

SAW

AWWA C 203, C205, C210 BS 534

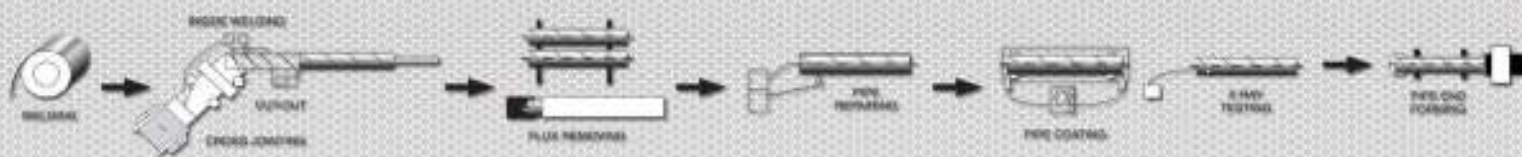


SUBMERGED ARC WELDED

SPIRAL-SEAM STEEL PIPE FOR LARGE CARBON
STEEL PIPE DIAMETER (250-3000 m/m.)

SUBMERGED ARC WELDING

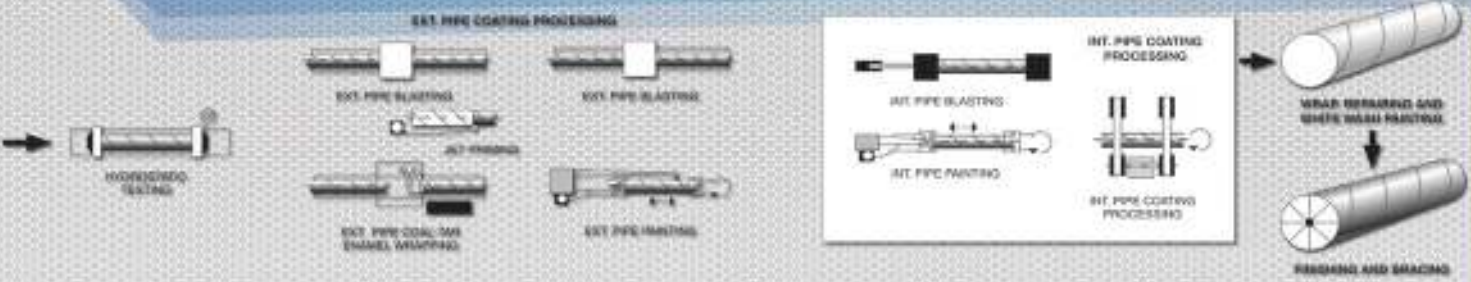
PRODUCTION PROCESS



Arc Welding Carbon Steel Pipes



Specification	Products	Production Capacity	
		Outside Diameter (mm.)	Wall Thickness (mm.)
ASTM A139	Electrical-Fusion Submerge Arc Welding Steel Pipe	300-3000	4.50-19.10
ASTM A211	Submerged Arc Welding Steel or Iron Pipe	300-3000	4.50-19.10
ASTM A252	Welded and Seamless Steel Pipe Piles	300-3000	4.50-19.10
AWWA C 200	Steel Water Pipe 6 Inch and Larger	300-3000	4.50-19.10
AWWA C 203	Coaltar Enamel Protective Coating for steel Water Pipe	300-3000	4.50-19.10
AWWA C 205	Cement Mortar Protective Lining and Coating for Steel Water Pipe	300-3000	4.50-19.10
AWWA C 210	Liquid Epoxy Coating for Steel Water Pipe	300-3000	4.50-19.10
JIS G 3443	Coating Steel Pipe for Water Pipe	300-3000	4.50-19.10
JIS G 3444	Carbon Steel Tubes for General Structural Purpose	300-3000	4.50-19.10
JIS G 3457	Submerged Arc Welded Carbon Steel Pipes	300-3000	4.50-19.10
JIS G 3492	Coaltar Enamel Protective Coating for Steel Water Pipes	300-3000	4.50-19.10
JIS A 5525	Steel Pipes Piles	300-3000	4.50-19.10
BS 534	Steel Pipes, Joints and specials for water and sewage	300-3000	4.50-19.10
HWA, PWA	Steel Pipe and Fittings	300-2100	6.00-19.10
TIS 427	Standard for Electrically Welded Steel Water Pipe	300-1500	6.00-12.70



