

# SSAB Water mains

## PIPES AND FITTINGS

Pipes and fittings manufactured by SSAB are used primarily with water pipeline sizes DN 400–1200. The fittings are made of steel pressure pipes (ex works delivery) and can be coated internally and externally. Ends of fittings can be equipped for different joining methods. This brochure presents the recommended dimensions, which are agreed individually for each order.

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**Joining methods and their designation on an order**

Pipe joints are used to join pipes and fittings into an integrated pipeline. Joints can be divided into two main types: tension-resistant and non-resistant ones. Figure 1 describes tension-resistant joint types. Joints may also be divided by applications. A general description of joint types, their applications and installation is given in SSAB's installation instruction.

**Designation of pipe end shapes**

- DIN/G = sleeve end of DIN joint with rubber ring
- SL = straight end, no bevel
- SS = straight end, external 30° bevel
- OS = straight end of OV joint, internal 18° bevel
- OM = sleeve end of OV joint
- FL = weld-neck flange

**Impact of OV and DIN joints on effective length of pipe**

The sleeve reduces the effective length of the OV joint by 50 mm (e.g. the effective length of a 12 m pipe is 11.95 m). The sleeve reduces the effective length of the DIN joint by 110 mm (e.g. the effective length of a 12 m pipe is 11.89 m).

**Designations on fittings**

The following designations are marked on fittings

- manufacturer's code
- part number.

Other designation methods are agreed when placing an order.

Figure 1. Pipe end shapes used in tension-resistant joints and their designation

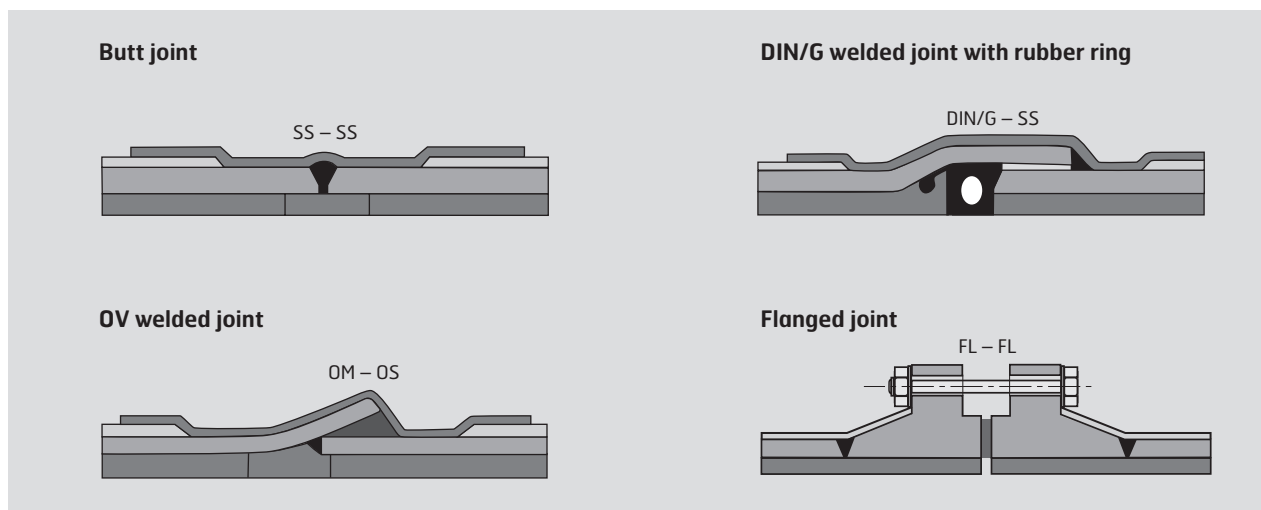


Table 1. Dimensions and metre weights

Nominal size, DN	Outside diameter mm	Mass (kg/m) by wall thickness t(mm)								
		6.3	7.1	8.0	8.8	10.0	11.0	12.5	14.2	16.0
<b>400</b>	406.4	<b>62.2</b>	69.9	78.6	86.3	97.8	107	121		
<b>500</b>	508	<b>77.9</b>	87.7	98.6	108	123	135	153		
<b>600</b>	610	93.8	106	<b>119</b>	130	148	162	184	209	
<b>700</b>	711		123	<b>139</b>	152	173	190	215	244	
<b>800</b>	813			159	<b>175</b>	198	218	247	280	314
<b>900</b>	914			179	196	<b>223</b>	245	278	315	354
<b>1000</b>	1016			199	219	248	<b>273</b>	309	351	395
<b>1200</b>	1220			239	263	298	328	<b>372</b>	422	475

The dimensions recommended by SSAB are shown in bold. These dimensions are spirally welded of steel grade P235GH.

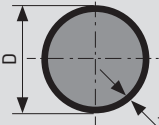


Table 2. Mechanical properties

Steel grade	Standard	Yield strength $R_{eH}$ N/mm <sup>2</sup> Minimum	Tensile strength $R_m$ N/mm <sup>2</sup>	Elongation $A_5$ % Minimum
<b>P235TR1</b>	EN 10217-1	235	360 – 500	25
<b>P235GH TC1<sup>1)</sup></b>	EN 10217-5	235	360 – 500	25
<b>P355TR1<sup>2)</sup></b>	EN 10217-1	355	500 – 650	21
<b>St 37.0</b>	DIN 1626	235	350 – 480	25
<b>St 52.0</b>	DIN 1626	355	500 – 650	21
<b>L235</b>	EN 10224	235	350 – 500	25
<b>L355</b>	EN 10224	355	500 – 650	21

<sup>1)</sup> P235GH is SSAB's most common steel grade on stock.  
<sup>2)</sup> P355TR1 is produced acc. to suitable parts of EN 10217-1, not on stock

Table 3. Permissible pressures

Outside diameter, mm	Wall thickness mm								
	6.3	7.1	8.0	8.8	10.0	11.0	12.5	14.2	16.0
	<b>Permissible pressure (bar) according to outside diameter and wall thickness</b>								
<b>406.4</b>	35	40	47	52	61	67	78		
<b>508</b>	28	32	37	42	49	53	62		
<b>610</b>	23	27	31	35	40	44	51	60	
<b>711</b>		23	26	30	35	38	44	51	
<b>813</b>			23	26	30	33	39	45	
<b>914</b>			21	23	27	29	34	40	
<b>1016</b>			18	21	24	26	31	36	41
<b>1220</b>			15	17	20	22	26	30	34

Table shows rough permissible service pressures at room temperature according to standard SFS 3274 according to outside diameter and wall thickness for steel grade P235 (design strength and safety factor 1,5). The calculations assumed coated pipes which allows ignoring the corrosion allowance. Accurate calculation of permissible service pressure shall be made according to application e.g. according to standard EN 13480-3.

During pipe production leak-tightness of each pipe will be tested by hydrostatic water pressure test. Test pressure is calculated using equation in standard EN 10217-1 section 10.3.2 or standard EN 10217-5 section 11.6.

