.

The tabulated areas are for a rainfall of 50mm/hr (0.014 l/s/m²) and will generally comply with the requirements stated in guidance to The Building Regulations (Part H 2002). Where the project must comply with the National Standards for Sustainable Drainage Systems, multiple rainfall events using design rainfall specific to the geographical location of the site must be analysed. The ACO Water Management Design Services Team will be able to assist with this process.

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

ACO Water Management Design Services Team

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

Designing a drainage system

An example design method is provided on page 23 to help determine your drainage requirements.

This example will enable you to use the hydraulic performance tables on these pages.

ACO S100 constant depth channels

ACO S100 S01									
Length to Outlet (m)	Slope 0%								
	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	3.2	0.32	230	4.8	0.48	346	5.8	0.58	420
20	2.9	0.15	210	5.2	0.26	377	6.6	0.33	476
30	2.7	0.09	194	5.5	0.18	394	7.0	0.23	506
40	2.5	0.06	182	5.6	0.14	404	7.3	0.18	525
50	2.4	0.05	172	5.7	0.11	411	7.5	0.15	539
60	2.3	0.04	164	5.8	0.10	416	7.6	0.13	548
70	2.2	0.03	156	5.8	0.08	420	7.7	0.11	556
80	2.1	0.03	150	5.9	0.07	423	7.8	0.10	562
90	2.0	0.02	144	5.9	0.07	426	7.9	0.09	567
100	1.9	0.02	139	5.9	0.06	427	7.9	0.08	571

ACO S100 S05									
Length to Outlet (m)	Slope 0%								
	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	4.7	0.47	336	6.6	0.66	477	7.9	0.79	571
20	4.3	0.21	308	7.2	0.36	516	8.9	0.45	642
30	4.0	0.13	287	7.5	0.25	538	9.5	0.32	683
40	3.7	0.09	270	7.7	0.19	552	9.8	0.25	709
50	3.6	0.07	256	7.8	0.16	561	10.1	0.20	727
60	3.4	0.06	244	7.9	0.13	567	10.3	0.17	741
70	3.2	0.05	233	7.9	0.11	572	10.4	0.15	751
80	3.1	0.04	224	8.0	0.10	576	10.6	0.13	760
90	3.0	0.03	216	8.0	0.09	579	10.7	0.12	768
100	2.9	0.03	209	8.1	0.08	582	10.7	0.11	772

ACO S100 S010									
Length to Outlet (m)	Slope 0%								
	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	6.8	0.68	487	9.1	0.91	657	10.8	1.08	775
20	6.2	0.31	448	9.8	0.49	704	12.0	0.60	863
30	5.8	0.19	419	10.1	0.34	730	12.7	0.42	914
40	5.5	0.14	395	10.4	0.26	747	13.2	0.33	947
50	5.2	0.10	375	10.5	0.21	758	13.5	0.27	972
60	5.0	0.08	359	10.6	0.18	766	13.7	0.23	990
70	4.8	0.07	344	10.7	0.15	771	13.9	0.20	1003
80	4.6	0.06	331	10.8	0.13	776	14.1	0.18	1014
90	4.4	0.05	319	10.8	0.12	779	14.2	0.16	1023
100	4.3	0.04	309	10.9	0.11	782	14.3	0.14	1030



ACO S100 Range hydraulic performance tables

ACO S100 S020									
Length to Outlet (m)	Slope 0%								
	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	11.7	1.17	843	14.8	1.48	1064	17.0	1.70	1225
20	10.8	0.54	777	15.5	0.78	1119	18.6	0.93	1343
30	10.1	0.34	729	16.0	0.53	1151	19.6	0.65	1411
40	9.6	0.24	690	16.3	0.41	1171	20.2	0.51	1456
50	9.1	0.18	657	16.4	0.33	1183	20.7	0.41	1488
60	8.7	0.15	629	16.5	0.28	1191	21.0	0.35	1512
70	8.4	0.12	604	16.6	0.24	1198	21.2	0.30	1530
80	8.1	0.10	582	16.7	0.21	1202	21.4	0.27	1544
90	7.8	0.09	563	16.7	0.19	1205	21.6	0.24	1556
100	7.6	0.08	545	16.8	0.17	1207	21.8	0.22	1566