Arc Welding Carbon Steel Pipes



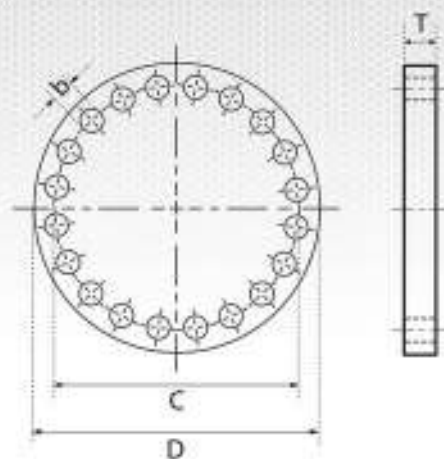
Normal Diameter	Outside Diameter of Pipe and Fitting (mm.)	Length of Underground Pipe and aboveground Pipe (m.)	Length of Sleeve Pipe (m.)	Wall Thickness		Cement-Mortar Lining Thickness (mm.)
				Underground Pipe and Sleeve Pipe (mm.)	Aboveground Pipe (mm.)	
100	114.3+/-1.6	-	-	2.65-0.25	4.5-0.25	6+2,-1
150	168.3+/-1.6	6.00+/-0.05	3.0+/-0.05	3.45-0.25	5.5-0.25	6+2,-1
200	219.1+/-1.6	6.00+/-0.05	3.0+/-0.05	4.50-0.25	6.0-0.25	6+2,-1
250	273.0+/-1.6	6.00+/-0.05	3.0+/-0.05	4.80-0.25	6.0-0.25	6+2,-1
300	323.9+/-1.6	6.00+/-0.05	3.0+/-0.05	6.00-0.25	6.0-0.25	6+2,-1
400	406.4+/-1.6	9.00+/-0.05	3.0+/-0.05	6.00-0.25	7.9-0.25	8+3,-2
500	508.0+/-1.6	9.00+/-0.05	3.0+/-0.05	6.00-0.25	7.9-0.25	8+3,-2
600	609.6+/-1.6	9.00+/-0.05	3.0+/-0.05	6.00-0.25	11.1-0.25	8+3,-2
700	711.2+/-1.6	9.00+/-0.05	3.0+/-0.05	6.00-0.25	11.1-0.25	10+3,-2
800	812.8+/-1.6	9.00+/-0.05	3.0+/-0.05	7.90-0.25	12.7-0.25	10+3,-2
900	914.4+/-1.6	9.00+/-0.05	3.0+/-0.05	7.90-0.25	12.7-0.25	10+3,-2
1000	1016.0+/-1.6	See note 1	3.0+/-0.05	9.50-0.25	12.7-0.25	12+3,-2
1100	1117.6+/-1.6	-	-3.0+/-0.05	9.50-0.25	-	-
1200	1219.2+/-1.6	See note 1	3.0+/-0.05	11.10-0.25	15.9-0.25	12+3,-2
1300	1320.8+/-1.6	-	3.0+/-0.05	12.70-0.25	-	-
1400	1422.4+/-1.6	-	3.0+/-0.05	12.70-0.25	-	-
1500	1524.0+/-1.6	See note 1	3.0+/-0.05	12.70-0.25	19.1-0.25	12+3,-2
1600	1625.6+/-1.6	See note 1	3.0+/-0.05	15.90-0.25	19.1-0.25	-
1800	1820.0+/-3.0	6.00+/-0.05	3.0+/-0.05	15.90-0.25	25.4-0.25	14+3,-2
2100	2120.0+/-3.0	-	3.0+/-0.05	19.10-0.25	-	-

Note 1 : 6.0+/-0.05 meters or 9.0+/-0.05 meter as approved by Project Engineer
Source : Metropolitan Waterworks Authority of Thailand

DIMENSIONS FOR STANDARD FLANGE

ISO 7005 - 1, BS 4504

Dimensions of Standard Flanges and Blank Flanges
Flanged Ends for Steel Pipe and Blank Flanges



BLANK FLANGE Unit : mm.

