BRIDGE DRAINAGE

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BRIDGE DRAINAGE

The proper functioning of the facilities' drainage system guarantees the planned lifetime of such facilities and minimizes the maintenance costs. Besides the request for low maintenance costs, polyester products also meet the aesthetic criterion, i.e. merging with the environment since, due to the industrial process, their colour is similar to the colour of concrete.

INDUSTRIAL PROCESS

Polyester pipe is a product of continuous and discontinuous filament winding machines and is commonly abbreviated to GRP, FRP, or fiberglass pipe. By combining glass fibres, thermosetting resin, and special fillers in the appropriate ratio, one may produce pipes with a wide range of mechanical and chemical properties. The composite structure may contain granular or platelet fillers, agents, pigments, or dyes. By selecting the appropriate ratio of resin, glass fibres, fillers, and design, manufacturer may create a product which meets even the most stringent product specifications. Fibreglass composite technology enables a successful comparison of polyester pipes with pipes made of traditional materials in terms of price-performance ratio. Since they provide such an outstanding combination of these parameters, the number and type of products manufactured from these composite materials in a quality way, effectively and cost-efficiently increases each year. The company was awarded a number of certificates and technical reports on the quality of products, as well as the Integrated Management System certificates, such as ISO 9001, ISO 14001, and ISO 45001.

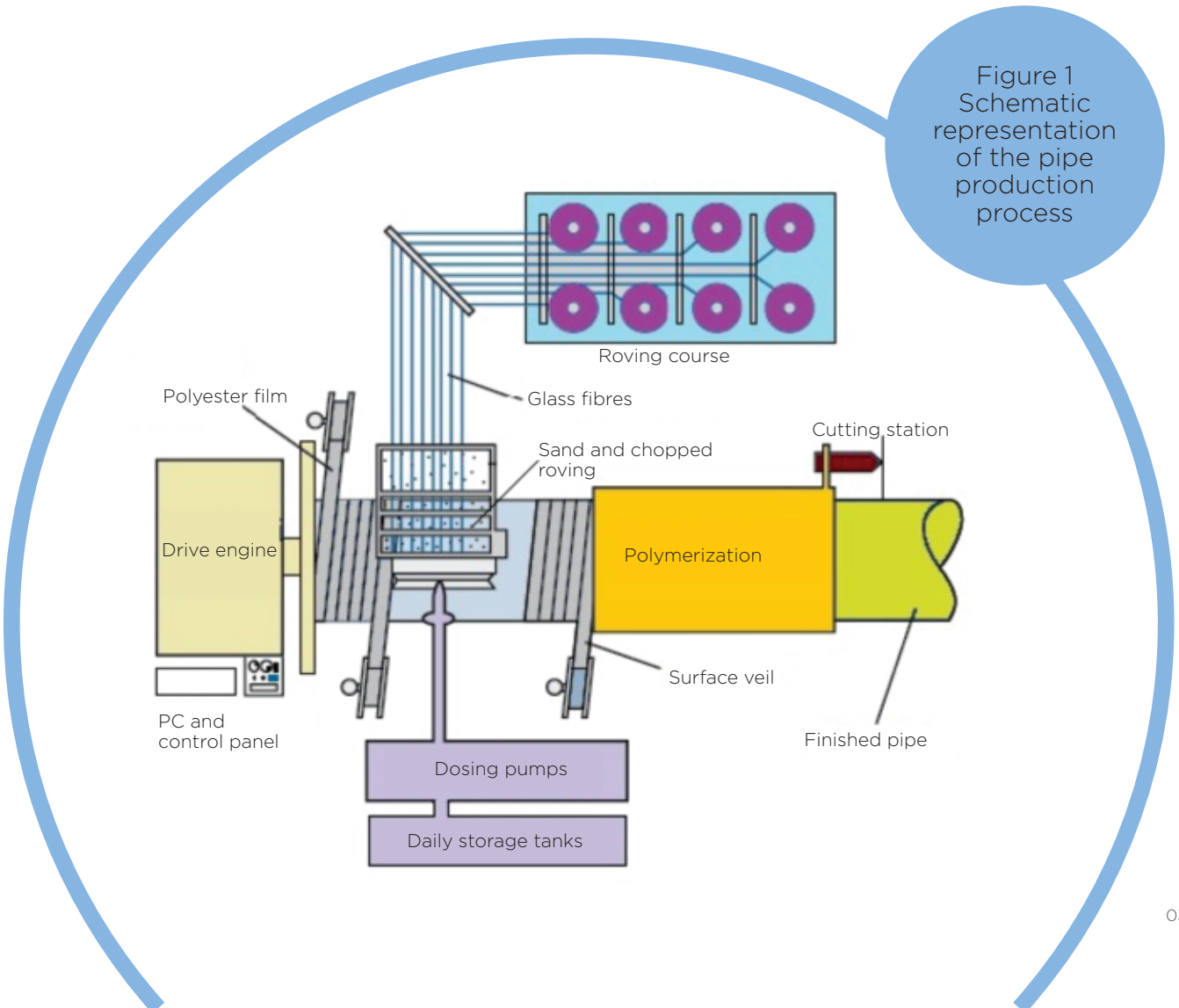


Figure 1 Schematic representation of the pipe production process

PIPE WALL STRUCTURE

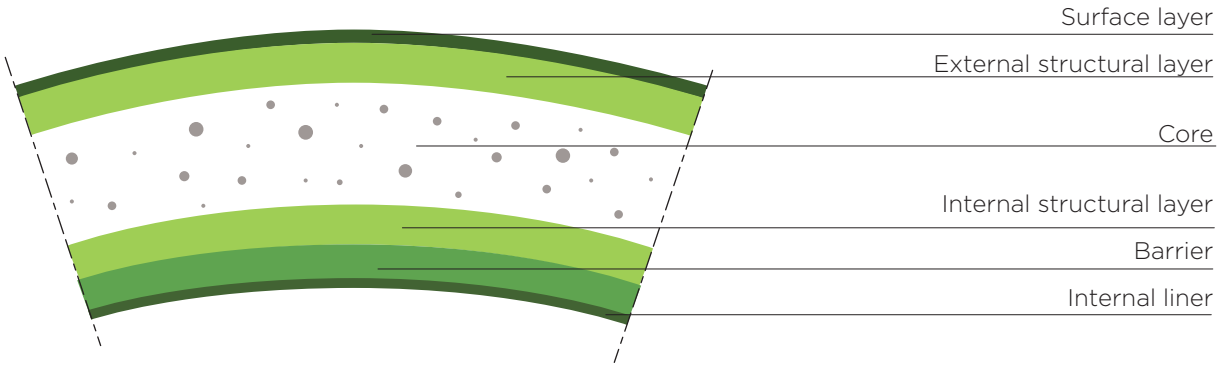


Figure 2 - Pipe wall structure

LAYER	CONSTRUCTION	FUNCTION
Internal liner	Surface veil	Protection
Barrier	Chopped glass fibres	Protection
Internal structural layer	Direct and chopped glass fibres	High coefficient of structural reinforcements
Core	Silica sand, chopped and direct glass fibres	Durable hard core
External structural layer	Direct and chopped glass fibres	High coefficient of structural reinforcements
Surface layer	Surface veil	Protection

Note: Resin is implied in each layer!

STIFFNESS CLASS

Pipe stiffness is the ability of the pipe to withstand traffic and soil loads, as well as the internal pressure. Pipe stiffness is the ratio of the product of ring flexural modulus of elasticity of the pipe wall material and the moment of inertia to the diameter of the pipe to the third power ($STI=EI/D^3$).

In the AWWA C950 standard, the stiffness class of the material is expressed in psi units, while the ISO standard specifies the stiffness in N/m^2. Polyester pipes for the bridge drainage line may be supplied with four standard stiffness classes.

STANDARD STIFFNESS CLASSES	
Designation SN	Stiffness N/m^2 (Pa)
1250	1250
2500	2500
5000	5000
10000	10000

Along with the standard stiffness classes, polyester pipes with other (higher) stiffness classes can also be fabricated as per customer's request.

PIPE DIAMETERS

Polyester pipes for bridge drainage may be supplied with nominal diameters DN (mm) as follows.

NOMINAL DIAMETER DN (mm)														
50	80	100	125	150	200	250	300	350	400	450	500	600	700	800

Note: Other diameters products line are also available upon request.

LENGTH

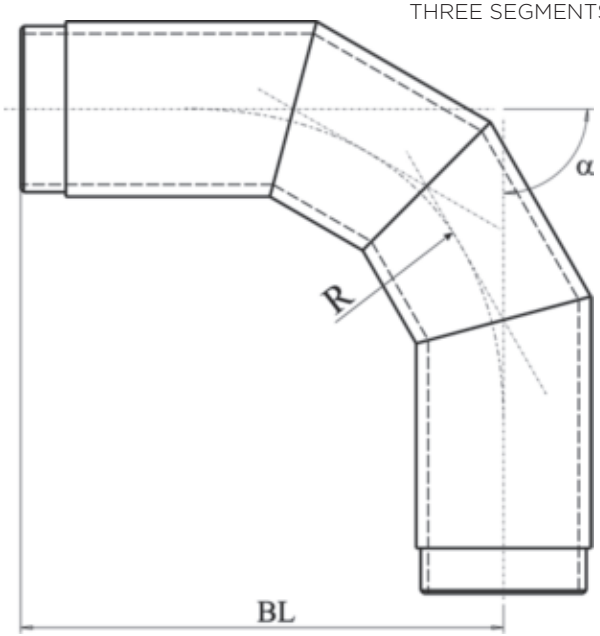
The standard length of polyester pipes is 6 meters and 12 meters.

PIPE FITTINGS

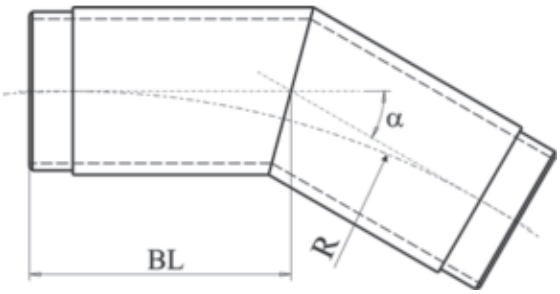
A variety of fittings enables an effective method of dealing with difficult situations in forming a bridge drainage pipeline.