Figure 2. Determination of effective length on DIN/G and OV welded joints

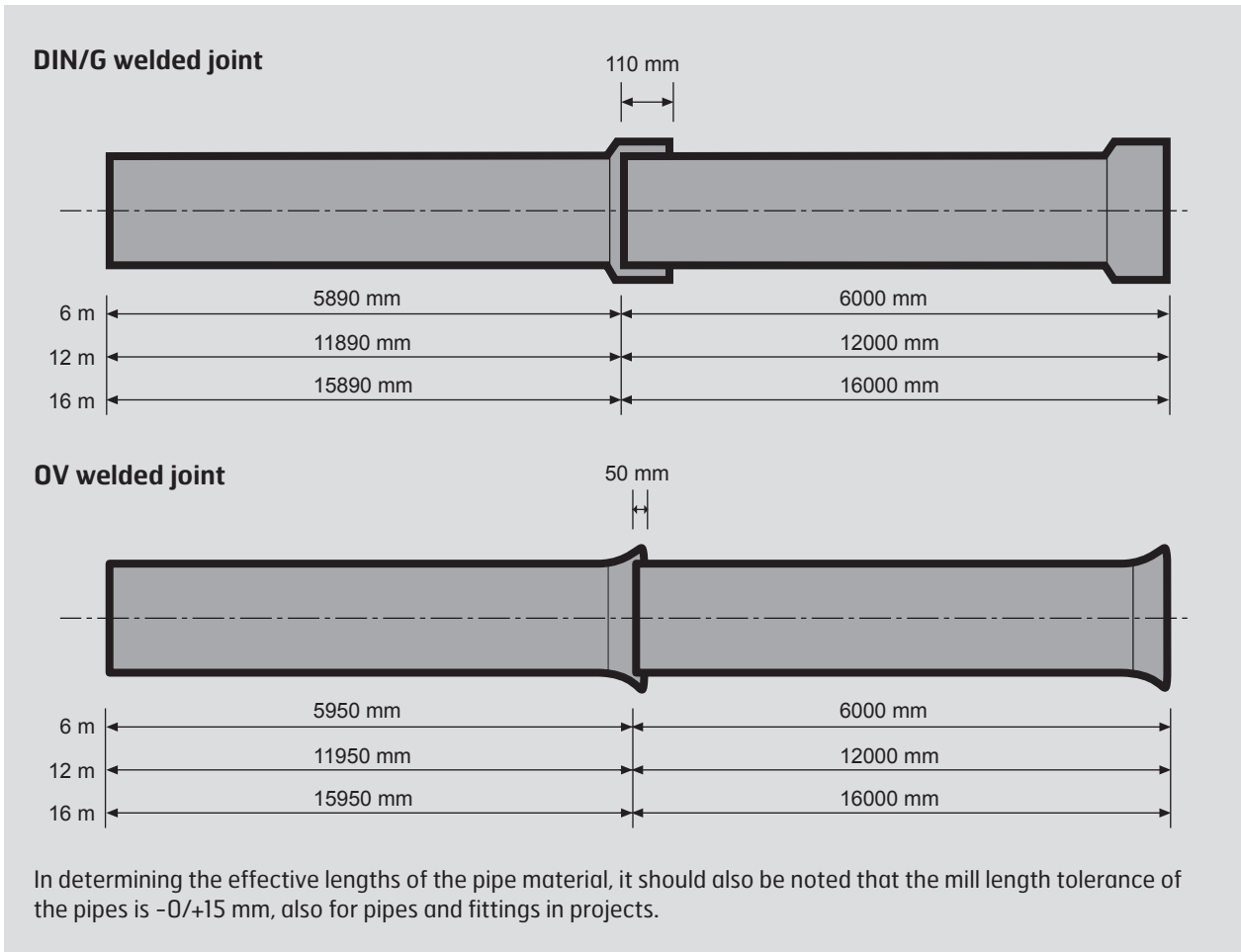
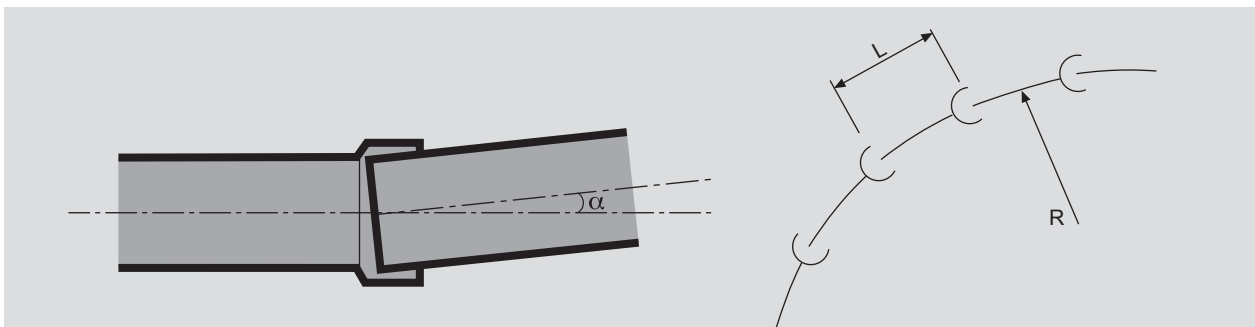


Figure 3. Allowed bends of sleeve joints



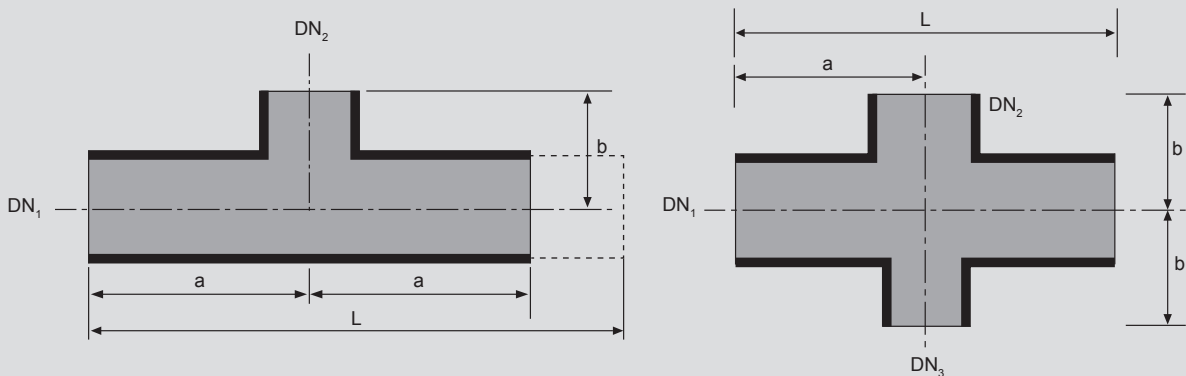
Sleeve joints allow maximum bends as shown in the table. Usually in piping plans a maximum of 50% of the allowed bends are used to ensure that the maximum limit is not exceeded during installation.

Nominal size	Maximum bends	
	DIN/G welded joint	OV welded joint
DN 400	2,25°	-
DN 500	2°	-
DN 600	1,75°	3°
DN 700	1,5°	2,75°
DN 800	1,25°	2,5°
DN 900	1°	2,25°
DN 1000	0,75°	2°
DN 1200	0,5°	1,5°

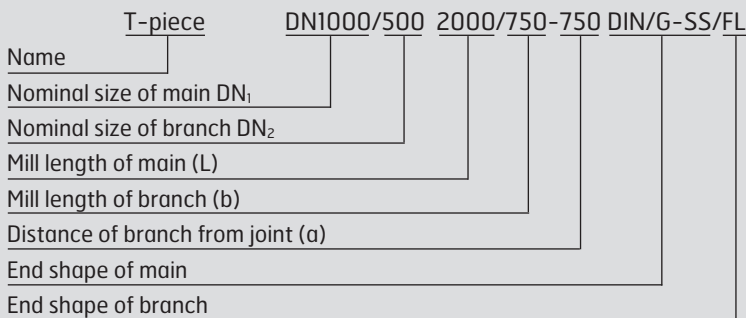
Table 4. T-piece

Main pipe		Mill Length	Branch pipe, nominal size, DN <sub>2</sub>												
Nominal size, DN <sub>1</sub>	Outside diameter		100	150	200	250	300	400	500	600	700	800	900	1000	1200
300	323.9	a	450	450	450	450	450	-	-	-	-	-	-	-	-
		b	400	400	450	450	450	-	-	-	-	-	-	-	-
400	406.4	a	600	600	600	600	600	600	-	-	-	-	-	-	-
		b	400	400	450	450	450	500	-	-	-	-	-	-	-
500	508	a	600	600	600	600	600	600	760	-	-	-	-	-	-
		b	450	450	500	500	500	550	550	-	-	-	-	-	-
600	610	a	600	600	600	600	600	600	760	920	-	-	-	-	-
		b	500	500	550	550	550	600	600	600	-	-	-	-	-
700	711	a	600	600	600	600	600	600	760	920	1070	-	-	-	-
		b	550	550	600	600	600	650	650	650	650	-	-	-	-
800	813	a	600	600	600	600	600	600	760	920	1070	1220	-	-	-
		b	600	600	650	650	650	710	710	710	710	790	-	-	-
900	914	a	600	600	600	600	600	600	760	920	1070	1220	1370	-	-
		b	600	625	650	650	650	675	700	725	750	775	800	-	-
1000	1016	a	600	600	600	600	600	600	760	920	1070	1220	1370	1520	-
		b	710	710	760	760	760	810	810	810	810	890	890	890	-
1200	1220	a	600	600	600	600	600	600	760	920	1070	1220	1370	1370	1830
		b	810	810	860	860	860	910	910	910	910	990	990	990	990

Recommended dimensions according to Standard EN 10224. A branch pipe may also be welded to a main without a separate fitting. Often thicker wall thickness is used to make stiffer T-piece. Production tolerance is -0/+10 mm for L, a and b. All dimensions are in millimetres.



**Order designation example**



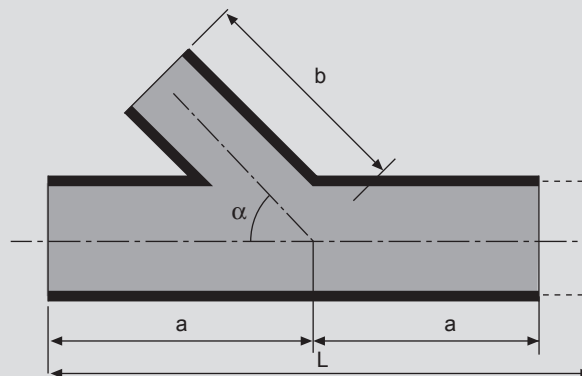
**Designation of end shapes**

- SL = straight end, no bevel
- SS = straight end, external 30° bevel
- OS = Straight end of OV joint, internal 18° bevel
- FL = weld-neck flange
- OM = sleeve end of OV joint
- DIN/G = sleeve end of DIN joint with rubber ring

