

DucoVer®

Dual Laminate Piping

Doc. Nr.
Datum
Opgesteld door
Akkoord

V32.002
26-10-2022
A. Schuitema
P. Bogers



Versteden®
fiberglass piping systems

DUAL LAMINATE PIPING

INDEX - DUAL LAMINATE PIPING

INFORMATION	DucoVer DL-003
PVC-U/FRP PIPES	DucoVer DL-004
PVC Dekadur Plus/FRP PIPES	DucoVer DL-005
PVC-C/FRP PIPES	DucoVer DL-006
PP/FRP PIPES	DucoVer DL-007
PE/FRP PIPES	DucoVer DL-008
PVDF/FRP PIPES	DucoVer DL-009
SUPPORT SPAN PN 10	DucoVer DL-010
SUPPORT SPAN PN 16	DucoVer DL-011
CURVED ELBOWS	DucoVer DL-012
MITER BENDS	DucoVer DL-013
STRAIGHT TEES 90°	DucoVer DL-014
REDUCING TEES 90°	DucoVer DL-015
CONCENTRIC REDUCERS (DN 32 - DN 300)	DucoVer DL-016
CONCENTRIC REDUCERS (DN 350 - DN 1000)	DucoVer DL-017
ECCENTRIC REDUCERS (DN 32 - DN 300)	DucoVer DL-018
ECCENTRIC REDUCERS (DN 350 - DN 1000)	DucoVer DL-019
STUB ENDS + L.J. FLANGES DIN PN 10 drilling PN 10	DucoVer DL-020
STUB ENDS + L.J. FLANGES DIN PN 16 drilling PN 16	DucoVer DL-021
STUB ENDS + L.J. FLANGES DIN PN 10 drilling ANSI 150 [#]	DucoVer DL-022
STUB ENDS + L.J. FLANGES DIN PN 16 drilling ANSI 150 [#]	DucoVer DL-023
FIXED FLANGES DIN	DucoVer DL-024
FIXED FLANGES ANSI	DucoVer DL-025
BLIND FLANGES DIN	DucoVer DL-026
BLIND FLANGES ANSI	DucoVer DL-027
WELDED/LAMINATE JOINTS	DucoVer DL-028
GASKETS ELASTOMET OR	DucoVer DL-029
RIGID SUPPORT SYSTEM - PIPE SHOES DN 25 - DN 150 (1" - 6")	DucoVer DL-030
RIGID SUPPORT SYSTEM - PIPE SHOES DN 200 - DN 600 (8" - 24")	DucoVer DL-031
RIGID SUPPORT SYSTEM - PIPE SHOES (DN 700 - DN 1000 (28" - 40"))	DucoVer DL-032
RIGID SUPPORT SYSTEM - FLANGE SUPPORT (DN 25 - DN 200 (1" - 8"))	DucoVer DL-033
RIGID SUPPORT SYSTEM - FLANGE SUPPORT (DN 250 - DN 1000 (10" - 40"))	DucoVer DL-034
MECHANICAL PROPERTIES	DucoVer DL-035

FIBERGLASS PIPING

DucoVer Dual Laminate Piping are manufactured from a thermoplastic liner (PE, PP, PVC-U, PVC Dekadur Plus, PVC-C, PVDF or ECTFE), reinforced by FRP based on Vinyl ester (GRVE).

DucoVer Dual Laminate Piping is available in the diameters 25 till 1.000 mm in PN 10 and PN 16.

PIPE WALL STRUCTURE

Liner

The inner thermoplastic liner (PE, PP, PVC-U, PVC Dekadur Plus, PVC-C, PVDF or ECTFE) provides chemical resistance properties and acts as an anti-diffusion barrier. The dimensions are according to DIN 16 965 Part 2.

Structural wall

The structural wall of the pipe is to withstand the mechanical forces. Reinforcement materials consists of "E" glass roving with a number of layers in function depending on the diameter and pressure class.

The pipes are manufactured with a computer controlled machine by the "dual helical filament winding" process, in which the rovings, impregnated with resin, are wound around the thermoplastic liner at an angle of 55° until the required thickness is reached.

The dimensions are as per ISO 14692.

External layer

The UV-resistant outer layer consists of low weight synthetic veil and is in relatively rich of naturel resin with a thickness of 0.2 mm. On request, the pipes can be supplied in any possible RAL colour.

CONNECTION SYSTEMS

The connection systems which can be used are:

- Welded / Laminate connection
- Flange connection

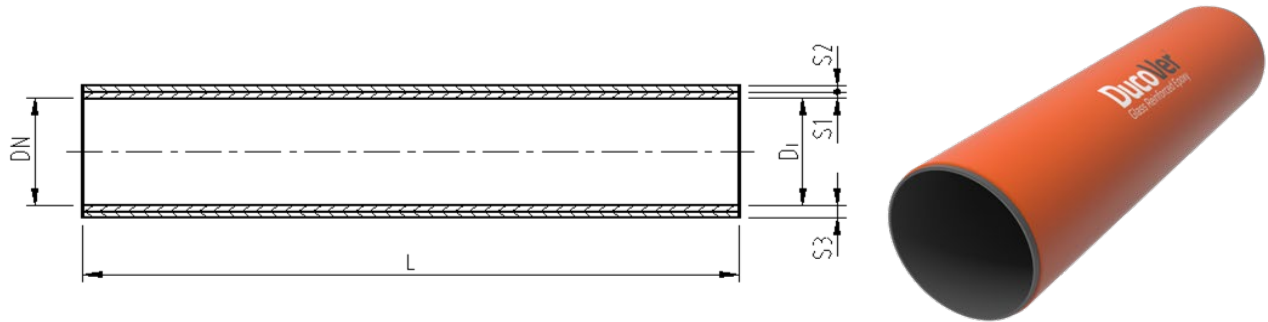
Welded / Laminated connection

The thermoplastic liner is connected by hand or mirror welding according DVS.

After welding the liner, a laminate is applied on the connection to restore the structural wall.

Flange connection

Flanges are delivered as collar with lapped flange or on request as fixed flange. The flanges are drilled according to ANSI or DIN standards. Other standards are available on request.



PVC-U / FRP				PN 10			PN 16			DN (inch)			
DN (mm)	DL x S1 (mm)	Di (mm)	L (mm)	S2 (mm)	S3 (mm)	Wp (kg/m)	S2 (mm)	S3 (mm)	Wp (kg/m)				
25	32 x 3,6	24,8	5.000	SEE PN 16			3,0	6,8	1,2	1"			
32	40 x 4,5	31,0	5.000				3,0	7,7	1,7	1¼"			
40	50 x 3,7	42,6	5.000				3,0	6,9	1,9	1½"			
50	63 x 4,7	53,6	6.000				3,0	7,9	2,7	2"			
65	75 x 3,6	67,8	6.000				3,0	6,8	3,0	2½"			
80	90 x 4,3	81,4	6.000				3,0	7,5	3,9	3"			
100	110 x 5,3	99,4	6.000				3,0	8,5	5,2	4"			
125	125 x 3,7	117,6	6.000				3,0	6,9	5,4	5"			
150	160 x 4,7	150,6	6.000				3,0	7,9	7,3	6"			
200	200 x 4,0	192,0	6.000				3,0	7,2	8,9	8"			
250	250 x 4,9	240,2	6.000				3,8	8,9	13,3	10"			
300	315 x 4,5	306,0	6.000				3,0	7,7	14,2	4,6	9,3	17,0	12"
350	355 x 4,5	346,0	6.000				3,0	7,7	16,3	4,6	9,3	19,5	14"
400	400 x 5,0	390,0	6.000	3,8	9,0	21,3	5,3	10,5	25,0	16"			
450	450 x 5,0	440,0	6.000	3,8	9,0	23,9	6,1	11,3	30,2	18"			
500	500 x 5,0	490,0	6.000	4,6	9,8	28,9	6,8	12,0	35,9	20"			
600	600 x 5,0	590,0	6.000	5,3	10,5	37,4	8,4	13,6	48,6	24"			
700	708 x 4*	700,0	6.000	6,1	10,3	43,7	9,1	13,3	56,8	28"			
800	808 x 4*	800,0	6.000	6,8	11,0	53,6	10,6	14,8	72,2	32"			
900	908 x 4*	900,0	6.000	7,6	11,8	64,4	12,2	16,4	89,5	36"			
1000	1008 x 4*	1.000,0	6.000	8,4	12,6	76,1	13,7	17,9	108,6	40"			

REMARKS:

DN = nominal diameter

Di = liner inside diameter

DL = liner outside diameter

L = pipe length

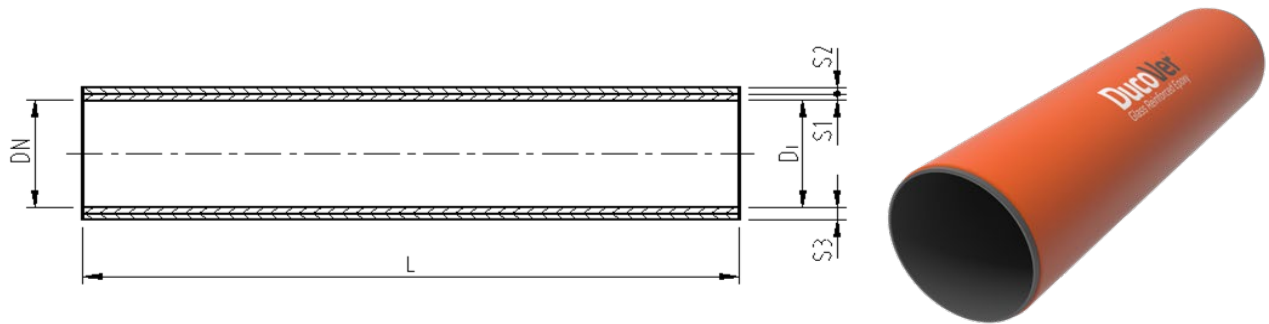
S1 = wallthickness thermoplastic liner (can vary; manufacture standard)

S2 = thickness of fiberglass reinforcement

S3 =total wall thickness with thermoplastic liner and 0,2 mm topcoat

* = min. thickness, liner made out of sheet

Wp = pipe mass



PVC Dekadur Plus / FRP				PN 10			PN 16			DN (inch)
DN (mm)	DL x S1 (mm)	Di (mm)	L (mm)	S2 (mm)	S3 (mm)	Wp (kg/m)	S2 (mm)	S3 (mm)	Wp (kg/m)	
25	32 x 3,6	24,8	5.000	SEE PN 16			3,0	6,8	1,2	1"
32	40 x 4,5	31,0	5.000				3,0	7,7	1,7	1¼"
40	50 x 3,7	42,6	5.000				3,0	6,9	1,9	1½"
50	63 x 4,7	53,6	6.000				3,0	7,9	2,7	2"
65	75 x 3,6	67,8	6.000				3,0	6,8	3,0	2½"
80	90 x 4,3	81,4	6.000				3,0	7,5	3,9	3"
100	110 x 5,3	99,4	6.000				3,0	8,5	5,2	4"
125	125 x 3,7	117,6	6.000				3,0	6,9	5,4	5"
150	160 x 4,7	150,6	6.000				3,0	7,9	7,3	6"
200	200 x 4,0	192,0	6.000				3,0	7,2	8,9	8"
250	250 x 4,9	240,2	6.000				3,8	8,9	13,3	10"
300	315 x 4,5	306,0	6.000				3,0	7,7	14,2	4,6
350	355 x 4,5	346,0	6.000	3,0	7,7	16,3	4,6	9,3	19,5	14"
400	400 x 5,0	390,0	6.000	3,8	9,0	21,3	5,3	10,5	25,0	16"
450	450 x 5,0	440,0	6.000	3,8	9,0	23,9	6,1	11,3	30,2	18"
500	500 x 5,0	490,0	6.000	4,6	9,8	28,9	6,8	12,0	35,9	20"
600	600 x 5,0	590,0	6.000	5,3	10,5	37,4	8,4	13,6	48,6	24"
700	708 x 4*	700,0	6.000	6,1	10,3	43,7	9,1	13,3	56,8	28"
800	808 x 4*	800,0	6.000	6,8	11,0	53,6	10,6	14,8	72,2	32"
900	908 x 4*	900,0	6.000	7,6	11,8	64,4	12,2	16,4	89,5	36"
1000	1008 x 4*	1.000,0	6.000	8,4	12,6	76,1	13,7	17,9	108,6	40"