BENDS

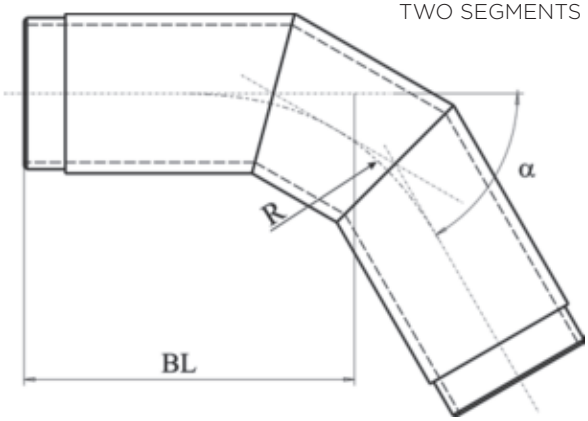
THREE SEGMENTS



ONE SEGMENT



TWO SEGMENTS

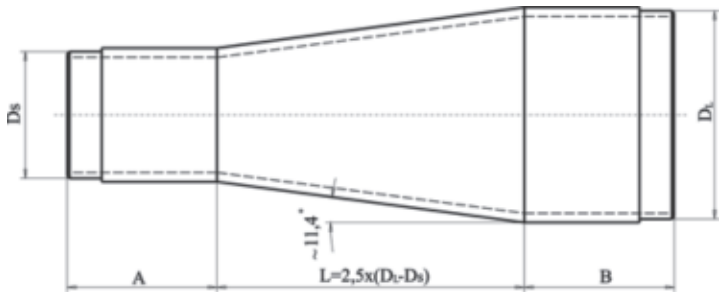


Effective axial length of bend (mm) - BL

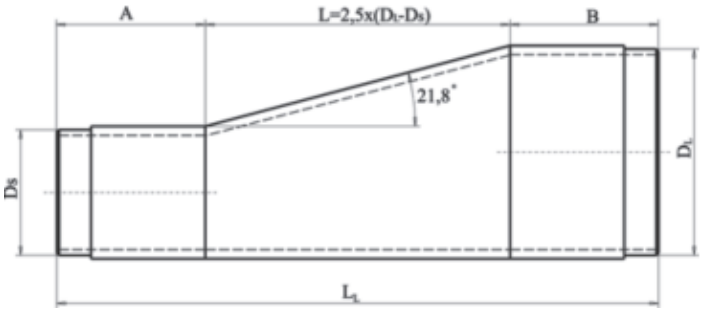
α		11.25°	15°	22.5°	30°	45°	60°	90°
DN (mm)	OD (mm)	# 1 BL (mm)	# 1 BL (mm)	# 1 BL (mm)	# 1 BL (mm)	# 2 BL (mm)	# 2 BL (mm)	# 3 BL (mm)
100	110	250	250	250	250	250	300	350
125	135	250	250	250	250	300	300	400
150	160	250	250	250	250	300	300	400
200	211	250	250	250	300	350	400	500
250	271	300	300	300	300	400	450	600
300	327	400	350	400	400	500	550	750
350	376	400	400	400	450	550	600	800
400	413	450	450	450	450	600	650	900
450	478	450	450	500	500	600	700	1000
500	515	450	450	500	500	650	750	1050
600	617	400	400	400	450	600	700	1100
700	719	400	400	450	450	650	800	1200
800	821	450	450	450	500	700	850	1350

- number of segments

CONCENTRIC



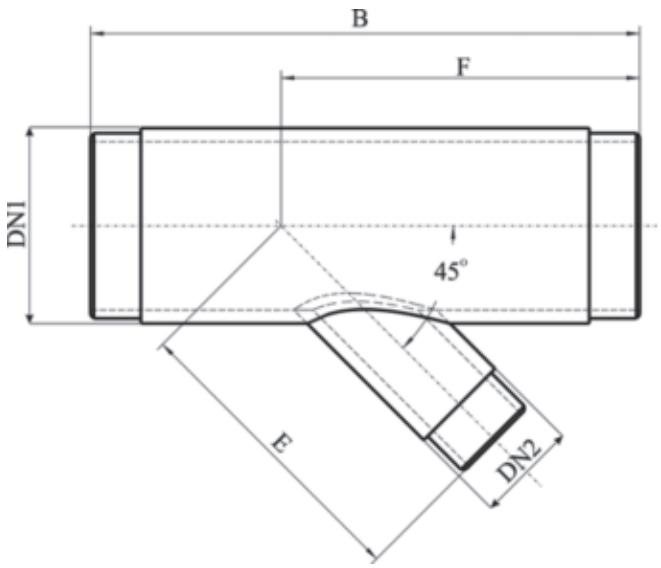
ECCENTRIC



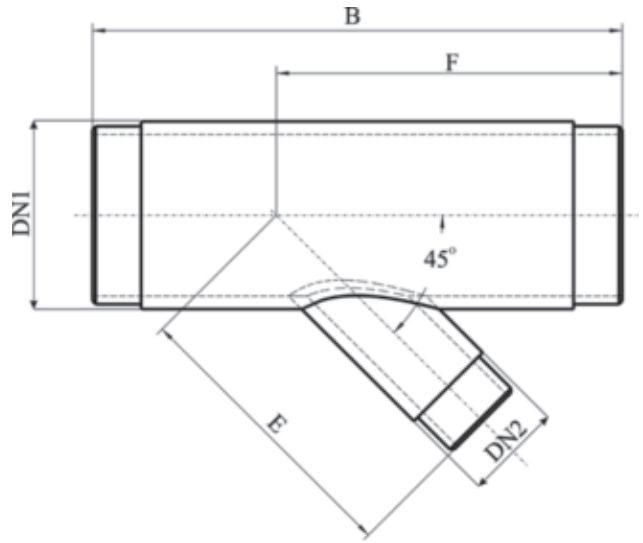
DN Larger diam. D_L (mm)	DN Smaller diam. D_S (mm)	Taper length L (mm)	Pipe length A=B (mm)	Axial length L_L (mm)
150	100	125	300	725
200	100	250	300	850
200	150	125	300	725
250	150	250	300	850
250	200	125	300	725
300	200	250	400	1050
300	250	125	400	925
350	250	250	400	1050
350	300	125	400	925
400	300	250	400	1050
400	350	125	400	925
450	350	250	400	1050
450	400	125	400	925
500	400	250	400	1050
500	450	125	400	925
600	450	375	400	1175
600	500	250	400	1050
700	500	500	400	1300
700	600	250	400	1050
800	600	500	400	1300
800	700	250	400	1050

Note: The polyester fittings production technology enables the fabrication of other fittings as per customers' request, that are not included in this document.

BRANCHES 45°

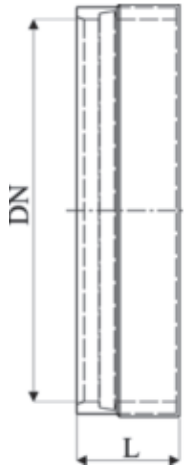


Header DN1 (mm)	Branch DN2 (mm)	Header Length B (mm)	Branch Length E (mm)	F (mm)
100	100	600	420	350
150	100	600	420	375
150	150	700	420	425
200	100	600	420	400
200	150	700	500	450
200	200	800	500	500
250	100	600	500	425
250	150	700	500	475
250	200	800	570	525
250	250	900	570	575
300	100	700	500	500
300	150	800	570	550
300	200	900	570	600
300	250	1000	640	650
300	300	1100	710	700
350	100	700	570	525
350	150	800	570	575
350	200	900	640	625
350	250	1000	640	675
350	300	1100	710	725
350	350	1200	780	775
400	100	700	570	550
400	150	800	640	600
400	200	900	640	650
400	250	1000	710	700
400	300	1100	780	750
400	350	1200	850	800
400	400	1300	850	850



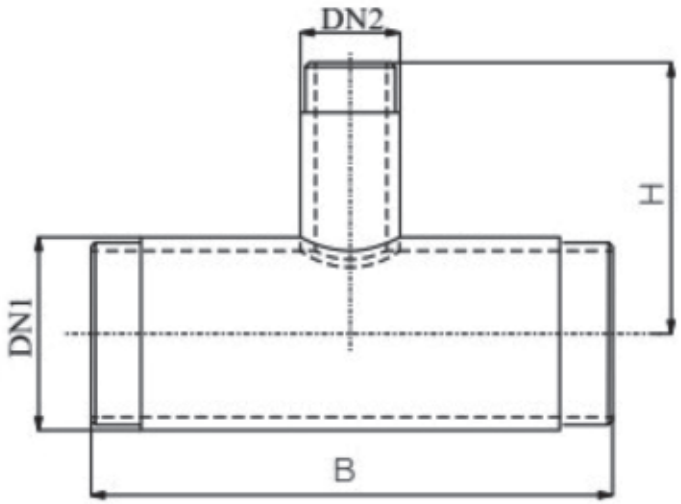
Header DN1 (mm)	Branch DN2 (mm)	Header Length B (mm)	Branch Length E (mm)	F (mm)
500	100	700	710	600
500	150	800	710	650
500	200	900	780	700
500	250	1000	780	750
500	300	1100	850	800
500	350	1200	920	850
500	400	1300	920	900
500	500	1500	990	1000
600	300	1100	920	850
600	400	1300	990	950
600	500	1500	1060	1050
600	600	1600	1130	1100
700	300	1100	990	900
700	400	1300	1060	1000
700	500	1500	1130	1100
700	600	1700	1200	1200
700	700	1900	1270	1300
800	300	1100	1060	950
800	400	1300	1130	1050
800	500	1500	1200	1150
800	600	1700	1270	1250
800	700	1900	1340	1350
800	800	2100	1410	1450