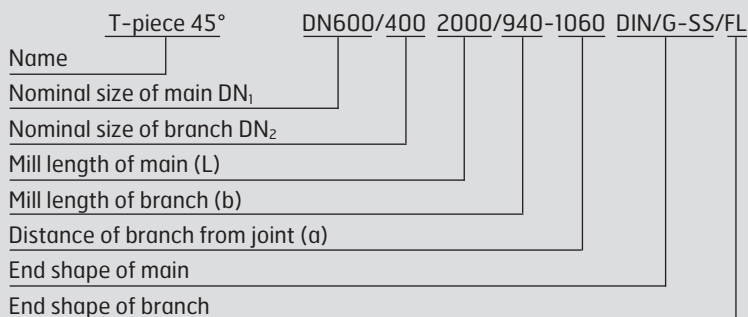
Table 5. Angled T-piece

Main		Mill length	Branch pipe, nominal size, DN <sub>2</sub>										
Nominal size, DN <sub>1</sub>	Outside diameter		200	250	300	400	500	600	700	800	900	1000	1200
			L										
			1300	1300	1300	1700	1700	1700	2100	2100	2500	2500	3000
300	323.9	a	560	615	660	–	–	–	–	–	–	–	–
		b	545	570	620	–	–	–	–	–	–	–	–
400	406.4	a	610	660	710	760	–	–	–	–	–	–	–
		b	625	650	700	800	–	–	–	–	–	–	–
500	508	a	660	710	760	810	870	–	–	–	–	–	–
		b	695	720	770	870	970	–	–	–	–	–	–
600	610	a	810	760	810	860	920	1180	–	–	–	–	–
		b	765	790	840	940	1040	1140	–	–	–	–	–
700	711	a	760	810	860	910	970	1230	1330	–	–	–	–
		b	835	860	910	1010	1110	1210	1260	–	–	–	–
800	813	a	–	860	910	960	1020	1280	1380	1480	–	–	–
		b	–	940	980	1080	1180	1280	1330	1380	–	–	–
900	914	a	–	–	960	1010	1070	1330	1430	1530	1630	–	–
		b	–	–	1040	1140	1250	1350	1400	1450	1500	–	–
1000	1016	a	–	–	–	1060	1120	1380	1480	1580	1680	1780	–
		b	–	–	–	1210	1320	1420	1470	1520	1570	1620	–
1200	1220	a	–	–	–	–	–	1480	1530	1630	1730	1830	2080
		b	–	–	–	–	–	–	1570	1620	1670	1720	1770

Recommended dimensions. Lengths may also be chosen according to project. Production tolerances are for angle  $\alpha \pm 1^\circ$  and lengths  $-0/+10$  mm for L, a and b. Minimum angle  $\alpha$  is  $45^\circ$ . All dimensions are in millimetres.



**Order designation example**



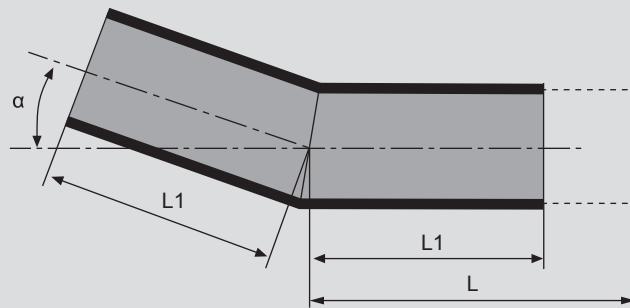
**Designation of end shapes**

- SL = straight end, no bevel
- SS = straight end, external  $30^\circ$  bevel
- OS = Straight end of OV joint, internal  $18^\circ$  bevel
- FL = weld-neck flange
- OM = sleeve end of OV joint
- DIN/G = sleeve end of DIN joint with rubber ring

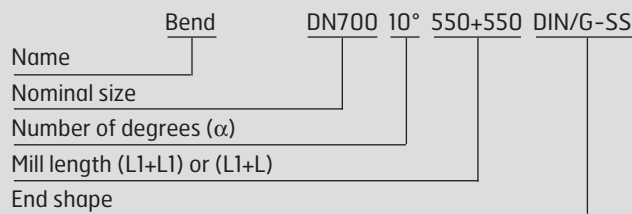
Table 6. Bend  $\alpha \leq 30^\circ$

Nominal size DN	Outside diameter	Section length L1
300	323.9	375
400	406.4	450
500	508	450
600	610	550
700	711	550
800	813	600
900	914	600
1000	1016	750
1200	1220	850

Recommended dimensions according to Standard EN 10224 for gusseted bends. Length, L, may also be chosen according to project. Solid angle  $\alpha$  of a bend is needed. Solid angle is calculated with horizontal and vertical angles according to table 17. Production tolerances are for angle  $\alpha \pm 1^\circ$  and for section lengths L and L1  $-0/+10$  mm. All dimensions are in millimetres.



#### Order designation example



#### Designation of end shapes

- SL = straight end, no bevel
- SS = straight end, external 30° bevel
- OS = straight end of OV joint, internal 18° bevel
- FL = weld-neck flange
- OM = sleeve end of OV joint
- DIN/G = sleeve end of DIN joint with rubber ring

#### Designation example of bend dimensions

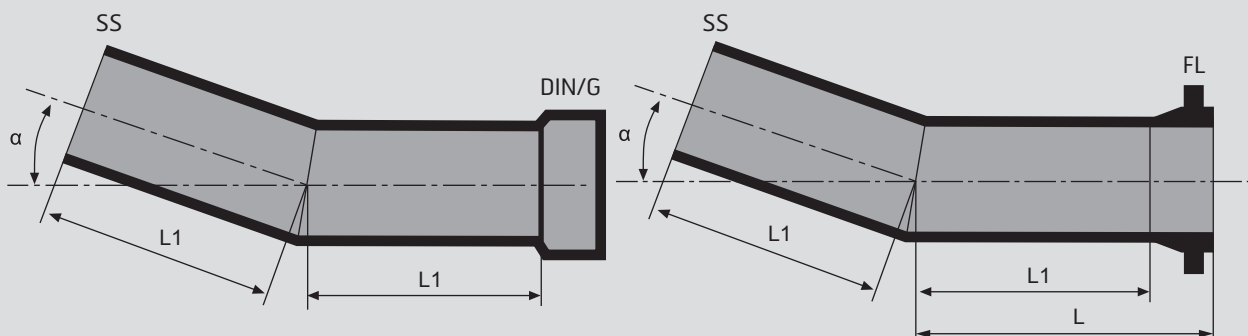
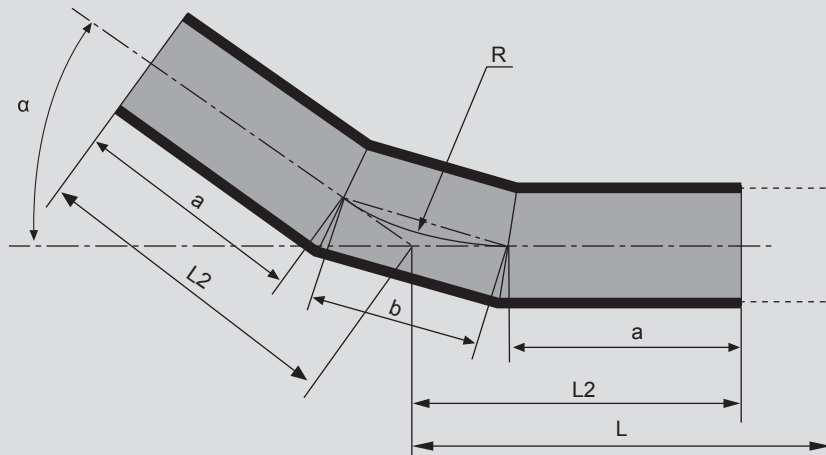


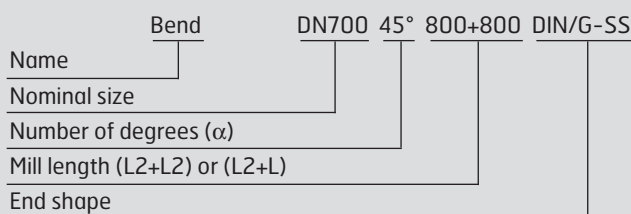
Table 7. Bend  $30^\circ < \alpha \leq 60^\circ$

Nominal size DN	Outside diameter	$30^\circ < \alpha \leq 45^\circ$	Radius R	$45^\circ < \alpha \leq 60^\circ$	Radius R
		Section length L2		Section length L2	
300	323.9	450	450	500	450
400	406.4	600	600	600	600
500	508	600	750	600	500
600	610	750	900	750	600
700	711	800	1050	750	700
800	813	850	1200	850	800
900	914	900	1350	900	900
1000	1016	1100	1500	1100	1000
1200	1220	1200	1800	1200	1200

Recommended dimensions according to Standard EN 10224 for gusseted bends. Solid angle  $\alpha$  of a bend is needed. Solid angle is calculated with horizontal and vertical angles according to table 17. Section lengths a and b are not needed, because SSAB calculates itself them for production. Production tolerances are for angle  $\alpha \pm 1^\circ$ , for radius R  $\pm 1\%$  of length of radius, and for section lengths L and L2  $-0/+10$  mm. All dimensions are in millimetres.