REMARKS:

DN = nominal diameter

Di = liner inside diameter

DL = liner outside diameter

L = pipe length

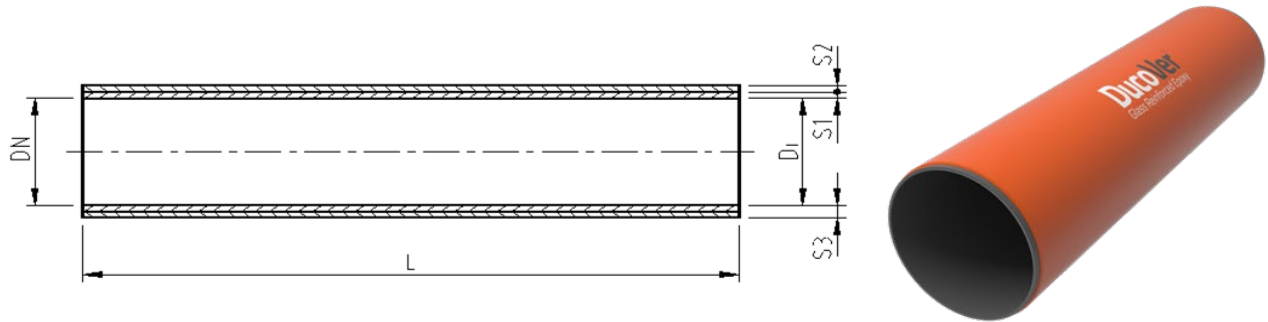
S1 = wallthickness thermoplastic liner (can vary; manufacture standard)

S2 = thickness of fiberglass reinforcement

S3 =total wall thickness with thermoplastic liner and 0,2 mm topcoat

* = min. thickness, liner made out of sheet

Wp = pipe mass



PVC-C / FRP				PN 10			PN 16			DN (inch)
DN (mm)	DL x S1 (mm)	Di (mm)	L (mm)	S2 (mm)	S3 (mm)	Wp (kg/m)	S2 (mm)	S3 (mm)	Wp (kg/m)	
25	32 x 3,6	24,8	4.800	SEE PN 16			3,0	6,8	1,3	1"
32	40 x 4,5	31,0	4.800				3,0	7,7	1,8	1¼"
40	50 x 3,7	42,6	4.800				3,0	6,9	2,0	1½"
50	63 x 4,7	53,6	4.800				3,0	7,9	2,8	2"
65	75 x 3,6	67,8	4.800				3,0	6,8	3,1	2½"
80	90 x 4,3	81,4	4.800				3,0	7,5	4,0	3"
100	110 x 5,3	99,4	4.800				3,0	8,5	5,5	4"
125	125 x 3,5	118,0	4.800				3,0	6,9	5,5	5"
150	160 x 4,7	150,6	4.800				3,0	7,9	7,7	6"
200	200 x 4,0	192,0	4.800				3,0	7,2	9,3	8"
250	250 x 4,9	240,2	4.800				3,8	8,9	13,8	10"
300	315 x 4,5	306,0	4.800				3,0	7,7	14,2	4,6
350	355 x 4,5	346,0	4.800	3,0	7,7	16,3	4,6	9,3	20,3	14"
400	400 x 5,0	390,0	4.800	3,8	9,0	21,3	5,3	10,5	26,0	16"
450	450 x 5,0	440,0	4.800	3,8	9,0	23,9	6,1	11,3	31,3	18"
500	500 x 5,0	490,0	4.800	4,6	9,8	28,9	6,8	12,0	37,1	20"
600	600 x 5,0	590,0	4.800	5,3	10,5	37,4	8,4	13,6	50,0	24"
700	708 x 4*	700,0	6.000	6,1	10,3	43,7	9,1	13,3	58,2	28"
800	808 x 4*	800,0	6.000	6,8	11,0	53,6	10,6	14,8	73,8	32"
900	908 x 4*	900,0	6.000	7,6	11,8	64,4	12,2	16,4	91,3	36"
1000	1008 x 4*	1.000,0	6.000	8,4	12,6	76,1	13,7	17,9	110,6	40"

REMARKS:

DN = nominal diameter

Di = liner inside diameter

DL = liner outside diameter

L = pipe length

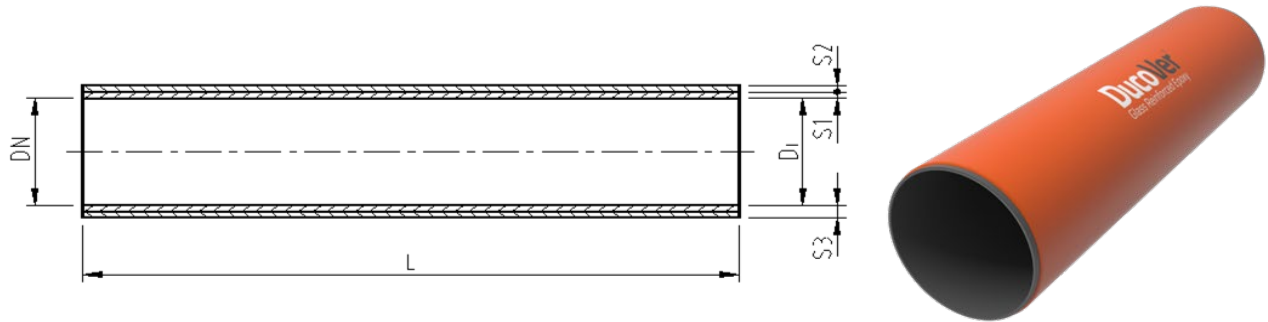
S1 = wallthickness thermoplastic liner (can vary; manufacture standard)

S2 = thickness of fiberglass reinforcement

S3 =total wall thickness with thermoplastic liner and 0,2 mm topcoat

* = min. thickness, liner made out of sheet

Wp = pipe mass



PP / FRP				PN 10			PN 16			DN (inch)			
DN (mm)	DL x S1 (mm)	Di (mm)	L (mm)	S2 (mm)	S3 (mm)	Wp (kg/m)	S2 (mm)	S3 (mm)	Wp (kg/m)				
25	32 x 2,9	26,2	4.700	SEE PN 16			3,0	6,1	1,0	1"			
32	40 x 3,7	32,6	4.700				3,0	6,9	1,3	1¼"			
40	50 x 4,6	40,8	4.700				3,0	7,8	1,8	1½"			
50	63 x 3,6	55,8	4.700				3,0	6,8	2,1	2"			
65	75 x 4,3	66,4	4.700				3,0	7,5	2,8	2½"			
80	90 x 5,1	79,8	4.700				3,0	8,3	3,2	3"			
100	110 x 6,3	97,4	4.700				3,0	9,5	4,7	4"			
125	125 x 4,8	115,4	4.700				3,0	8	5,2	5"			
150	160 x 4,9	150,2	4.700				3,0	8,1	6,3	6"			
200	200 x 6,2	187,6	4.700				3,0	9,4	9,0	8"			
250	250 x 6,2	237,6	4.700				3,8	10,2	12,2	10"			
300	315 x 7,7	299,6	4.700				3,0	10,9	14,2	4,6	12,5	17,9	12"
350	355 x 8,7	337,6	4.700				3,0	11,9	16,3	4,6	13,5	21,6	14"
400	400 x 6,0	388,0	4.700	3,8	10,0	21,3	5,3	11,5	23,1	16"			
450	450 x 7,0	436,0	4.700	3,8	11,0	23,9	6,1	13,3	29,5	18"			
500	500 x 8,0	484,0	4.700	4,6	12,8	28,9	6,8	15,0	36,5	20"			
600	608 x 4*	600,0	6.000	5,3	9,5	37,4	8,4	12,6	42,2	24"			
700	708 x 4*	700,0	6.000	6,1	10,3	43,7	9,1	13,3	52,4	28"			
800	808 x 4*	800,0	6.000	6,8	11,0	53,6	10,6	14,8	67,2	32"			
900	908 x 4*	900,0	6.000	7,6	11,8	64,4	12,2	16,4	83,8	36"			
1000	1008 x 4*	1.000,0	6.000	8,4	12,6	76,1	13,7	17,9	102,3	40"			

REMARKS:

DN = nominal diameter

Di = liner inside diameter

DL = liner outside diameter

L = pipe length

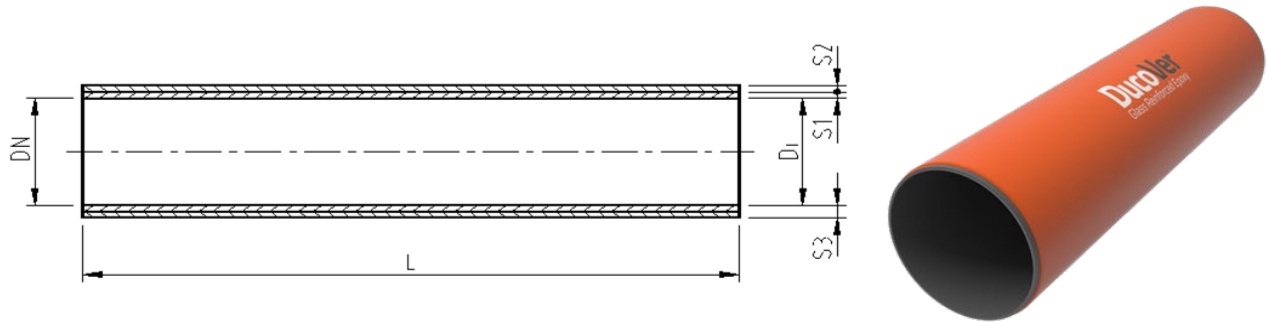
S1 = wallthickness thermoplastic liner (can vary; manufacture standard)

S2 = thickness of fiberglass reinforcement

S3 =total wall thickness with thermoplastic liner and 0,2 mm topcoat

* = min. thickness, liner made out of sheet

Wp = pipe mass



PE / FRP				PN 10			PN 16			DN (inch)
DN (mm)	DL x S1 (mm)	Di (mm)	L (mm)	S2 (mm)	S3 (mm)	Wp (kg/m)	S2 (mm)	S3 (mm)	Wp (kg/m)	
25	32 x 2,9	26,2	5.700	SEE PN 16			3,0	6,1	1,0	1"
32	40 x 3,7	32,6	5.700				3,0	6,9	1,3	1¼"
40	50 x 4,6	40,8	5.700				3,0	7,8	1,8	1½"
50	63 x 3,8	55,4	5.700				3,0	7	2,1	2"
65	75 x 4,5	66,0	5.700				3,0	7,7	2,8	2½"
80	90 x 5,4	79,2	5.700				3,0	8,6	3,2	3"
100	110 x 6,6	96,8	5.700				3,0	9,8	4,7	4"
125	125 x 4,9	115,2	5.700				3,0	8,1	5,2	5"
150	160 x 4,9	150,2	5.700				3,0	8,1	6,9	6"
200	200 x 6,2	187,6	5.700				3,0	9,4	9,0	8"
250	250 x 6,1	237,8	5.700				3,8	10,1	12,2	10"
300	315 x 7,7	299,6	5.700				3,0	10,9	14,2	4,6
350	355 x 8,7	337,6	5.700	3,0	11,9	16,3	4,6	13,5	21,6	14"
400	400 x 6,0	388,0	5.700	3,8	10,0	21,3	5,3	11,5	23,1	16"
450	450 x 7,0	436,0	5.700	3,8	11,0	23,9	6,1	13,3	28,4	18"
500	500 x 8,0	484,0	5.700	4,6	12,8	28,9	6,8	15,0	35,0	20"
600	608 x 4*	600,0	6.000	5,3	9,5	37,4	8,4	12,6	42,2	24"
700	708 x 4*	700,0	6.000	6,1	10,3	43,7	9,1	13,3	52,4	28"
800	808 x 4*	800,0	6.000	6,8	11,0	53,6	10,6	14,8	67,2	32"
900	908 x 4*	900,0	6.000	7,6	11,8	64,4	12,2	16,4	83,8	36"
1000	1008 x 4*	1.000,0	6.000	8,4	12,6	76,1	13,7	17,9	102,3	40"

REMARKS:

DN = nominal diameter

Di = liner inside diameter

DL = liner outside diameter

L = pipe length

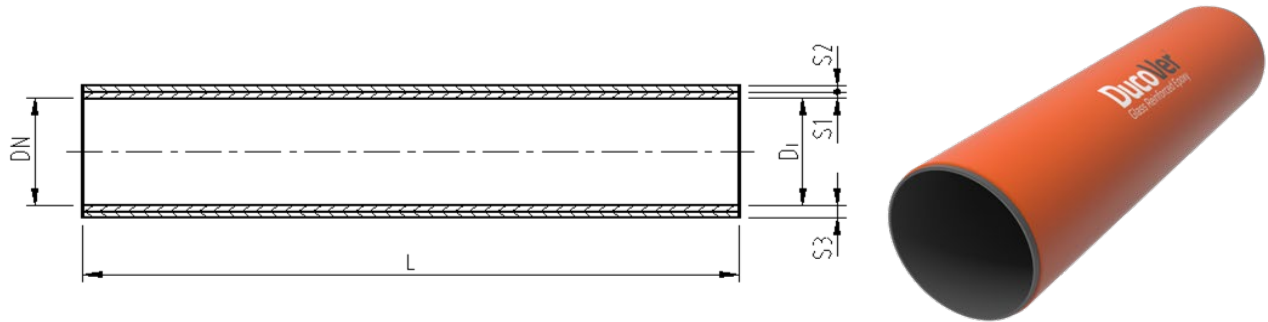
S1 = wallthickness thermoplastic liner (can vary; manufacture standard)

S2 = thickness of fiberglass reinforcement

S3 =total wall thickness with thermoplastic liner and 0,2 mm topcoat

* = min. thickness, liner made out of sheet

Wp = pipe mass



PVDF / FRP				PN 10			PN 16			DN (inch)
DN (mm)	DL x S1 (mm)	Di (mm)	L (mm)	S2 (mm)	S3 (mm)	Wp (kg/m)	S2 (mm)	S3 (mm)	Wp (kg/m)	
25	32 x 2,4	27,2	4.800	SEE PN 16			3,0	5,6	1,1	1"
32	40 x 2,4	35,2	4.800				3,0	5,6	1,5	1¼"
40	50 x 3,0	44,0	4.800				3,0	6,2	2,0	1½"
50	63 x 3,0	57,0	4.800				3,0	6,2	2,5	2"
65	75 x 3,0	69,0	4.800				3,0	6,2	3,1	2½"
80	90 x 3,0	84,0	4.800				3,0	6,2	3,7	3"
100	110 x 3,0	104,0	4.800				3,0	6,2	4,5	4"
125	125 x 3,0	119,0	4.800				3,0	6,2	5,5	5"
150	160 x 3,0	154,0	4.800				3,0	6,2	6,7	6"
200	200 x 3,0	194,0	4.800				3,0	6,2	8,7	8"
250	250 x 3,0	244,0	4.800				3,8	7	12,0	10"
300	315 x 4,0	307,0	4.800				3,0	7,2	14,2	4,6
350	355 x 5,0	345,0	4.800	3,0	8,2	16,3	4,6	9,8	22,6	14"
400	400 x 5,0	390,0	4.800	3,8	9,0	21,3	5,3	10,5	27,5	16"
450	456 x 3*	450,0	6.000	3,8	37,0	23,9	6,1	39,3	27,8	18"
500	506 x 3*	500,0	6.000	4,6	7,8	28,9	6,8	10,0	33,3	20"
600	606 x 3*	600,0	6.000	5,3	8,5	37,4	8,4	11,6	45,5	24"
700	706 x 3*	700,0	6.000	6,1	9,3	43,7	9,1	12,3	56,2	28"
800	806 x 3*	800,0	6.000	6,8	10,0	53,6	10,6	13,8	71,6	32"
900	906 x 3*	900,0	6.000	7,6	10,8	64,4	12,2	15,4	88,8	36"
1000	1006 x 3*	1.000,0	6.000	8,4	11,6	76,1	13,7	16,9	107,8	40"

REMARKS:

DN = nominal diameter

Di = liner inside diameter

DL = liner outside diameter

L = pipe length

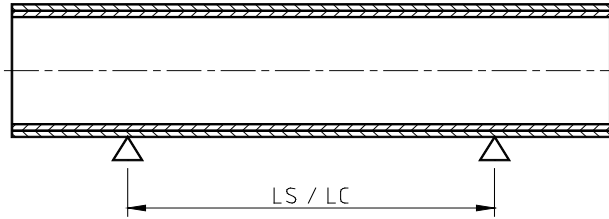
S1 = wallthickness thermoplastic liner (can vary; manufacture standard)

S2 = thickness of fiberglass reinforcement

S3 =total wall thickness with thermoplastic liner and 0,2 mm topcoat

* = min. thickness, liner made out of sheet

Wp = pipe mass



PN 10								
LIQUIDS $\rho_{med} = 1$								
DN (mm)	1,00 x PN		0,75 x PN		0,5 x PN		DN (inch)	
	pd = 10,00 bar(g)		pd = 7,50 bar(g)		pd = 5,00 bar(g)			
	Ls (mm)	Lc (mm)	Ls (mm)	Lc (mm)	Ls (mm)	Lc (mm)		
25	SEE PN 16						1"	
32							1¼"	
40							1½"	
50							2"	
65							2½"	
80							3"	
100							4"	
125							5"	
150							6"	
200							8"	
250	10"							
300	3.980	5.180	3.980	5.960	3.980	5.960	12"	
350	3.420	4.200	4.140	5.880	4.140	6.200	14"	
400	4.400	5.400	4.540	6.780	4.540	6.780	16"	
450	3.640	4.460	4.680	6.440	4.680	7.000	18"	
500	4.580	5.600	5.020	7.460	5.020	7.500	20"	
600	4.740	5.800	5.460	7.920	5.460	8.180	24"	
700	4.900	6.000	5.880	8.360	5.880	8.780	28"	
800	5.040	6.180	6.260	8.760	6.260	9.360	32"	
900	5.180	6.360	6.620	9.160	6.620	9.900	36"	
1000	5.320	6.520	6.960	9.540	6.960	10.420	40"	

REMARKS:

DN = nominal diameter

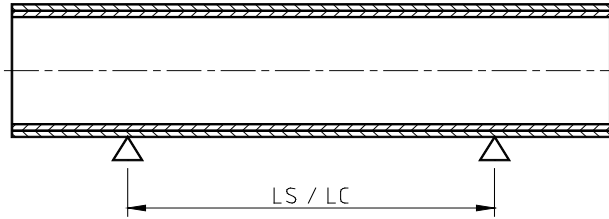
 ρ_{med} = density flow-through medium

pd = design pressure

pt = test pressure

Ls = maximum single span length; without insulation

Lc = maximum length continuous span; without insulation



PN 16							
LIQUIDS $\rho_{med} = 1$							
DN (mm)	1,00 x PN		0,75 x PN		0,5 x PN		DN (inch)
	pd = 16,00 bar(g)		pd = 12,00 bar(g)		pd = 8,00 bar(g)		
	Ls (mm)	Lc (mm)	Ls (mm)	Lc (mm)	Ls (mm)	Lc (mm)	
25	1.840	2.960	1.840	2.960	1.840	2.960	1"
32	2.020	3.180	2.020	3.180	2.020	3.180	1¼"
40	2.200	3.400	2.200	3.400	2.200	3.400	1½"
50	2.400	3.640	2.400	3.640	2.400	3.640	2"
65	2.620	3.920	2.620	3.920	2.620	3.920	2½"
80	2.780	4.160	2.780	4.160	2.780	4.160	3"
100	2.960	4.420	2.960	4.420	2.960	4.420	4"
125	3.140	4.700	3.140	4.700	3.140	4.700	5"
150	3.300	4.960	3.300	4.960	3.300	4.960	6"
200	3.580	4.660	3.580	5.360	3.580	5.360	8"
250	4.000	5.240	4.000	5.980	4.000	5.980	10"
300	4.380	5.760	4.380	6.560	4.380	6.560	12"
350	3.540	4.340	4.560	6.720	4.560	6.840	14"
400	4.040	4.940	4.920	7.340	4.920	7.340	16"
450	4.480	5.500	5.220	7.820	5.220	7.820	18"
500	4.880	5.980	5.520	8.280	5.520	8.280	20"
600	5.620	6.880	6.080	9.100	6.080	9.100	24"
700	5.060	6.200	6.480	9.560	6.480	9.680	28"
800	5.760	7.060	6.960	10.400	6.960	10.400	32"
900	6.380	7.820	7.400	11.080	7.400	11.080	36"
1000	6.960	8.520	7.820	11.720	7.820	11.720	40"

REMARKS:

DN = nominal diameter

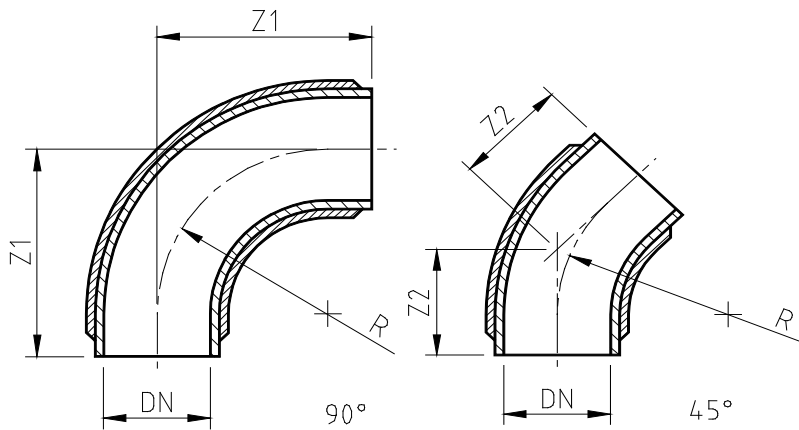
 ρ_{med} = density flow-through medium

pd = design pressure

pt = test pressure

Ls = maximum single span length; without insulation

Lc = maximum length continuous span; without insulation



DN (mm)	PN 10 / PN 16		PN 10 / PN 16		DN (inch)
	PP / PE		PVC-U / PVC Dekadur Plus / PVC-C		
	Z1 (mm)	Z2 (mm)	Z1 (mm)	Z2 (mm)	
25	79	57	110	70	1"
32	93	63	130	80	1¼"
40	109	70	150	90	1½"
50	130	80	180	105	2"
65	150	90	-	-	2½"
80	168	101	-	-	3"
100	192	108	-	-	4"
125	218	131	-	-	5"
150	160	100	-	-	6"
200	200	124	-	-	8"
250	256	217	-	-	10"
300	321	251	-	-	12"
350	340	-	-	-	14"
400	345	-	-	-	16"
500	449	-	-	-	20"

REMARKS:

DN = nominal diameter

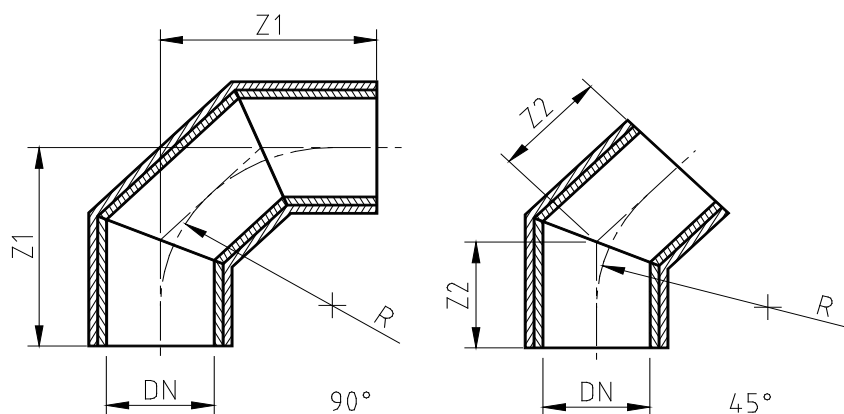
 $R \approx 1,0 \times DN$ (PP and PE)

 $R \approx 1,5 \times DN$ (PVC-U / PVC Dekadur Plus / PVC-C)

Z1 = element Length for 90° elbow

Z2 = element Length for 45° elbow

Curved elbows only available in PVC, PP and PE100.



