

## Grate Drainage System

- Robust and durable.
- Proven and trusted.
- Low to high capacity.
- Wide range of channels and gratings.
- Constant and inbuilt fall channels.
- Manufactured in accordance with BS EN 1433:2002.

Birco is a high quality linear drainage system combining robust concrete channels with a range of gratings to suit all loading applications.

Birco linear drainage system is to intercept, store and transport surface water in a cost-effective and efficient way.

### The Standard Range

Marshalls standard Birco range is extensive utilising five different systems which are detailed in this section:

- Birco 100.
- Birco 150.
- Birco 200.
- Birco 300<sub>AS</sub>.
- Birco Shallow\*.

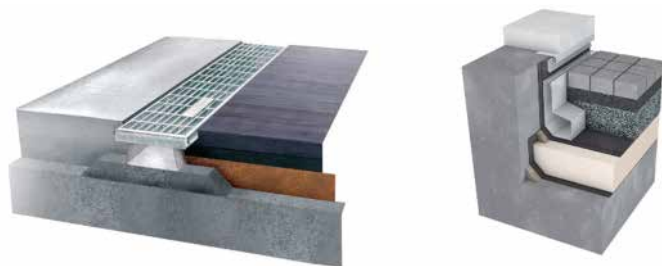
\* Where limited channel depth is critical, Birco Shallow is ideally suited and available in 100, 150 and 300mm channel widths.

### Birco Special Ranges

Marshalls also offers a variety of made to order specialist ranges to suit niche applications:

- BircoProfil, BircoTop & BircoTopline

BircoProfil, BircoTop and BircoTopline steel channel systems is suitable for shallow construction heights and ensures optimum drainage performance and reliable traffic safety.



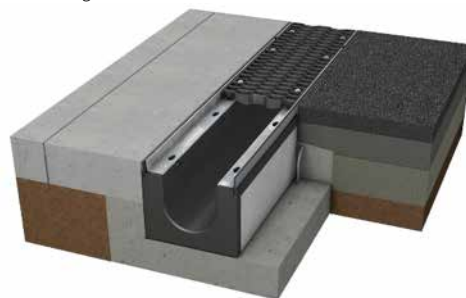
- BircoPur

A modular filter system to clean run-off from debris, chemicals, combustion residues and leaching and is permanently reliable over the entire service life and especially maintenance-friendly.



- BircoDicht

BircoDicht provides reliable, lasting protection in any area where liquids posing a threat to water needs to be collected. Its continuous PEHD lining and massive concrete body ensure that your waterway has a total tight seal.



For further information on these ranges or other specialist requirements please contact our technical department.

### Channels

Birco channels are manufactured in high quality, precast concrete using the most up-to-date production techniques. All channels incorporate rolled galvanised steel edge angles firmly cast into each channel to position and attach the appropriate grating.

- Birco 100 have channel invert widths of 100mm.
- Birco 150, 200 and 300mm systems have channel invert widths in mm equivalent to their designation.

### Constant Invert Depths

Channels are available in a range of standard constant invert depths to accommodate a range of drainage requirements.

### Inbuilt Falls

To complement the standard constant depth channels, Birco 100, 150 and 200 Channels are also available with in-built gradients.

### Outfalls

To complete the system, outfalls must be provided to discharge the water collected by the channels. A range of inline, side and end outlet and junction outfalls are available, all trapped and roddable as standard.

Various Outfalls can accommodate 100mm, 150mm and 225mm diameter discharge pipes.

### Gratings

The wide range of grating materials, profiles, colours and loading capacities available, allows Birco to provide a solution to almost any drainage problem:

- Grating of galvanised steel, stainless steel, cast iron (grey and ductile), and aluminium are available in the load classifications as defined in BS EN 1433: 2002.
- Cast iron (grey and ductile) are offered in a variety of profiles – ribbed (straight or diagonal), wave or ellipse. The ellipse pattern can be further customised with the addition of bespoke emblems or logos. Made to special order for high profile projects.
- Ribbed gratings are profiled to ensure water cannot cross the rib but is discharged through the slot into the channel.
- Heelsure cast iron gratings, having a 6mm narrow slot width, are designed to minimise the risk of trapping high heels, as well as providing an improved riding surface for small-wheeled trolleys, pushchairs, etc.
- Colour coated cast iron gratings which resist surface oxidation and offer greater design flexibility are available.
- Solid covers can be supplied for alternative uses where gratings would not be suitable.

Robust concrete Birco channels are highly resistant to impact damage on site during the construction phase.

Range of base depths and inbuilt falls to provide efficient drainage for all project types.

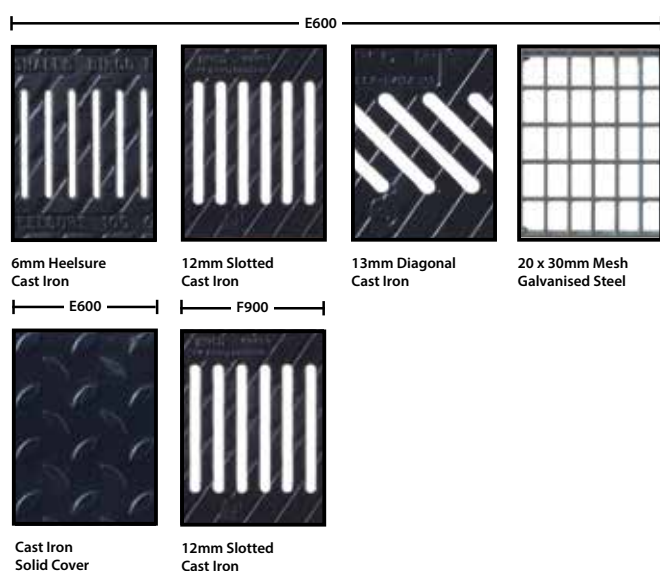
Channels with removable gratings provide continuous inspection and access for maintenance.



Extensive range of gratings, textures, colours, slot profiles and materials are available to the specifier.

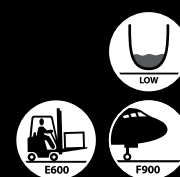


Birco 100, Manchester



## Birco 100

### Grate Drainage System

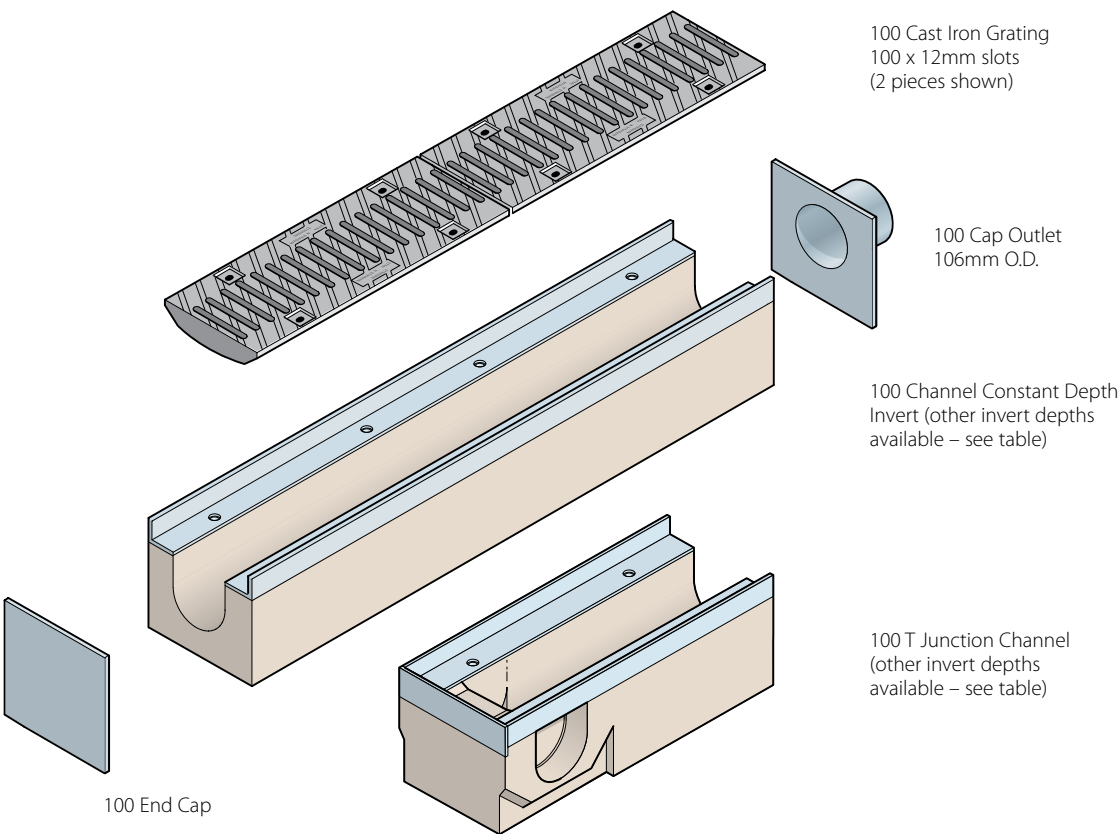


A multi-purpose low capacity linear drainage system, combining a robust concrete channel with a wide aesthetic choice of cast iron, stainless steel or galvanised grates. A variety of loadings make Birco 100 suitable for light to heavy trafficking so suitable for a variety of projects including civic, commercial, rail and industrial applications.

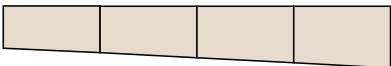
# Components

## Grate Drainage System

- Birco 100 system is suitable for a wide range of applications up to Class F900 when used with the appropriate grating, the 100 denoting the 100mm width of the invert within the channel.
- The Birco 100 system comprises a range of channels, gratings and in-line outfalls with a common junction outfall for all Birco systems.
- Birco 100 channel has a wall thickness of 50mm with a heavy gauge rolled galvanised steel angle cast into the wall ensuring strength under the heavier load applications.
- The grating and covers are secured by bolting stainless steel bolts into threaded steel sockets cast into the channel wall.
- Birco 100 channels are offered in 5 constant invert depths of 130, 180, 230, 280 and 330mm, designed 0/0, 5/0, 10/0, 15/0 and 20/0 respectively, in 1000mm and 500mm channel lengths.
- Channels with inbuilt falls are available – 20 Inbuilt fall channels with a gradient 1%.



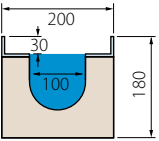
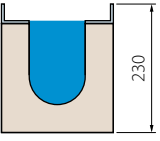
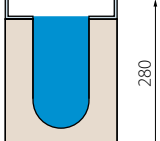
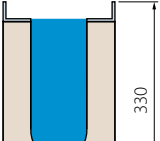
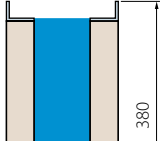
**INBUILT FALLS**  
20 Inbuilt Fall Channels, with a gradient of 1.0%. Inbuilt fall channels are 1000mm long.

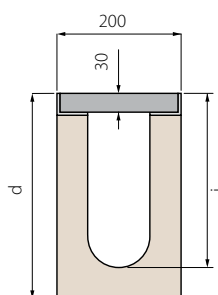




# Hydraulic Data

## FLOW CAPACITY

Birco 100 with 0/0 Channel Unit	Birco 100 with 5/0 Channel Unit	Birco 100 with 10/0 Channel Unit	Birco 100 with 15/0 Channel Unit	Birco 100 with 20/0 Channel Unit
				
(0/0)	(5/0)	(10/0)	(15/0)	(20/0)
Equivalent Pipe Diameter (mm) 120	Equivalent Pipe Diameter (mm) 145	Equivalent Pipe Diameter (mm) 160	Equivalent Pipe Diameter (mm) 175	Equivalent Pipe Diameter (mm) 190



BIRCO 100		
ref.	d	i
0/0	180	130
IBF 1-5*	190-230*	140-180*
5/0	230	180
IBF 6-10*	240-280*	190-230*
10/0	280	230
IBF 11-15*	290-330*	240-280*
15/0	330	280
IBF 16-20*	340-380*	290-330*
20/0	380	330

\*-dimensions at downstream end; deduct 10mm for upstream end.  
All dimensions measured from grating surface, pavement should be 5mm above this level.

The Birco hydraulic data stated in the following tables comprises of flow capacity, in litres per second (l/s) and velocity in metres per second (m/s). This data has been calculated using the Colebrook-White formulae.