**Order designation example**



**Designation of end shapes**

- SL = straight end, no bevel
- SS = straight end, external 30° bevel
- OS = straight end of OV joint, internal 18° bevel
- FL = weld-neck flange
- OM = sleeve end of OV joint
- DIN/G = sleeve end of DIN joint with rubber ring

**Designation example of bend dimensions**

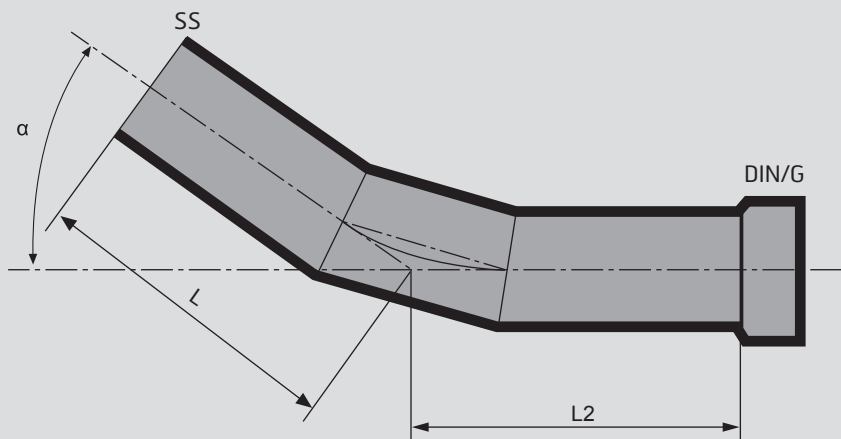
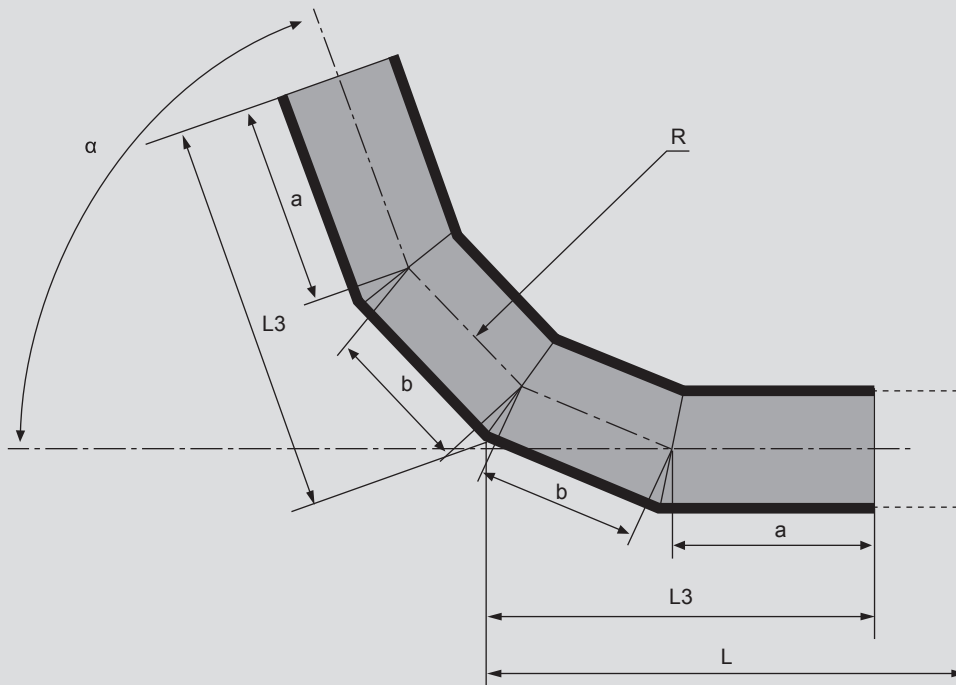




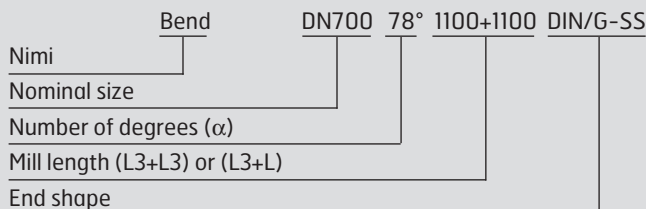
Table 8. Bend  $60^\circ < \alpha \leq 90^\circ$

Nominal size DN	Outside diameter	Section length L3	Radius R
300	323.9	700	450
400	406.4	850	600
500	508	850	500
600	610	1000	600
700	711	1100	700
800	813	1200	800
900	914	1300	900
1000	1016	1500	1000
1200	1220	1700	1200

Recommended dimensions according to Standard EN 10224 for gusseted bends. Length, L, may also be chosen according to project. Solid angle  $\alpha$  of a bend is needed. Solid angle is calculated with horizontal and vertical angles according to table 17. Section lengths a and b are not needed, because SSAB calculates itself them for production. Production tolerances are for angle  $\alpha \pm 1^\circ$ , for radius  $R \pm 1\%$  of length of radius, and for section lengths L and L3  $-0/+10$  mm. All dimensions are in millimetres.



### Order designation example



### Designation of end shapes

- SL = straight end, no bevel
- SS = straight end, external 30° bevel
- OS = straight end of OV joint, internal 18° bevel
- FL = weld-neck flange
- OM = sleeve end of OV joint
- DIN/G = sleeve end of DIN joint with rubber ring

Designation example of bend dimensions, see tables 6 and 7.

Table 9. Flanged pipe

Nominal size DN	Outside diameter	Overall length L
300	323.9	400
400	406.4	400
500	508	400
600	610	600
700	711	600
800	813	800
900	914	800
1000	1016	800
1200	1220	1000

All dimensions are in millimetres. The flange may also be welded directly onto the end of a pipe of a max. length of 16 m.

**Flange type, see table 12**

EN 1092-1 type 11 PN10

EN 1092-1 type 11 PN16

**Order designation example**

Flanged pipe		DN600	600	SS-FL EN 1092-1	type 11 PN10
Name					
Nominal size DN					
Mill Length (L)					
End shape					
Flange type and pressure class					

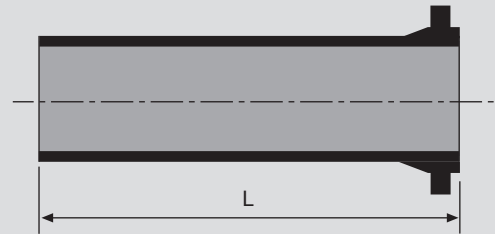


Table 10. Welding collar

Nominal size DN	Internal diameter, Di	Length, L	Thickness, t
600	610	200	8
700	711	200	8
800	813	200	10
900	914	200	10
1000	1016	200	10
1200	1220	200	12

The wall thickness *t* of the welding collar is at least same as the wall thickness of the main pipe. The length *L* can be also longer according to the project, for example 300 mm. All dimensions are in millimetres.

**Use**

The coupling ring is placed on top of the pipe ends and welded onto them by external and internal fillet welds.

More information is given in SSAB's data sheet "SSAB Water mains. Installation".

**Order designation example**

Coupling ring		DN800
Name		
Nominal size DN		

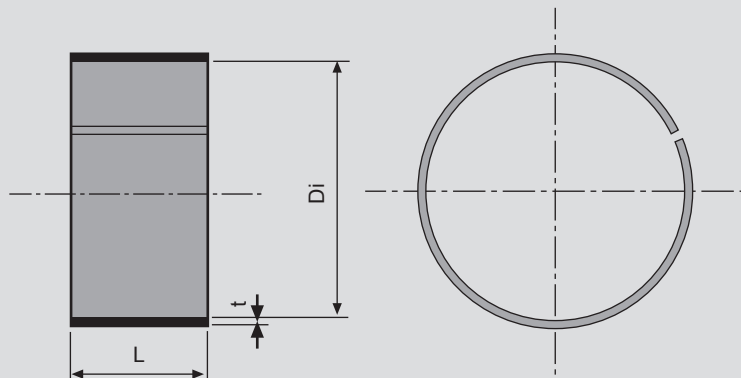
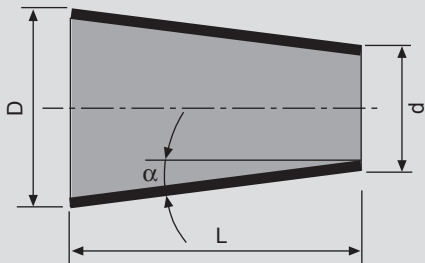
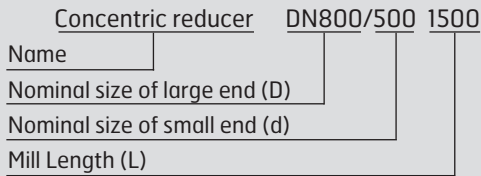


Table 11. Reducer (concentric or eccentric)

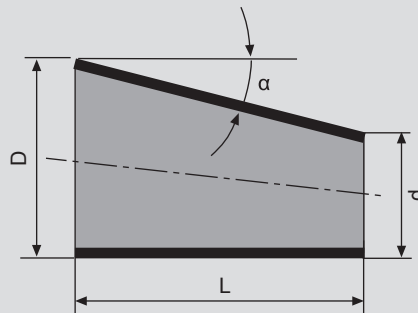
Large end, D		Small end, d, nominal size									
Nominal size DN	Outside diameter	200	300	400	500	600	700	800	900	1000	1100
		Mill length, L									
300	323.9	520	–	–	–	–	–	–	–	–	–
400	406.4	920	400	–	–	–	–	–	–	–	–
500	508	–	900	500	–	–	–	–	–	–	–
600	610	–	–	1000	500	–	–	–	–	–	–
700	711	–	–	–	1000	500	–	–	–	–	–
800	813	–	–	–	1500	1000	500	–	–	–	–
900	914	–	–	–	–	1500	1000	500	–	–	–
1000	1016	–	–	–	–	–	1500	1000	500	–	–
1100	1120	–	–	–	–	–	–	1500	1000	500	–
1200	1220	–	–	–	–	–	–	–	1500	1000	500

All dimensions are in millimetres. Table gives recommended length, L, when the angle  $\alpha$  about 5°. Production tolerances are for angle  $\alpha \pm 1^\circ$  and length L  $-0/+10$  mm.