ACO S100 S030									
Length to Outlet (m)	Slope 0%								
	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	17.5	1.75	1262	21.2	2.12	1528	24.0	2.40	1730
20	16.1	0.81	1162	22.0	1.10	1582	25.9	1.30	1866
30	15.2	0.51	1092	22.4	0.75	1614	27.1	0.90	1948
40	14.4	0.36	1034	22.7	0.57	1634	27.8	0.70	2002
50	13.7	0.27	987	22.9	0.46	1646	28.3	0.57	2040
60	13.1	0.22	945	23.0	0.38	1653	28.7	0.48	2068
70	12.6	0.18	909	23.0	0.33	1658	29.0	0.41	2089
80	12.2	0.15	877	23.1	0.29	1661	29.3	0.37	2106
90	11.8	0.13	848	23.1	0.26	1662	29.4	0.33	2120
100	11.4	0.11	822	23.1	0.23	1663	29.6	0.30	2131

Hydraulic performance table

ACO S100 sloping invert channel systems

Total Flow Rate (litres/sec), site fall 0%

Total Flow Rate (litres / sec)						
Length to outlet (m)	Start channel number					
	1	6	11	16	21	26
4	4.3	6.2	8.5	10.8	13.6	16.6
9	5.5	8.0	10.5	13.0	16.5	
14	7.8	9.6	12.0	16.1		
19	9.6	11.0	13.8			
24	11.0	13.8				
29	12.9					

NB Constant invert depth channels can be used to extend the channel length. Please contact ACO Design Services Team for further advice.

Notes on table usage.

This table may be used for ACO S100 sloping invert channels.

It is assumed that the gratings are laid level and that a constant invert fall of 0.6% is maintained for the full length of the channel.

Laid with a longitudinal ground slope, the Total Flow Rates can be considerably increased or alternatively, the length of the channel to an outlet can be greatly extended. Please contact the ACO Water Management Design Services Team for further guidance.



ACO S150 Range hydraulic performance tables

Notes for ACO S150 hydraulic tables

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

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

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

A (m²) is the maximum area that can be drained and will depend on the design rainfall intensity chosen.

The tabulated areas are for a rainfall of 50mm/hr (0.014 l/s/m²) and will generally comply with the requirements stated in guidance to The Building Regulations (Part H 2002). Where the project must comply with the National Standards for Sustainable Drainage Systems, multiple rainfall events using design rainfall specific to the geographical location of the site must be analysed. The ACO Water Management Design Services Team will be able to assist with this process.

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

ACO S150 constant depth channels

ACO S150 S1501									
Length to Outlet (m)	Slope 0%								
	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	13.2	1.32	952	17.3	1.73	1249	20.3	2.03	1461
20	12.4	0.62	894	18.9	0.94	1360	23.0	1.15	1657
30	11.8	0.39	849	19.9	0.66	1432	24.8	0.83	1785
40	11.3	0.28	812	20.6	0.51	1481	26.0	0.65	1871
50	10.8	0.22	780	21.1	0.42	1517	26.9	0.54	1936
60	10.4	0.17	751	21.5	0.36	1545	27.6	0.46	1986
70	10.1	0.14	726	21.8	0.31	1567	28.1	0.40	2024
80	9.8	0.12	703	22.0	0.28	1585	28.6	0.36	2057
90	9.5	0.11	682	22.2	0.25	1598	29.0	0.32	2085
100	9.2	0.09	663	22.4	0.22	1610	29.3	0.29	2109

ACO S150 S1502									
Length to Outlet (m)	Slope 0%								
	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	19.9	1.99	1429	24.8	2.48	1787	28.5	2.85	2054
20	18.6	0.93	1342	26.6	1.33	1917	31.9	1.60	2298
30	17.8	0.59	1279	27.8	0.93	2005	34.1	1.14	2458
40	17.0	0.43	1225	28.7	0.72	2066	35.7	0.89	2570
50	16.4	0.33	1179	29.3	0.59	2111	36.9	0.74	2658
60	15.8	0.26	1138	29.8	0.50	2145	37.8	0.63	2722
70	15.3	0.22	1101	30.2	0.43	2172	38.5	0.55	2776
80	14.8	0.19	1068	30.5	0.38	2193	39.1	0.49	2818
90	14.4	0.16	1038	30.7	0.34	2211	39.6	0.44	2855
100	14.0	0.14	1011	30.9	0.31	2225	40.0	0.40	2883