DN.	D	T	C	Hole	
				Number	b
100	220	20	180	8	19
150	285	22	240	8	23
200	340	24	295	8	23
250	395	26	350	12	23
300	445	26	400	12	23
400	565	26	515	16	28
500	670	28	620	20	28
600	780	34	725	20	31
700	895	38	840	24	31
800	1015	42	950	24	34
900	1115	46	1050	28	34
1000	1230	52	1160	28	37
1200	1455	60	1380	32	40
1500	1785	72	1700	36	43
1600	1915	72	1820	40	48
1800	2115	84	2020	44	49

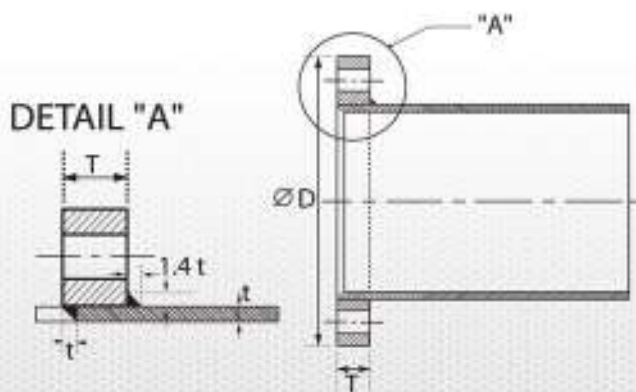
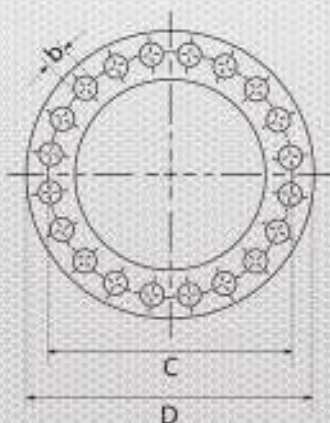


PLATE FLANGE FOR WELDING Unit : mm.

DN.	D	T	t		1.4 t	
			Underground pipes	Aboveground pipes	Underground pipes	Aboveground pipes
100	220	22	2.65	4.5	3.71	6.30
150	285	24	3.45	5.5	4.83	7.70
200	340	24	4.50	6.0	6.30	8.40
250	395	26	4.80	6.0	6.72	8.40
300	445	26	6.00	6.0	8.40	8.40
400	565	32	6.00	7.9	8.40	11.06
500	670	38	6.00	7.9	8.40	11.06
600	780	42	6.00	11.1	8.40	15.54



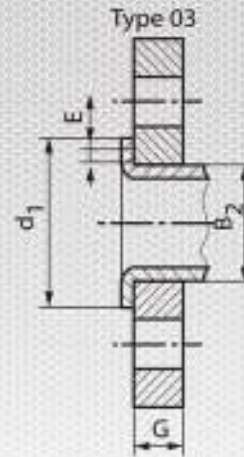
MATING DIMENSIONS Unit : mm.

DN	D	C	Hole	
			Number	b
100	220	180	8	19
150	285	240	8	23
200	340	295	8	23
250	395	350	12	23
300	445	400	12	23
400	565	515	16	28
500	670	620	20	28
600	780	725	20	31