**Order designation example**

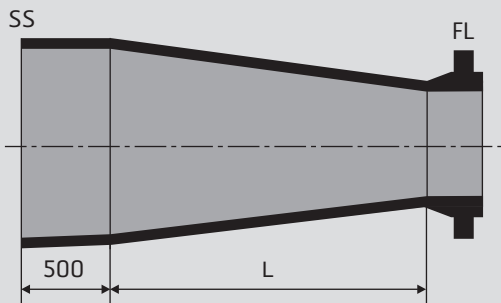


Concentric

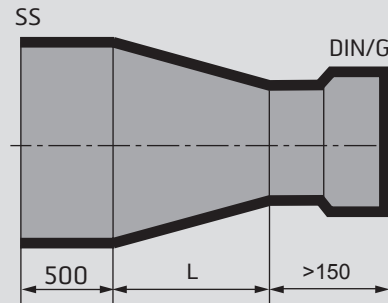


Eccentric

**Example of reducer use**



Flanged reducer



Reducer with DIN/G joint end

Table 12. Weld-neck flange

PN 10							Bolting	
Nominal size							Number	Size
DN	A	D	K	H2	L	C2		
80	88.9	200	160	50	18	20	8	M16
100	114.3	220	180	52	18	20	8	M16
150	168.3	285	240	55	22	22	8	M20
200	219.1	340	295	62	22	24	8	M20
300	323.9	445	400	68	22	26	12	M20
400	406.4	565	515	72	26	26	16	M24
500	508	670	620	75	26	28	20	M24
600	610	780	725	82	30	30	20	M27
700	711	895	840	85	30	35	24	M27
800	813	1015	950	96	33	38	24	M30
900	914	1115	1050	99	33	38	28	M30
1000	1016	1230	1160	105	36	44	28	M33
1200	1220	1455	1380	132	39	55	32	M36

PN 16							Bolting	
Nominal size							Number	Size
DN	A	D	K	H2	L	C2		
80	88.9	200	160	50	18	20	8	M16
100	114.3	220	180	52	18	20	8	M16
150	168.3	285	240	55	22	22	8	M20
200	219.1	340	295	62	22	24	12	M20
300	323.9	460	410	78	26	28	12	M24
400	406.4	580	525	85	30	32	16	M27
500	508	715	650	84	33	36	20	M30
600	610	840	770	88	36	40	20	M33
700	711	910	840	104	36	40	24	M33
800	813	1025	950	108	39	41	24	M36
900	914	1125	1050	118	39	48	28	M36
1000	1016	1255	1170	137	42	59	28	M39
1200	1220	1485	1390	160	48	78	32	M45

All dimensions are in millimetres. Values of tables are in accordance with standard EN 1092-1 tables 12 and 13.

Weld-neck flanges are delivered according to EN 1092-1 type 11 either welded to fittings or separately. SSAB delivers coated weld-neck flanges without any gasket or bolts. Gaskets reinforced with steel, such as KLINGER-KGS, are recommended.

**Flange type**

EN 1092-1 type 11 PN10 (DIN 2632)

EN 1092-1 type 11 PN16 (DIN 2633)

**Order designation example**

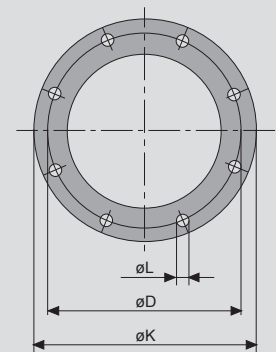
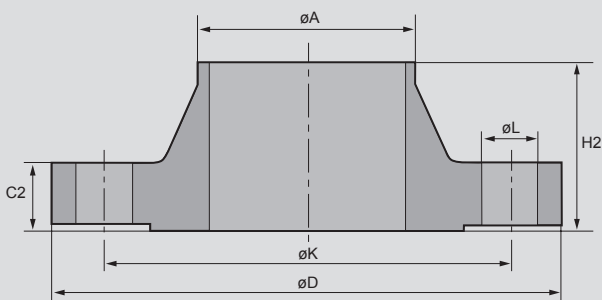
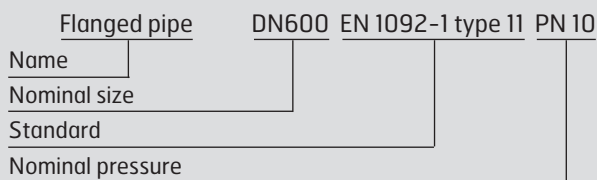


Table 13. Blind flange

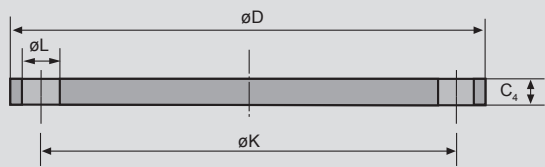
PN 10							
Nominal size						Bolting	
DN	D	K	C4	f1	L	Number	Size
300	445	400	26	4	22	12	M20
400	565	515	26	4	26	16	M24
500	670	620	28	4	26	20	M24
600	780	725	34	5	30	20	M27
700	895	840	38	5	30	24	M27
800	1015	950	48	5	33	24	M30
1000	1230	1160	54	5	36	28	M33
1200	1455	1380	66	5	39	32	M36

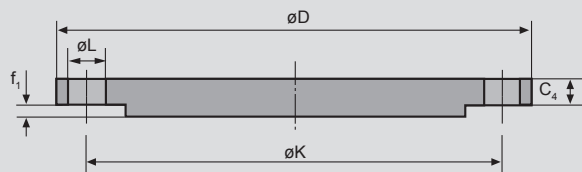
PN 16							
Nominal size						Bolting	
DN	D	K	C4	f1	L	Number	Size
300	460	410	28	4	26	12	M24
400	580	525	32	4	30	16	M27
500	715	650	44	4	33	20	M30
600	840	770	54	5	36	20	M33
700	910	840	58	5	36	24	M33
800	1025	950	62	5	39	24	M36
1000	1255	1170	68	5	42	28	M39
1200	1485	1390	— <sup>1)</sup>	5	48	32	M45

All dimensions are in millimetres. Values of tables are in accordance with standard EN 1092-1 tables 8,12 and 13.

Type A



Type B



Blind flanges are delivered without a gasket or fastening bolts.

Unless otherwise specified in the order, a shape B blind flange is always delivered.

**Blind flange**

EN 1092-1 type 05 PN 10

EN 1092-1 type 05 PN 16

**Material**

S235JRG2 SFS-EN 10025

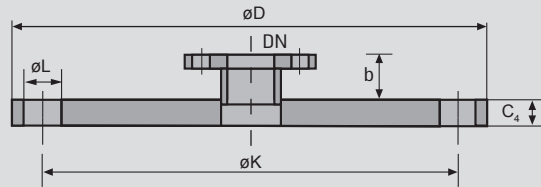
**Order designation example**

Blind flange DN500 EN 1092-1 type 05/A PN 10

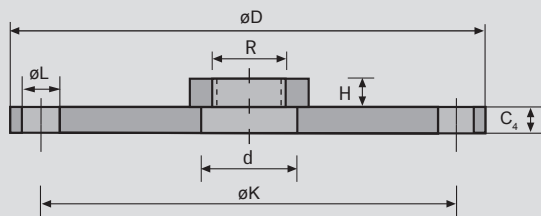
Name	
Nominal size	
Standard	
Flange type/facing type	
Nominal pressure	

Table 14. Blind flange with welded fitting

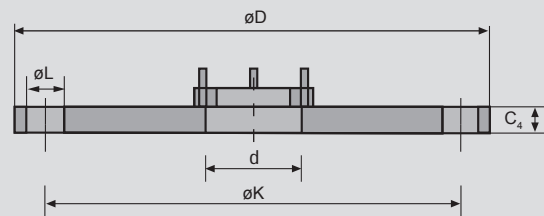
SSAB also offers blind flanges with various fittings with holes as needed. The fitting can be a weld-neck flange, a threaded socket or a headless screw socket. This kind of blind flange is usually used to connect, e.g. a vent pipe, fire hydrant branch pipe or a pressure gauge to DN600 manholes.



Blind flange with weld-neck flange



Blind flange with threaded socket



Blind flange with headless screw socket

Table 15. Dished flanged head

Nominal size DN	Height, H
500	175
600	200
700	230
800	260

All dimensions are in millimetres.