ACO S150 S1503									
Length to Outlet (m)	Slope 0%								
	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	27.4	2.74	1970	33.1	3.31	2384	37.5	3.75	2702
20	25.7	1.28	1850	35.1	1.75	2524	41.5	2.07	2986
30	24.5	0.82	1764	36.4	1.21	2624	44.1	1.47	3177
40	23.5	0.59	1692	37.4	0.94	2695	46.0	1.15	3313
50	22.6	0.45	1630	38.1	0.76	2746	47.4	0.95	3415
60	21.9	0.36	1576	38.7	0.64	2786	48.6	0.81	3499
70	21.2	0.30	1527	39.1	0.56	2817	49.5	0.71	3563
80	20.6	0.26	1482	39.5	0.49	2841	50.2	0.63	3616
90	20.0	0.22	1441	39.7	0.44	2861	50.8	0.56	3660
100	19.5	0.20	1404	40.0	0.40	2877	51.3	0.51	3696



ACO S200 and S300 hydraulic performance tables

Notes for ACO S200 and S300 hydraulic tables

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

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

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

A (m²) is the maximum area that can be drained and will depend on the design rainfall intensity chosen.

The tabulated areas are for a rainfall of 50mm/hr (0.014 l/s/m²) and will generally comply with the requirements stated in guidance to The Building Regulations (Part H 2002). Where the project must comply with the National Standards for Sustainable Drainage Systems, multiple rainfall events using design rainfall specific to the geographical location of the site must be analysed. The ACO Water Management Design Services Team will be able to assist with this process.

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

ACO S200 constant depth channels

ACO S200									
Length to Outlet (m)	Slope 0%								
	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	30.9	3.09	2228	38.2	3.82	2749	43.7	4.37	3144
20	29.4	1.47	2115	41.3	2.06	2971	49.3	2.46	3547
30	28.2	0.94	2034	43.5	1.45	3133	53.2	1.77	3829
40	27.3	0.68	1964	45.2	1.13	3255	56.2	1.40	4044
50	26.4	0.53	1903	46.5	0.93	3348	58.4	1.17	4203
60	25.7	0.43	1848	47.6	0.79	3425	60.2	1.00	4332
70	25.0	0.36	1798	48.4	0.69	3484	61.6	0.88	4434
80	24.3	0.30	1752	49.1	0.61	3534	62.8	0.79	4522
90	23.8	0.26	1710	49.7	0.55	3575	63.9	0.71	4599
100	23.2	0.23	1671	50.2	0.50	3611	64.8	0.65	4664
120	22.2	0.19	1601	51.0	0.42	3669	66.3	0.55	4773
140	21.4	0.15	1540	51.6	0.37	3713	67.5	0.48	4857
160	20.6	0.13	1485	52.1	0.33	3748	68.4	0.43	4925
180	19.9	0.11	1436	52.5	0.29	3777	69.2	0.38	4980
200	19.3	0.10	1391	52.8	0.26	3801	69.8	0.35	5024

ACO S300 constant depth channels

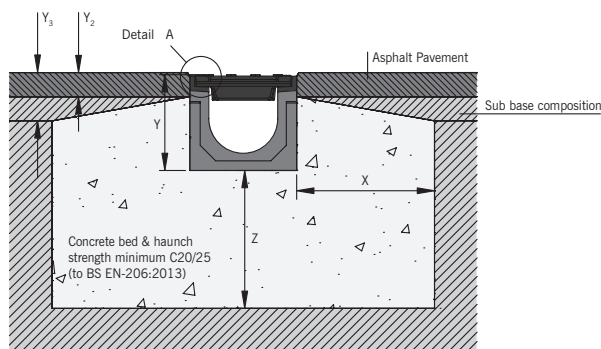
ACO S300									
Length to Outlet (m)	Slope 0%								
	0%			0.5%			1%		
	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)	Q (l/s)	q (l/s/m)	A (m ²)
10	76.5	7.65	5505	90.1	9.01	6488	101.0	10.10	7271
20	73.1	3.66	5264	96.4	4.82	6942	113.0	5.65	8135
30	71.0	2.37	5109	101.8	3.39	7327	122.3	4.08	8805
40	69.1	1.73	4978	106.1	2.65	7636	129.5	3.24	9327
50	67.5	1.35	4863	109.6	2.19	7889	135.6	2.71	9766
60	66.1	1.10	4759	112.5	1.88	8101	140.6	2.34	10120
70	64.7	0.92	4661	115.0	1.64	8278	144.7	2.07	10415
80	63.5	0.79	4571	117.1	1.46	8431	148.1	1.85	10661
90	62.3	0.69	4486	119.0	1.32	8571	151.2	1.68	10888
100	61.2	0.61	4407	120.6	1.21	8686	154.0	1.54	11085
120	59.2	0.49	4261	123.3	1.03	8878	158.6	1.32	11420
140	57.4	0.41	4130	125.5	0.90	9034	162.4	1.16	11691
160	55.7	0.35	4010	127.2	0.80	9161	165.5	1.03	11915
180	54.2	0.30	3902	128.7	0.71	9266	168.1	0.93	12101
200	52.8	0.26	3802	129.9	0.65	9356	170.1	0.85	12245