END CAP

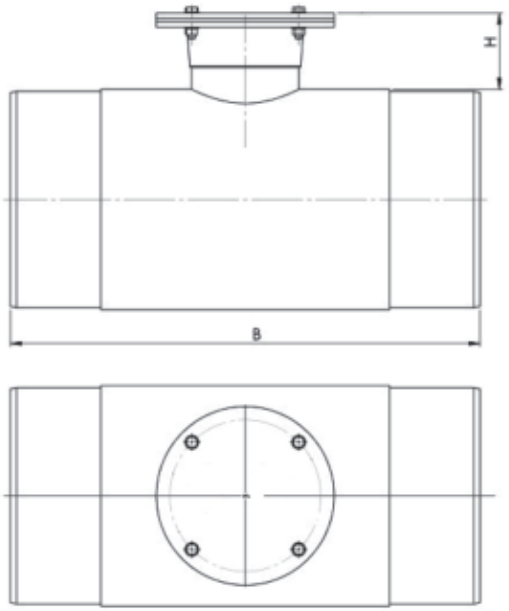


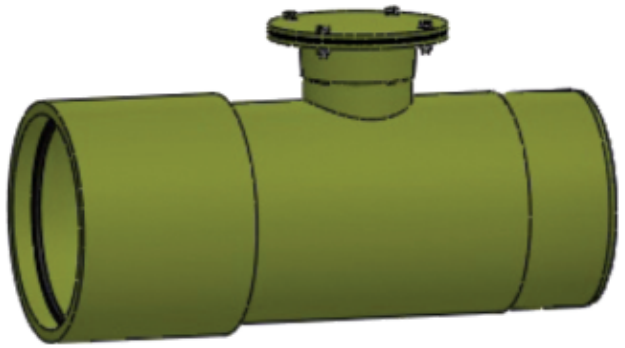
DN (mm)	L (mm)
100	80
125	80
150	85
200	100
250	100
300	135
350	135
400	135

TEES



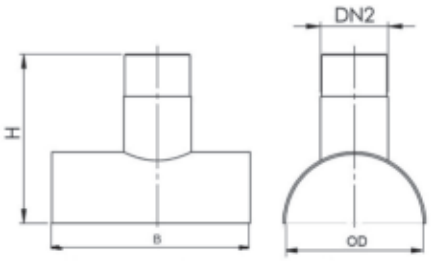
DN2 / DN1	100		125		150		200		250		300		350		400		500		600		700		800	
	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)
100	500	300																						
125	500	300	500	300																				
150	550	300	550	300	650	300																		
200	600	350	600	350	650	350	700	350																
250	600	400	600	400	650	400	700	400	800	450														
300	700	400	700	400	700	400	800	400	800	400	900	450												
350	700	450	700	450	700	450	800	450	800	450	900	500	900	500	1000	500								
400	700	450	700	450	700	450	800	450	800	450	900	500	1000	500	1000	200								
450	700	500	700	500	700	500	800	500	800	500	900	550	1000	550	1000	500								
500	700	500	700	500	700	500	800	500	800	500	900	550	1000	600	1000	600	1200	600						
600	800	550	800	550	800	550	900	550	900	600	900	600	1000	600	1100	600	1200	600	1300	650				
700	800	600	800	600	850	600	900	600	900	650	900	650	1000	650	1100	650	1200	700	1300	700	1400	700		
800	800	650	900	650	900	650	900	650	900	700	900	700	1000	700	1100	700	1200	750	1400	750	1500	800	1600	800

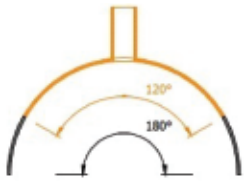




DN2 / DN1	100		125		150		200		250		300		350		400		500		600		700		800	
	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)	B (mm)	H (mm)
100	500	100																						
125	500	100	500	100																				
150	550	100	550	100	650	100																		
200	600	100	600	100	650	100	700	175																
250	600	100	600	100	650	100	700	175	700	175														
300	700	100	700	100	700	100	800	175	800	175	900	175												
350	700	100	700	100	700	100	800	175	800	175	900	175	900	175										
400	700	100	700	100	700	100	800	175	800	175	900	175	1000	200	1000	200								
450	700	100	700	100	700	100	800	175	800	175	900	175	1000	175	1000	200								
500	700	100	700	100	700	100	800	175	800	175	900	175	1000	175	1000	200	1200	200						
600	800	100	800	100	800	100	900	175	900	175	900	175	1000	200	1100	200	1200	200	1300	240				
700	800	100	850	100	850	100	900	175	900	175	900	175	1000	200	1100	200	1200	200	1300	240	1400	240		
800	800	100	900	100	900	100	900	175	900	175	900	175	1000	200	1100	200	1200	200	1400	240	1500	240	1600	240

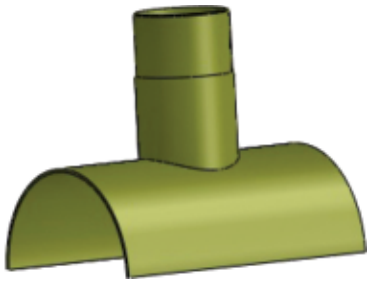
SADDLE α = 45° / 90°



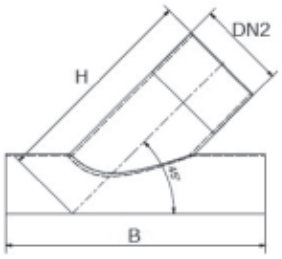


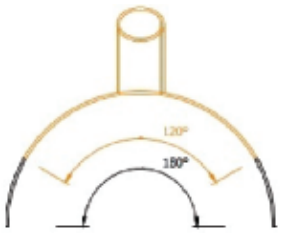
For pipes DN ≤ 500, the saddle angle 180°

*For pipes DN > 500, the saddle angle 120°



DN1 (mm)	DN2 (mm)	OD (mm) Main Pipe	B (mm)		H (mm)	
			90°	45°	90°	45°
100	100	110	400	470	300	420
125	100	135	400	470	300	420
125	125		400	470	300	420
150	100	160	400	470	300	420
150	125		400	470	300	420
150	150		400	470	300	420
200	100	210	400	470	350	420
200	125		400	470	350	420
200	150		400	470	350	500
200	200		450	530	350	500
250	100	272	400	470	400	500
250	125		400	470	400	500
250	150		400	470	400	500
250	200		450	530	400	570
250	250		500	600	450	570
300	100	327	400	470	400	500
300	125		400	470	400	500
300	150		400	470	400	570
300	200		450	530	400	570
300	250		500	600	400	640
300	300		550	700	450	640
350	100	376	400	470	450	570
350	125		400	470	450	570
350	150		400	470	450	570
350	200		450	530	450	640
350	250		500	600	450	640
350	300		550	700	500	710
350	350		600	750	500	780
400	100	413	400	470	450	570
400	125		400	470	450	570
400	150		400	470	450	640
400	200		450	530	450	640
400	250		500	600	450	710
400	300		550	700	500	780
400	350		600	750	500	850
400	400		650	800	500	850



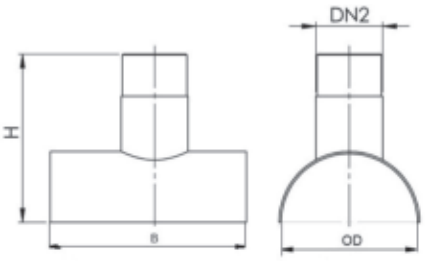


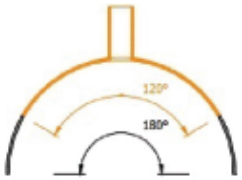
For pipes DN ≤ 500, the saddle angle 180°

*For pipes DN > 500, the saddle angle 120°

DN1 (mm)	DN2 (mm)	Main Pipe OD (mm)	B (mm)		H (mm)	
			90°	45°	90°	45°
450	100	476	400	470	500	640
450	125		400	470	500	640
450	150		400	470	500	710
450	200		450	530	500	710
450	250		500	600	500	780
450	300		550	700	550	850
450	350		600	750	550	920
450	400		650	800	550	990
450	450		700	900	550	1060
500	100	515	400	470	500	710
500	125		400	470	500	710
500	150		400	470	500	710
500	200		450	530	500	780
500	250		500	600	500	780
500	300		550	700	550	850
500	350		600	750	550	920
500	400		650	800	550	920
500	450		700	900	550	990
500	500		750	950	550	990
*600	100	617	400	470	550	780
*600	125		400	470	550	780
*600	150		400	470	550	780
*600	200		450	530	550	850
*600	250		500	600	600	850
*600	300		550	700	600	920
600	350		600	750	600	960
600	400		650	800	600	990
600	450		700	900	600	1030
600	500		750	950	600	1060
600	600		870	1150	650	1130

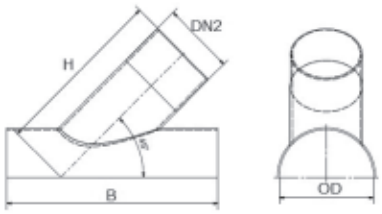
SADDLE α = 45° / 90°





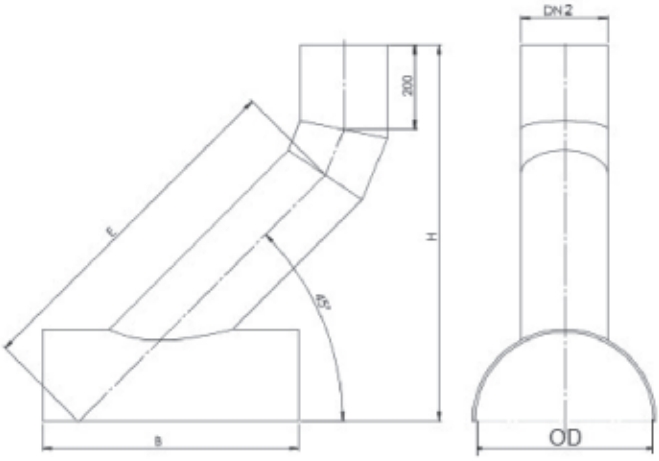
For pipes DN ≤ 500, the saddle angle 180°