The dished flanged head is made by welding the dished end and the flange together. Bolt holes are in accordance with weld-neck flange in flanged pipe or manhole.

**Dished end**

SS 482

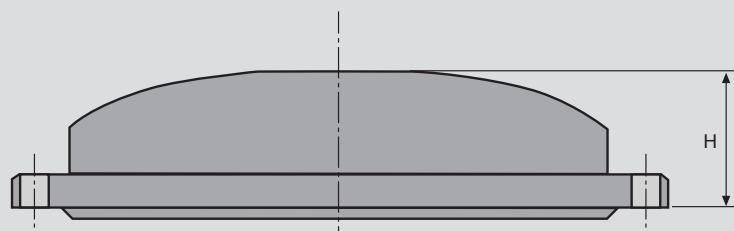
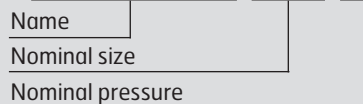
**Flange type**

SFS 2170 PN10

SFS 4171 PN16

**Order designation example**

Dished flanged head DN500 PN10



Dished flanged head

Table 16. Threaded socket

R	D	d	H	h
3/8 "	45	25	20	10
1/2 "	50	30	20	10
3/4 "	55	35	21	11
1 "	60	40	22	12
1 1/4 "	75	50	40	25
1 1/2 "	85	60	45	30
2 "	85	60	45	30

All dimensions are in millimetres. By special agreement, products not included in the table may be delivered.

**Order designation example**

Threaded socket 2"  
 Name \_\_\_\_\_  
 Thread dimension \_\_\_\_\_

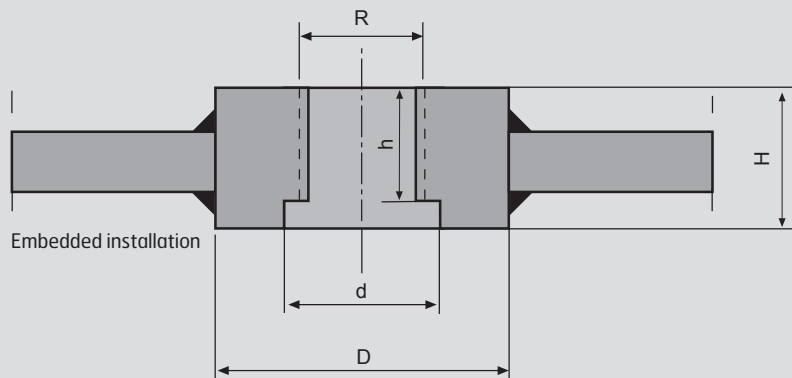
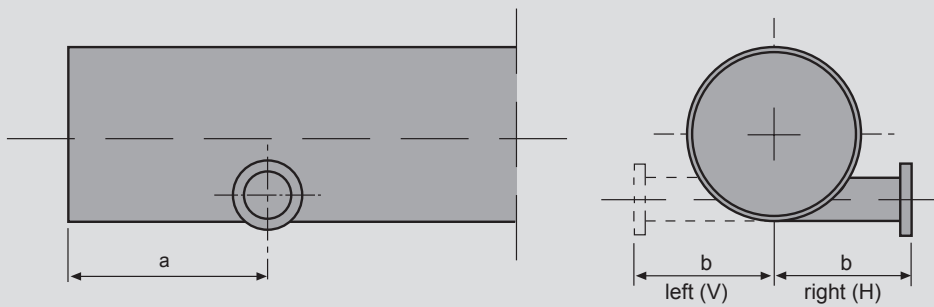


Table 17. Drain pipe

The drain pipe is always equipped with a flange. Often size DN200 is used for drain pipe.

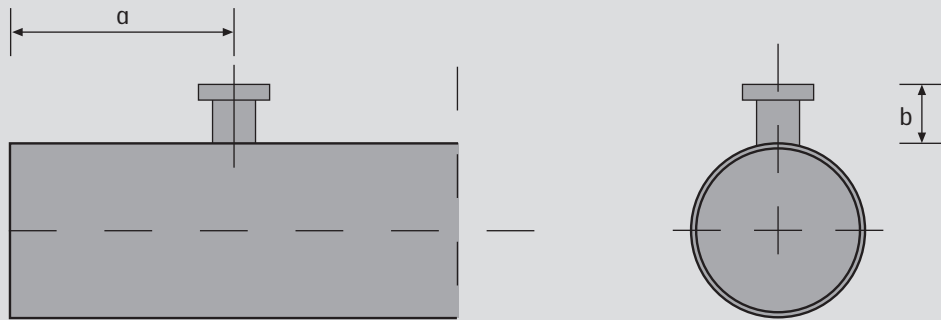


**Order designation example**

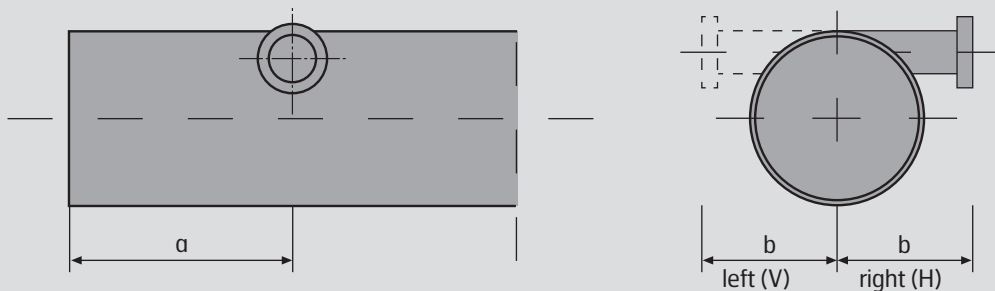
Pipe with drain pipe DN800 7800 DIN/G-SS H DN200 x 600-550  
 Name \_\_\_\_\_  
 Nominal size of main \_\_\_\_\_  
 Main length (L) \_\_\_\_\_  
 End shape of main \_\_\_\_\_  
 Direction of drain pipe \_\_\_\_\_  
 Nominal size of drain pipe \_\_\_\_\_  
 Mill length of drain pipe (b) \_\_\_\_\_  
 Distance of drain pipe from end of pipe (a) \_\_\_\_\_

Table 18. Vent pipe

A vent pipe (or fire hydrant branch pipe) is always equipped with a flange and can either be vertical or horizontal. If the vent pipe is vertical, its mill length  $b$  is indicated from the surface of the steel pipe, and if it is horizontal, the mill length  $b$  is indicated from the centre of the mains. The flange type corresponds with Table 13, the permissible pressure is PN10 or PN16. A vent pipe can be added to a piece of any shape, such as pipes, angled pieces and T pieces. Often sizes DN80 and DN100 are used for vent pipe.



Vent pipe (vertical)



Vent pipe (horizontal)

**Order designation example**

	Pipe fitted with a vent pipe	DN800	6000	DIN/G-SS	H	DN80	x	200	x	550
Name										
Nominal size of main										
Main length (L)										
End shape of main										
Direction of vent pipe										
Nominal size of vent pipe										
Mill length of vent pipe (b)										
Distance of vent pipe from end of pipe (a)										