DN (mm)	PN 10 / PN 16		DN (inch)
	Z1 (mm)	Z2 (mm)	
25	110	70	1"
32	130	80	1¼"
40	150	90	1½"
50	180	105	2"
65	135	85	2½"
80	165	100	3"
100	205	115	4"
125	245	135	5"
150	285	150	6"
200	365	190	8"
250	415	225	10"
300	520	245	12"
350	600	275	14"
400	670	320	16"
450	770	365	18"
500	850	380	20"
600	1.020	495	24"
700	1.190	575	28"
800	1.305	650	32"
900	1.525	735	36"
1000	1.695	820	40"

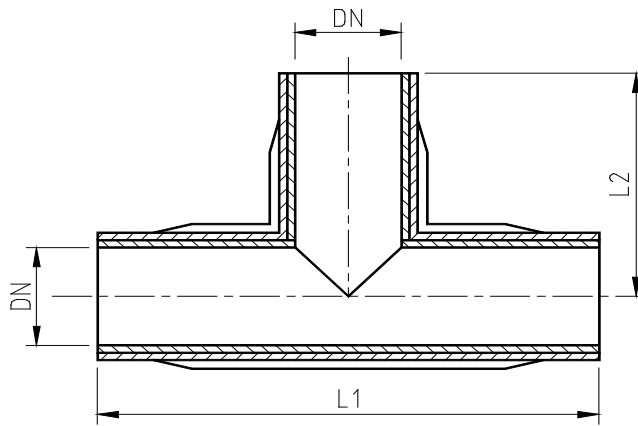
REMARKS:

DN = nominal diameter

 $R = 1,5 \times DN$

Z1 = element Length for 90° elbow

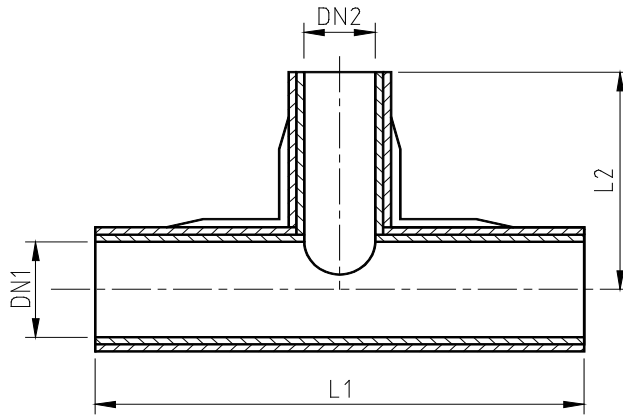
Z2 = element Length for 45° elbow



DN (mm)	PN 10 / PN 16		DN (inch)
	L1 (mm)	L2 (mm)	
25	440	215	1"
32	440	220	1¼"
40	450	225	1½"
50	480	235	2"
65	510	250	2½"
80	530	255	3"
100	580	270	4"
125	620	285	5"
150	680	310	6"
200	700	370	8"
250	820	440	10"
300	990	520	12"
350	1.110	590	14"
400	1.240	655	16"
450	1.400	735	18"
500	1.520	810	20"
600	1.790	945	24"
700	2.080	1.085	28"
800	2.320	1.225	32"
900	2.610	1.385	36"
1000	2.890	1.525	40"

REMARKS:

DN = nominal diameter
L1 = run pipe length
L2 = branch pipe length

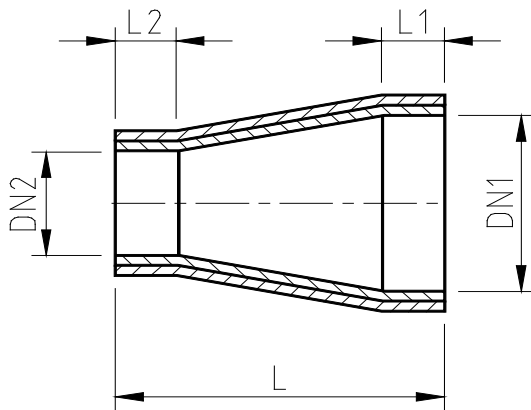


DN1 (mm)	DN2 (mm)	PN 10 / PN 16		DN2 (inch)	DN1 (inch)
		L1 (mm)	L2 (mm)		
32	25	440	220	1"	1¼"
40	25	440	225	1"	1½"
	32	440	225	1¼"	
50	25	450	230	1"	2"
	32	450	230	1¼"	
	40	460	230	1½"	
65	32	460	235	1¼"	2½"
	40	470	235	1½"	
	50	490	240	2"	
80	40	470	245	1½"	3"
	50	490	250	2"	
	65	500	255	2½"	
100	50	500	260	2"	4"
	65	510	265	2½"	
	80	520	265	3"	
125	65	520	275	2½"	5"
	80	530	275	3"	
	100	550	280	4"	
150	80	550	290	3"	6"
	100	570	295	4"	
	125	590	300	5"	
200	100	620	325	4"	8"
	125	630	330	5"	
	150	670	340	6"	
250	125	670	360	5"	10"
	150	710	370	6"	
	200	730	385	8"	
300	150	770	405	6"	12"
	200	820	420	8"	
	250	870	435	10"	

DN1 (mm)	DN2 (mm)	PN 10 / PN 16		DN2 (inch)	DN1 (inch)
		L1 (mm)	L2 (mm)		
350	200	890	445	8"	14"
	250	940	490	10"	
	300	1.020	545	12"	
400	250	1.000	515	10"	16"
	300	1.600	570	12"	
	350	1.150	615	14"	
450	300	1.150	595	12"	18"
	350	1.200	640	14"	
	400	1.290	680	16"	
500	350	1.270	670	14"	20"
	400	1.320	710	16"	
	450	1.430	765	18"	
600	400	1.470	760	16"	24"
	450	1.520	815	18"	
	500	1.590	860	20"	
700	450	1.660	865	18"	28"
	500	1.710	910	20"	
	600	1.870	995	24"	
800	500	1.850	960	20"	32"
	600	1.950	1.045	24"	
	700	2.140	1.135	28"	
900	600	2.120	1.100	24"	36"
	700	2.230	1.190	28"	
	800	2.410	1.280	32"	
1000	700	2.370	1.240	28"	40"
	800	2.490	1.330	32"	
	900	2.690	1.435	36"	

REMARKS:

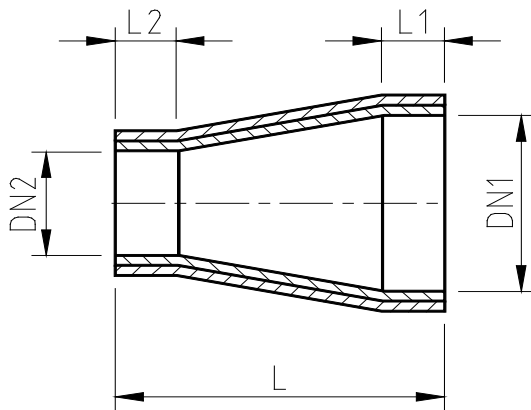
- DN1 = nominal diameter run pipe
- DN2 = nominal diameter branch pipe
- L1 = run pipe length
- L2 = branch pipe length



DN1 (mm)	DN2 (mm)	PN 10 / PN 16			DN2 (inch)	DN1 (inch)
		L (mm)	L1 (mm)	L2 (mm)		
32	25	180	77	84	1"	1¼"
40	25	205	83	83	1"	1½"
	32	200	86	93	1¼"	
50	25	235	90	80	1"	2"
	32	230	93	90	1¼"	
	40	205	89	90	1½"	
65	32	260	97	78	1¼"	2½"
	40	235	94	76	1½"	
	50	210	88	83	2"	
80	40	275	97	75	1½"	3"
	50	245	88	79	2"	
	65	210	86	85	2½"	
100	50	325	109	87	2"	4"
	65	285	104	90	2½"	
	80	250	102	96	3"	
125	65	350	108	87	2½"	5"
	80	310	104	90	3"	
	100	285	111	109	4"	
150	80	375	112	82	3"	6"
	100	350	119	102	4"	
	125	310	128	117	5"	
200	100	495	139	98	4"	8"
	125	430	134	103	5"	
	150	370	128	113	6"	
250	125	575	153	100	5"	10"
	150	510	144	108	6"	
	200	400	143	128	8"	
300	150	655	164	105	6"	12"
	200	540	161	121	8"	
	250	435	163	143	10"	

REMARKS:

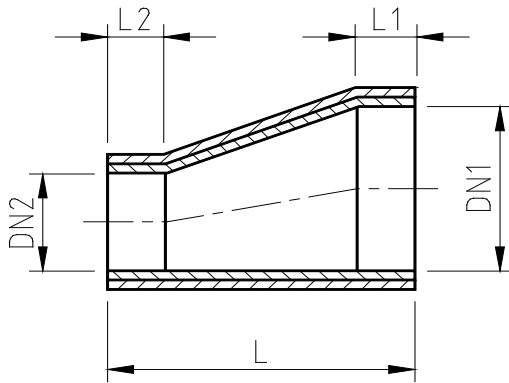
DN1 = nominal diameter larger pipe
 DN2 = nominal diameter smaller pipe
 L = overall length
 L1 = straight length larger pipe
 L2 = straight length smaller pipe



DN1 (mm)	DN2 (mm)	PN 10 / PN 16			DN2 (inch)	DN1 (inch)
		L (mm)	L1 (mm)	L2 (mm)		
350	200	665	166	113	8"	14"
	250	550	163	129	10"	
	300	440	161	150	12"	
400	250	695	179	130	10"	16"
	300	580	174	148	12"	
	350	450	168	153	14"	
450	300	680	170	124	12"	18"
	350	565	170	137	14"	
	400	450	169	152	16"	
500	350	710	184	140	14"	20"
	400	730	255	217	16"	
	450	485	184	172	18"	
600	450	785	219	180	18"	24"
	500	665	217	190	20"	
700	500	965	253	197	20"	28"
	600	735	253	224	24"	
800	600	1.030	284	231	24"	32"
	700	805	286	261	28"	
	750	685	284	272	30"	
900	700	1.110	326	269	28"	36"
	750	990	324	280	30"	
	800	875	325	292	32"	
1000	750	1.290	360	286	30"	40"
	800	1.175	361	299	32"	
	900	950	361	331	36"	

REMARKS:

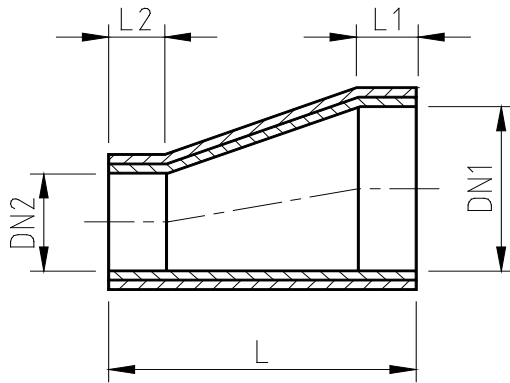
- DN1 = nominal diameter larger pipe
- DN2 = nominal diameter smaller pipe
- L = overall length
- L1 = straight length larger pipe
- L2 = straight length smaller pipe



DN1 (mm)	DN2 (mm)	PN 10 / PN 16			DN2 (inch)	DN1 (inch)
		L (mm)	L1 (mm)	L2 (mm)		
32	25	180	77	85	1"	1¼"
40	25	205	83	84	1"	1½"
	32	200	92	88	1¼"	
50	25	235	95	78	1"	2"
	32	230	99	86	1¼"	
	40	205	90	90	1½"	
65	32	260	96	82	1¼"	2½"
	40	235	93	80	1½"	
	50	210	88	84	2"	
80	40	275	96	79	1½"	3"
	50	245	88	82	2"	
	65	210	87	85	2½"	
100	50	325	113	88	2"	4"
	65	285	103	95	2½"	
	80	250	102	88	3"	
125	65	350	112	89	2½"	5"
	80	310	108	90	3"	
	100	285	116	107	4"	
150	80	375	115	86	3"	6"
	100	350	124	102	4"	
	125	310	128	120	5"	
200	100	495	147	100	4"	8"
	125	430	138	106	5"	
	150	370	133	113	6"	
250	125	575	160	105	5"	10"
	150	510	147	115	6"	
	200	400	148	128	8"	
300	150	655	171	112	6"	12"
	200	540	165	127	8"	
	250	435	165	146	10"	