LOOSE FLANGE

ISO 7005 - 1 : 1992

Loose plate flange with lapped pipe end



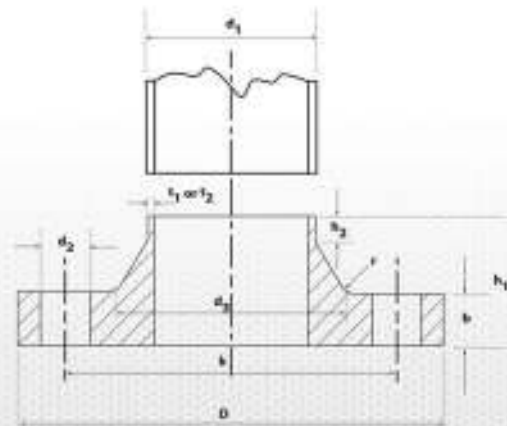
PN 10-40

DN 10-600

Unless otherwise all dimension shall be redesigned by customer requested

STEEL WELDING NECK FLANGE

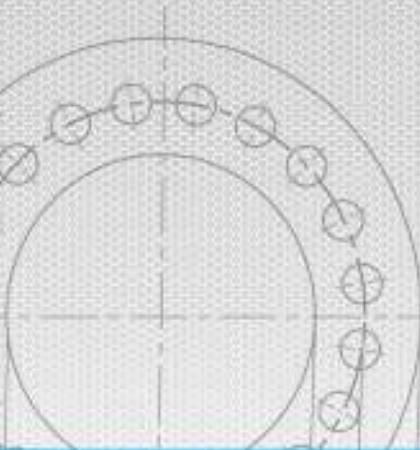
ISO 7005 - 1, BS 4504



Unit : mm.

Nom. Size	Pipe OD d_1	Flange			Bolting	Drilling			Neck				
		D	b	h_1		No.	d_2	k	d_3	h_2	r	t_1	t_2
700	711.2 ± 1.6	895	30	80	M27	24	30	840	746	18	12	6.0	11.1
800	812.8 ± 1.6	1015	32	90	M30	24	33	950	848	18	12	7.9	12.7
900	914.4 ± 1.6	1115	34	95	M30	28	33	1050	948	20	12	7.9	12.7
1000	1016.0 ± 1.6	1230	34	95	M33	28	36	1160	1050	20	12	9.5	12.7
1200	1219.2 ± 1.6	1455	38	115	M36	32	39	1380	1256	25	12	11.1	15.9
1500	1524.0 ± 1.6	1785	46	125	M39	36	42	1700	1563	25	12	12.7	19.1
1600	1625.6 ± 1.6	1915	46	125	M45	40	48	1820	1670	25	12	15.9	19.1
1800	1820.0 ± 3.0	2115	50	140	M45	44	48	2020	1866	30	15	15.9	25.4

Dimension of Fittings



DIMENSIONS OF FITTINGS

TEE, LATERAL, ELBOW, REDUCER

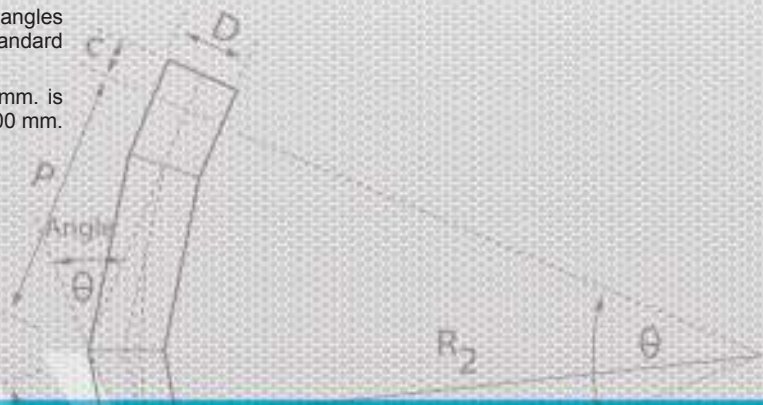


Unit : mm.