Table 19. Sealing flange

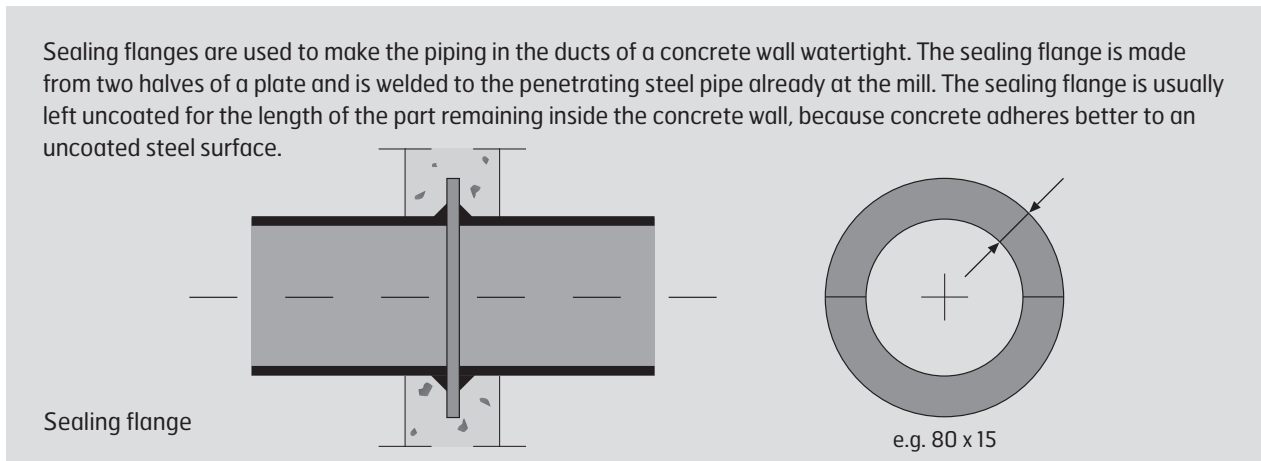


Table 20. Anchorage flange

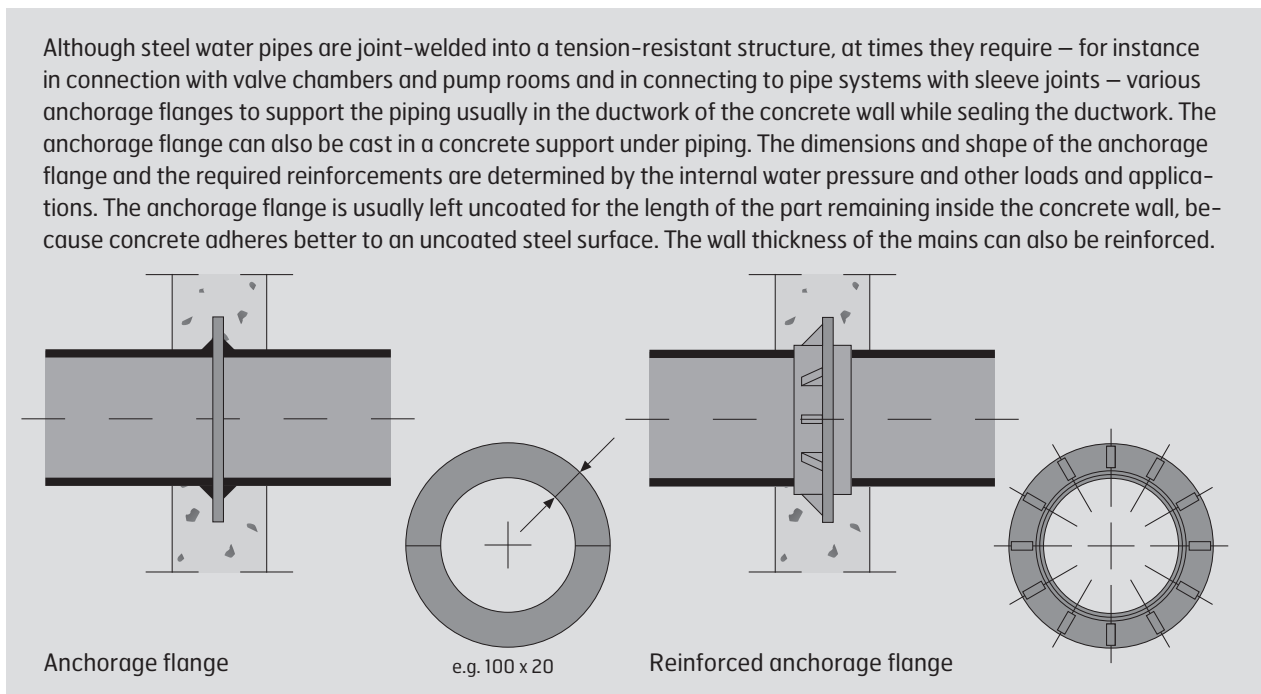


Table 21. Leading-in ring

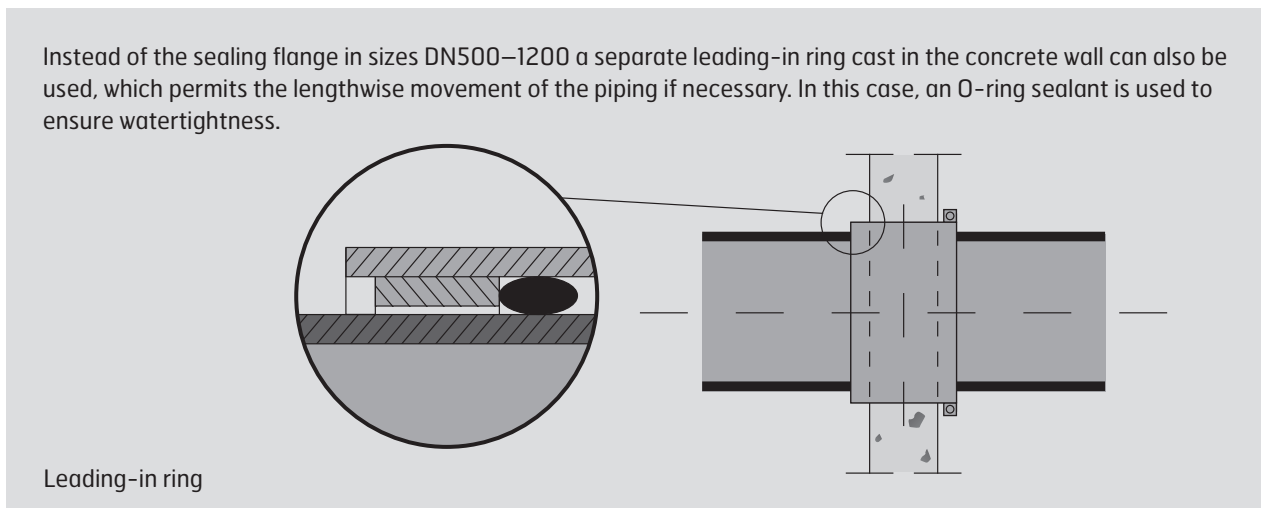
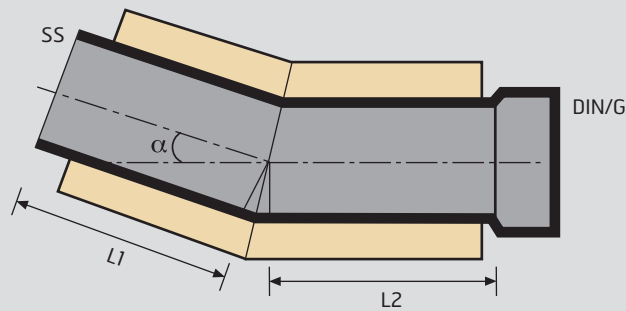
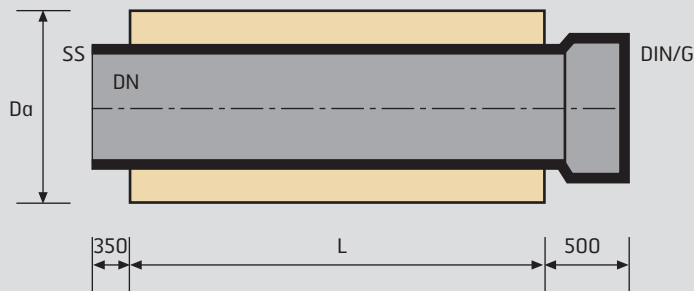
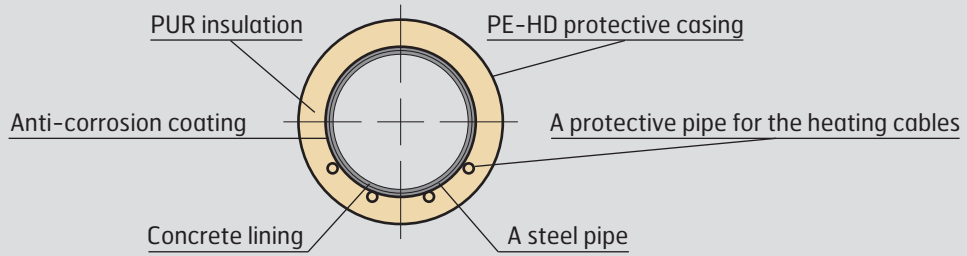


Table 22. Pre-insulated pipes and fittings

SSAB also offers thermally insulated, coated steel pipes and fittings for sites where the piping is not sufficiently protected and is at risk of freezing during winter. Such sites include pipelines in bridges, above ground or underground at minimum cover depth. A thermally insulated pipe consists of a plastic PE-HD protective casing, PUR insulation, an anti-corrosion coating, steel pipe and internal concrete lining. The ends of the fittings can be equipped to suit various joining methods. Metal protection pipes for heat tracing cables can be installed in the insulation in the bottom of the steel pipe. The delivery can also include the materials required for insulating extension seams at the construction site.

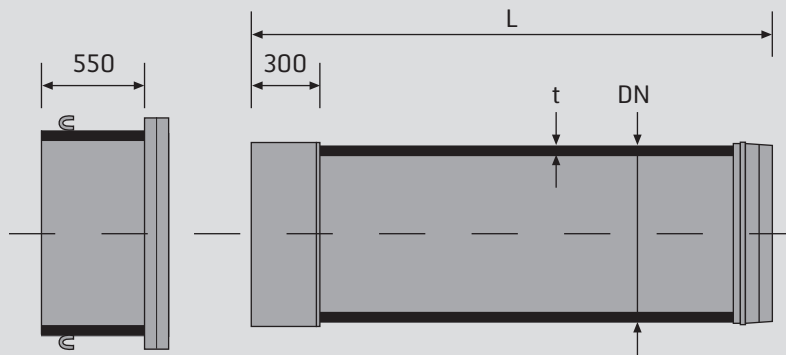


Nominal size DN	Protective casing Da
400	560
500	710
600	800
700	900
800	1000

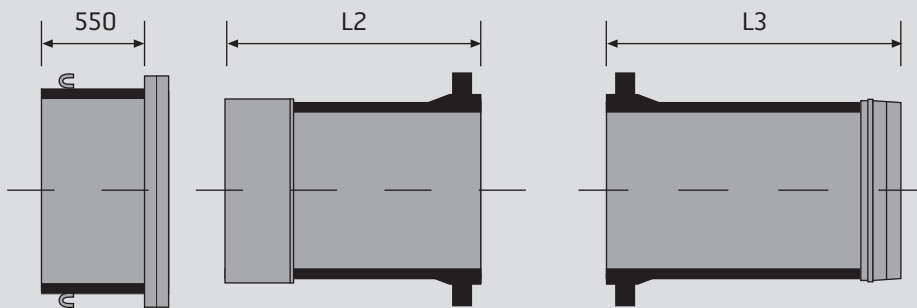
All dimensions are in millimetres.