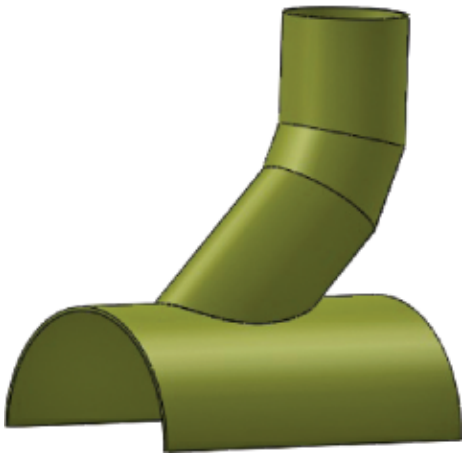
*For pipes DN > 500, the saddle angle 120°



DN1 (mm)	DN2 (mm)	Main Pipe OD (mm)	B (mm)		H (mm)	
			90°	45°	90°	45°
* 700	100	719	400	470	600	850
* 700	125		400	470	600	850
* 700	150		400	470	600	850
* 700	200		450	530	600	920
* 700	250		500	600	650	920
* 700	300		550	700	650	990
* 700	350		600	750	650	1030
700	400		650	800	650	1060
700	450		700	900	700	1100
700	500		750	950	700	1030
700	600		870	1150	700	1200
700	700		970	1370	700	1270
* 800	100	821	400	470	650	920
* 800	125		400	470	650	920
* 800	150		400	470	650	920
* 800	200		450	530	650	990
* 800	250		500	600	700	990
* 800	300		550	700	700	1060
* 800	350		600	750	700	1100
* 800	400		650	800	700	1130
800	450		700	900	750	1170
800	500		750	950	750	1200
800	600		870	1150	750	1270
800	700		970	1370	800	1340
800	800		1100	1450	800	1410

INTEGRATED SADDLE – SADDLE WITH A BEND α = 45°

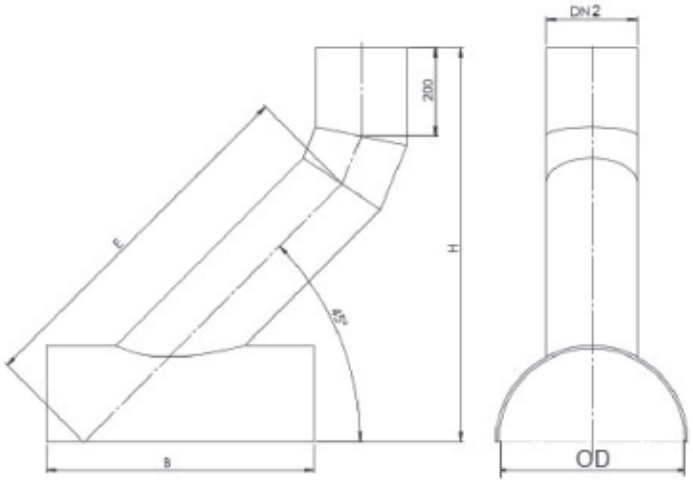


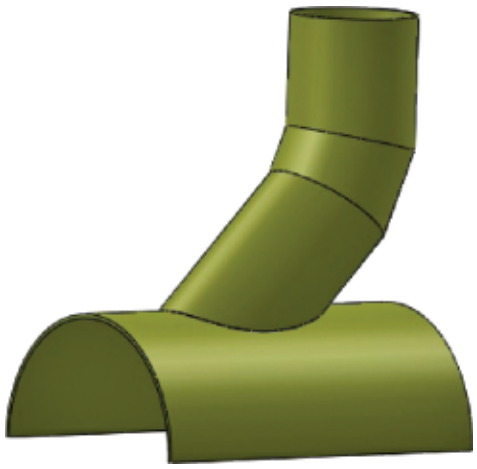


For pipes DN ≤ 500, the saddle angle 180°
For pipes DN > 500, the saddle angle 120°

DN1 (mm)	DN2 (mm)	Main Pipe OD (mm)	B (mm)	E (mm)	H (mm)
100	100	110	470	420	560
125	100	135	470	420	560
125	125		470	420	570
150	100	160	470	420	560
150	125		470	420	570
150	150		470	420	580
200	100	210	470	420	560
200	125		470	420	620
200	150		470	500	640
200	200		530	500	665
250	100	272	470	500	610
250	125		470	500	620
250	150		470	500	640
250	200		530	570	715
250	250		600	570	740
300	100	327	470	500	610
300	125		470	500	670
300	150		470	570	690
300	200		530	570	715
300	250		600	640	790
350	100	376	470	570	660
350	125		470	570	670
350	150		470	570	690
350	200		530	640	765
350	250		600	640	790
400	100	413	470	570	660
400	125		470	570	670
400	150		470	640	740
400	200		530	640	765
400	250		600	710	840

INTEGRATED SADDLE – SADDLE WITH A BEND α = 45°





For pipes DN ≤ 500, the saddle angle 180°
For pipes DN > 500, the saddle angle 120°

DN1 (mm)	DN2 (mm)	Main Pipe OD (mm)	B (mm)	E (mm)	H (mm)
450	100	478	470	640	710
450	125		470	640	745
450	150		470	710	760
450	200		530	710	810
450	250		600	780	865
500	100	515	470	710	760
500	125		470	710	770
500	150		470	710	790
500	200		530	780	860
500	250		600	780	890
600	100	617	470	780	805
600	125		470	780	820
600	150		470	780	835
600	200		530	850	910
600	250		600	850	940
700	100	719	470	850	855
700	125		470	850	870
700	150		470	850	885
700	200		530	920	960
700	250		600	920	990
800	100	821	470	920	905
800	125		470	920	920
800	150		470	920	935
800	200		530	990	1010
800	250		600	990	1040

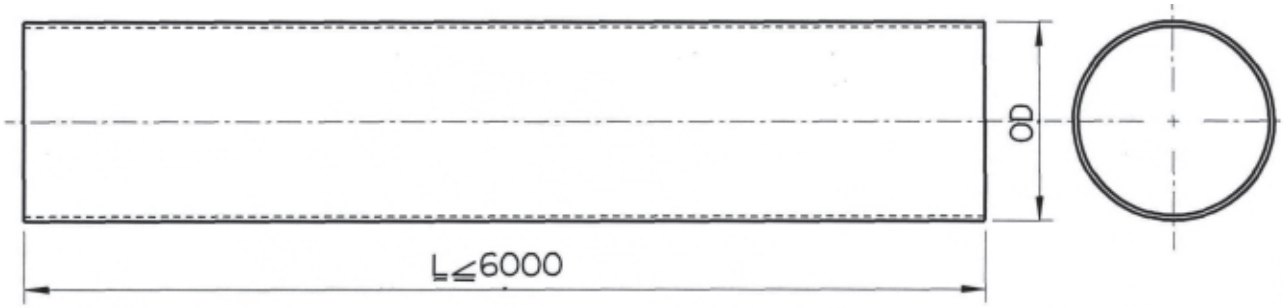
PRODUCTS WITH FLAMMABILITY CLASS B2 ACCORDING TO DIN 4102

Due to the ever-growing needs on the market, both domestic and foreign, successfully produce a special bridge drainage products line that meets the flammability requirements defined by Class B2 as per the *DIN4102 Testing of fire behaviour of building materials and building components* standard, which is confirmed by the relevant test reports issued by the authorized institutions.

In this way, the conditions to meet all the requests from clients pertaining to the bridge and motorway drainage pipelines, both with and without the given flammability class, are fully satisfied.

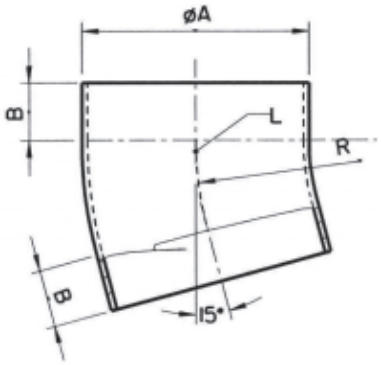
The products line with flammability Class B2 according to DIN 4102 is normally fabricated in RAL 7030 and RAL 5007. However, as per the customer's request, these can be manufactured in other RAL too.

GRP PIPES



DN (mm)	OD (mm)	SN (N/m^2)
50	58	10.000
80	88	10.000
100	110	10.000
125	135	10.000
150	160	10.000
200	211	10.000
250	271	5.000/10.000
300	327	5.000/10.000
350	376	5.000/10.000
400	413	5.000/10.000
500	515	5.000/10.000
600	617	5.000/10.000
700	719	5.000/10.000
800	821	5.000/10.000
900	923	5.000/10.000
1000	1025	5.000/10.000

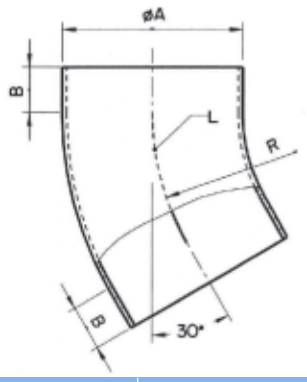
BEND 15°



Isometric projection

DN (mm)	A (mm)	R (mm)	B (mm)	L (mm)
50	58	80	40	100
80	88	118	40	110
100	110	153	40	120
125	135	191	40	130
150	160	229	40	140
200	211	305	40	160
250	271	381	40	180
300	327	457	40	200
350	376	468	80	285
400	413	512	80	295
500	515	605	80	320
600	617	682	120	420

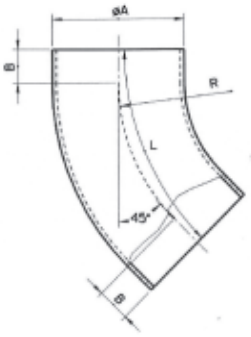
BEND 30°



Isometric projection

DN (mm)	A (mm)	R (mm)	B (mm)	L (mm)
50	58	80	40	120
80	88	118	40	140
100	110	153	40	160
125	135	191	40	180
150	160	229	40	200
200	211	305	40	240
250	271	381	40	280
300	327	457	40	320
350	376	468	80	405
400	413	512	80	430
500	515	605	80	480
600	617	682	120	600