DN	Tee		Lateral						Elbow								Reducer Cone		Flange and Plain end
			θ = 30°		θ = 45°		θ = 60°		2 - pieces θ = 11.25°		3 - pieces θ = 22.5°		4 - pieces θ = 45°		5 - pieces θ = 90°				
D	Run J+J	Outlet J	X + Y	Y	X + Y	Y	X + Y	Y	M	a	N	b	p	e	Q	d	G	e	L
150	800	400	950	625	875	525	800	450	100	250	175	225	275	225	375	250	4 (D-D)	300	600
200	850	425	1075	725	925	575	875	500	100	250	200	225	300	225	450	250		300	600
250	900	450	1175	825	1025	650	950	550	100	250	225	200	350	225	500	250		300	600
300	1400	700	1800	1350	1525	1050	1350	850	125	275	250	275	400	275	575	300		380	600
400	1600	800	2100	1650	1750	1225	1575	1000	150	350	300	325	500	325	700	350		440	900
500	1750	875	2400	1875	1925	1375	1700	1100	175	350	350	325	550	325	825	350		455	900
600	2000	1000	2800	2175	2200	1575	1925	1250	200	350	400	350	650	350	950	375		505	900
700	2250	1125	3125	2450	2550	1800	2250	1450	225	400	450	400	725	400	1075	425		580	900
800	2500	1250	3475	2725	2800	1975	2525	1625	225	475	500	450	800	450	1175	475		645	900
900	2600	1300	3750	2950	2975	2100	2600	1700	250	450	525	450	850	425	1250	450		645	1000
1000	2850	1425	4100	3200	3200	2300	2875	1875	250	525	550	500	875	500	1300	525		710	1100
1200	2850	1425	4250	3450	3325	2425	2900	1900	275	400	575	400	950	375	1375	400		620	1100
1500	3400	1700	5100	4000	3975	2975	3475	2300	300	475	625	475	1050	450	1475	475		710	1200
1600	3400	1700	5100	4000	3975	2975	3475	2300	300	475	625	475	1050	450	1475	475		710	1200
1800	3800	1900	5825	4825	4400	3275	3825	2550	325	450	700	425	1150	425	1575	550		710	1300

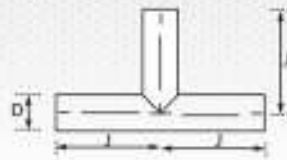
Note :

1. Lateral dimension given for 30,45 and 60 degree angles, for other degree angles the Contractor shall be required to submit shop drawings to Engineering Standard Division for approval.
2. Minimum distance between welded girth joints for pipe size 150-700 mm. is $100+200 \left(\frac{D-1}{650} \right)$ for all pipe size over 700 mm. the minimum distance is 300 mm.