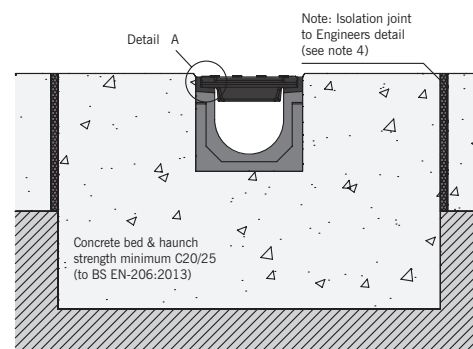
Installation detail

ACO S RANGE LOAD CLASS F 900

Asphalt pavement



Concrete 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 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.

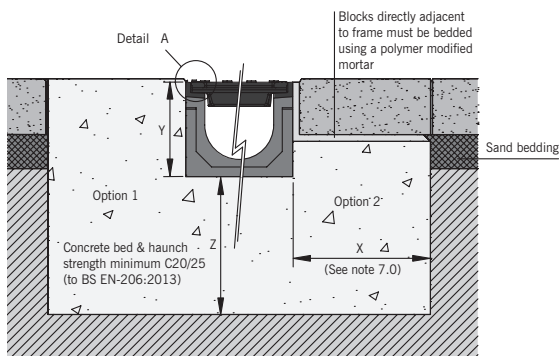
8.0 Grate Locking System

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

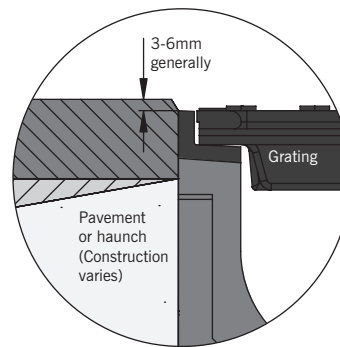
Where the grate locking system incorporates fixing bolts, these should be tightened to the torque of 40Nm.



Block pavement options 1 and 2



Detail A



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 must be used (e.g., Silkaflex 11FC or similar).

Guidance on the necessary surface preparation and/or priming should be sought from the sealant manufacturer.

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 S Range. ACO S Range should be installed using acceptable levels of workmanship and according to the National Code of Practice (UK: BS8000: Part 14: 1989) in keeping with EN 1433:2002 (Drainage channels for vehicular and pedestrian areas).

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

For further information please contact our Design Services Team (technical@aco.co.uk) or the ACO website www.aco.co.uk

11.0 Minimum dimensions of concrete surround

Load Class		F 900*
Minimum dimensions (mm)	x	200
	y	Full depth of channel (Less Y2 if necessary)
	z	200
Maximum dimensions (mm)	Y2	35
Asphalt pavement only	Y3	70

*Not suitable for carriageways or roads or motorways



These details are available to download in DWG or PDF format from the ACO website. Please go to www.aco.co.uk and sign in or register to access this information.

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.