Table 23. Repair parts for Sentab and Premo pipes

SSAB delivers coated steel repair parts for old DN500-1200 concrete Sentab and Premo piping. A complete repair part includes steel sleeve and straight ends, and the mains pipe in between these. As an alternative, SSAB can also deliver separate transfer parts for the sleeve or straight end and can supply these parts welded to T pieces or flanges, as needed. A T piece in a new structure always requires a corner brace. The original Sentab or Premo sealant (not in SSAB's product offering) is used. In connection with the order, the customer must ensure the compatibility of the repair part with the existing piping. The dimensions and installation of repair parts are described in more detail in separate instructions.



A complete repair part with sleeve and straight end



Sleeve with flange

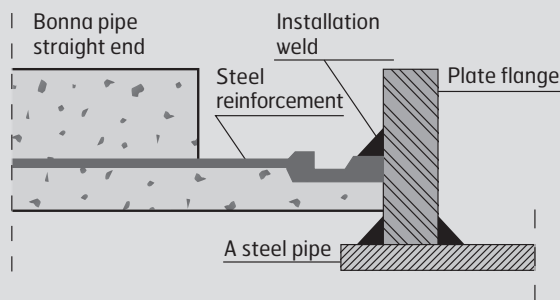
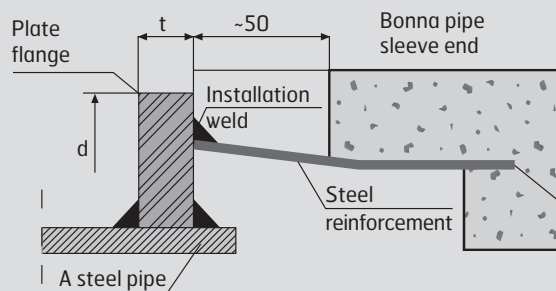
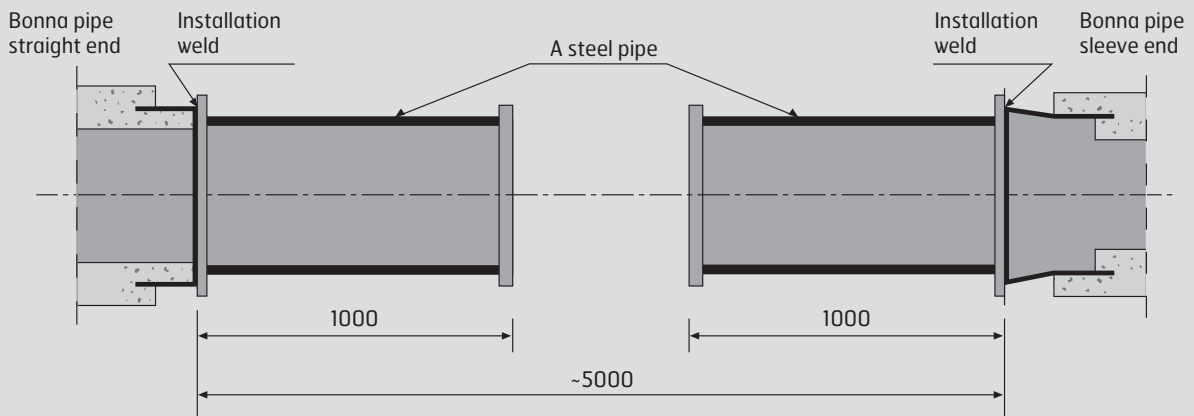
Straight end with flange

Nominal size DN	Outside diameter	Length, L	Wall thickness, t
500	508	4750	6,3
600	610	4750	8
700	711	4750	8
800	813	4750	8,8
900	914	4750	10
1000	1016	4750	11
1200	1220	4750	12,5

All dimensions are in millimetres.

Table 24. Repair parts for Bonna and Normal pipes

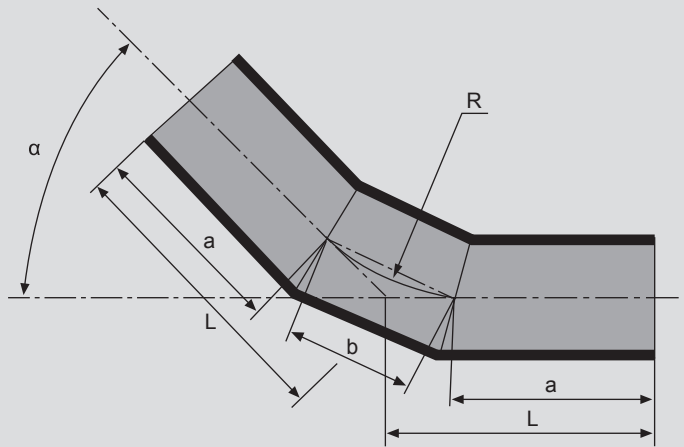
SSAB delivers coated steel repair parts for old DN400-600 concrete Bonna and Normal piping. The repair parts are usually flange-equipped coated pipes in between which a new valve or T piece can be installed. A T piece in a new structure always requires a corner brace. A plate flange is welded to one end of the flange pipe, and a weld-neck flange to the other end. The steel reinforcement inside the original Bonna pipe is welded to the plate flange at the construction site. In the Bonna pipe, approx. 5 cm of concrete in the sleeve end must be removed before welding. The exterior diameter of the plate flange is suitable for welding to both the Bonna pipe's sleeve and straight end. In connection with the order, the customer must ensure the compatibility of the repair part with the existing piping. The dimensions, use and installation of repair parts are described in more detail in separate instructions.



Nominal size DN	Outside diameter, D	Diameter, d	Thickness, t
400	406.4	500	12
500	508	600	12
600	610	700	12

All dimensions are in millimetres.

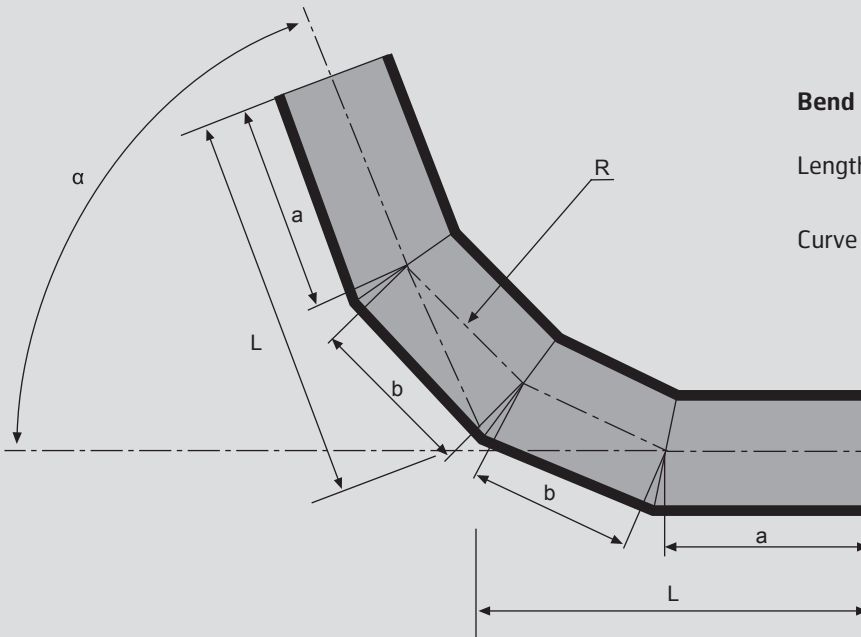
Table 25. Calculation of length and solid angle of a bend



**Bend  $30^\circ < \alpha \leq 60^\circ$**

$$\text{Length } L = a + \frac{b}{2 \cdot \cos \frac{\alpha}{2}}$$

$$\text{Curve of radius } R = \frac{b}{2 \cdot \tan \frac{\alpha}{4}}$$



**Bend  $60^\circ < \alpha \leq 90^\circ$**

$$\text{Length } L = a + b \left( \sin \frac{\alpha}{3} \cdot \tan \frac{\alpha}{2} + \cos \frac{\alpha}{3} \right)$$

$$\text{Curve of radius } R = \frac{b}{2 \cdot \tan \frac{\alpha}{6}}$$

**Calculation of solid angle of a bend**

$$\alpha = \arctan \left( \sqrt{(\tan(\text{horizontal angle}))^2 + (\tan(\text{vertical angle}))^2} \right)$$

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The SSAB logo consists of the letters 'SSAB' in a bold, blue, sans-serif font. The 'S' and 'A' are connected, and the 'B' has a distinctive shape with a vertical bar on its right side.