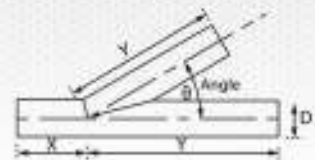


Dimension of Fittings

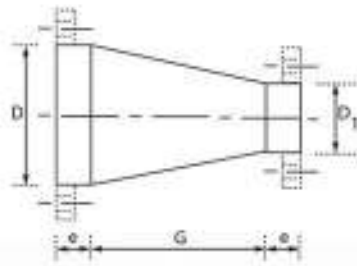
DIMENSIONS OF FITTINGS



TEE



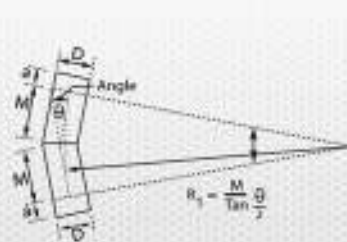
LATERAL



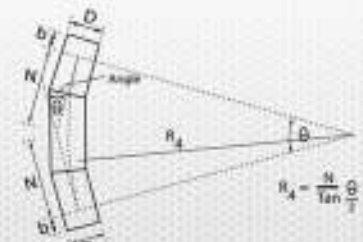
REDUCER



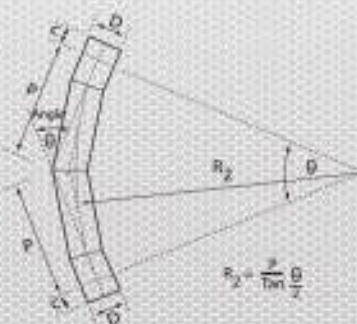
FLANGE AND PLAIN END PIECE



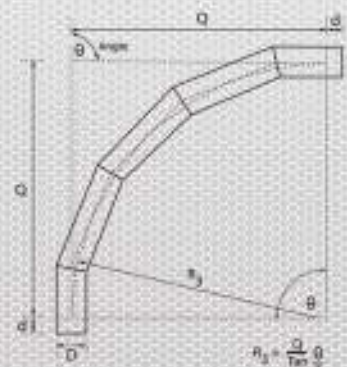
2 - PIECE ELBOW



3 - PIECE ELBOW



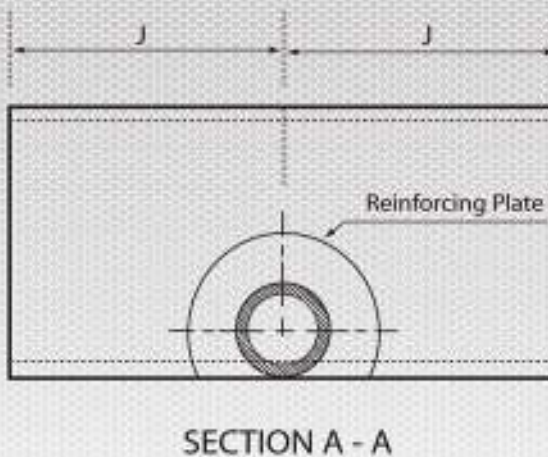
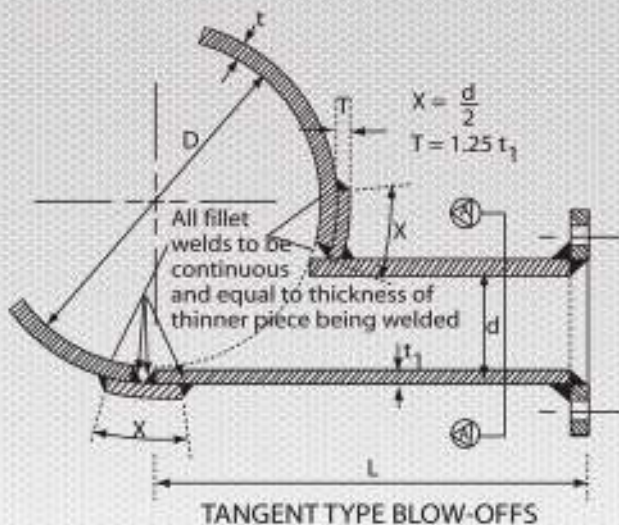
4 - PIECE ELBOW



5 - PIECE ELBOW

DIMENSIONS FOR WELDED-STEEL

TANGENT TYPE BLOW-OFFS

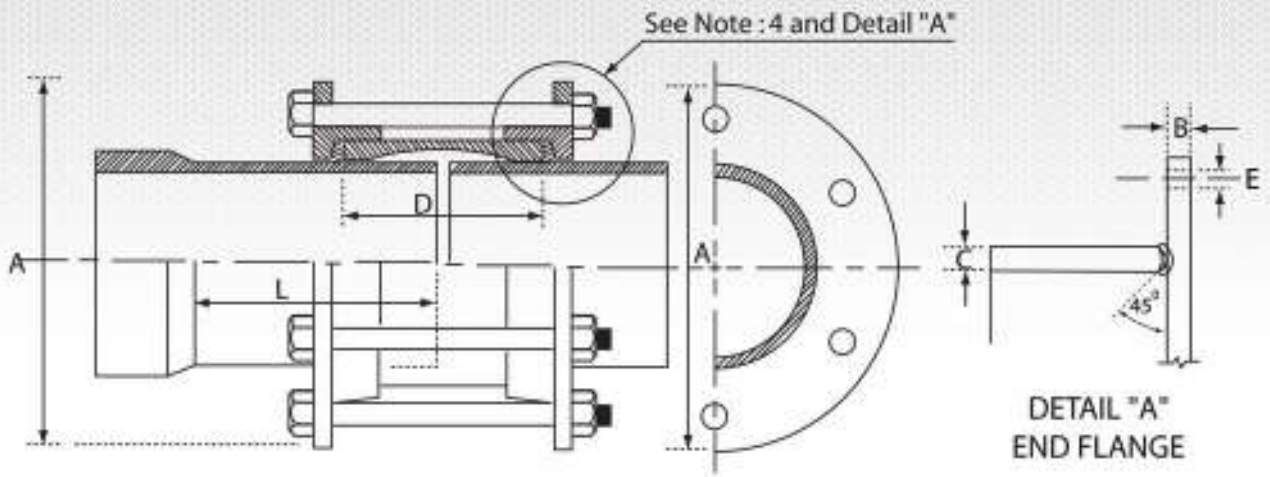


Nominal Diameter D mm.	L mm.					Run j + J mm.
	d = 100 mm.	d = 150 mm.	d = 200 mm.	d = 250 mm.	d = 300 mm.	
400	425	450	450	450	450	1600
500	450	480	500	500	500	1750
600	475	525	550	550	550	2000
700	500	550	600	600	600	2250
800	550	600	650	650	650	2500
900	550	625	675	700	700	2600
1000	575	650	700	725	725	2850
1200	625	700	750	800	825	2850
1500	675	750	825	875	900	3400
1600	675	750	825	875	900	3400
1800	725	825	875	950	975	3800