Birco 100										
Channel Type	0/0		5/0		10/0		15/0		20/0*	
Gradient "1 in"	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
10	27	3.06	46	3.29	64	3.39	84	3.50	103	3.55
20	19	2.16	32	2.32	45	2.40	59	2.47	73	2.51
30	16	1.76	26	1.89	37	1.95	48	2.01	59	2.04
40	14	1.52	23	1.64	32	1.69	42	1.74	51	1.77
50	12	1.36	20	1.46	29	1.51	37	1.56	46	1.58
75	10	1.11	17	1.19	23	1.23	30	1.27	37	1.29
100	9	0.96	14	1.03	20	1.06	26	1.10	32	1.11
150	7	0.78	12	0.84	16	0.87	21	0.89	26	0.91
200	6	0.67	10	0.72	14	0.75	18	0.77	23	0.78
300	5	0.55	8	0.59	12	0.61	15	0.63	18	0.64
400	4	0.47	7	0.51	10	0.53	13	0.54	16	0.55
500	4	0.42	6	0.45	9	0.47	12	0.48	14	0.49
750	3	0.34	5	0.37	7	0.38	9	0.39	12	0.40
1000	3	0.29	4	0.32	6	0.33	8	0.34	10	0.34
1500	2	0.24	4	0.26	5	0.27	7	0.27	8	0.28
2000	2	0.21	3	0.22	4	0.23	6	0.24	7	0.24

# Birco 100 Component Codes

## A Gratings

Gratings	Loading	Length (mm)	Width (mm)	Unit Weight (kg)	Item Code
6mm Heelsure Cast Iron	E600	500	187	7.2	<b>DR115135</b>
12mm Slotted Cast Iron	E600	500	187	6.2	DR115125
13mm Diagonal Cast Iron	E600	500	187	12.4	DR115020
20 x 30mm Mesh Galvanised Steel	E600	500	187	4.86	DR115285
Cast Iron Solid Cover	E600	500	187	7.46	DR115250
12mm Slotted Cast Iron	F900	500	187	7.4	DR115130

## F Outfalls

Outfalls	Unit Weight (kg)	Item Code
100 End Outfall 100mm	105	DR130170
100 Side Outfall 150mm	142	<b>DR130175</b>
100 Shallow Outfall 100mm	142	DR420480

Birco 100 with reference numbers indicated in **bold** black are available ex-stock.

Birco 100 with reference numbers indicated in light are manufactured to order.

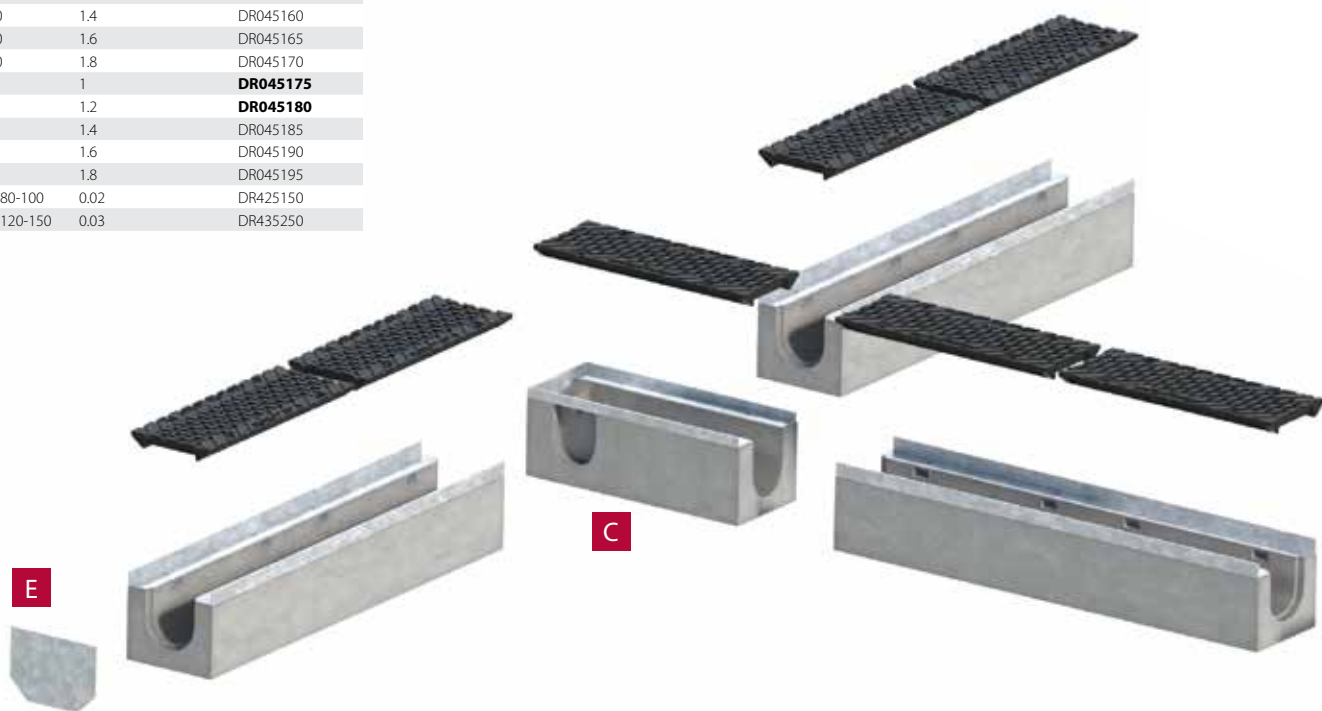
Contact our sales office to discuss your requirements.

## C T Junction Channels

T Junction Channels	Unit Weight (kg)	Item Code
T-Channel 0/0	27	DR010210
T-Channel 5/0	33	DR010220
T-Channel 10/0	39	DR010230

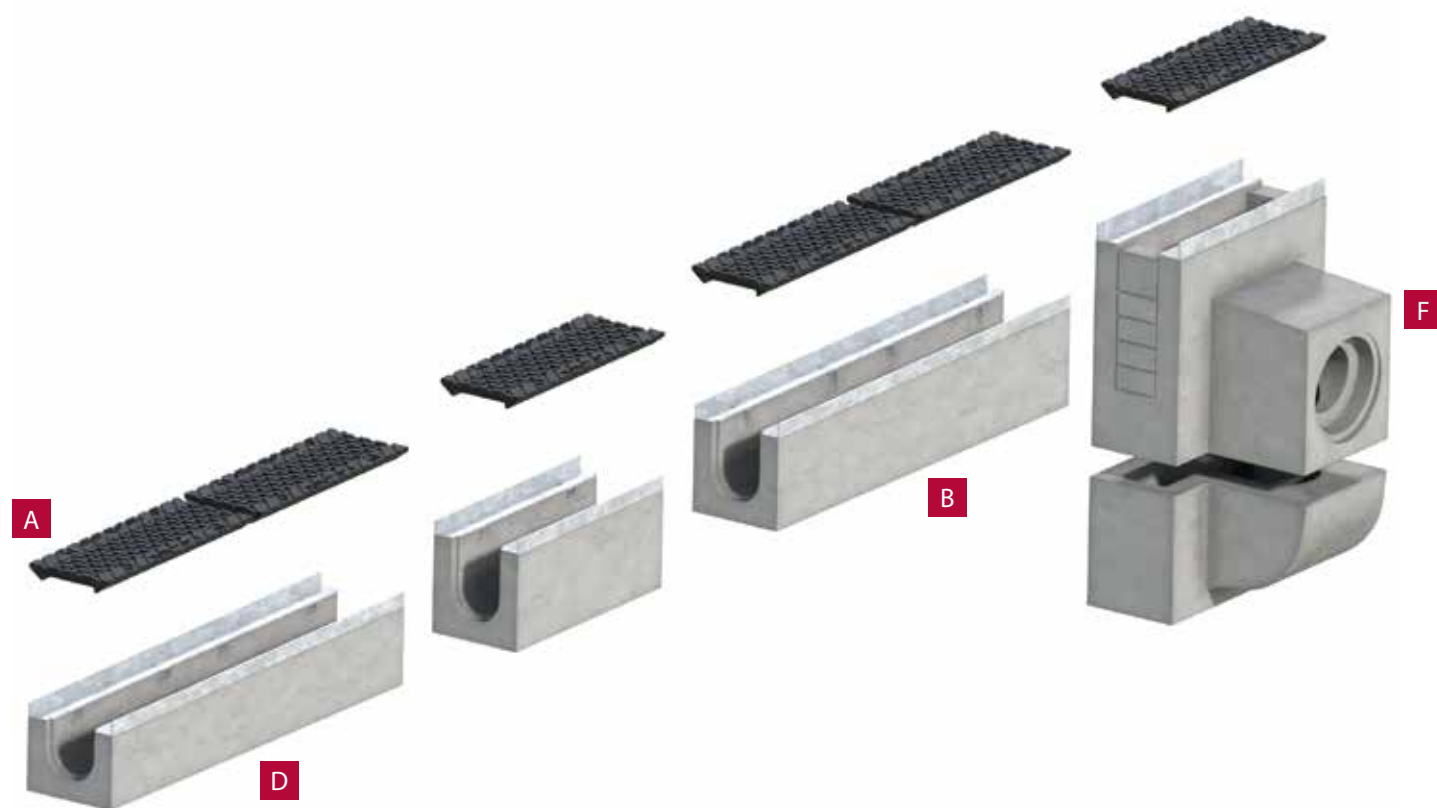
## E End Cap/Cap Outlets

End Cap/Cap Outlets	Unit Weight (kg)	Item Code
100 End Cap 0/0	1	<b>DR045150</b>
100 End Cap 5/0	1.2	<b>DR045155</b>
100 End Cap 10/0	1.4	DR045160
100 End Cap 15/0	1.6	DR045165
100 End Cap 20/0	1.8	DR045170
Cap Outlet 0/0	1	<b>DR045175</b>
Cap Outlet 5/0	1.2	<b>DR045180</b>
Cap Outlet 10/0	1.4	DR045185
Cap Outlet 15/0	1.6	DR045190
Cap Outlet 20/0	1.8	DR045195
Shallow End Cap 80-100	0.02	DR425150
Shallow End Cap 120-150	0.03	DR435250



## B Constant Depth Channels

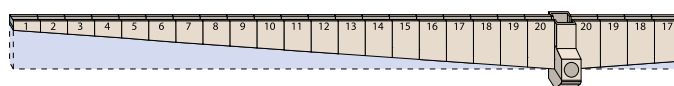
Constant Depth Channels	Length (mm)	Width (mm)	Invert Width (mm)	Depth (mm)	Invert Depth (mm)	Unit Weight (kg)	Item Code
Channel 0/0	1000	200	100	180	130	54	<b>DR080105</b>
Channel 5/0	1000	200	100	230	180	66	<b>DR080115</b>
Channel 10/0	1000	200	100	280	230	78	DR080125
Channel 15/0	1000	200	100	330	280	90	DR080135
Channel 20/0	1000	200	100	380	330	102	DR080145
Channel 0/0	500	200	100	180	130	27	DR090150
Channel 5/0	500	200	100	230	180	33	DR090160
Channel 10/0	500	200	100	280	230	38	DR090170
Channel 15/0	500	200	100	330	280	43	DR090180
Channel 20/0	500	200	100	380	330	51	DR090190
Shallow 80	1000	200	100	80	50		DR420450
Shallow 100	1000	200	100	100	70		DR420460
Shallow 150	1000	200	100	150	110		DR420480



### D Inbuilt Fall Channels

Inbuilt Fall Channels	Length (mm)	Width (mm)	Invert Width (mm)	Depth (mm) Upstream/ Downstream	Invert Depth (mm) Upstream/ Downstream	Unit Weight (kg)	Item Code
IBF Channel No. 1	1000	200	100	180/190	130/140	57	DR020010
IBF Channel No. 2	1000	200	100	190/200	140/150	57.5	DR020020
IBF Channel No. 3	1000	200	100	200/210	150/160	61	DR020030
IBF Channel No. 4	1000	200	100	210/220	160/170	62.5	DR020040
IBF Channel No. 5	1000	200	100	220/230	170/180	65	DR020050
IBF Channel No. 6	1000	200	100	230/240	180/190	67	DR020060
IBF Channel No. 7	1000	200	100	240/250	190/200	69	DR020070
IBF Channel No. 8	1000	200	100	250/260	200/210	71	DR020080
IBF Channel No. 9	1000	200	100	260/270	210/220	73	DR020090
IBF Channel No. 10	1000	200	100	270/280	220/230	77	DR020100
IBF Channel No. 11	1000	200	100	280/290	230/240	77	DR020110
IBF Channel No. 12	1000	200	100	290/300	240/250	81.5	DR020120
IBF Channel No. 13	1000	200	100	300/310	250/260	81	DR020130
IBF Channel No. 14	1000	200	100	310/320	260/270	86.5	DR020140
IBF Channel No. 15	1000	200	100	320/330	270/280	85	DR020150
IBF Channel No. 16	1000	200	100	330/340	280/290	91	DR020160
IBF Channel No. 17	1000	200	100	340/350	290/300	93.5	DR020170
IBF Channel No. 18	1000	200	100	350/360	300/310	96	DR020180
IBF Channel No. 19	1000	200	100	360/370	310/320	98.5	DR020190
IBF Channel No. 20	1000	200	100	370/380	320/330	101	DR020200

Inbuilt Fall



Birco 100 Channels are available with inbuilt falls. Inbuilt Fall Channels increase drainage discharge capacity by improving flow rates and thereby increasing the overall discharge capacity of the system. Inbuilt fall channels are 1000mm long.