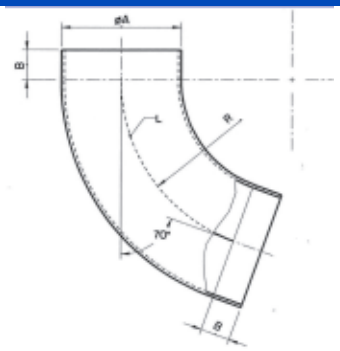
BEND 45°



Isometric projection

DN (mm)	A (mm)	R (mm)	B (mm)	L (mm)
50	58	80	40	140
80	88	118	40	170
100	110	153	40	200
125	135	191	40	230
150	160	229	40	260
200	211	305	40	320
250	271	381	40	380
300	327	457	40	440
350	376	468	80	530
400	413	512	80	565
500	515	605	80	635
600	617	682	120	780
700	719	784	120	856
800	821	896	120	944

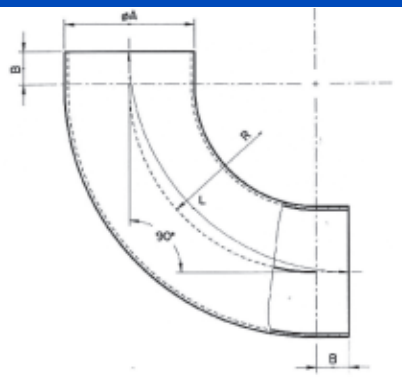
BEND 70°



Isometric projection

DN (mm)	A (mm)	R (mm)	B (mm)	L (mm)
50	58	80	40	180
80	88	118	40	225
100	110	153	40	270
125	135	191	40	315
150	160	229	40	360
200	211	305	40	455
250	271	381	40	550
300	327	457	40	640
350	376	468	80	735
400	413	512	80	785
500	515	605	80	900
600	617	682	120	1075

BEND 90°

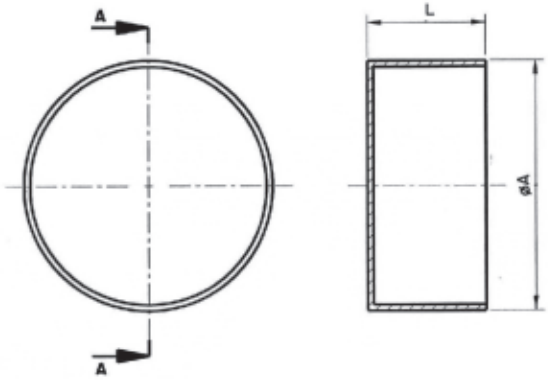


Isometric projection

DN (mm)	A (mm)	R (mm)	B (mm)	L (mm)
50	58	80	40	200
80	88	118	40	260
100	110	153	40	320
125	135	191	40	380
150	160	229	40	440
200	211	305	40	560
250	271	381	40	680
300	327	457	40	800
350	376	468	80	895
400	413	512	80	965
500	515	605	80	1110
600	617	682	120	1315
800	821	896	120	1648

In practice and literature, bends are also found under the name elbows.

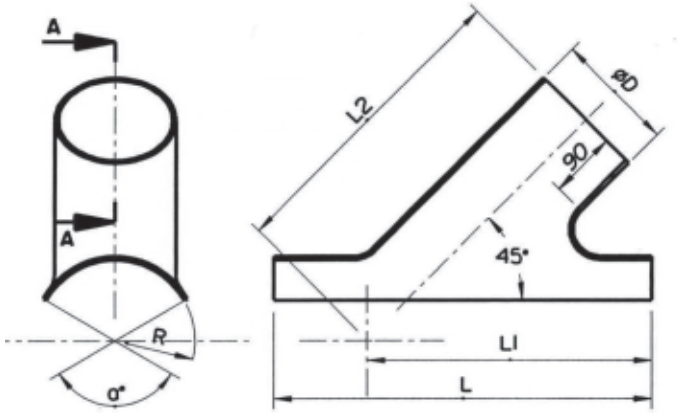
END CAP



Isometric projection

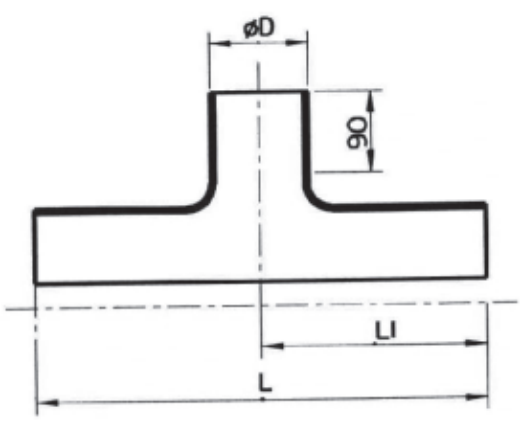
DN (mm)	A (mm)	L (mm)
100	110	100
150	160	100
200	211	100
250	271	100
300	327	100
350	376	100
400	413	120
500	515	120
600	617	120
700	719	120
800	821	120

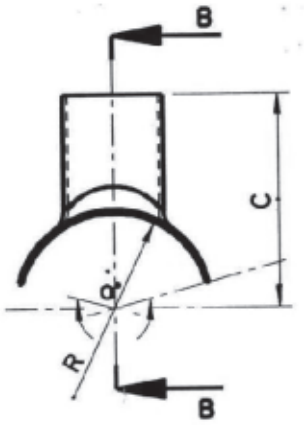
BRANCH SADDLE 45°



Isometric projection

DN (mm)	L (mm)	L1 (mm)	L2 (mm)	D (mm)	R (mm)	α (°)
100x100	500	338	343	110	55	180
150x100	500	339	343	110	80	180
150x150	500	350	372	160	80	180
200x100	500	365	380	110	105.5	180
200x150	500	376	409	160	105.5	180
200x200	580	413	435	211	105.5	180
250x100	500	392	418	110	135.5	180
250x150	500	392	439	160	135.5	180
250x200	580	440	473	211	135.5	180
250x250	620	477	499	271	135.5	180
300x100	500	418	455	110	163.5	180
300x150	500	429	484	160	163.5	180
300x200	580	466	510	211	163.5	180
300x250	620	503	536	271	163.5	180
300x300	720	540	562	327	163.5	180
350x100	500	444	492	110	188	180
350x150	500	455	521	160	188	180
350x200	580	492	547	211	188	180
350x250	620	529	573	271	188	180
350x300	720	566	599	327	188	180
400x100	500	470	528	110	206	180
400x150	500	481	557	160	206	180
400x200	580	517	583	211	206	180
400x250	620	554	609	271	206	180
400x300	720	591	635	327	206	180
400x400	860	664	686	413	206	180
500x100	500	521	601	110	257	180
500x150	500	532	630	160	257	180
500x200	580	569	656	211	257	180
500x250	620	606	682	271	257	180
500x300	720	643	708	327	257	180
600x100	500	564	661	110	308	120
600x150	500	575	690	160	308	120
600x200	580	612	716	211	308	120
600x250	620	649	742	271	308	120
600x300	720	686	768	327	308	180
700x150	500	650	770	160	360	120
800x150	500	680	842	160	410	120