Note :

1. The length of the sleeve (D) for flexible coupling shall be 254 mm.
2. The tolerances on length of middle rings shall be ± 5 mm.
3. Pitch shall be 1.75 mm. for bolts M.12 and 2 mm. for bolts M.16
4. End Flanges made from steel plate shall be fabricated by double bevel welding. (See detail "A")
5. Dimensions of sleeves, rubber rings and length of bolts shall be designed by the manufacturer.
6. In case that the construction of the sleeves proposed differ from that shown on the drawing. The Contractor shall be required to submit the shop drawing showing the construction and principal dimensions of the proposed sleeve to the Authority for approval.
7. t and t1 shall be the pipeline thickness and outlet thickness respectively.

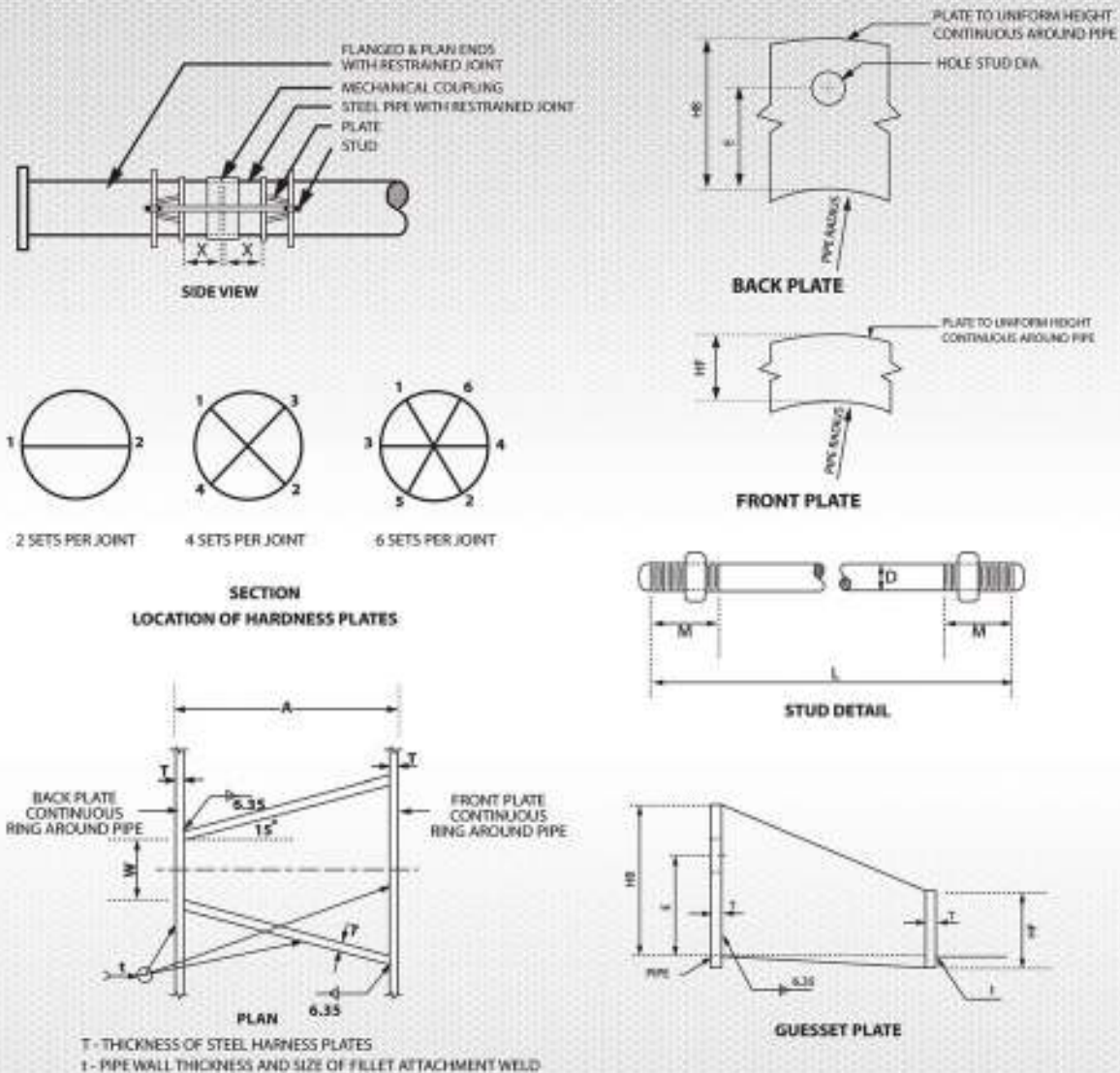
STEEL COUPLING FOR STEEL PIPE



Pipe Dimensions		Coupling Dimensions						
Pipe O.D.	Tolerance On O.D.	L Minimum	A	B	C	D x Average Thickness	E	Bolts No. - Dia.
168.3	± 1.6	152	256	7.9	6.0	102 x 7.2	15	4 -12
219.1	± 1.6	152	306	7.9	6.0	102 x 7.2	15	5 -12
273.0	± 1.6	152	365	7.9	6.0	102 x 8.7	15	6 -12
323.9	± 1.6	152	416	7.9	6.0	102 x 8.7	15	8 -12
406.4	± 1.6	254	521	12.0	7.9	178 x 11.1	19	12 -16
508.0	± 1.6	254	622	12.0	7.9	178 x 11.1	19	12 -16
609.6	± 1.6	254	724	12.0	7.9	178 x 11.1	19	12 -16