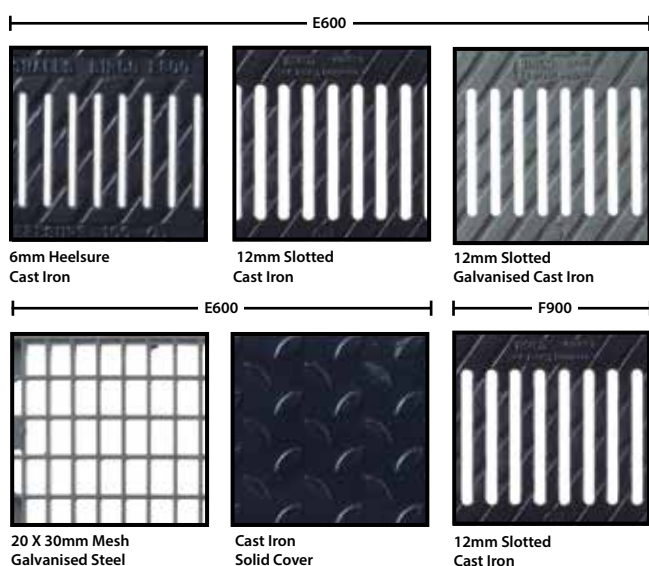






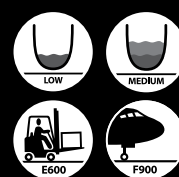


Birco 150, London



## Birco 150

### Grate Drainage System

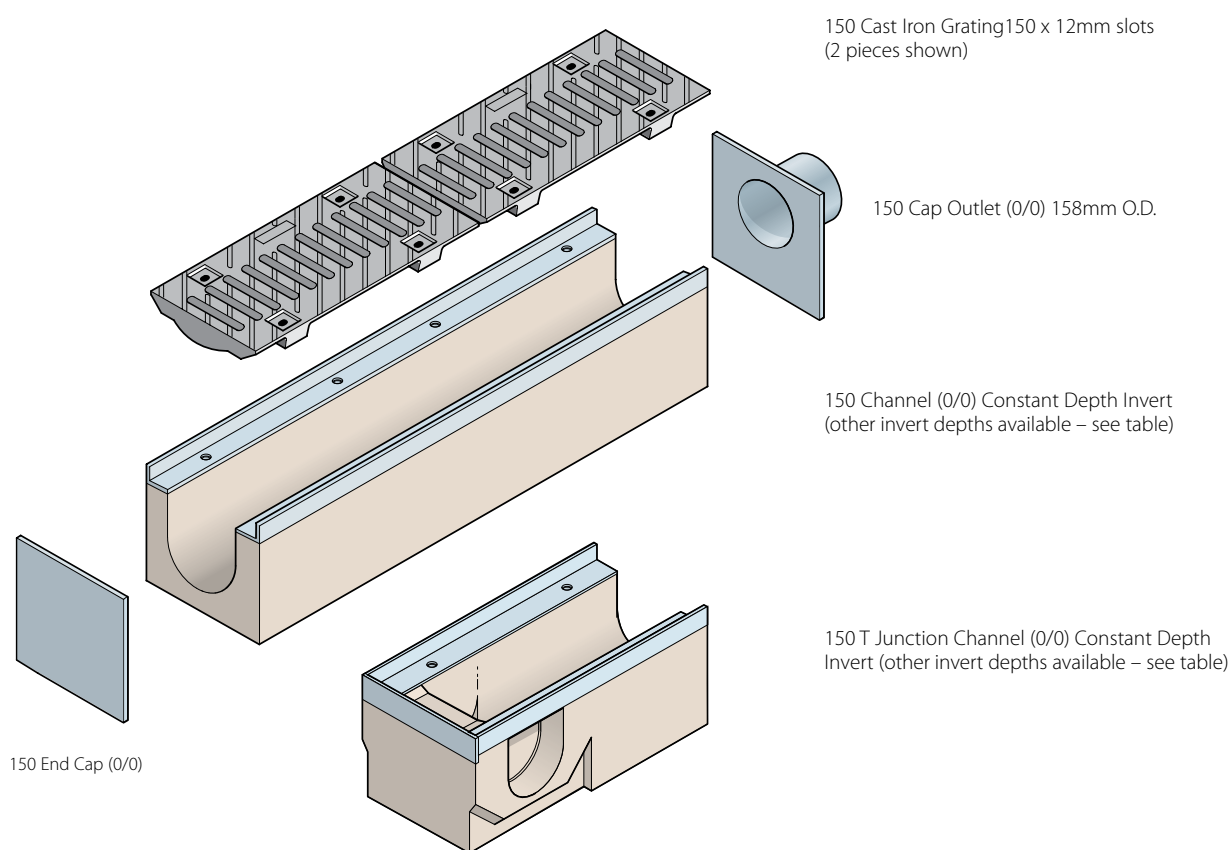


A medium capacity linear drainage system which combines a robust concrete channel with a wide aesthetic choice of cast iron and galvanised steel grates. Birco 150 is available up to the highest loading classification making it suitable for a variety of commercial, rail and industrial applications.

# Components

## Grate Drainage System

- Birco 150 offers an increased flow capacity over the Birco 100 and is suitable for applications up to and including Class F900, when used with the appropriate grating.
- The Birco 150 system comprises a range of channels, gratings and covers together with complementary in-line outfalls. A common junction outfall is available for all Birco systems available for use in the Birco 150 range up to the 15/0 channel.
- The grating and covers are secured by bolting stainless steel bolts into threaded steel sockets cast into the channel wall.
- Birco 150 channels are offered in 5 constant invert depths of 180, 230, 280, 330 and 380mm designated 0/0, 5/0, 10/0, 15/0 and 20/0 respectively, in 500 & 1000mm channel lengths.
- Channels with inbuilt falls are available – 20 Inbuilt fall channels with a gradient 1%.



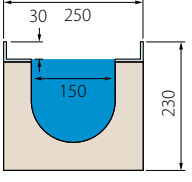
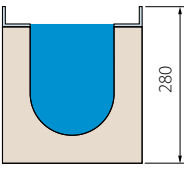
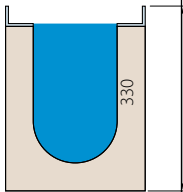
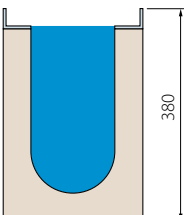
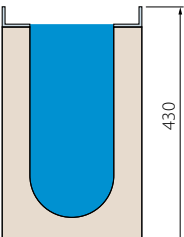





### INBUILT FALLS

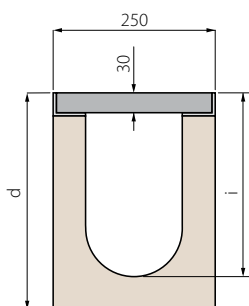
20 Inbuilt Fall Channels, with a gradient of 1%. Inbuilt fall channels are 1000mm long.



# Hydraulic Data

## FLOW CAPACITY

Birco 150 with 0/0 Channel Unit	Birco 150 with 5/0 Channel Unit	Birco 150 with 10/0 Channel Unit	Birco 150 with 15/0 Channel Unit	Birco 150 with 20/0 Channel Unit
				
(0/0)	(5/0)	(10/0)	(15/0)	(20/0)
				
Equivalent Pipe Diameter (mm) 175	Equivalent Pipe Diameter (mm) 200	Equivalent Pipe Diameter (mm) 225	Equivalent Pipe Diameter (mm) 245	Equivalent Pipe Diameter (mm) 260



BIRCO 150		
ref.	d	i
0/0	230	180
IBF 1-5*	240-280*	190-230*
5/0	280	230
IBF 6-10*	290-330*	240-280*
10/0	330	280
IBF 11-15*	340-380*	290-330*
15/0	380	330
IBF 16-20*	390-430*	340-380*
20/0	430	380

\*: dimensions at downstream end; deduct 10mm for upstream end.  
All dimensions measured from grating surface, pavement should be 5mm above this level.

The Birco hydraulic data stated in the following tables comprises of flow capacity, in litres per second (l/s) and velocity in metres per second (m/s). This data has been calculated using the Colebrook-White formulae.

Birco 150										
Channel Type	0/0		5/0		10/0		15/0		20/0*	
Gradient "1 in"	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
10	79.22	3.96	95.62	4.09	115.54	4.19	133.53	4.27	152.04	4.33
20	55.93	2.8	67.52	2.89	81.58	2.96	94.28	3.01	107.36	3.06
30	45.61	2.28	55.06	2.35	66.54	2.41	76.9	2.46	87.56	2.49
40	39.46	1.97	47.64	2.04	57.57	2.09	66.53	2.13	75.76	2.16
50	35.26	1.76	42.57	1.82	51.45	1.86	59.46	1.9	67.71	1.93
75	28.74	1.44	34.7	1.48	41.93	1.52	48.47	1.55	55.19	1.57
100	24.85	1.24	30.01	1.28	36.26	1.31	41.91	1.34	47.73	1.36
150	20.24	1.01	24.44	1.04	29.54	1.07	34.14	1.09	38.88	1.11
200	17.49	0.87	21.12	0.9	25.53	0.92	29.51	0.94	33.61	0.96
300	14.23	0.71	17.19	0.73	20.78	0.75	24.02	0.77	27.35	0.78
400	12.29	0.61	14.84	0.63	17.94	0.65	20.74	0.66	23.62	0.67
500	10.97	0.55	13.24	0.57	16.01	0.58	18.51	0.59	21.08	0.6
750	8.91	0.45	10.76	0.46	13.01	0.47	15.04	0.48	17.13	0.49
1000	7.68	0.38	9.28	0.4	11.22	0.41	12.97	0.41	14.78	0.42
1500	6.23	0.31	7.53	0.32	9.1	0.33	10.52	0.34	11.99	0.34
2000	5.36	0.27	6.48	0.28	7.84	0.28	9.07	0.29	10.33	0.29



# Birco 150 Component Codes

## A Gratings

Gratings	Loading	Length (mm)	Width (mm)	Unit Weight (kg)	Item Code
6mm Heelsure Cast Iron	E600	500	237	10.5	<b>DR195240</b>
12mm Slotted Cast Iron	E600	500	237	11.0	DR195210
12mm Slotted Galvanised Cast Iron	E600	500	237	11	DR197030
20 x 30mm Mesh Galvanised Steel	E600	500	237	7.36	DR197290
20 x 30mm Mesh Galvanised Steel	E600	1000	237	15	DR197280
Cast Iron Solid Cover	E600	500	237	10.3	DR195230
12mm Slotted Cast Iron	F900	500	237	12.20	DR195220

## C T Junction Channels

T-Junction Channels	Unit Weight (kg)	Item Code
T-Channel 0/0	38	DR190020
T-Channel 5/0	44	DR190030
T-Channel 10/0	50	DR190040

Birco 150 with reference numbers indicated in **bold** black are available ex-stock.

Birco 150 with reference numbers indicated in light are manufactured to order.