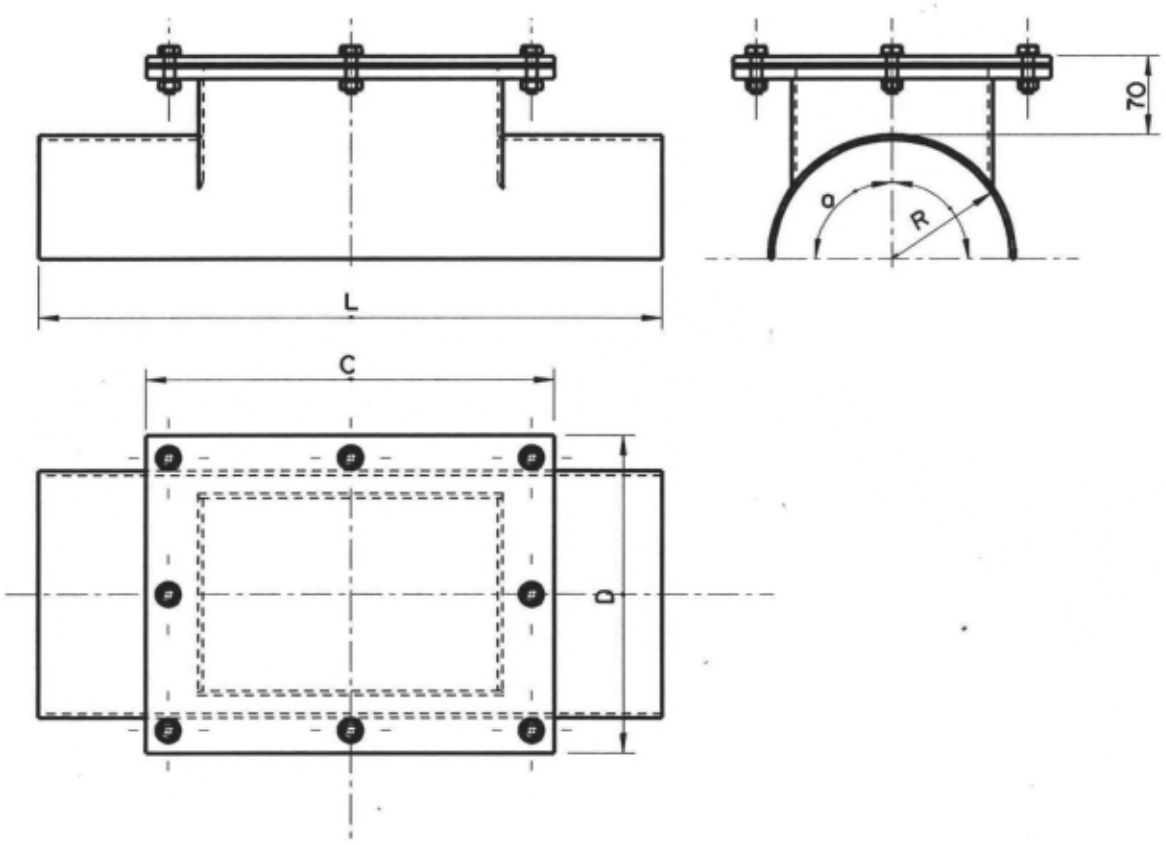




Isometric projection

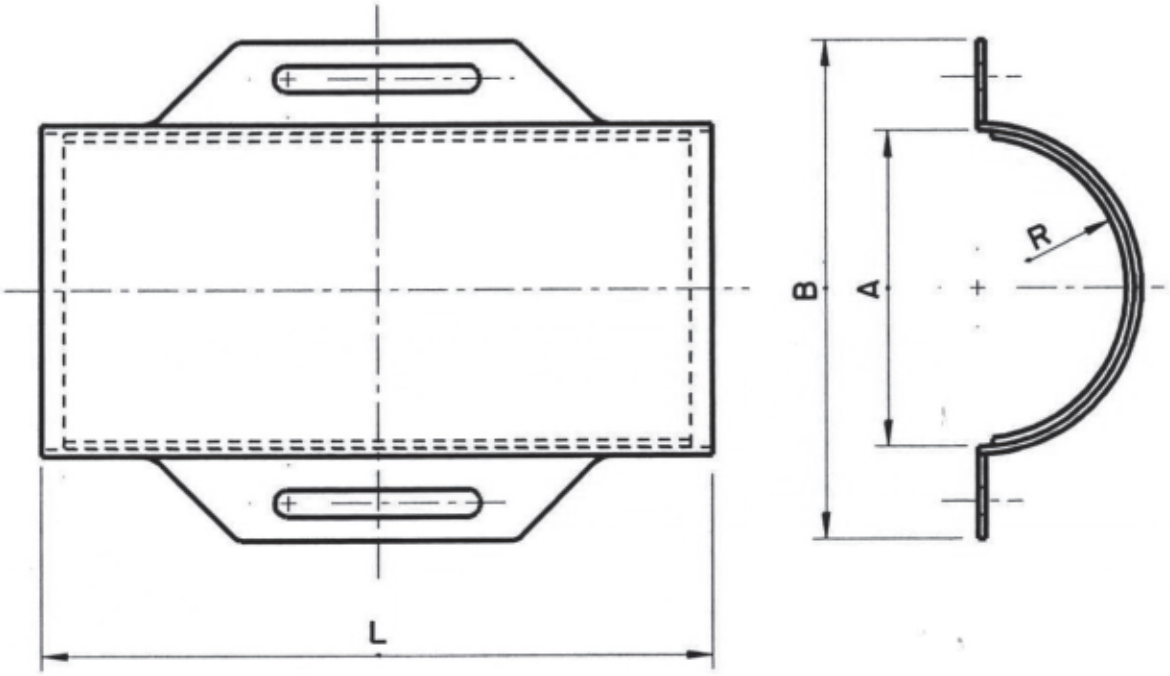
DN (mm)	L (mm)	L1 (mm)	C (mm)	D (mm)	R (mm)	α (°)
150x50	500	250	210	58	80	180
150x100	500	250	210	110	80	180
150x150	500	250	210	160	80	180
200x050	500	250	236	58	105.5	180
200x100	500	250	236	110	105.5	180
200x150	500	250	236	160	105.5	180
200x200	580	290	236	211	105.5	180
250x050	500	250	262	58	135.5	180
250x100	500	250	262	110	135.5	180
250x150	500	250	262	160	135.5	180
250x200	580	290	262	211	135.5	180
300x050	500	250	288	58	163.5	180
300x100	500	250	288	110	163.5	180
300x150	500	250	288	160	163.5	180
300x200	500	290	288	211	163.5	180
350x050	500	250	314	58	188	180
350x100	500	250	314	110	188	180
350x150	500	250	314	160	188	180
350x200	580	290	314	211	188	180
400x050	500	250	340	58	206.5	180
400x100	500	250	340	110	206.5	180
400x150	500	250	340	160	206.5	180
400x200	580	290	340	211	206.5	180
500x050	500	250	391	58	257.5	120
500x100	500	250	391	110	257.5	120
500x150	500	250	391	160	257.5	120
500x200	580	290	391	211	257.5	120
600x050	500	250	434	58	308.5	120
600x100	500	250	434	110	308.5	120
600x150	500	250	434	160	308.5	120
600x200	580	290	434	211	308.5	120

SADDLE WITH RECTANGULAR CLEANSING OPENING



Isometric projection

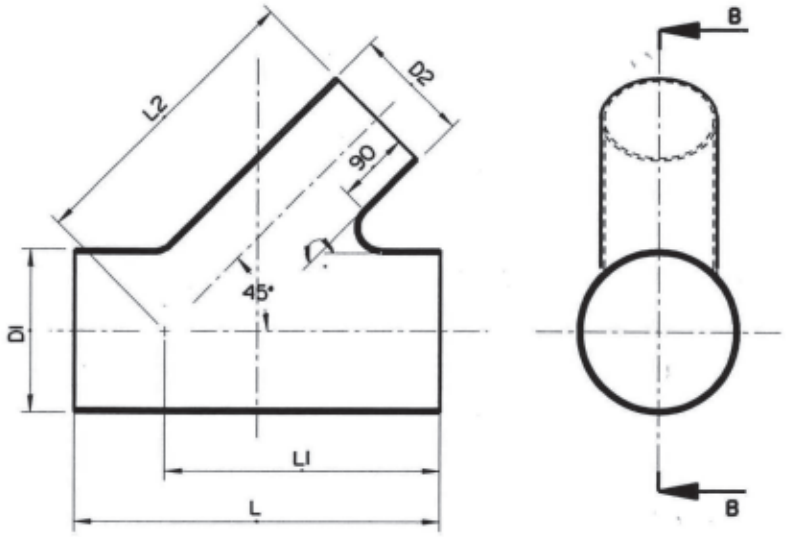
DN (mm)	C (mm)	D (mm)	L (mm)	R (mm)	α (°)
100	360	240	550	55	90
150	360	240	550	80	90
200	360	280	550	105	90
250	360	280	550	135	90
300	360	280	550	163	90
350	360	280	550	188	90
400	360	280	550	206	90
500	360	280	550	257	90
600	360	280	550	308	60
700	360	280	550	359	60
800	360	280	550	410	60



Isometric projection

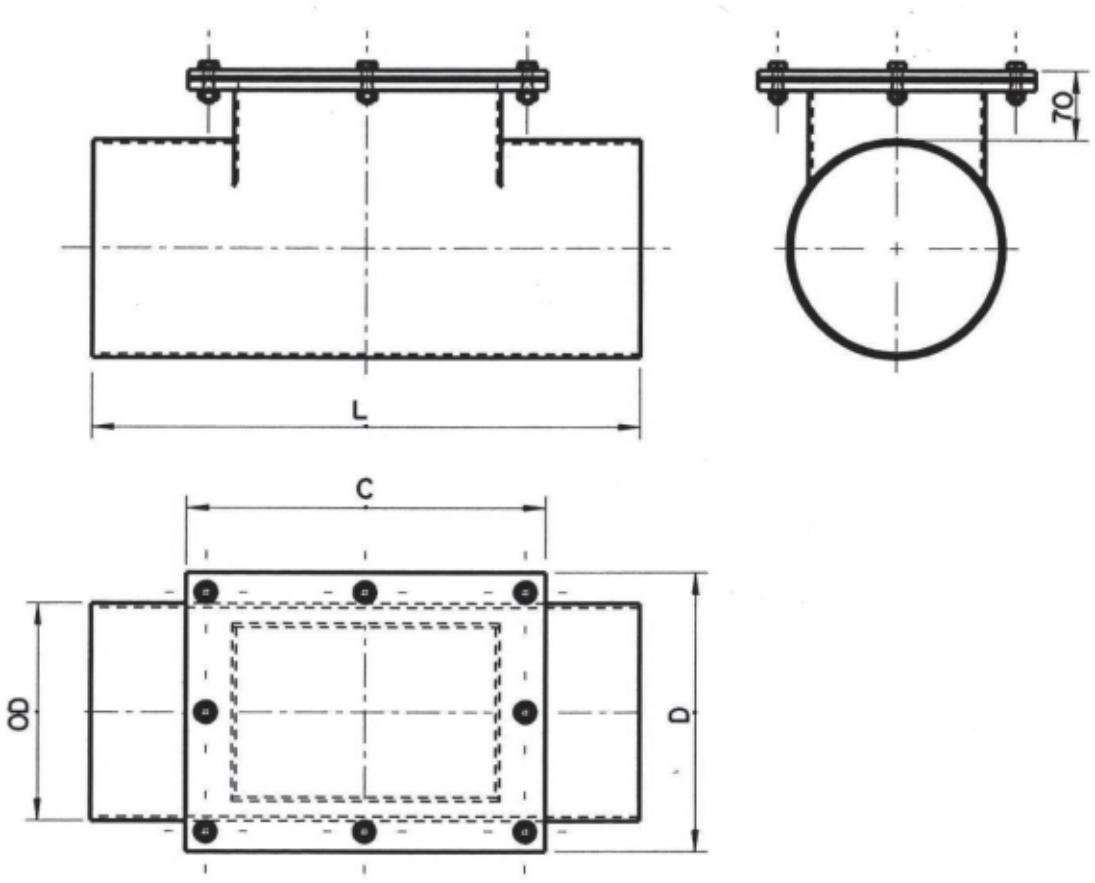
DN (mm)	A (mm)	R (mm)	B (mm)	L (mm)
100	110	55	220	450
150	170	80	280	450
200	222	105.5	332	450
250	274	135.5	384	450
300	274	163.5	384	450
350	285	188	395	450
400	285	206.5	395	450
500	300	257.5	400	450
600	300	308.5	400	450
700	300	359.5	400	450
800	300	410.5	400	450