REMARKS:

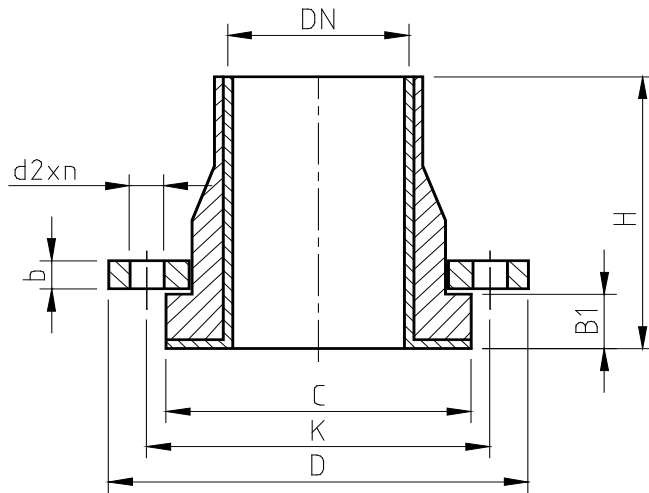
- DN1 = nominal diameter larger pipe
- DN2 = nominal diameter smaller pipe
- L = overall length
- L1 = straight length larger pipe
- L2 = straight length smaller pipe



DN1 (mm)	DN2 (mm)	PN 10 / PN 16			DN2 (inch)	DN1 (inch)
		L (mm)	L1 (mm)	L2 (mm)		
350	200	665	173	120	8"	14"
	250	550	168	134	10"	
	300	440	164	152	12"	
400	250	695	187	136	10"	16"
	300	580	180	152	12"	
	350	450	171	155	14"	
450	300	685	180	133	12"	18"
	350	575	180	147	14"	
	400	465	180	161	16"	
500	350	715	195	148	14"	20"
	400	730	261	221	16"	
	450	500	195	181	18"	
600	450	795	232	191	18"	24"
	500	685	233	204	20"	
700	500	980	272	212	20"	28"
	600	760	271	241	24"	
800	600	1.055	308	251	24"	32"
	700	835	306	281	28"	
	750	725	307	294	30"	
900	700	1.130	346	288	28"	36"
	750	1.020	347	301	30"	
	800	910	348	314	32"	
1000	750	1.315	386	310	30"	40"
	800	1.205	386	323	32"	
	900	990	386	356	36"	

REMARKS:

DN1 = nominal diameter larger pipe
 DN2 = nominal diameter smaller pipe
 L = overall length
 L1 = straight length larger pipe
 L2 = straight length smaller pipe



DN (mm)	STUB END with L.J. FLANGE PN 10 - DIN PN 10 DRILLING						FRP		STEEL GALVANIZED		DN (mm)
	C (mm)	B1 (mm)	H (mm)	D (mm)	K (mm)	d2 x n (mm x pc)	b (mm)	PN (barg)	b (mm)	PN (barg)	
25	SEE PN 16										25
32											
40											
50											
65	122	24	180	185	145	18 x 4 ¹⁾	20	10	18	16	65
80	138	24	180	200	160	18 x 8	22	10	20	16	80
100	158	26	200	220	180	18 x 8	24	10	20	16	100
125	188	29	220	250	210	18 x 8	27	10	22	16	125
150	212	30	240	285	240	22 x 8	30	10	22	16	150
200	268	34	260	340	295	22 x 8	32	(6)	25	16	200
250	320	37	280	395	350	22 x 12	34	(6)	26	10	250
300	370	40	320	445	400	22 x 12	36	(6)	27	10	300
350	430	42	360	505	460	22 x 16	38	(4)	25	10	350
400	482	44	400	565	515	25 x 16	42	(4)	27	10	400
450	531	46	460	615	565	25 x 20	45	(4)	27	10	450
500	585	48	480	670	620	25 x 20	47	(4)	28	10	500
600	685	50	560	780	725	30 x 20	50	(4)	28	10	600
700	800	52	640	895	840	30 x 24	-	-	30	10	700
800	905	54	700	1.015	950	33 x 24	-	-	33	10	800
900	1.005	56	780	1.115	1.050	33 x 28	-	-	35	10	900
1000	1.110	58	860	1.230	1.160	36 x 28	-	-	35	10	1000

REMARKS:

DN = nominal diameter

B1 = collar thickness incl. liner

C = outside diameter collar

D = outside diameter flange

K = diameter bolt circle

b = thickness of flange

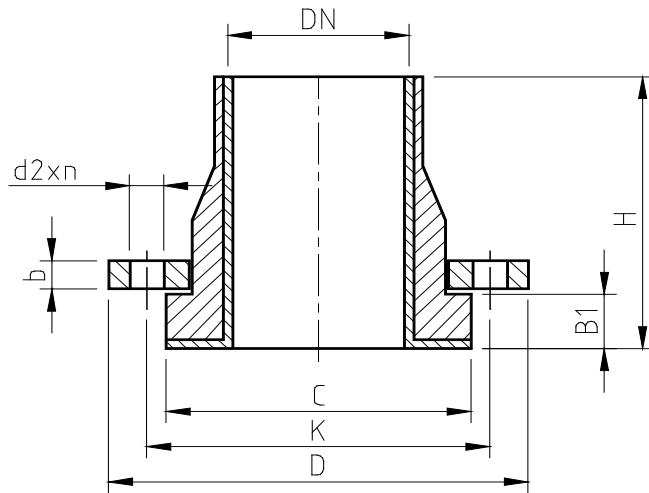
d2 = diameter bolt holes

n = number of bolt holes

¹⁾ also available with 8 holes Ø18

Drilling = according to EN 1029-2 / DIN 2501 - PN 10

For spool building, flanges are directly moulded to pipe or fitting



DN (mm)	STUB END with L.J. FLANGE PN 16 - DIN PN 16 DRILLING						FRP		STEEL GALVANISED		DN (mm)
	C (mm)	B1 (mm)	H (mm)	D (mm)	K (mm)	d2 x n (mm x pc)	b (mm)	PN (barg)	b (mm)	PN (barg)	
25	68	20	160	115	85	14 x 4	14	16	16	16	25
32	78	20	160	140	100	18 x 4	15	16	16	16	32
40	88	21	160	150	110	18 x 4	16	16	16	16	40
50	102	22	180	165	125	18 x 4	18	16	18	16	50
65	122	24	180	185	145	18 x 4 ¹⁾	-	-	18	16	65
80	138	24	180	200	160	18 x 8	-	-	20	16	80
100	158	26	200	220	180	18 x 8	-	-	20	16	100
125	188	29	220	250	210	18 x 8	-	-	22	16	125
150	212	30	240	285	240	22 x 8	-	-	22	16	150
200	268	37	260	340	295	22 x 12	-	-	26	16	200
250	325	41	280	405	355	25 x 12	-	-	27	16	250
300	378	44	320	460	410	25 x 12	-	-	32	16	300
350	437	46	360	520	470	25 x 16	-	-	35	16	350
400	488	48	400	580	525	30 x 16	-	-	33	16	400
450	552	51	460	640	585	30 x 20	-	-	32	16	450
500	613	57	480	715	650	33 x 20	-	-	35	16	500
600	730	60	560	840	770	36 x 20	-	-	37	16	600
700	800	67	640	910	840	36 x 24	-	-	40	16	700
800	907	69	700	1.025	950	39 x 24	-	-	52	16	800
900	1.007	77	780	1.125	1.050	39 x 28	-	-	58	16	900
1000	1.124	80	860	1.255	1.170	42 x 28	-	-	64	16	1000

REMARKS:

DN = nominal diameter

B1 = collar thickness incl. liner

C = outside diameter collar

D = outside diameter flange

K = diameter bolt circle

b = thickness of flange

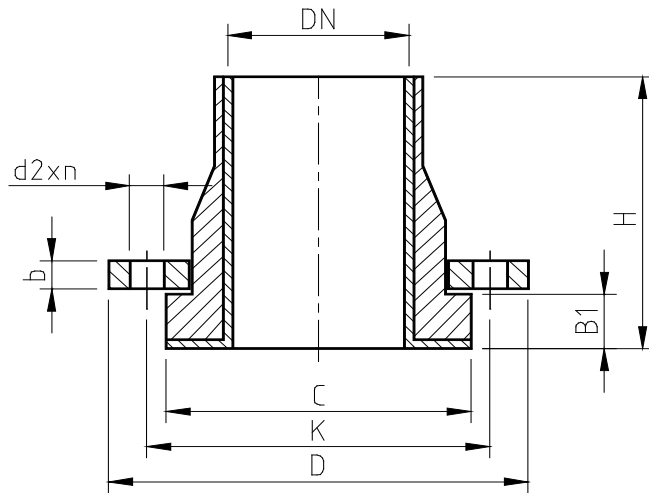
d2 = diameter bolt holes

n = number of bolt holes

¹⁾ also available with 8 holes Ø18

Drilling = according to EN 1029-2 / DIN 2501 - PN 16

For spool building, flanges are directly moulded to pipe or fitting



DN (inch)	STUB END with L.J. FLANGE PN 10 - ANSI 150 [#] DRILLING						FRP		STEEL GALVANISED		DN (inch)
	C (mm)	B1 (mm)	H (mm)	D (mm)	K (mm)	d2 x n (mm x pc)	b (mm)	PN (barg)	b (mm)	PN (barg)	
1"	SEE PN 16 150 [#]										1"
1¼"											1¼"
1½"											1½"
2"											2"
2½"	117	24	180	177,8	139,7	19 x 4	21	10	19	16	2½"
3"	130	24	180	190,5	152,4	19 x 4	24	10	19	16	3"
4"	169	26	200	228,6	190,5	19 x 8	25	10	19	16	4"
5"	189	29	220	254,0	215,9	22 x 8	29	10	19	16	5"
6"	212	30	240	279,4	241,3	22 x 8	31	10	19	16	6"
8"	270	37	260	342,9	298,4	22 x 8	33	(6)	20	16	8"
10"	328	41	280	406,4	361,9	25 x 12	36	(6)	23	16	10"
12"	398	44	320	482,6	431,8	25 x 12	38	(6)	25	16	12"
14"	438	42	360	533,4	476,2	28 x 12	40	(4)	28	16	14"
16"	503	44	400	596,9	539,7	28 x 16	44	(4)	33	16	16"
18"	538	46	460	635,0	577,8	32 x 16	49	(4)	33	16	18"
20"	593	48	480	698,5	635,0	32 x 20	49	(4)	37	10	20"
24"	708	50	560	812,6	749,3	35 x 20	58	(4)	37	10	24"
28"	820	52	640	927,1	863,6	35 x 28	-	-	37	10	28"
32"	928	54	700	1.060,5	977,9	41 x 28	-	-	38	10	32"
36"	1.035	56	780	1.168,4	1.085,8	41 x 32	-	-	35	10	36"
40"	1.148	58	860	1.289,1	1.200,2	41 x 36	-	-	35	10	40"

REMARKS:

DN = nominal diameter

B1 = collar thickness incl. liner

C = outside diameter collar

D = outside diameter flange

K = diameter bolt circle

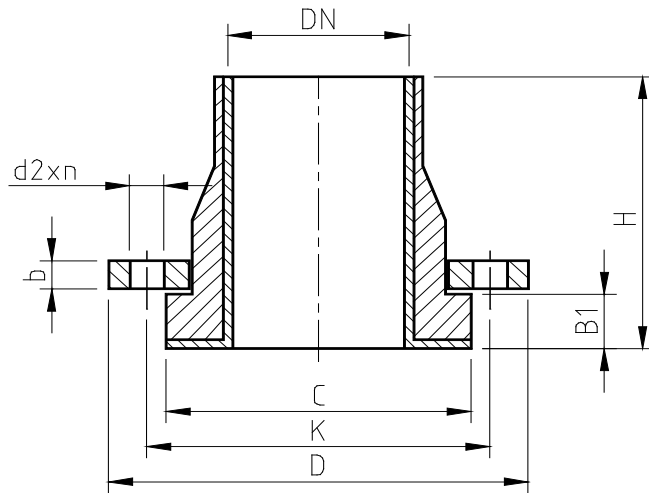
b = thickness of flange

d2 = diameter bolt holes

n = number of bolt holes

Drilling = according to ANSI B16.5 150lbs

For spool building, flanges are directly moulded to pipe or fitting



DN (inch)	STUB END with L.J. FLANGE PN 16 - ANSI 150 [#] DRILLING						FRP		STEEL GALVANISED		DN (inch)
	C (mm)	B1 (mm)	H (mm)	D (mm)	K (mm)	d2 x n (mm x pc)	b (mm)	PN (barg)	b (mm)	PN (barg)	
1"	61	20	160	107,9	79,4	16 x 4	17	16	14	16	1"
1¼"	70	20	160	117,5	88,9	16 x 4	17	16	16	16	1¼"
1½"	80	21	160	127,0	98,4	16 x 4	17	16	17	16	1½"
2"	98	22	180	152,4	120,6	19 x 4	20	16	18	16	2"
2½"	117	24	180	177,8	139,7	19 x 4	-	-	19	16	2½"
3"	130	24	180	190,5	152,4	19 x 4	-	-	19	16	3"
4"	169	26	200	228,6	190,5	19 x 8	-	-	19	16	4"
5"	189	29	220	254,0	215,9	22 x 8	-	-	19	16	5"
6"	212	30	240	279,4	241,3	22 x 8	-	-	19	16	6"
8"	270	37	260	342,9	298,4	22 x 8	-	-	20	16	8"
10"	328	41	280	406,4	361,9	25 x 12	-	-	23	16	10"
12"	398	44	320	482,6	431,8	25 x 12	-	-	25	16	12"
14"	438	46	360	533,4	476,2	28 x 12	-	-	28	16	14"
16"	503	48	400	596,9	539,7	28 x 16	-	-	33	16	16"
18"	538	51	460	635,0	577,8	32 x 16	-	-	33	16	18"
20"	593	57	480	698,5	635,0	32 x 20	-	-	37	16	20"
24"	708	60	560	812,6	749,3	35 x 20	-	-	37	16	24"
28"	820	67	640	927,1	863,6	35 x 28	-	-	37	16	28"
32"	928	69	700	1.060,5	977,9	41 x 28	-	-	40	16	32"
36"	1.035	77	780	1.168,4	1.085,8	41 x 32	-	-	35	16	36"
40"	1.148	80	860	1.289,1	1.200,2	41 x 36	-	-	35	16	40"

REMARKS:

DN = nominal diameter

B1 = collar thickness incl. liner

C = outside diameter collar

D = outside diameter flange

K = diameter bolt circle

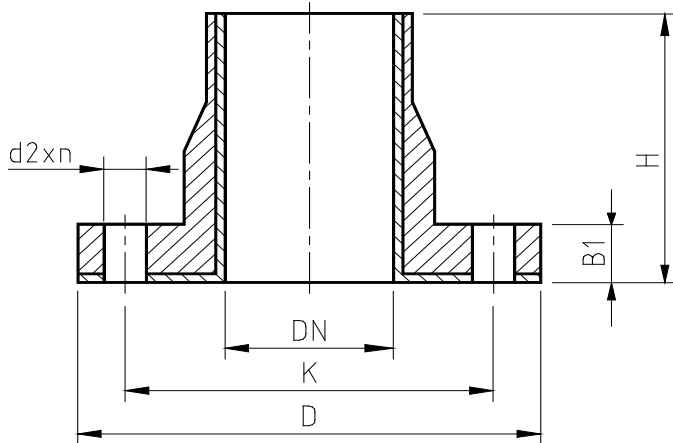
b = thickness of flange

d2 = diameter bolt holes

n = number of bolt holes

Drilling = according to ANSI B16.5 150lbs

For spool building, flanges are directly moulded to pipe or fitting



DN (mm)	PN 10 - DIN PN 10 DRILLING				PN 16 - DIN PN 16 DRILLING				H (mm)	DN (mm)
	D (mm)	K (mm)	B1 (mm)	d2 x n (mm x pc)	D (mm)	K (mm)	B1 (mm)	d2 x n (mm x pc)		
25	SEE DIN PN 16				115	85	24	14 x 4	160	25
32					140	100	24	18 x 4	160	32
40					150	110	25	18 x 4	160	40
50					165	125	26	18 x 4	180	50
65					185	145	28	18 x 4 ¹⁾	180	65
80					200	160	28	18 x 8	180	80
100					220	180	31	18 x 8	200	100
125					250	210	34	18 x 8	220	125
150					285	240	36	22 x 8	240	150
200					340	295	40	22 x 8	340	295
250	395	350	44	22 x 12	405	355	49	26 x 12	280	250
300	445	400	48	22 x 12	460	410	52	26 x 12	320	300
350	505	460	50	22 x 16	520	470	55	26 x 16	360	350
400	565	515	52	25 x 16	580	525	57	30 x 16	400	400
450	615	565	55	25 x 20	640	585	61	30 x 20	460	450
500	670	620	57	25 x 20	715	650	68	33 x 20	480	500
600	780	725	60	30 x 20	840	770	72	36 x 20	560	600
700	895	840	62	30 x 24	-	-	-	-	640	700
800	1.015	950	64	33 x 24	-	-	-	-	700	800
900	1.115	1.050	67	33 x 28	-	-	-	-	780	900
1000	1.230	1.160	69	36 x 28	-	-	-	-	860	1000

REMARKS:

DN = nominal diameter

B1 = thickness of flange incl. liner

D = outside diameter flange

K = diameter bolt circle

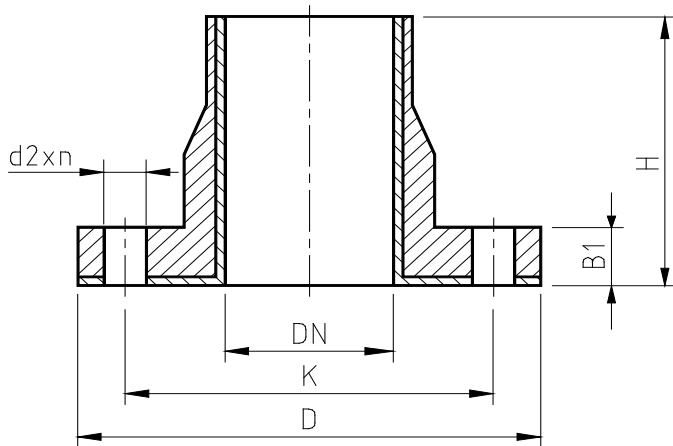
d2 = diameter bolt holes

n = number of bolt holes

¹⁾ also available with 8 holes Ø18

Drilling = according to EN 1029-2 / DIN 2501 - PN 10 and PN 16

For spool building, flanges are directly moulded to pipe or fitting



DN (inch)	PN 10 - ANSI 150# DRILLING				PN 16 - ANSI 150# DRILLING				H (mm)	DN (inch)
	D (mm)	K (mm)	B1 (mm)	d2 x n (mm x pc)	D (mm)	K (mm)	B1 (mm)	d2 x n (mm x pc)		
1"					108,0	79,4	24	16 x 4	160	1"
1¼"					117,5	88,9	24	16 x 4	160	1¼"
1½"					127,0	98,4	25	16 x 4	160	1½"
2"					152,4	120,6	26	19 x 4	180	2"
2½"					177,8	139,7	28	19 x 4	180	2½"
3"					190,5	152,4	28	19 x 4	180	3"
4"					228,6	190,5	31	19 x 8	200	4"
5"					254,0	215,9	34	22 x 8	220	5"
6"					279,4	241,3	36	22 x 8	240	6"
8"					342,9	298,4	44	22 x 8	260	8"
10"					406,4	361,9	49	25 x 12	280	10"
12"					482,6	431,8	52	25 x 12	320	12"
14"	533,4	476,2	50	28 x 12	533,4	476,2	55	28 x 12	360	14"
16"	596,9	539,7	52	28 x 16	596,9	539,7	57	28 x 16	400	16"
18"	635,0	577,8	55	32 x 16	635,0	577,8	61	32 x 16	460	18"
20"	698,5	635,0	57	32 x 20	698,5	635,0	68	32 x 20	480	20"
24"	812,6	749,3	60	35 x 20	812,6	749,3	72	35 x 20	560	24"
28"	927,1	863,6	62	35 x 28	-	-	-	-	640	28"
32"	1.060,5	977,9	64	41 x 28	-	-	-	-	700	32"
36"	1.168,4	1.085,8	67	41 x 32	-	-	-	-	780	36"
40"	1.289,1	1.200,2	69	41 x 36	-	-	-	-	860	40"

REMARKS:

DN = nominal diameter

B1 = thickness of flange incl. liner

D = outside diameter flange

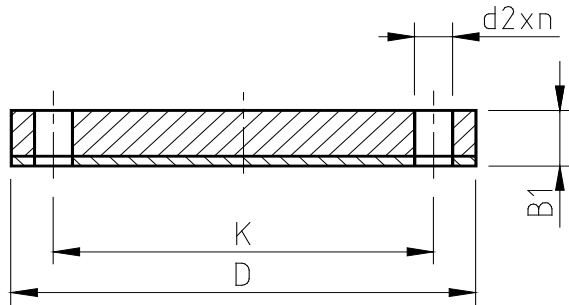
K = diameter bolt circle

d2 = diameter bolt holes

n = number of bolt holes

Drilling = according to ANSI B16.5 150lbs

For spool building, flanges are directly moulded to pipe or fitting



DN (mm)	PN 10 - DIN PN 10 DRILLING				PN 16 - DIN PN 16 DRILLING				DN (mm)
	D (mm)	K (mm)	B1 (mm)	d2 x n (mm x pc)	D (mm)	K (mm)	B1 (mm)	d2 x n (mm x pc)	
25	SEE DIN PN 16				115	85	24	14 x 4	25
32					140	100	24	18 x 4	32
40					150	110	25	18 x 4	40
50					165	125	26	18 x 4	50
65					185	145	28	18 x 4 ¹⁾	65
80					200	160	28	18 x 8	80
100					220	180	31	18 x 8	100
125					250	210	34	18 x 8	125
150					285	240	36	22 x 8	150
200					340	295	44	22 x 12	200
250	395	350	49	26 x 12	250				
300	445	400	52	26 x 12	300				
350	505	460	55	26 x 16	350				
400	565	515	57	30 x 16	400				
450	615	565	61	30 x 20	450				
500	670	620	68	33 x 20	500				
600	780	725	72	36 x 20	600				
700	895	840	-	-	700				
800	1.015	950	-	-	800				
900	1.115	1.050	-	-	900				
1000	1.230	1.160	-	-	1000				

REMARKS:

DN = nominal diameter

B1 = thickness of flange incl. liner

D = outside diameter flange

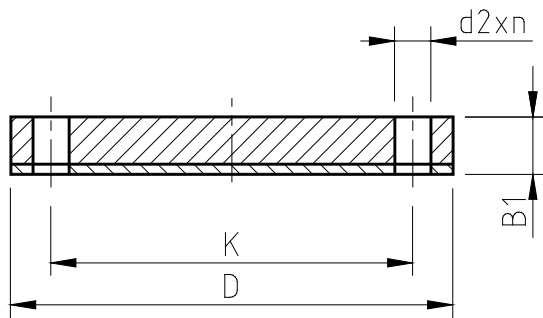
K = diameter bolt circle

d2 = diameter bolt holes

n = number of bolt holes

¹⁾ also available with 8 holes Ø18

Drilling = according to EN 1029-2 / DIN 2501 - PN 10 and PN 16



DN (inch)	PN 10 - ANSI 150# DRILLING				PN 16 - ANSI 150# DRILLING				DN (inch)
	D (mm)	K (mm)	B1 (mm)	d2 x n (mm x pc)	D (mm)	K (mm)	B1 (mm)	d2 x n (mm x pc)	
1"	SEE PN 16 150 [#]				108,0	79,4	24	16 x 4	1"
1¼"					117,5	88,9	24	16 x 4	1¼"
1½"					127,0	98,4	25	16 x 4	1½"
2"					152,4	120,6	26	19 x 4	2"
2½"					177,8	139,7	28	19 x 4	2½"
3"					190,5	152,4	28	19 x 4	3"
4"					228,6	190,5	31	19 x 8	4"
5"					254,0	215,9	34	22 x 8	5"
6"					279,4	241,3	36	22 x 8	6"
8"					342,9	298,4	44	22 x 8	8"
10"					406,4	361,9	49	25 x 12	10"
12"					482,6	431,8	52	25 x 12	12"
14"	533,4	476,2	50	28 x 12	533,4	476,2	55	28 x 12	14"
16"	596,9	539,7	52	28 x 16	596,9	539,7	57	28 x 16	16"
18"	635,0	577,8	55	32 x 16	635,0	577,8	61	32 x 16	18"
20"	698,5	635,0	57	32 x 20	698,5	635,0	68	32 x 20	20"
24"	812,6	749,3	60	35 x 20	812,6	749,3	72	35 x 20	24"
28"	927,1	863,6	62	35 x 28	-	-	-	-	28"
32"	1.060,5	977,9	64	41 x 28	-	-	-	-	32"
36"	1.168,4	1.085,8	67	41 x 32	-	-	-	-	36"
40"	1.289,1	1.200,2	69	41 x 36	-	-	-	-	40"