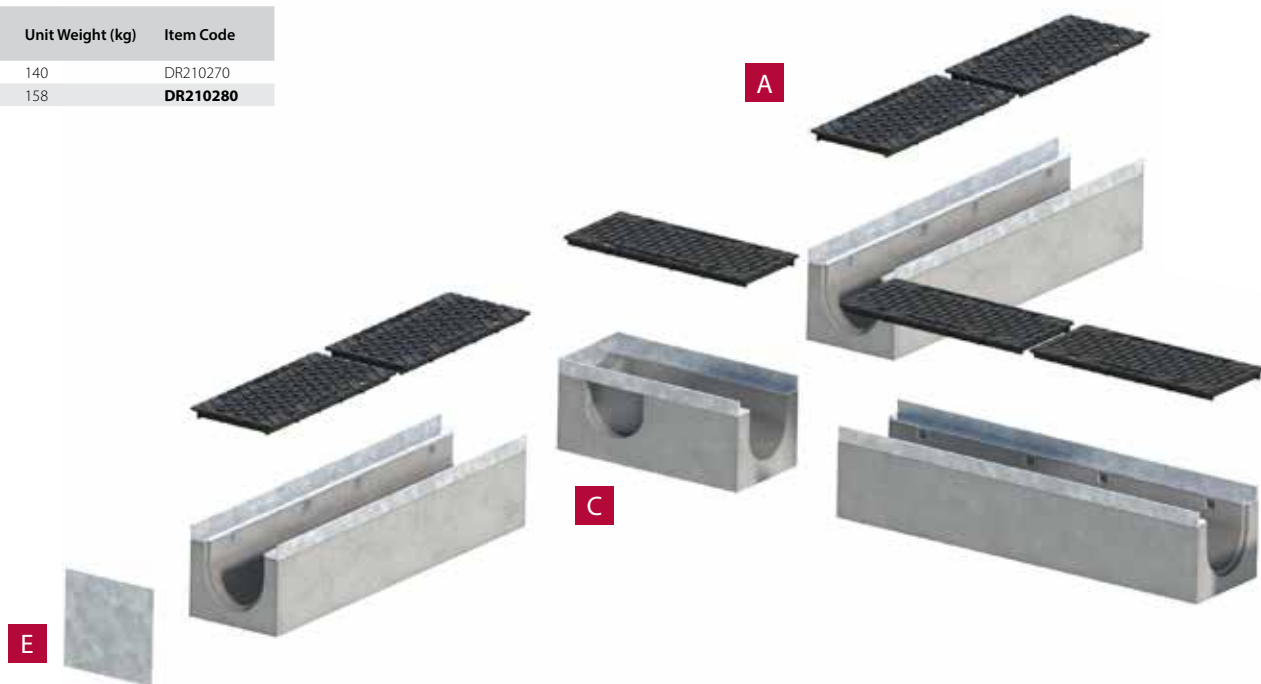
Contact our sales office to discuss your requirements.

## E End Cap/Cap Outlets

End Cap/Cap Outlets	Unit Weight (kg)	Item Code
150 End Cap 0/0	1	<b>DR197200</b>
150 End Cap 5/0	1.2	<b>DR197210</b>
150 End Cap 10/0	1.4	DR197220
150 End Cap 15/0	1.6	DR197230
150 Cap Outlet 0/0	2	<b>DR200250</b>
150 Cap Outlet 5/0	2	<b>DR200260</b>
150 Cap Outlet 10/0	2	DR200270
150 Cap Outlet 15/0	2	DR200280

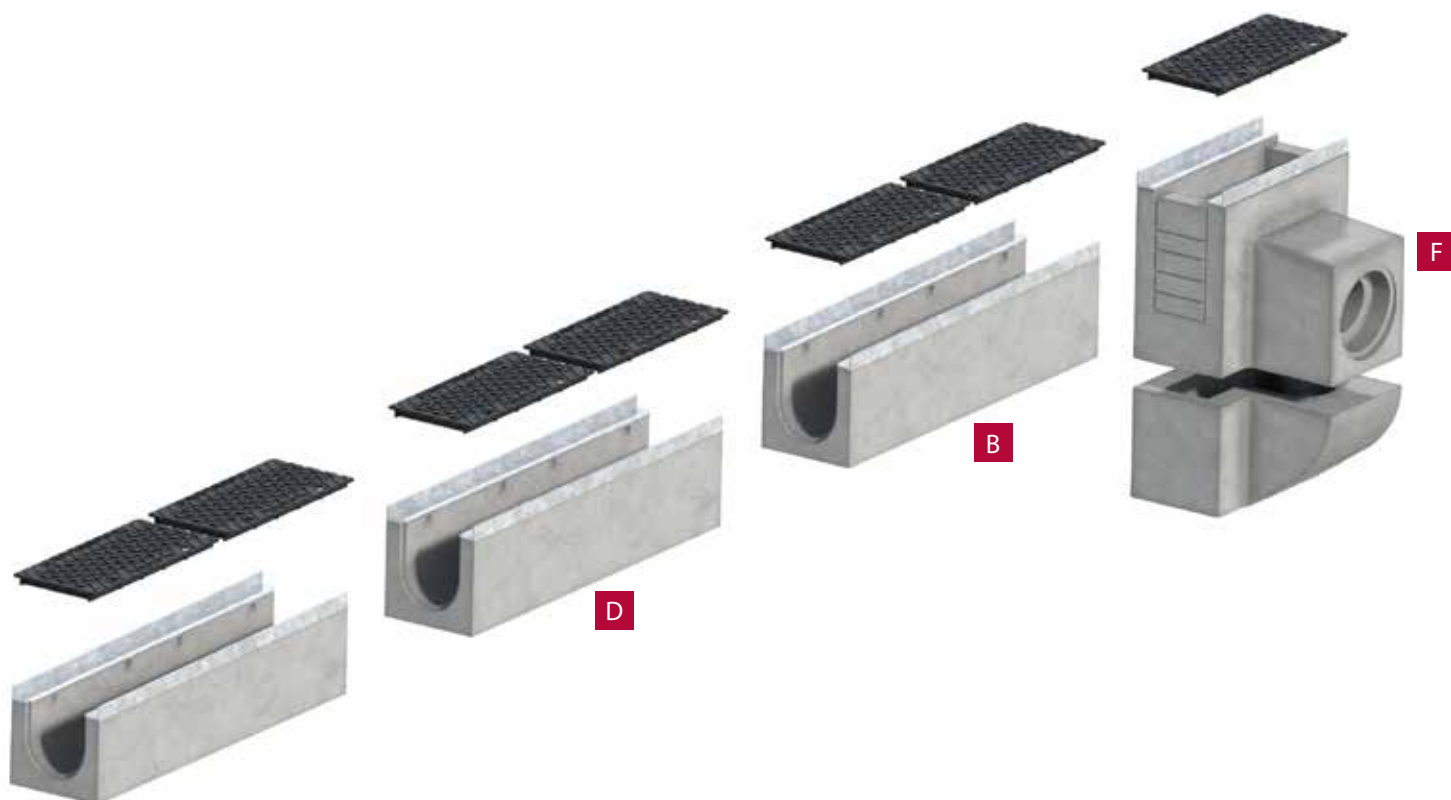
## F Outfalls

Outfalls	Unit Weight (kg)	Item Code
150 End Outfall 100mm	140	DR210270
150 Side Outfall 150mm	158	<b>DR210280</b>



## B Constant Depth Channels

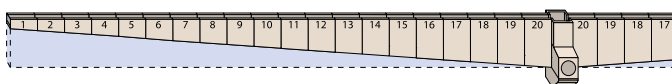
Constant Depth Channels	Length (mm)	Width (mm)	Invert Width (mm)	Depth (mm)	Invert Depth (mm)	Unit Weight (kg)	Item Code
Channel 0/0	1000	250	150	230	180	76	<b>DR160200</b>
Channel 5/0	1000	250	150	280	230	88	<b>DR160205</b>
Channel 10/0	1000	250	150	330	280	100	DR160210
Channel 15/0	1000	250	150	380	330	112	DR160215
Channel 20/0	1000	250	150	430	380	124	DR160220
Channel 0/0	500	250	150	230	180	38	DR170206
Channel 5/0	500	250	150	280	230	44	DR170226
Channel 10/0	500	250	150	330	280	50	DR170236
Channel 15/0	500	250	150	380	330	45	DR170246



### D Inbuilt Fall Channels

Inbuilt Fall Channels	Length (mm)	Width (mm)	Invert Width (mm)	Depth (mm) Upstream/ Downstream	Invert Depth (mm) Upstream/ Downstream	Unit Weight (kg)	Item Code
IBF Channel No. 1	1000	250	150	230/240	180/190	76	DR180010
IBF Channel No. 2	1000	250	150	240/250	190/200	77	DR180020
IBF Channel No. 3	1000	250	150	250/260	200/210	77	DR180030
IBF Channel No. 4	1000	250	150	260/270	210/220	79	DR180040
IBF Channel No. 5	1000	250	150	270/280	220/230	80	DR180050
IBF Channel No. 6	1000	250	150	280/290	230/240	81	DR180060
IBF Channel No. 7	1000	250	150	290/300	240/250	82	DR180070
IBF Channel No. 8	1000	250	150	300/310	250/260	83	DR180080
IBF Channel No. 9	1000	250	150	310/320	260/270	84	DR180090
IBF Channel No. 10	1000	250	150	320/330	270/280	85	DR180100
IBF Channel No. 11	1000	250	150	330/340	280/290	86	DR180110
IBF Channel No. 12	1000	250	150	340/350	290/300	87	DR180120
IBF Channel No. 13	1000	250	150	350/360	300/310	88	DR180130
IBF Channel No. 14	1000	250	150	360/370	310/320	89	DR180140
IBF Channel No. 15	1000	250	150	370/380	320/330	90	DR180150
IBF Channel No. 16	1000	250	150	380/390	330/340	91	DR180160
IBF Channel No. 17	1000	250	150	390/400	340/350	92	DR180170
IBF Channel No. 18	1000	250	150	400/410	350/360	93	DR180180
IBF Channel No. 19	1000	250	150	410/420	360/370	94	DR180190
IBF Channel No. 20	1000	250	150	420/430	370/380	95	DR180200

Inbuilt Fall



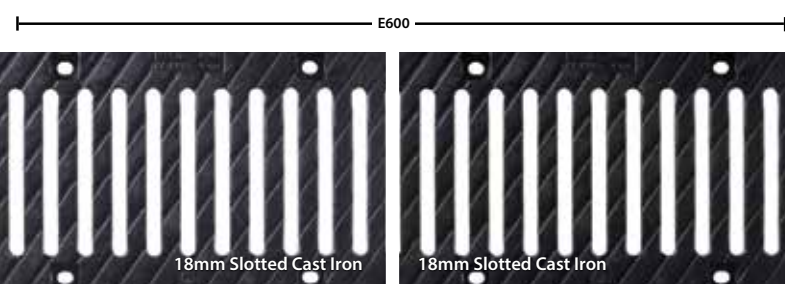
Birco 150 Channels are available with inbuilt falls. Inbuilt Fall Channels increase drainage discharge capacity by improving flow rates and thereby increasing the overall discharge capacity of the system. Inbuilt fall channels are 1000mm long.







Birco 200, Gloucestershire

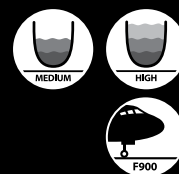


18mm Slotted Cast Iron

18mm Slotted Cast Iron

## Birco 200

### Grate Drainage System



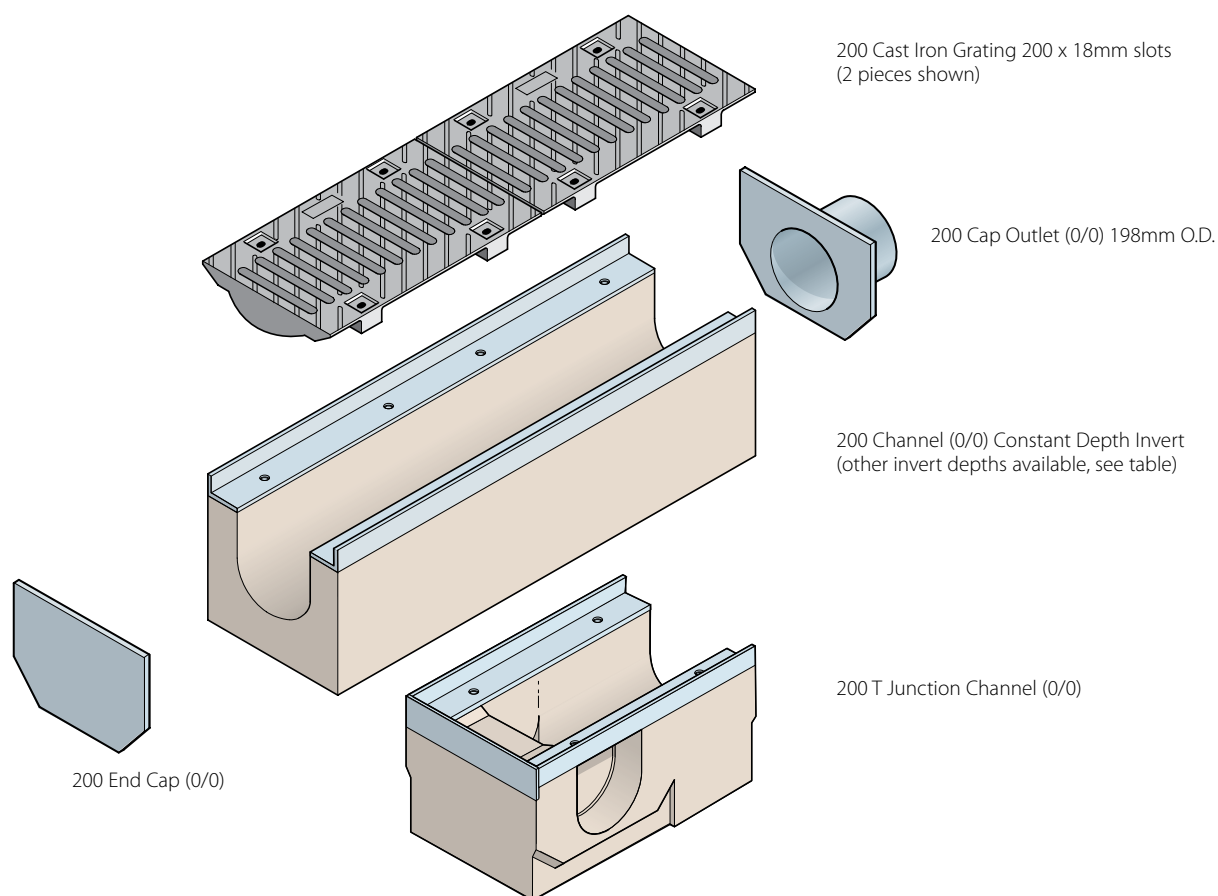
A medium to high capacity linear drainage system which combines a robust concrete channel with a cast iron slotted grate. Suitable for loadings up to F900, making Birco 200 ideal for projects where vehicles impose particularly heavy wheel loads such as industrial applications.