BRANCH 45°



Isometric projection

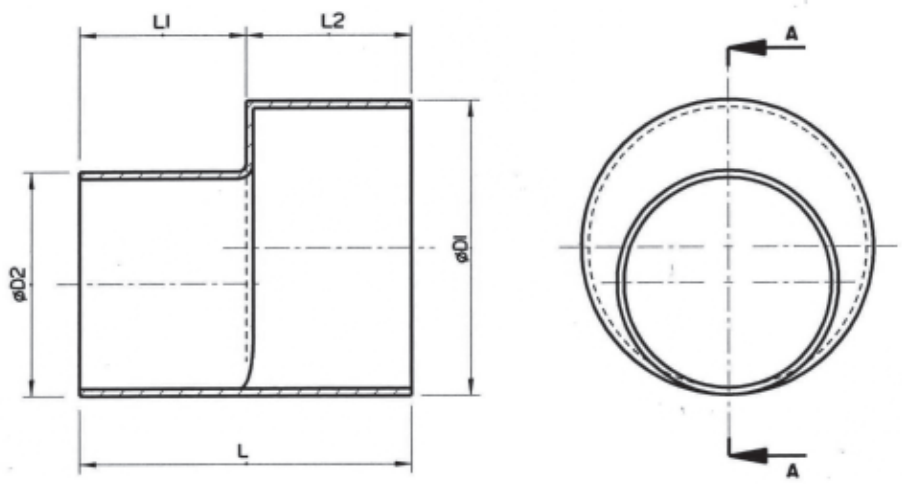
DN (mm)	L (mm)	L1 (mm)	L2 (mm)	D1 (mm)	D2 (mm)
150x150	500	345	365	160	160
200x150	500	371	402	211	160
200x200	580	408	428	211	211
250x150	500	397	439	271	160
250x200	580	434	465	271	211
250x250	620	471	491	271	271
300x150	500	423	476	327	160
300x200	580	460	502	327	211
300x250	620	497	528	327	271
300x300	720	534	554	327	327
350x150	500	449	512	376	160
350x200	580	486	538	376	211
350x250	620	523	564	376	271
350x300	720	560	590	376	327
400x150	500	475	548	413	160
400x200	580	511	574	413	211
400x250	620	548	600	413	271
400x300	720	585	626	413	327
500x150	500	526	621	515	160
500x200	580	563	647	515	211
500x250	620	600	673	515	271
500x300	720	637	699	515	327
600x150	500	569	682	617	160
600x200	580	606	708	617	211
600x250	620	643	734	617	271
600x300	720	680	760	617	327



Isometric projection

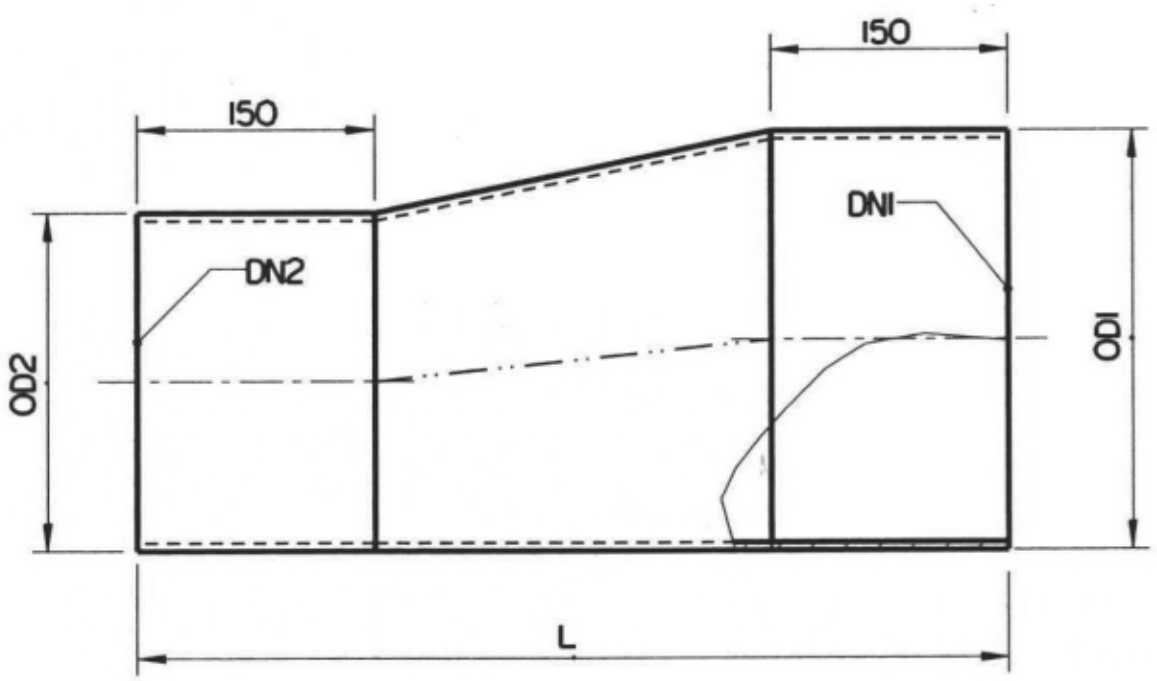
DN (mm)	C (mm)	D (mm)	L (mm)	OD (mm)
100	360	240	550	110
150	360	240	550	160
200	360	280	550	211
250	360	280	550	271
300	360	280	550	327
350	360	280	550	376
400	360	280	550	413
500	360	280	550	515
600	360	280	550	617

SHARP REDUCER



Isometric
projection

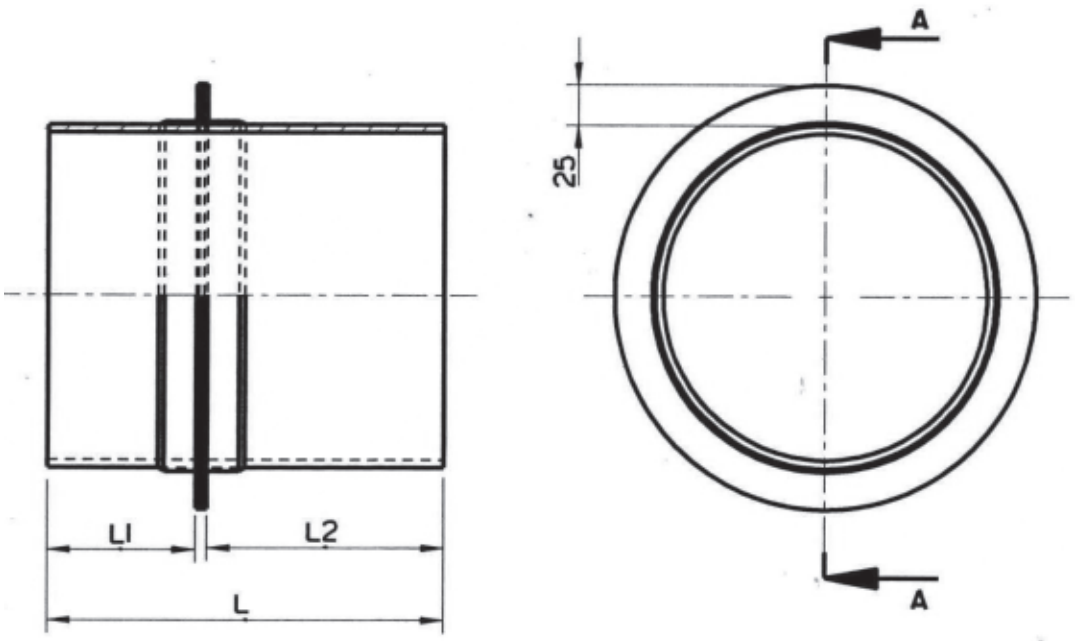
DN (mm)	L (mm)	L1 (mm)	L2 (mm)	D1 (mm)	D2 (mm)
100x50	135	65	70	110	58
150x050	135	65	70	160	58
150x100	135	65	70	160	110
150x125	135	65	70	160	135
200x100	240	120	120	211	110
200x150	240	120	120	211	160
250x150	240	120	120	271	160
250x200	240	120	120	271	211
300x150	240	120	120	327	160
300x200	240	120	120	327	311
300x250	240	120	120	327	271
350x200	240	120	120	376	211
350x250	240	120	120	376	271
350x300	240	120	120	376	327
400x250	240	120	120	413	271
400x300	240	120	120	413	327
400x350	240	120	120	413	376
500x350	240	120	120	515	376
500x400	240	120	120	515	413
600x400	240	120	120	617	413
600x500	240	120	120	617	515
700x600	240	120	120	719	617
700x500	240	120	120	719	515
800x700	240	120	120	821	719
800x600	240	120	120	821	617



Isometric
projection

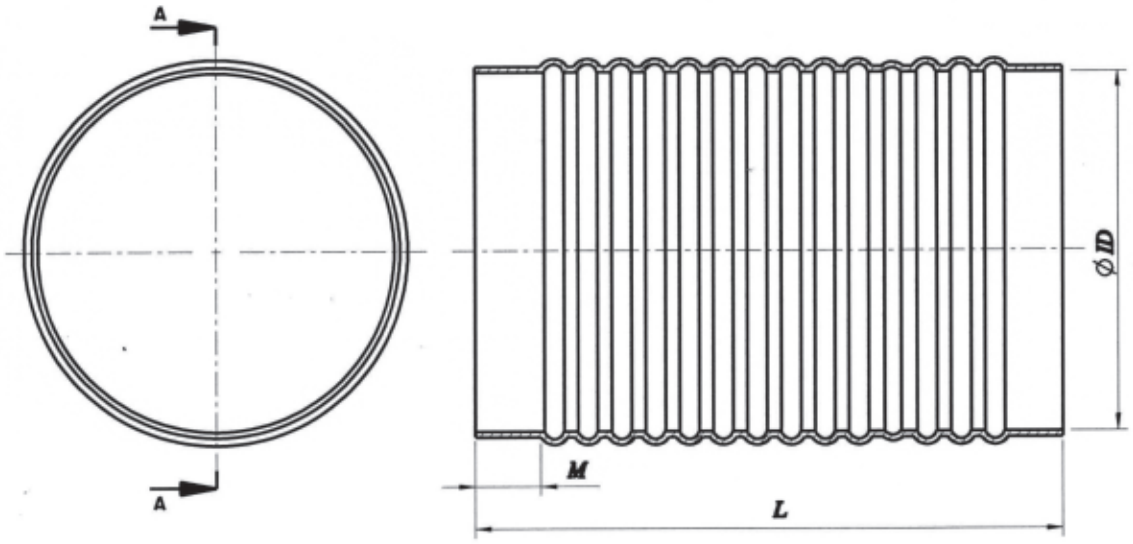
DN1xDN2 (mm)	L (mm)	OD1 (mm)	OD2 (mm)
200x150	470	211	160
250x150	550	271	160
250x200	550	271	211
300x150	550	327	160
300x200	550	327	211
300x250	600	327	271
350x250	600	376	271
350x300	600	376	327
400x250	600	413	271
400x300	600	413	327
400x350	600	413	376
500x300	600	515	327
500x400	600	515	413
600x400	600	617	413
600x500	600	617	515