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	Chemical medium	% conc	Resistance: Polyester concrete
Acetic acid, glacial	100	No	Hydrobromic acid	48	Yes
Acetic acid	10	Yes	Hydrochloric acid	10	Yes
Acetic anhydride	100	No	Hydrofluoric acid	10	No
Acetone	10	No	Hydrogen peroxide	30	Yes
Acetone	100	No	Lactic acid	100	Yes
Alum	100	Yes	Lead acetate	100	Yes
Aluminium sulphate	100	Yes	Magnesium chloride	100	Yes
Ammonium chloride	100	Yes	Magnesium sulphate	100	Yes
Ammonium nitrate	100	Yes	Maleic acid	100	Yes
Ammonium phosphate	65	Yes	Methyl ethyl ketone (MEK)	100	No
Ammonium sulphate	100	Yes	Motor oil	100	Yes
Aniline (aminobenzene)	100	No	Nickel chloride	100	Yes
Barium chloride	100	Yes	Nickel sulphate	100	Yes
Benzaldehyde	100	No	Nitric acid	5	No
Benzene	100	No	Nitrobenzine	100	No
Benzyl alcohol	100	Yes	Oleic acid	100	Yes
Benzyl chloride	100	No	Oxalic acid	100	Yes
Borax	100	Yes	Perchloric acid	10	Yes
Boric acid	100	Yes	Perchlorethylene	100	Yes
Bromine	100	No	Phosphoric acid	20	Yes
Bromine water	Saturated	No	Phosphorus trichloride	100	No
Butyl acetate	100	No	Potassium carbonate	50	Yes
Butyric acid	100	Yes	Potassium chloride	100	Yes
Calcium carbonate	100	Yes	Potassium dichromate	100	Yes
Calcium chloride	100	Yes	Potassium hydroxide	10	Yes
Calcium chlorate	8	Yes	Potassium nitrate	100	Yes
Calcium hydroxide	100	Yes	Potassium permanganate	10	No
Calcium nitrate	100	Yes	Potassium sulphate	100	Yes
Carbon disulphide	100	No	Pyridine	100	No
Carbon tetrachloride	100	Yes	Sodium acetate	100	Yes
Castor oil	100	Yes	Sodium bromide	100	Yes
Chlorine gas, wet	100	No	Sodium carbonate	35	Yes
Chlorine water	Saturated	No	Sodium chlorate	100	Yes
Chlorobenzene	100	Yes	Sodium chloride	100	Yes
Chloroform (trichloro-methane)	100	No	Sodium hydroxide (caustic soda)	50	No
Chromic acid	12	Yes	Sodium hypochlorite	18	No
Citric acid	100	Yes	Sodium nitrate	100	Yes
Copper chloride	100	Yes	Sodium nitrite	100	Yes
Copper nitrate	100	Yes	Sodium phosphate	10	Yes
Cyclohexane	100	Yes	Sodium sulphate	100	Yes
Diesel fuel (DERV)	100	Yes	Sodium sulphide	100	Yes
Dimethyl formamide	100	No	Sodium sulphite	100	Yes
Dimethyl phthalate	100	Yes	Sodium thiosulphate	100	Yes
Diethyl phthalate	100	Yes	Stearic acid	100	Yes
Ethanol	95	No	Styrene	100	No
Ethanolamine	100	Yes	Sulphuric acid	75	No
Ethyl acetate	100	No	Sulphuric acid	50	Yes
Ethylene glycol	100	Yes	Sulphuric acid at up to 40°C	10	Yes
Ferrous chloride	100	Yes	Tetachloroethylene	100	Yes
Ferric chloride	100	Yes	Thioglycolic acid	80	Yes
Ferrous sulphate	100	Yes	Thionyl chloride	100	No
Formaldehyde	30	Yes	Toluene	100	Yes
Formic acid	10	Yes	Toluene sulphonic acid (aqueous solution)	Saturated	Yes
Formic acid	100	No	Trichloroacetic acid	50	Yes
Fuel oil	100	Yes	Turpentine	100	Yes
Gasoline	100	Yes	Water	100	Yes
Glycerine	100	Yes	Xylene	100	Yes
Hydrazine	50	No	Zinc sulphate	100	Yes



Specification clause

The surface drainage system shall be ACO Drain S100/S150/S200/S300† 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 certificated to Load Class F 900 as defined in BS EN 1433:2002; load test certificates shall be supplied to the Supervising Officer.

Declarations of Performance (DoP) shall be supplied to the Supervising Officer upon request. The system shall be of 100mm/150mm/200mm/ 300mm† nominal internal width, manufactured in polyester resin concrete with cast-in grey iron edge rails. The channels shall be installed with manufacturer's grating appropriate to the Load Class of the place of installation and locked securely in place using 4 bolts per half metre.

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 752:2008 and BS 8000:Part 14:1989.

* insert appropriate information
† delete non-appropriate information

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, The total recycled content of each product in the ACO S Range system will vary as the proportion of the different materials (in channels, edge rails, gratings etc.) varies.

The ACO S Range 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 S Range 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 S Range system is fully certified to BS EN 1433:2002 and CE marked in accordance with the Construction Products Regulation.

Declarations of Performance are available on the side bar via the product page on our website (www.aco.co.uk/products/s-range), 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
Building + Landscape
- ACO Building Drainage
- ACO Sport
- ACO Wildlife

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

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FM 13502



ISO 14001
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