**nssPlus**  
Q10 180  
Q10 115

# Components

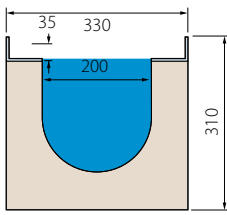
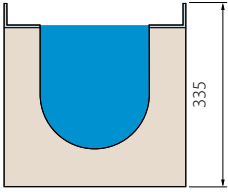
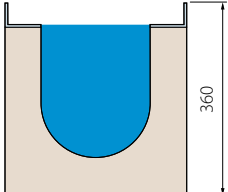
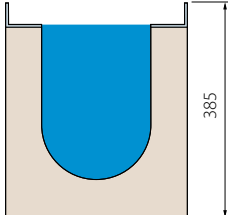
## Grate Drainage System

- Birco 200 is a high capacity system, suitable for applications up to and including loading class F900, when used with appropriate grating.
- The Birco 200 system comprises of a range of channels, gratings and in-line outfalls.
- The grating and covers are secured by bolting stainless steel bolts into threaded steel sockets cast into the channel wall.
- Birco 200 channels are produced in 4 constant invert depths of 240, 265, 290 and 315mm designated 0/0, 5/0, 10/0 and 15/0 respectively, in 1000mm channel lengths.



# Hydraulic Data

## FLOW CAPACITY

Birco 200 with 0/0 Channel Unit	Birco 200 with 5/0 Channel Unit	Birco 200 with 10/0 Channel Unit	Birco 200 with 15/0 Channel Unit
 <p>(0/0)</p> <p>Equivalent Pipe Diameter (mm) 230</p>	 <p>(5/0)*</p> <p>Equivalent Pipe Diameter (mm) 245</p>	 <p>(10/0)</p> <p>Equivalent Pipe Diameter (mm) 260</p>	 <p>(15/0)*</p> <p>Equivalent Pipe Diameter (mm) 270</p>

BIRCO 200		
ref.	d	i
0/0	310	240
5/0	335	265
10/0	360	290
15/0	385	315

\*-dimensions at downstream end; deduct 10mm for upstream end.  
All dimensions measured from grating surface, pavement should be 5mm above this level.

The Birco hydraulic data stated in the following tables comprises of flow capacity, in litres per second (l/s) and velocity in metres per second (m/s). This data has been calculated using the Colebrook-White formulae.

Birco 200								
Channel Type	0/0		5/0		10/0		15/0	
Gradient "1 in"	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
10	176	4.78	204	4.90	233	4.99	262	5.07
20	124	3.38	144	3.46	165	3.52	185	3.58
30	101	2.76	118	2.82	134	2.87	151	2.92
40	88	2.38	102	2.44	116	2.49	131	2.53
50	78	2.13	91	2.18	104	2.22	117	2.26
75	64	1.74	74	1.78	85	1.81	95	1.84
100	55	1.50	64	1.54	73	1.57	82	1.59
150	45	1.22	52	1.25	60	1.28	67	1.30
200	39	1.06	45	1.08	52	1.10	58	1.12
300	32	0.86	37	0.88	42	0.90	47	0.91
400	27	0.74	32	0.76	36	0.78	41	0.79
500	24	0.66	28	0.68	32	0.69	36	0.70
750	20	0.54	23	0.55	26	0.56	30	0.57
1000	17	0.47	20	0.48	23	0.49	26	0.49
1500	14	0.38	16	0.39	18	0.40	21	0.40
2000	12	0.33	14	0.33	16	0.34	18	0.35



# Birco 200 Component Codes

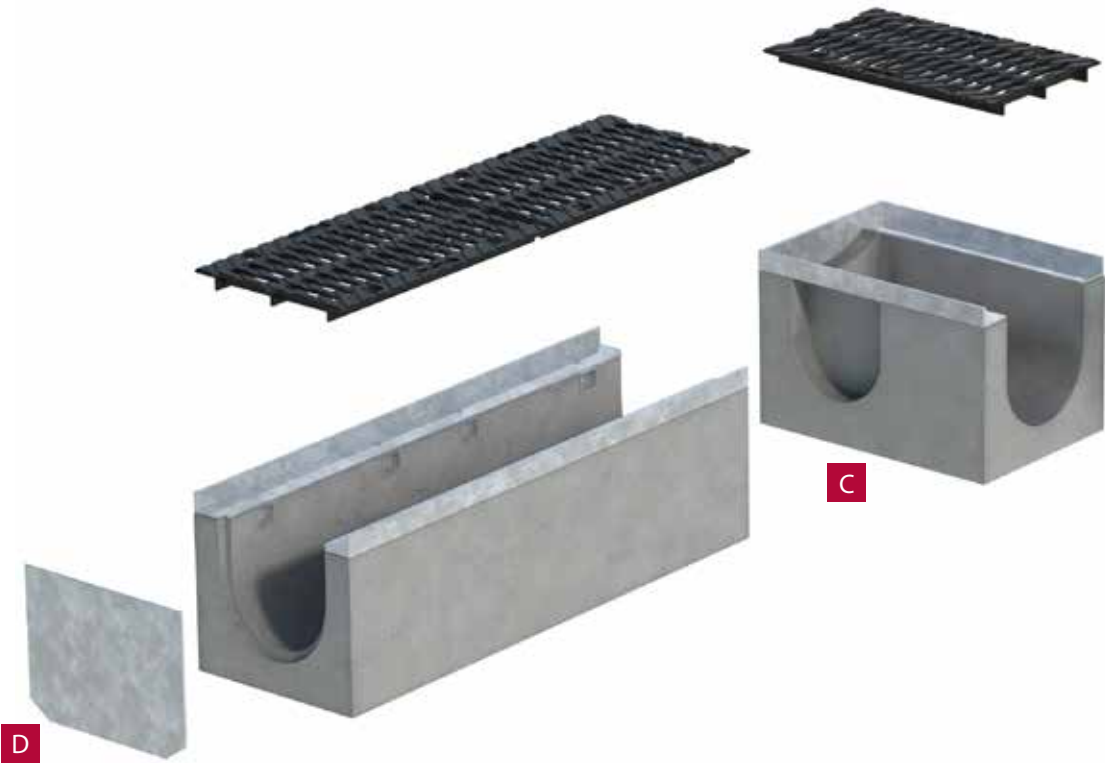
## A Gratings

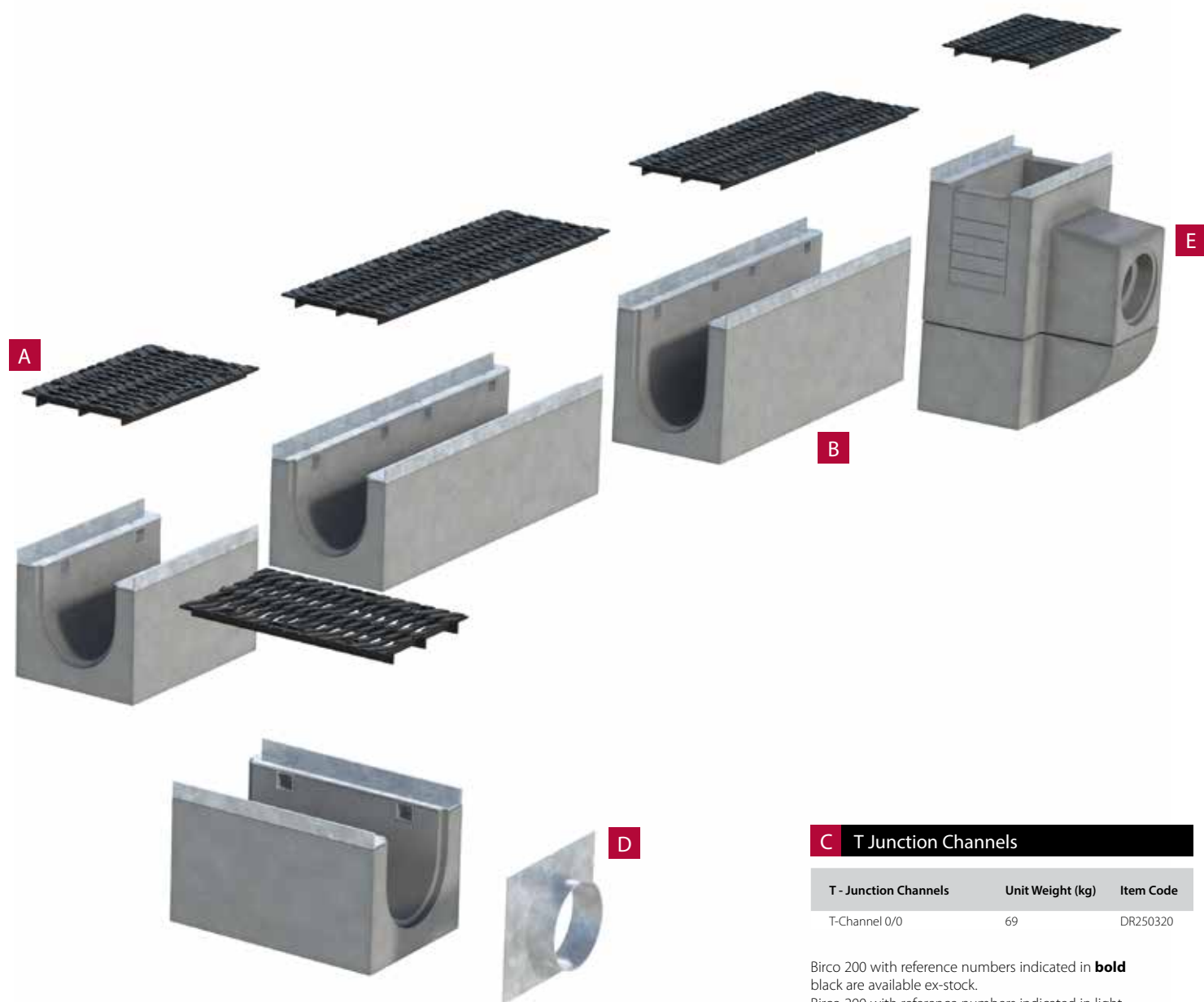
Gratings	Loading	Length (mm)	Width (mm)	Depth (mm)	Unit Weight (kg)	Item Code
18mm Slotted Cast Iron	E600	520	287	35	12.5	DR2754100

## B Constant Depth Channels

Constant Depth Channels	Length (mm)	Width (mm)	Invert Width (mm)	Depth (mm)	Invert Depth (mm)	Unit Weight (kg)	Item Code
Channel 0/0	1000	330	200	310	240	142	DR240300
Channel 5/0	1000	330	200	335	265	140	DR240310
Channel 10/0	1000	330	200	360	290	147.5	DR240320
Channel 15/0	1000	330	200	385	315	153	DR240330

\* Half meter channel are available upon request





### C T Junction Channels

T - Junction Channels	Unit Weight (kg)	Item Code
T-Channel 0/0	69	DR250320

Birco 200 with reference numbers indicated in **bold** black are available ex-stock.

Birco 200 with reference numbers indicated in light are manufactured to order.

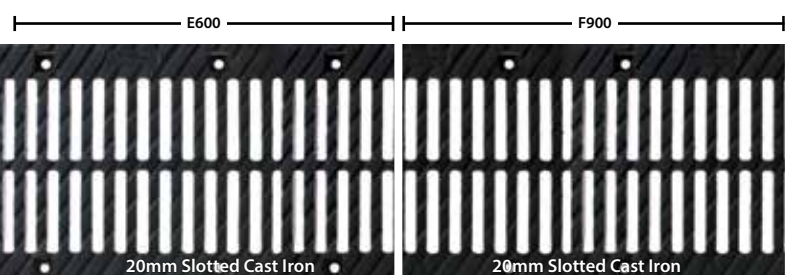
Contact our sales office to discuss your requirements.