DOWNPIPE SUPPORT



Isometric
projection

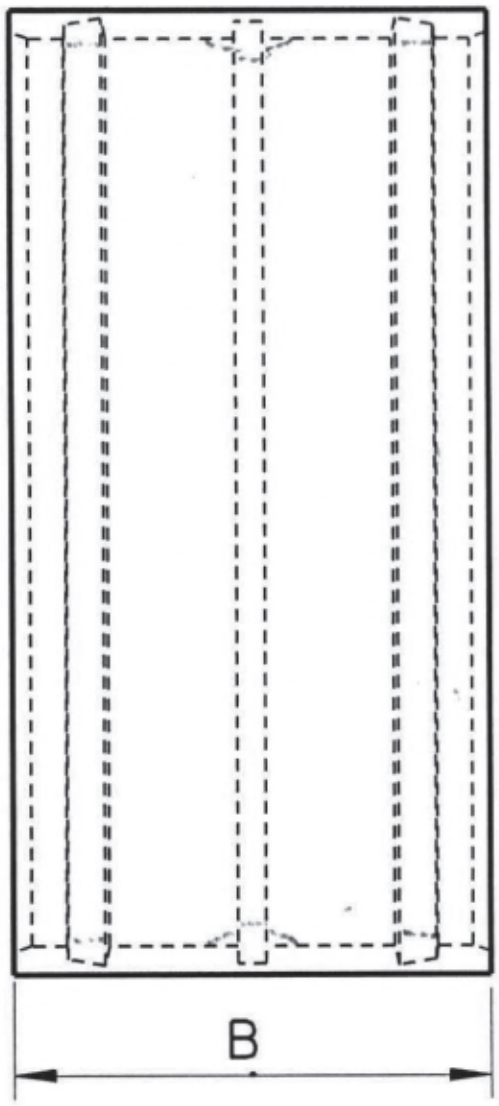
DN (mm)	L (mm)	L1 (mm)	L2 (mm)
150	300	97	197
200	300	97	197
250	300	97	197
300	300	97	197
350	300	97	197
400	300	97	197
500	400	146	246
600	400	146	246
700	400	146	246
800	400	146	246
900	400	146	246
1000	400	146	246



Isometric projection

DN (mm)	PIPE OD (mm)	ID (mm)	M (mm)	L (mm)
150	160	161	50	300; 400 500; 600
200	210	211	50	300; 400 500; 600
250	271	272	50	300; 400 500; 600
300	327	328	50	300; 400 500; 600
350	376	377	75	300; 400 500; 600
400	413	414	75	300; 400 500; 600
450	478	479	75	300; 400 500; 600
500	515	516	75	300; 400 500; 600

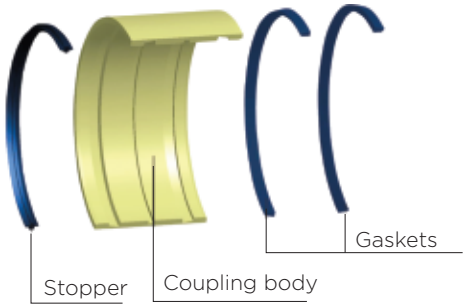
POLYESTER BETO COUPLING



DN (mm)	B (mm)
150	172
200	200
250	200
300	270
350	270
400	270
450	270
500	270
600	330
700	330
800	330
900	330
1000	330

Polyester pipes for bridge drainage are joined using one of the following methods.

- Polyester BETO coupling (Fig. 1);
- Stainless steel coupling with EPDM gasket - Rapid or CV (Fig. 2)
- EPDM Expansion joint (Fig. 3)



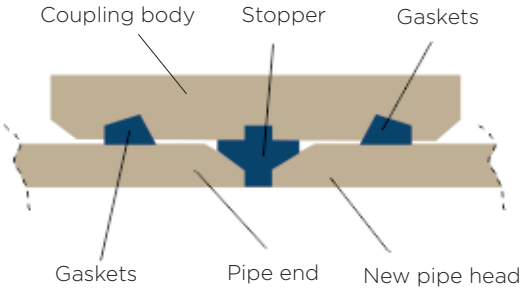


Figure 1 - BETO coupling joint

Figure 2 - Stainless steel couplings (Rapid and CV)

Stainless steel coupling consists of a stainless steel casing with an internal EPDM gasket. This method of assembly eliminates the need to bevel pipe ends, thus saving time and funds.

EPDM expansion joint is used to prevent the transmission of axial and lateral movements of the pipeline. These movements occur between fixed bridge components and adjustable parts (superstructure).

Figure 3 - EPDM expansion joint

PIPE INSTALLATION

Polyester pipes for bridge drainage are of exceptionally low weight compared to other materials. Therefore, they are easy to manipulate with using the standard equipment and are quickly and easily installed.

The pipes are attached to the facility construction using suspending elements.

The suspension elements connecting the bridge pipes to the facility structure shall be of sufficient stiffness to secure the pipes against any loads that may arise in case of swinging and shall also have the height regulation possibility. Suspensions may be fixed or adjustable (Figures 4-6).

The suspension, i.e. fixing, elements for pipes in the wastewater drainage system on bridges shall be made with suitable corrosion protection or from stainless steel.

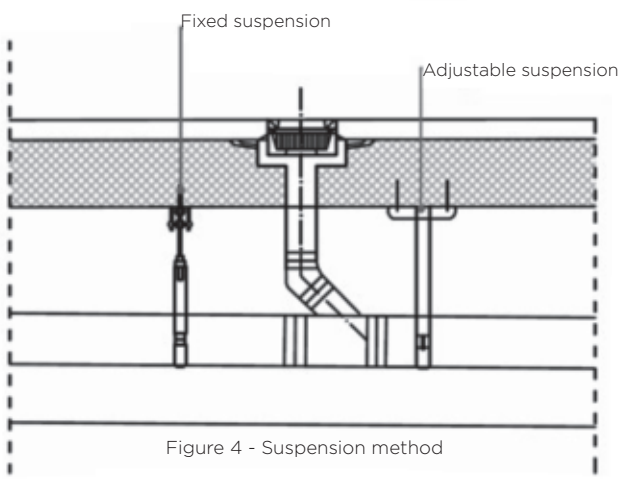


Figure 4 - Suspension method

Fig. 5 - Fixed suspension

Figure 6 - Adjustable suspension

STANDARDS

Polyester pipes comply with specifications and standards worldwide, such as:

- EN;
- ASTM;
- AWWA;
- ISO;
- DIN.

Here follows the overview of standards applied in the production, testing, and verification of quality of polyester pipes.

1. STANDARDS APPLIED IN RAW MATERIAL CONTROL AND TESTING

1. STANDARDS FOR THE INSPECTION AND TESTING OF RESIN

1. ISO 2555 - Viscosity testing
2. ISO 2535 - Gel time testing
3. ISO 2811 - Density testing
4. ISO 3251 - Styrene monomer content testing
5. ISO 2114 - Acid number determination
6. ISO 584 - Resin reactivity determination

2. STANDARDS FOR THE INSPECTION AND TESTING OF GLASS REINFORCEMENTS

1. ISO 1889 - Linear density determination
2. ISO 3344 - Moisture content determination
3. ISO 1887 - Loss on ignition
4. ISO 3268 - (OC R110) Tensile strength and reduction factor
5. ISO 2078 - Glass type
6. SNO 5320 - Wetting properties

3. STANDARDS FOR THE INSPECTION AND TESTING OF SILICA SAND

1. OC R 115 - Loss on ignition
2. OC R 114 - Moisture content determination
3. OC R 112 - Carbonate content determination
4. OC R 116 - Wetting properties
5. ASTM E11 - Granulation

4. STANDARDS FOR THE INSPECTION AND TESTING OF STYRENE MONOMER

1. ASTM D2121 - Polymer content determination

5. STANDARDS FOR THE INSPECTION AND TESTING OF METHYL ETHYL KETONE PEROXIDE (MEKP) AND COBALT OCTOATE

1. ISO 2555 - Viscosity testing
2. ISO 2535 - Gel time testing
3. OC R111 - Water content in MEKP

2. STANDARDS FOR THE INSPECTION AND TESTING OF PIPES

1. ASTM D3567 Standard Practice for Determining Dimensions of Reinforced Thermosetting Resin Pipes and Fittings
2. AWWA C950 Fibreglass Pressure Pipe for Water Services
3. ASTM D3517 Standard Specification for Fibreglass (Glass-Fibre Reinforced Theremosetting Resin) Pressure Pipe
4. ASTM D3754 Standard Specification for Fibreglass (Glass-Fibre Reinforced Thermosetting Resin) Sewer and Industrial Pressure Pipe
5. ASTM D3262 Standard Specification for Fibreglass (Glass-Fibre Reinforced Thermosetting Resin) Sewer Pipe
6. ASTM D2412 External Loading Characteristics of Plastic Pipe by Parallel Plate Loading
7. ASTM D2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
8. ASTM D 790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
9. ASTM D2290 Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe by Split Disk Method
10. ASTM D 638 Tensile Properties of Plastics
11. ASTM C581 Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass Fibre Reinforced Structures Intended for Liquid Service
12. ASTM D4161 Standard Specification for Fibreglass (Glass-Fibre-Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
13. ASTM D1172 Textile-glass-reinforced plastics - Prepregs, moulding compounds and laminates - Determination of the textile-glass and mineral filler content - Calcination methods
14. ASTM D3839 Standard Practice for Underground Installation of Flexible Reinforced Thermosetting Resin Pipe and Reinforced Plastic Mortar Pipe

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