REMARKS:

DN = nominal diameter

B1 = thickness of flange incl. liner

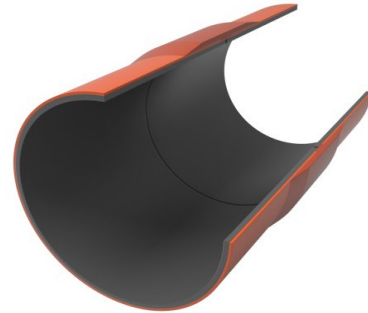
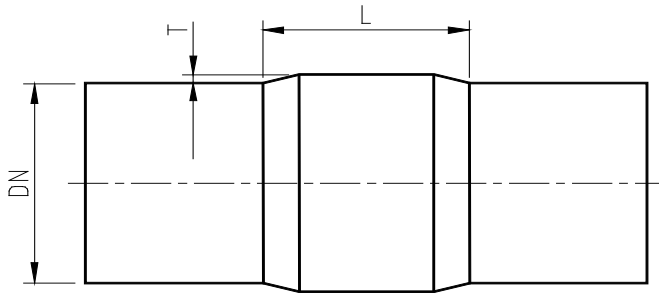
D = outside diameter flange

K = diameter bolt circle

d2 = diameter bolt holes

n = number of bolt holes

Drilling = according to ANSI B16.5 150Lbs



DN (mm)	PN 10		PN 16		DN (inch)
	L (mm)	T (mm)	L (mm)	T (mm)	
25	SEE PN 16	4	100	4	1"
32			100	4	1¼"
40			100	4	1½"
50			110	4	2"
65			120	4	2½"
80			120	4	3"
100			130	4	4"
125			120	4	140
150	130	4	160	5	6"
200	140	4	190	6	8"
250	160	5	220	7	10"
300	180	6	270	9	12"
350	200	6	300	10	14"
400	220	7	340	11	16"
450	250	8	390	13	18"
500	280	9	420	14	20"
600	320	11	490	17	24"
700	360	12	570	20	28"
800	420	14	630	22	32"
900	460	16	720	25	36"
1000	500	17	800	28	40"

REMARKS:

DN = nominal diameter

L = laminate length

T = laminate thickness



DN (mm)	EPDM PN 10			EPDM 150 Lbs			DN (inch)
	OD (mm)	ID (mm)	Thickness (mm)	OD (mm)	ID (mm)	Thickness (mm)	
25	70	35	3	64	33	3	1"
32	82	43	3	73	42	3	1¼"
40	92	49	3	83	48	3	1½"
50	107	61	4	102	60	4	2"
65	127	77	4	121	73	4	2½"
80	142	90	4	133	89	4	3"
100	162	115	5	171	115	5	4"
125	192	141	5	193	140	5	5"
150	218	169	6	219	168	6	6"
200	273	220	6	276	219	6	8"
250	328	274	6	337	273	6	10"
300	378	325	6	406	325	6	12"
350	438	368	7	448	356	7	14"
400	490	420	7	512	406	7	16"
450	540	470	7	547	457	7	18"
500	595	520	7	604	508	7	20"
600	695	620	7	715	610	7	24"
700	810	720	8	720	829	8	28"
800	915	820	8	820	937	8	32"
1000	1.120	1.020	8	1.020	1.159	8	40"

REMARKS:

DN = nominal diameter

OD = outside diameter gasket

ID = inside diameter gasket

gasket materials also available in FPM (Viton), CSM (Hypalon) and CR (Neoprene)

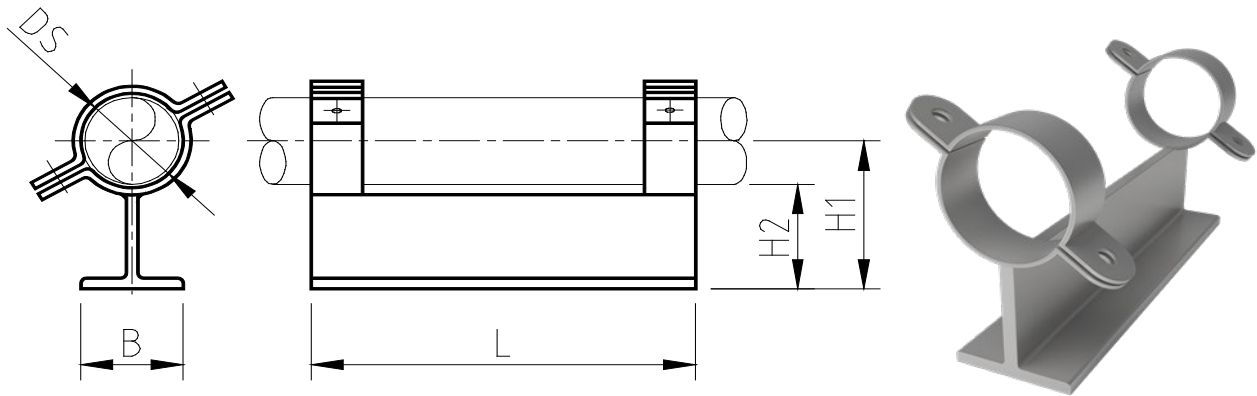


FIGURE 1

DN (mm)	PIPE SHOE DIMENSIONS for UNINSULATED and INSULATED PIPES										MAX. INSUL. Thickn. (mm)	DN (inch)
	SHOE TYPE	PROFILE TYPE (mm)	CLAMP Ds (mm)	INLAY WxT (mm)	B (mm)	L (mm)	H1 (mm)	H2 (mm)	BOLT Dim. (mm)	SHOE Weight (kg)		
25	Fig. 1	T 60x60x7	38	30x3	60	300	84	64	M10 x 30	2,5	50	1"
32	Fig. 1	T 60x60x7	48	40x3	60	300	89	66	M12 x 40	3,2	50	1¼"
40	Fig. 1	T 60x60x7	54	40x3	60	300	93	66	M12 x 40	3,3	50	1½"
50	Fig. 1	T 80x80x9	63	40x3	80	300	118	86	M12 x 40	4,8	70	2"
65	Fig. 1	T 80x80x9	80	40x3	80	300	126	86	M12 x 40	5,0	70	2½"
80	Fig. 1	T 80x80x9	95	40x3	80	300	133	86	M12 x 40	5,2	70	3"
100	Fig. 1	T 80x80x9	114	40x3	80	300	145	88	M12 x 40	6,1	70	4"
125	Fig. 1	T 100x100x11	140	50x3	100	300	178	108	M16 x 50	9,5	80	5"
150	Fig. 1	T 100x100x11	165	50x3	100	300	190	108	M16 x 50	9,9	80	6"

REMARKS:

DN = inside diameter

Clamp Ds = clamp inside diameter

Inlay WxT = width x thickness of U-profile rubber protection

B = pipe shoe width

L = pipe shoe length

H1 = height to center of pipe

H2 = height to bottom of pipe (without inlay thickness)

Max. Insul. Thickn. = maximum pipe insulation thickness

NOTE:

Standard material = S235JR hot-dip galvanized

Clamp inlay = 3 mm TPE U-profile rubber

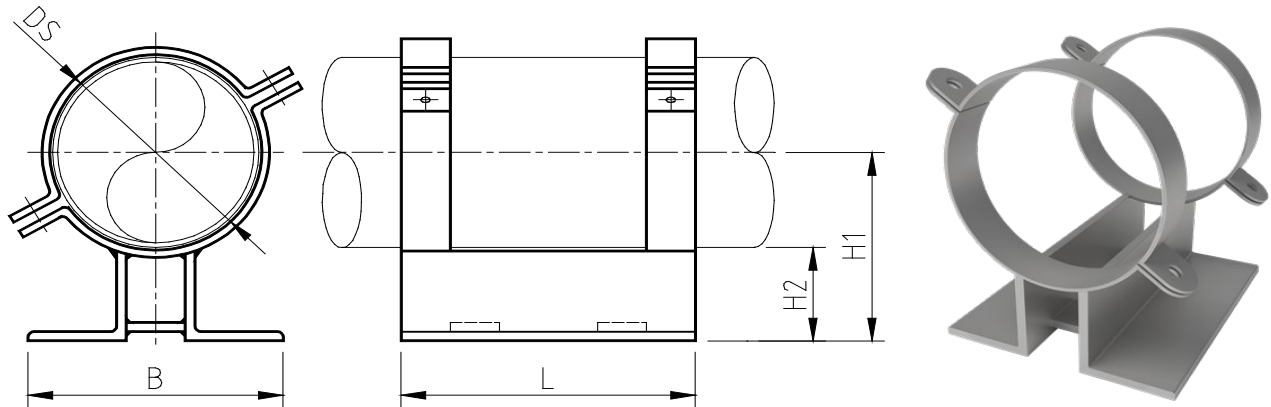


Figure 2

DN (mm)	PIPE SHOE DIMENSIONS for UNINSULATED and INSULATED PIPES										MAX. INSUL. Thickn. (mm)	DN (inch)
	SHOE TYPE	PROFILE TYPE	CLAMP Ds (mm)	INLAY WxT (mm)	B (mm)	L (mm)	H1 (mm)	H2 (mm)	BOLT Dim. (mm)	SHOE Weight (kg)		
200	Fig. 2	L 100x100x10	216	50x3	260	300	208	101	M16 x 50	15,6	80	8"
250	Fig. 2	L 100x100x10	267	60x3	260	300	234	101	M20 x 60	18,6	80	10"
300	Fig. 2	L 100x100x10	318	60x3	260	300	260	101	M20 x 60	19,8	80	12"
350	Fig. 2	L 100x100x10	368	60x3	260	300	286	102	M20 x 60	21,7	80	14"
400	Fig. 2	L 120x120x10	420	70x3	430	300	313	103	M24 x 80	30,8	80	16"
450	Fig. 2	L 120x120x10	480	70x3	460	300	339	104	M24 x 80	33,9	80	18"
500	Fig. 2	L 150x150x12	520	70x3	460	300	403	142	M24 x 80	42,3	120	20"
600	Fig. 2	L 150x150x12	620	70x3	460	400	455	142	M24 x 80	53,0	120	24"

REMARKS:

DN = inside diameter

Clamp Ds = clamp inside diameter

Inlay WxT = width x thickness of U-profile rubber protection

B = pipe shoe width

L = pipe shoe length

H1 = height to center of pipe

H2 = height to bottom of pipe (without inlay thickness)

Max. Insul. Thickn. = maximum pipe insulation thickness

NOTE:

Standard material = S235JR hot-dip galvanized

Clamp inlay = 3 mm TPE U-profile rubber

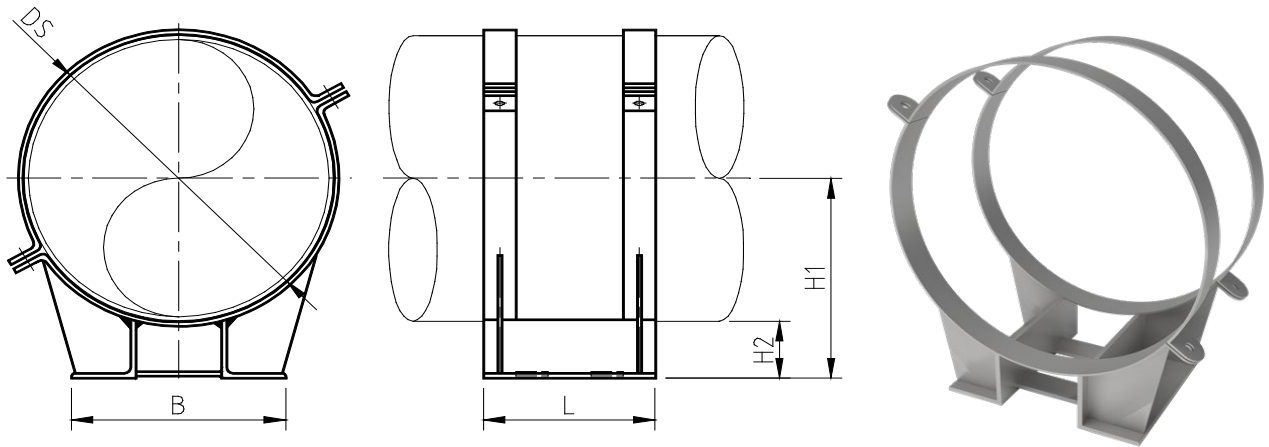


FIGURE 3

DN (mm)	PIPE SHOE DIMENSIONS for UNINSULATED and INSULATED PIPES (PN 10)										MAX. INSUL. Thickn. (mm)	DN (inch)
	SHOE TYPE	PROFILE TYPE (mm)	CLAMP Ds (mm)	INLAY WxT (mm)	B (mm)	L (mm)	H1 (mm)	H2 (mm)	BOLT Dim. (mm)	SHOE Weight (kg)		
700	Fig. 3	L 150x150x12	725	70x3	500	400	504	143	M24 x 80	80,9	120	28"
800	Fig. 3	L 150x150x12	830	70x3	500	400	558	147	M24 x 80	87,8	120	32"
900	Fig. 3	L 180x180x16	935	75x3	630	500	637	175	M24 x 80	127,7	140	36"
1000	Fig. 3	L 180x180x16	1032	75x3	630	500	688	175	M24 x 80	132,7	140	40"

REMARKS:

DN = inside diameter

Clamp Ds = clamp inside diameter

Inlay WxT = width x thickness of U-profile rubber protection

B = pipe shoe width

L = pipe shoe length

H1 = height to center of pipe

H2 = height to bottom of pipe (without inlay thickness)

Max. Insul. Thickn. = maximum pipe insulation thickness

NOTE:

Standard material = S235JR hot-dip galvanized

Clamp inlay = 3 mm TPE U-profile rubber

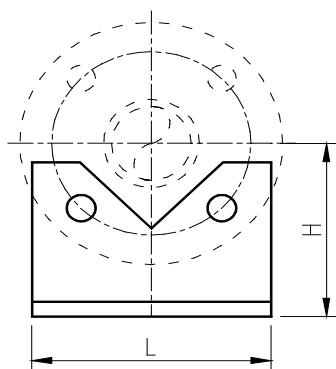


Figure 4

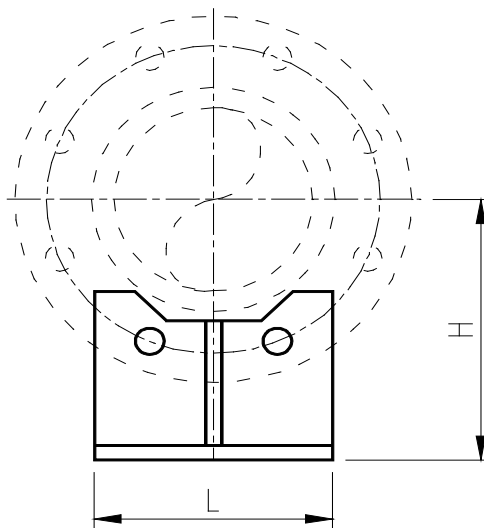
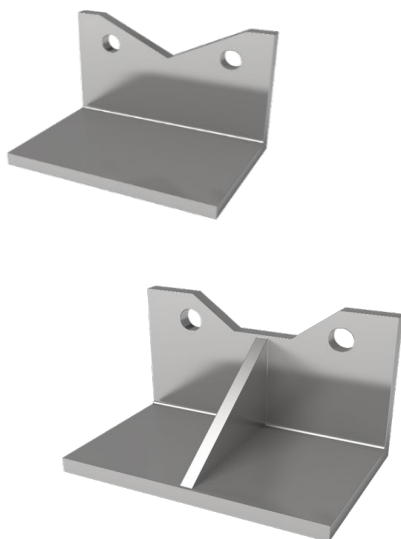


Figure 5

DN (mm)	FLANGE SUPPORT DIMENSIONS for UNINSULATED and INSULATED PIPES								DN (inch)
	SUPPORT TYPE	DRILLING PN 10		DRILLING PN 16		DRILLING 150 [#]		SUPPORT Weight (kg)	
		L (mm)	H (mm)	L (mm)	H (mm)	L (mm)	H (mm)		
25	Figure 4	SEE PN 16		100	84	110	84	0,9	1"
32	Figure 4			130	89	120	89	1,5	1¼"
40	Figure 4			140	93	120	93	1,6	1½"
50	Figure 4			150	118	150	118	2,3	2"
65	Figure 4			160	126	160	126	2,4	2½"
80	Figure 5	SEE PN 16		100	133	170	133	2,6	3"
100	Figure 5			110	145	120	145	1,8	4"
125	Figure 5			130	178	150	178	2,7	5"
150	Figure 5			160	190	160	190	2,8	6"
200	Figure 5			180	208	140	208	180	208

REMARKS:

DN = inside diameter
 L = profile length
 H = height to center of pipe

NOTE:

Standard material = S235JR hot-dip galvanized
 Deliveries may deviate from images

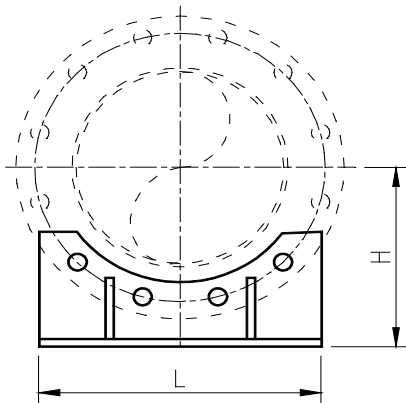


Figure 6

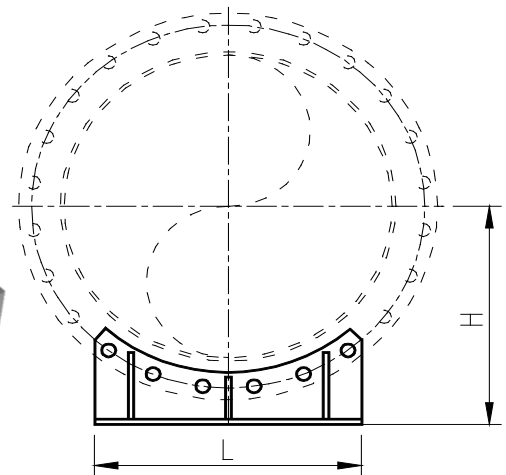
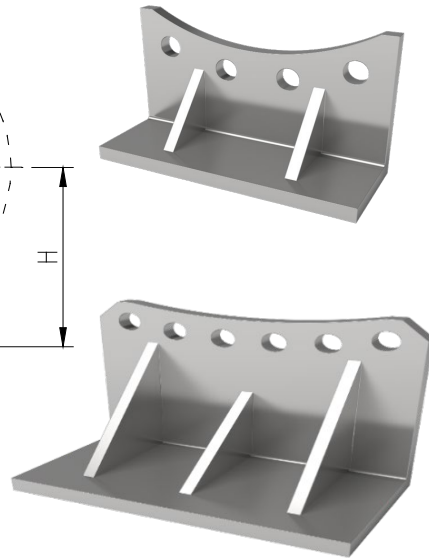


Figure 7

DN (mm)	FLANGE SUPPORT DIMENSIONS for UNINSULATED and INSULATED PIPES								DN (inch)
	SUPPORT TYPE	DRILLING PN 10		DRILLING PN 16		DRILLING 150 [#]		SUPPORT Weight (kg)	
		L (mm)	H (mm)	L (mm)	H (mm)	L (mm)	H (mm)		
250	Figure 6	300	234	310	234	320	234	7,4	10"
300	Figure 6	340	260	350	260	370	260	9,2	12"
350	Figure 6	310	286	320	286	400	286	10,4	14"
400	Figure 6	350	313	360	313	370	313	8,9	16"
450	Figure 6	320	339	340	339	390	339	10,0	18"
500	Figure 6	340	403	370	403	360	403	12,9	20"
600	Figure 6	400	455	430	455	420	455	14,8	24"
700	Figure 7	610	504	630	504	570	504	15,8	28"
800	Figure 7	680	558	670	558	610	558	19,4	32"
900	Figure 7	660	637	650	637	600	637	29,4	36"
1000	Figure 7	730	688	720	688	600	688	28,1	40"

REMARKS:

DN = inside diameter
 L = profile length
 H = height to center of pipe

NOTE:

Standard material = S235JR hot-dip galvanized
 Deliveries may deviate from images

HYDROSTATIC PROPERTIES				
DESCRIPTION	SYMB.	VALUE	UNIT	TEST METHOD
Short Term Tensile Strength, biaxial, hoop	σ_{tr}	282	N/mm ²	ASTM D 1599
Short Tensile Strength, biaxial, axial	σ_{ta}	141	N/mm ²	ASTM D 1599
Long Term Hydrostatic Design Basis	σ_{LTHS}	129	MPa	ASTM D 2992-B
97,5% Lower Confidence Limit	HDB, LCL, σ_{qs}	110	MPa	ASTM D 2992-B
Regression Gradient	$G_{default}$	0,059	-	ASTM D 2992-B
Hydrostatic Design Stress at NPR	HDS, σ_{npr}	62	MPa	ISO 14692
based on:	f_2	0,67	-	
	f_{2test}	0,89	-	
	f_3	0,845	-	

ISO 14692 FAILURE ENVELOPE				
DESCRIPTION	SYMB.	VALUE	UNIT	TEST METHOD
LCL Lower Confidence Limit or Qualified Stress	σ_{qs}	110	Mpa	ASTM D 2992-B
Short Term Hoop Strength at 2:1 Stress Ratio	$\sigma_{sh(2:1)}$	240	Mpa	ASTM D 1599
Scaling Factor	f_{scale}	0,46	-	
Short Term Axial Strength at 0:1 Stress Ratio	$\sigma_{sa(0:1)}$	80	Mpa	ASTM D 2105
Short Term Axial Strength at 2:1 Stress Ratio	$\sigma_{sa(2:1)}$	120	Mpa	ASTM D 1599

MECHANICAL PROPERTIES				
DESCRIPTION	SYMB.	VALUE	UNIT	TEST METHOD
Hoop Bending Stress	σ_{bh}	120	N/mm ²	ASTM D 2412
Hoop Bending Modulus	E_{bh}	25.000	N/mm ²	ASTM D 2412
Axial Bending Stress	σ_{ba}	80	N/mm ²	
Axial Bending Modulus	E_{ba}	12.500	N/mm ²	ASTM D 2925
Hoop Tensile Stress	σ_{th}	240	N/mm ²	ASTM D 2290
Hoop Tensile Modulus	E_{th}	22.000	N/mm ²	ASTM D 2290
Short Term Axial Tensile Stress	σ_{ta}	80	N/mm ²	ASTM D 2105
Axial Tensile Modulus	E_{ta}	12.000	N/mm ²	ASTM D 2105
Shear Modulus	G	11.000	N/mm ²	
Equivalent Ring Flexural Modulus of Elasticity	E_{hf}	28.000	N/mm ²	
Poissons Ratio Axial Load/Hoop Contraction	ρ_{gvk}	0,3	-	ASTM D 2105 (mod)
Poissons Ratio Hoop Load/Axial Contraction	ν_{xh}	0,55	-	
Barcol Hardness	ν_{xh}	40	-	ASTM D 2583

PHYSICAL PROPERTIES				
DESCRIPTION	SYMB.	VALUE	UNIT	TEST METHOD
Expansion Coefficient, axial	σ_r	$18 \cdot 10^{-6}$	1/°C	ASTM D 696
Density	ρ_{gvk}	1,9	kg/dm ³	ASTM D 792
K-Value	k	0,01	mm	
Heat Conductivity	λ	0,26	W/mK	ASTM C 177