### D End Cap/Cap Outlets

End Cap/Cap Outlets	Unit Weight (kg)	Item Code
200 End Cap	2	<b>DR280350</b>
200 Cap Outlet	2.5	<b>DR280370</b>

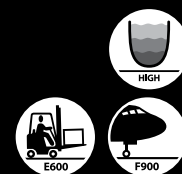
### E Outfalls

Outfalls	Unit Weight (kg)	Item Code
200 Outfall 150mm Side	186	<b>DR290380</b>



## Birco 300

### Grate Drainage System



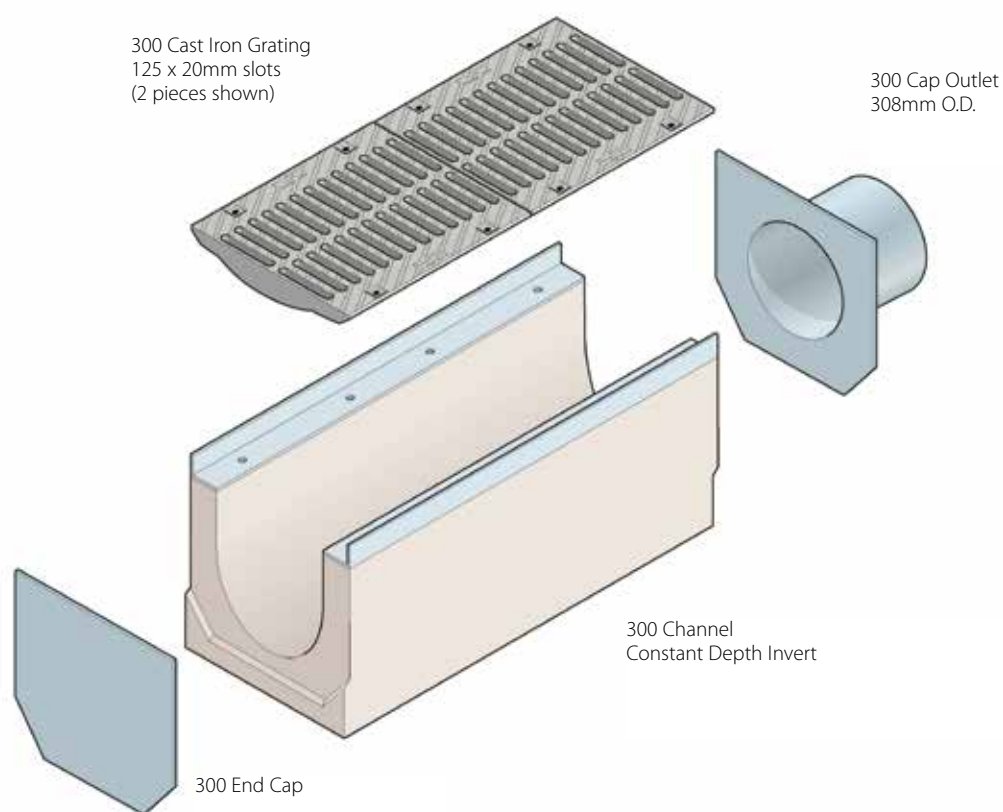
A high capacity linear drainage system which combines a robust concrete channel with a cast iron slotted grate. Suitable for loadings up to F900, Birco 300 is suitable for special projects with abnormally heavy wheel loads such as ports and aircraft pavements.

**n55Plus**  
Q10 115  
Q10 180

# Components

## Grate Drainage System

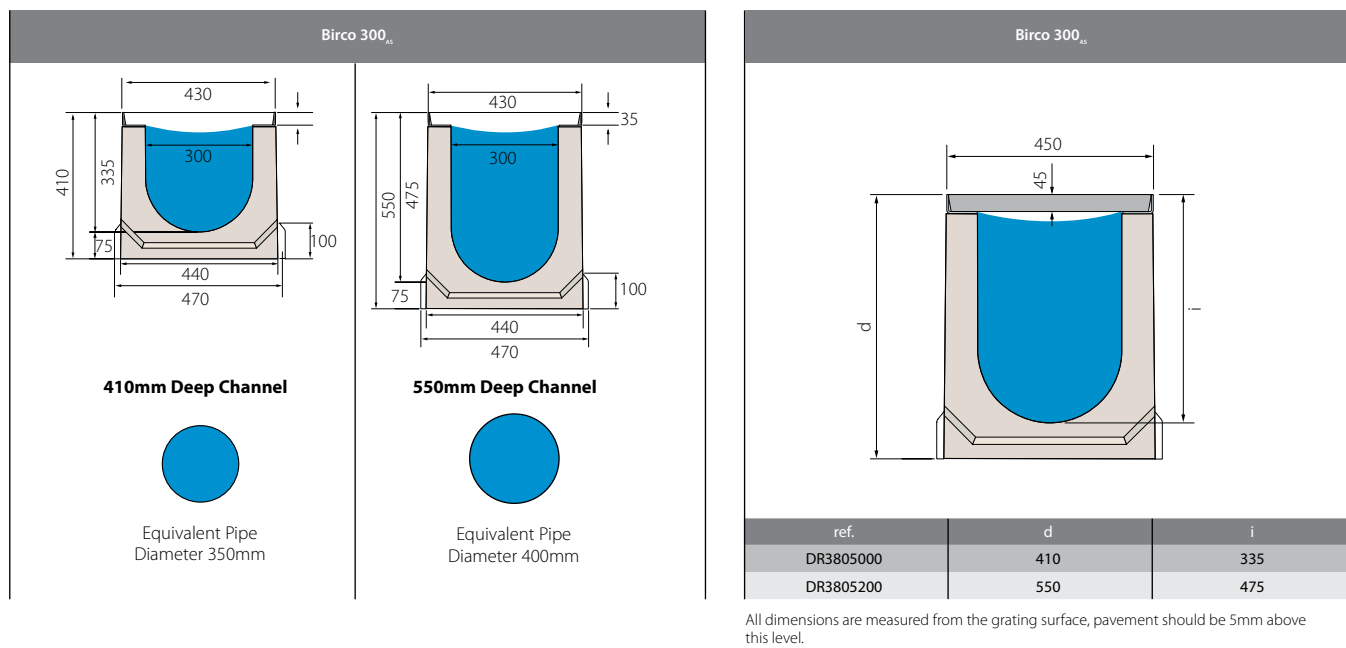
- Birco 300<sub>AS</sub> has an increased flow capacity, designed to cater for the large surface discharges generated by areas such as aircraft pavements and industrial hardstandings.
- Birco 300<sub>AS</sub> is suitable for applications up to and including Class F900 with the appropriate grating.
- The Birco 300<sub>AS</sub> system comprises a single channel with a range of cast iron gratings.
- The grating and covers are secured by bolting stainless steel bolts into threaded steel sockets cast into the channel wall.
- Birco 300<sub>AS</sub> channels are produced in 2 constant invert depths of 335mm and 475mm.





# Hydraulic Data

## FLOW CAPACITY



Birco 300				
Channel Type	410		550	
Gradient '1 in'	l/s	m/s	l/s	m/s
10	493.58	6.16	806.34	6.6
20	348.66	4.35	569.63	4.66
30	284.46	3.55	464.77	3.81
40	246.19	3.07	402.26	3.29
50	220.08	2.75	359.6	2.94
75	179.48	2.24	293.28	2.4
100	155.28	1.94	253.75	2.08
150	126.57	1.58	206.87	1.69
200	109.46	1.37	178.92	1.46
300	89.17	1.11	145.77	1.19
400	77.08	0.96	126.02	1.03
500	68.82	0.86	112.54	0.92
750	56	0.7	91.58	0.75
1000	48.36	0.6	79.1	0.65
1500	39.3	0.49	64.3	0.53
2000	33.9	0.42	55.48	0.45

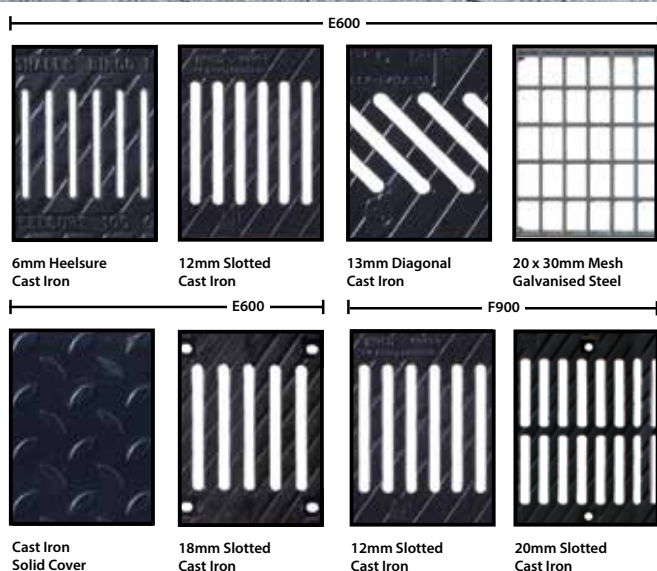
## Component Codes

Gratings	Loading	Length (mm)	Width (mm)	Depth (mm)	Unit Weight (kg)	Item Code
20mm Slotted Cast Iron	E600	500	417	45	20.20	DR390620
20mm Slotted Cast Iron	F900	500	417	45	24.7	DR390630

Base Channels	Length (mm)	Width (mm)	Invert Width (mm)	Depth (mm)	Invert Depth (mm)	Unit Weight (kg)	Item Code
Channel 0/0	1000	430	300	410	290	228	DR380500
Channel 5/0	1000	430	300	550	430	228	DR380520

Channel Accessories	Unit Weight (kg)	Item Code
300 AS End Cap	2.5	DR395530
300 AS Cap Outlet	3	DR395540
300 <sub>AS</sub> Outfall	220	DR395550

Birco 300 with reference numbers indicated in **bold** black are available ex-stock. Birco 300 with reference numbers indicated in light are manufactured to order. Contact our sales office to discuss your requirements.



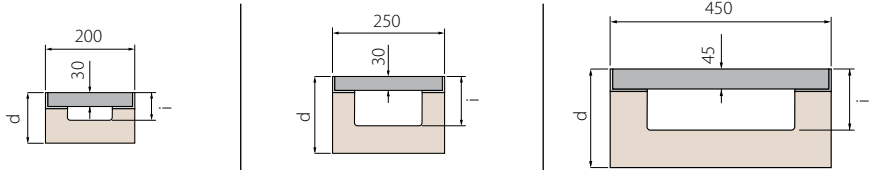
## Birco Shallow

### Grate Drainage System



A low to medium capacity system and the perfect solution where excavation depths are limited. Available across a variety of cast iron, stainless steel or galvanised grates offering both aesthetic and loading choice. Supported by a comprehensive range of accessories and ancillary units making Birco Shallow ideal for civic, commercial and rail applications.

# Hydraulic Data



BIRCO 100 SHALLOW			BIRCO 150 SHALLOW			BIRCO 300 SHALLOW		
ref.	d	i	ref.	d	i	ref.	d	i
DR4204500	80	50	DR4304600	120	80	DR4504900	300	225
DR4204600	100	70	DR4304700	150	110			
DR4204800	150	110						

All dimensions are measured from the grating surface, pavement should be 5mm above this level.

Birco 100 Shallow						
Channel Type	20 (80mm Deep)		40 (100mm Deep)		80 (150mm Deep)	
Gradient "1 in"	l/s	m/s	l/s	m/s	l/s	m/s
10	3.38	1.69	9.03	2.26	22.64	2.83
20	2.38	1.19	6.37	1.59	15.97	2
30	1.94	0.97	5.19	1.3	13.02	1.63
40	1.68	0.84	4.49	1.12	11.26	1.41
50	1.5	0.75	4.01	1	10.06	1.26
75	1.22	0.61	3.26	0.82	8.19	1.02
100	1.05	0.53	2.82	0.7	7.08	0.88
150	0.85	0.43	2.29	0.57	5.76	0.72
200	0.74	0.37	1.98	0.49	4.97	0.62
300	0.6	0.3	1.6	0.4	4.04	0.51
400	0.51	0.26	1.38	0.35	3.49	0.44
500	0.46	0.23	1.23	0.31	3.11	0.39
750	0.37	0.18	1	0.25	2.52	0.32
1000	0.32	0.16	0.86	0.21	2.17	0.27
1500	0.26	0.13	0.69	0.17	1.76	0.22
2000	0.22	0.11	0.59	0.15	1.51	0.19

Birco 150 Shallow				
Channel Type	50 (120mm Deep)		80 (150mm Deep)	
Gradient "1 in"	l/s	m/s	l/s	m/s
10	20.77	2.77	39.43	3.29
20	14.65	1.95	27.83	2.32
30	11.95	1.59	22.69	1.89
40	10.33	1.38	19.63	1.64
50	9.23	1.23	17.54	1.46
75	7.52	1	14.29	1.19
100	6.49	0.87	12.35	1.03
150	5.28	0.7	10.05	0.84
200	4.56	0.61	8.68	0.72
300	3.71	0.49	7.06	0.59
400	3.2	0.43	6.1	0.51
500	2.85	0.38	5.44	0.45
750	2.31	0.31	4.41	0.37
1000	1.99	0.27	3.8	0.32
1500	1.61	0.21	3.08	0.26
2000	1.38	0.18	2.65	0.22

Birco 300 Shallow		
Channel Type	180 (300mm Deep)	
Gradient "1 in"	l/s	m/s
10	285.6	5.29
20	201.71	3.74
30	164.55	3.05
40	142.4	2.64
50	127.28	2.36
75	103.78	1.92
100	89.77	1.66
150	73.16	1.35
200	63.26	1.17
300	51.51	0.95
400	44.51	0.82
500	39.74	0.74
750	32.31	0.6
1000	27.89	0.52
1500	22.65	0.42
2000	19.53	0.36

# Component Codes

Gratings	Loading	Length (mm)	Width (mm)	Unit Weight (kg)	Item Code
Birco 100 6mm Heelsure Cast Iron	E600	500	187	7.2	<b>DR115135</b>
Birco 100 12mm Slotted Cast Iron	E600	500	187	6.2	DR115125
Birco 100 13mm Diagonal Cast Iron	E600	500	187	12.4	DR115020
Birco 100 20 x 30mm Mesh Galvanised Steel	E600	500	187	4.86	DR115285
Birco 100 Cast Iron Solid Cover	E600	500	187	7.46	DR115250
Birco 100 12mm Slotted Cast Iron	F900	500	187	7.4	DR115130
Birco 150 6mm Heelsure Cast Iron	E600	500	237	10.5	<b>DR195240</b>
Birco 150 12mm Slotted Cast Iron	E600	500	237	11.0	DR195210
Birco 150 12mm Slotted Galvanised Cast Iron	E600	500	237	11	DR197030
Birco 150 20 x 30mm Mesh Galvanised Steel	E600	500	237	7.36	DR197290
Birco 150 20 x 30mm Mesh Galvanised Steel	E600	1000	237	15	DR197280
Birco 150 Cast Iron Solid Cover	E600	500	237	10.3	DR195230
Birco 150 12mm Slotted Cast Iron	F900	500	237	12.20	DR195220
Birco 300 20mm Slotted Cast Iron	E600	500	417	20.20	DR390620
Birco 300 20mm Slotted Cast Iron	F900	500	417	24.7	DR390630


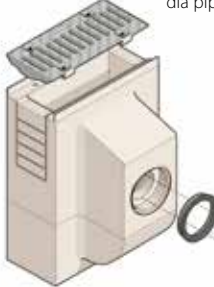
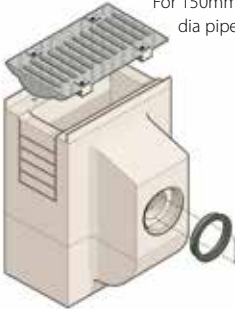
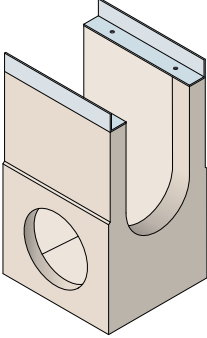
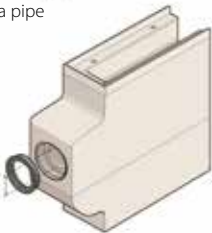
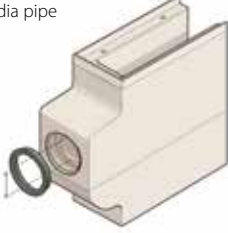
Base Channels	Length (mm)	Width (mm)	Invert Width (mm)	Depth (mm)	Invert Depth (mm)	Channel Item Code
100 Shallow	1000	200	100	80	80	DR420450
	1000	200	100	100	100	DR420460
	1000	200	100	150	150	DR420480
150 Shallow	1000	250	150	120	120	DR430460
	1000	250	150	150	150	DR430470
300 Shallow	1000	430	300	300	300	DR420490

Birco Shallow with reference numbers indicated in **bold** black are available ex-stock. Birco Shallow with reference numbers indicated in light are manufactured to order. Contact our sales office to discuss your requirements.

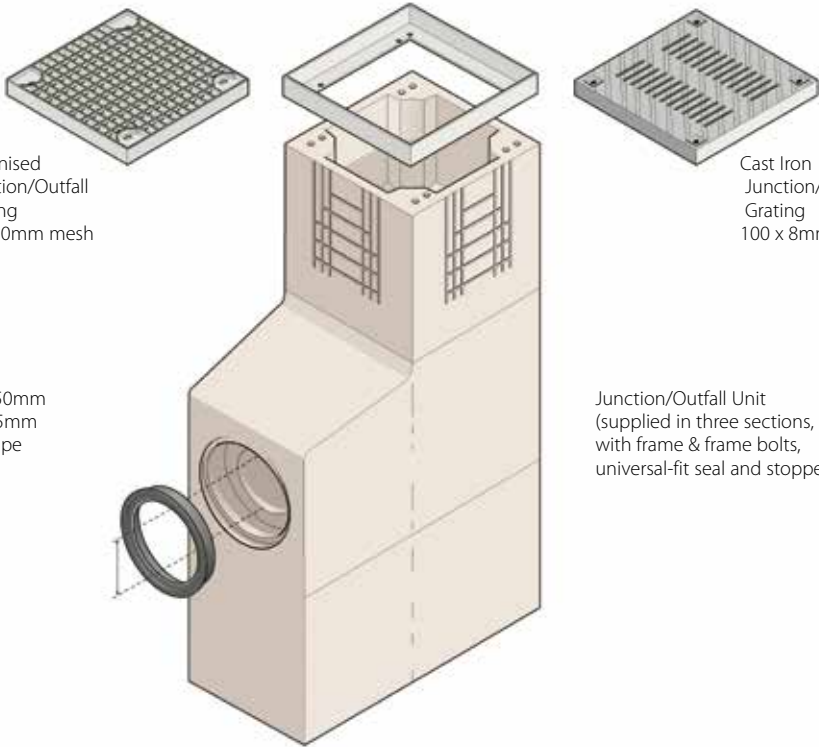
Channel Accessories	Weight (kg)	Item Code
100 Shallow End Cap 80 - 120	0.02	DR425150
100 Shallow End Cap 150 - 200	0.03	DR425160
150 Shallow End Cap 120 - 150	0.03	DR435250
300 Shallow End Cap 300	0.06	DR455540



# Birco Outfalls

Birco 100	Birco 150	Birco 200	Birco 300 <sub>AS</sub>
SIDE OUTFALLS			
<p>For 150mm dia pipe</p>  <p>100 In-line Outfall 150 Side Trap (supplied in two sections with universal-fit seal and stopper included)</p>	<p>For 150mm dia pipe</p>  <p>150 In-line Outfall 150 Side Trap (supplied in two sections with universal-fit seal and stopper included)</p>	<p>For 150mm dia pipe</p>  <p>200 In-line Outfall, 150 Side Trap. (supplied in two sections with universal-fit seal and stopper included)</p>	 <p>300AS In-line Outfall, 300 side outlet (supplied in one section)</p>
END OUTFALLS			
<p>For 100mm dia pipe</p>  <p>100 In-line Outfall 100 In-line Trap (supplied in two sections with universal-fit seal and stopper included)</p>	<p>For 150mm dia pipe</p>  <p>150 In-line Outfall 150 In-line Trap (supplied in two sections with universal-fit seal and stopper included)</p>		

**Birco System**



Galvanised Junction/Outfall Grating  
20 x 30mm mesh

For 150mm or 225mm dia. pipe

Cast Iron Junction/Outfall Grating  
100 x 8mm slots

Junction/Outfall Unit (supplied in three sections, with frame & frame bolts, universal-fit seal and stopper included)

# Hydraulic Data

Theoretical Outfall Capacities			
Outfall Type	Outlet Pipe Diameter (mm)	m/s	l/s
Birco 100 Inline End Outlet Outfall	100	2.27	11
Birco 100 Inline Side Outlet Outfall	150	2.42	26
Birco 150 inline End Outlet Outfall	150	2.42	26
Birco 150 inline Side Outlet Outfall	150	2.42	26
Birco 200 Inline Side Outlet Outfall	150	2.42	26
Birco 300 Inline Side Outlet Outfall	300	2.25	160
Junction Outfall 150mm	150	3.55	39
Junction Outfall 225mm	225	3.64	89

\*The outfall capacities quoted are theoretical calculated figures

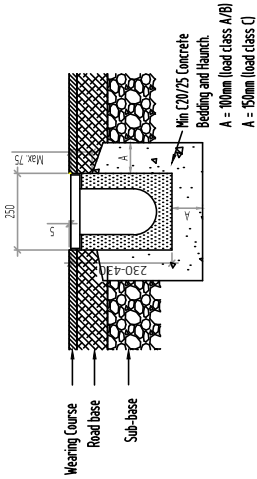
# Component Codes

Birco 100 In-Line Outfalls and Standard Gratings*			
Item	Description	Weight (kg)	Item Code
Outfalls	100 In-line Trap (for 100mm dia pipe)	105	DR1301700
	150 Side Trap (for 150mm dia pipe)	142	<b>DR1301750</b>
Birco 150 In-Line Outfalls and Standard Gratings*			
Item	Description	Weight (kg)	Item Code
Outfalls	150 In-line Trap (for 150mm dia pipe)	140	DR2102700
	150 Side Trap (for 150mm dia pipe)	158	<b>DR2102800</b>
Birco 200 In-Line Outfall and Standard Gratings*			
Item	Description	Weight (kg)	Item Code
Outfalls	150 Side Trap (for 150mm dia pipe)	186	<b>DR2903800</b>
Birco 300 <sub>u</sub> Outfall			
Item	Description	Weight (kg)	Item Code
Outfalls	300 <sub>u</sub> Outfall	220	<b>DR3955500</b>
Birco System Junction Outfalls and Gratings*			
Item	Description	Weight (kg)	Item Code
Outfalls	Junction/Outfall 150 (for 150mm dia pipe)	340	DR4604000
	Junction/Outfall 225 (for 225mm dia pipe)	305	DR4604050

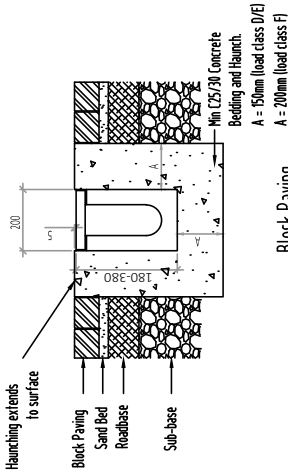
\*Special Gratings also available.  
Items available ex-stock.  
All outfall units are packed individually.

# Standard Details

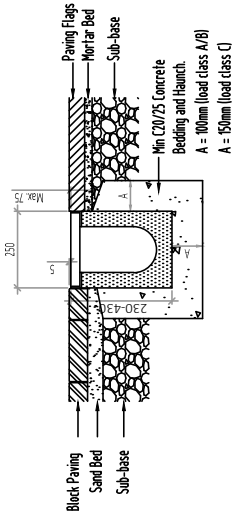
Drawing 1 of 2



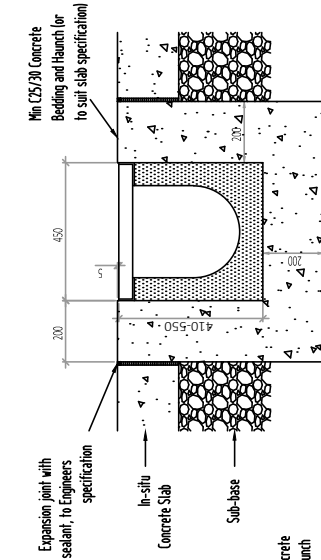
Bituminous Construction  
Loading Class A to C  
(Birco 150 Channel Shown)



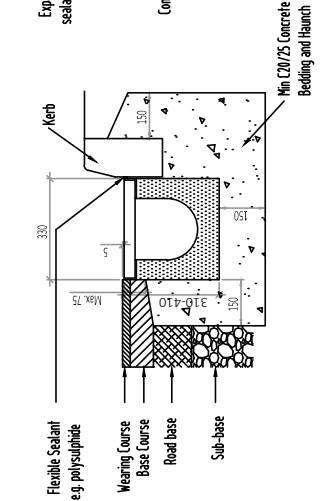
Block Paving  
Loading Class D to F  
(Birco 100 Channel Shown)



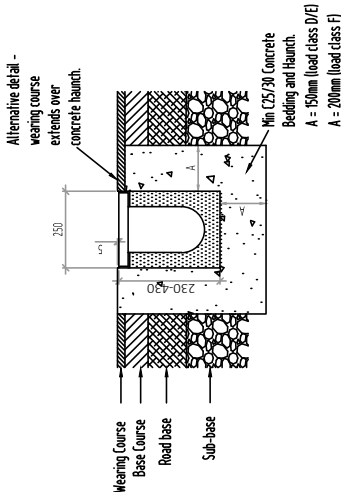
Block Paving / Paving Flags  
Loading Class A to C  
(Birco 150 Channel Shown)



In-situ Concrete Pavement  
Loading Class A to F  
(Birco 300 Channel Shown)



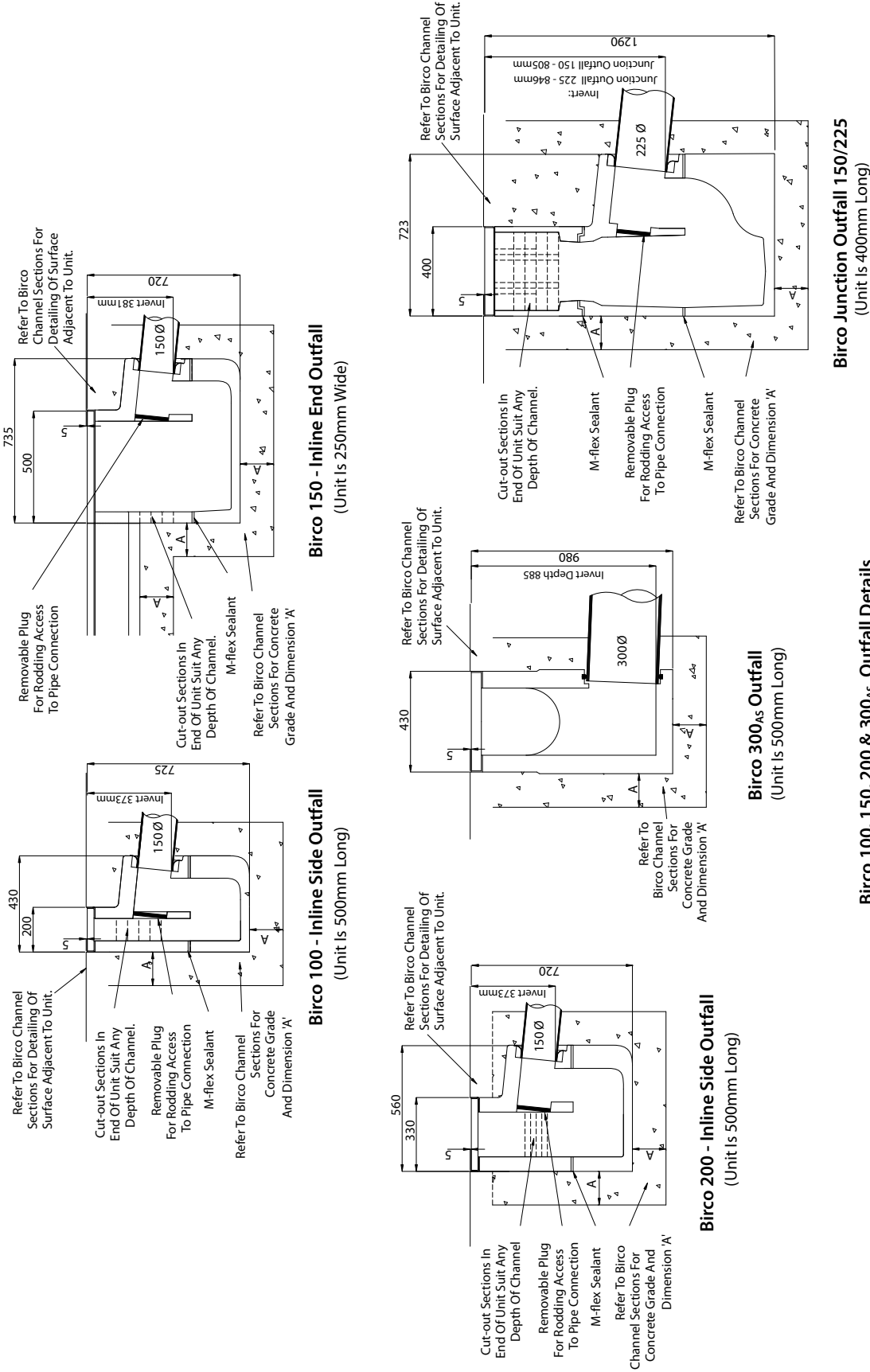
Kerb side application  
Loading Class C  
(Birco 200 Channel Shown)



Bituminous Construction  
Loading Class D to F  
(Birco 150 Channel Shown)

Birco 100, 150, 200 & 300 – Typical Channel Installation Details

Drawing 2 of 2



Note: All Invert & Overall Depths Are Measured From Carriageway Surface



# Standard Details

## Notes For Birco Installation Details

### Drawings 1 to 2

- 1. All loading applications are as defined in BS EN 1433:2002 "Drainage Channels for Vehicular and Pedestrian Areas - Classification, Design, Testing Requirements, Marking and Quality Control".
- 2. Birco outfall sections shall be jointed using Marshalls' M-Flex sealant.
- 3. The concrete grade and dimensions for bed, haunch and surround are shown in the Birco section of the Design Guide.
- 4. Where the concrete surround is taken to the surface, the concrete surround should have the appropriate freeze thaw resistance.
- 5. For high loading applications with poor conditions, consideration may be given to the local thickening of the sub-base.
- 6. Marshalls' vertical joint sealant, M-Flex, shall be applied to all vertical joints of the channels.
- 7. Birco gratings should be chosen to suit the appropriate loading application, taking into account both static and dynamic loading conditions.
- 8. Movement joints details that fully isolate the Birco system whilst maintaining restraint shall be provided adjacent to all concrete slabs even when the slab is covered by another material. The use of dowel bars in concrete slab joints is common and should be considered especially for higherloading applications.
- 9. All grating bolts should be tightened to the appropriate torque shown in the Birco section of the Design Guide.
- 10. The top surface of the grating shall be between 5mm below the final pavement level.
- 11. All dimensions are in millimetres.

# Specification

## Introduction

The following specification covers the complete Birco Linear Drainage System including ancillary fittings and is compatible with the Standard Detail Sheets.

## Birco

- 1. The linear drainage system shall be **100/150/200/300<sub>av</sub>**, \* manufactured in pre-cast concrete, with the exception of certain fitments manufactured in steel or cast iron, as supplied by Marshalls, Halifax HX5 9HT in accordance with Standard Detail Sheets.
- 2. The linear drainage shall be a two part system consisting of galvanised steel/cast iron gratings/covers bolted to precast concrete drainage channels reference **(0/0)/(5/0)/(10/0)/(15/0)/(20/0)\*** deep together with drainage channels that have **100-150-200 1.0%)\*** inbuilt fall. The overall width of the system shall be not less than **160/200/250/330/430\*mm**.
- 3. All components of the Marshalls' Birco System shall comply with Load Classification **C250/D400/E600/F900\*** in accordance with BS EN 1433:2002 and the following:
  - (i) The Gratings shall be bolted to the drainage channel with a minimum of **4 No. M12/M16mm Ø stainless steel bolts per metre**
  - (ii) The drainage channel will have cast-in **4mm (100/150/200/300)\*** thick galvanised steel edge angles
  - (iii) The system shall have a minimum of **refer to table\*** mm<sup>2</sup>/m water inlet aperture area
  - (iv) The drainage channels shall have an invert width of **100/150/200/300\*mm\***
- 4. The linear drainage system comprising gratings, covers, constant depth and inbuilt fall channels, outfalls, T junctions channels, end caps, cap outlets, and sealants shall be installed to the line and levels indicated in the contract documents and in accordance with the manufacturer's instructions and Standard Details.

Note: \* delete as required

# Construction

## Introduction

Installation of the Marshalls' Birco Linear Drain System should be carried out in accordance with the Specification and Standard Detail Sheets. The following method of installation is recommended.

## Excavation

Sufficient material should be excavated to accommodate the drainage channels, concrete bedding and haunching, any 'soft spots' or poorly compacted formation should be made good. The top of the Birco Channel shall be 5mm below the final pavement surface.

Channels and outfall units shall be bedded directly onto a freshly mixed concrete foundation as shown in the Birco Standard Detail Sheets, or alternatively bedded on a layer of Mortar Class 12 to BS EN 998-2:2003 not less than 10mm and not more than 40mm thick on a previously prepared concrete foundation.

## Channels

Unless otherwise agreed, Channel Units shall be laid commencing at the outfall to previously established line and level. Setting out pins should be accurately located, with a string line level with the top of the drainage channels. Pins can be located to the rear of the channels to avoid having to lift components over the string line. Channel ends should abut as tightly as possible. The invert and surface levels of adjacent channels shall correspond. Any Units deviating more than 3mm in 3m from line and level shall be made good by lifting and relaying.

A complete line of Units shall be approved by the specifier before the completion of concrete haunching. Where cutting the Birco Channel Units is required, they shall be cut with a concrete saw or disc cutter, so that no single Unit is less than 350mm long. Birco gratings shall not be cut unless directed by the engineer. Any cut galvanised steel shall be renovated using Defcon Z, or similar approved.

In situ concrete haunching shall not be placed until the installed units have been inspected and approved by the specifier. The concrete haunching shall be of a concrete grade appropriate to the Drainage Channel Loading Class as specified in the contract or the Birco Standard Detail Sheets. Haunching shall be carried out as one operation to a complete line of Channel Units, to the dimensions indicated in the Birco Standard Detail sheets. Haunching / surround concrete to the Outfall Unit shall be of the same grade as the adjacent Channel Unit haunching in accordance with the Birco Standard detail sheets.

Where channels are laid on or adjacent to existing or proposed concrete slabs, transverse joints shall be formed within the Units and haunching adjacent to the slab joints. Longitudinal movement joints shall also be formed between the haunching and the slabs as described in the contract and in accordance with Birco Drain Standard Detail Sheets.

## Outfalls

Outfall Units shall be of the type specified in the contract and constructed as shown in the Birco Standard Detail Sheets. Unless otherwise described in the contract, they shall be bedded on and surrounded by 150mm of concrete of the appropriate grade. A suitable section of the wall of the outfall unit shall be cut out to allow adjacent drainage channels to abut without restricting the flow of water. Cutting shall be achieved by using a concrete saw or disc cutter. The horizontal joints between the sections of the outfall units shall be sealed with M-Flex sealant. The appropriate pipe adaptor shall be placed in the aperture for connection to the underground pipework.

## Joint Sealant

Jointing of adjacent channels shall be carried prior to fixing the gratings. Marshalls' M-Flex sealant should be gunned into the sealant groove formed when adjacent channels abut. Surplus sealant shall be removed from the inner surface of the units as work proceeds.

One tube of M-Flex is sufficient to seal the following:-

M-Flex Requirement	
Base Type	Channels per tube
<b>BIRCO 100</b>	
0/0	22
5/0	16
10/0	13
15/0	11
20/0	9
<b>BIRCO 150</b>	
0/0	15
5/0	13
10/0	11
15/0	10
20/0	8
<b>BIRCO 200</b>	
0/0	11
5/0	10
10/0	9
15/0	8
IBF 16-20	8

## Gratings

Adjacent Carriageway and/or footway construction shall not be commenced within 3 days of any jointing or haunching/surrounding concrete being placed.

Unless agreed with the specifier, Birco gratings shall be securely bolted to Birco Channel Units having internal depths greater than 150mm, before adjacent pavement construction is commenced.

On completion of the works, the drainage channel units shall be cleaned out and left free from obstruction. This shall be carried out either by removal of gratings or by high pressure water jetting (100-150 bar at 200 litres/min minimum). Unless otherwise agreed with the specifier, the slot openings shall be covered by timber boards or other method during jetting operations. Outfall units shall be emptied. The cleaning process should be repeated where necessary on completion of any remedial works.

All gratings shall be evenly spaced with bolts tightened down securely to the appropriate torque (100, 150 and 200: 75 Nm, 300:100Nm).