711.2	± 1.6	254	826	12.0	7.9	178 x 11.1	19	12 -16
812.8	± 1.6	254	943	15.0	9.0	178 x 14.3	19	18 -16
914.4	± 1.6	254	1045	15.0	9.0	178 x 14.3	19	18 -16
1016.0	± 1.6	254	1146	15.0	9.0	178 x 14.3	19	18 -16
1219.2	± 1.6	254	1349	15.0	9.0	178 x 14.3	19	20 -16
1524.0	± 1.6	254	1654	15.0	9.0	178 x 14.3	19	24 -16
1625.6	± 1.6	254	1760	15.0	9.0	178 x 14.3	19	24 -16
1820.0	± 3.0	254	1955	17.0	11.0	178 x 15.9	19	28 -16

DIMENSIONS OF RESTRAINED JOINTS

RESTRAINED JOINTS FOR STEEL PIPE



Nominal Diameter of Pipe	Plates								Studs						
	T mm.	A mm.	W mm.	HB mm.	E mm.	HF mm.	Hole Dia. mm.	X mm.	D mm.	No. of Stud	Width Across Flats of nut mm.	Thickness nut mm.	Pitch Thread inch.	L mm.	M mm.
300	11.10	85.725	34.925	98.425	76.2	23.0	19.05	230	15.875	2	26.97-26.19	16.03-14.91	11 UNC	762	76.2
400	15.90	139.7	41.275	107.95	79.375	27.0	25.4	230	22.225	2	36.52-35.41	22.48-21.16	9 UNC	889	82.55
500	15.90	146.05	44.45	114.3	82.55	27.0	28.575	230	25.4	2	41.28-40.00	25.70-24.28	8 UN	914	85.72
600	19.10	190.5	50.8	127	95.25	27.0	34.925	230	31.75	2	50.8-49.22	31.78-30.15	8 UN	1016	92.08
700	19.10	254	57.15	139.7	98.425	27.0	41.275	230	38.1	2	60.32-58.42	38.23-36.40	8 UN	1168	98.42
800	25.40	304.8	63.5	149.225	101.6	32.0	47.625	240	44.45	2	69.85-67.61	44.68-42.65	8 UN	1295	104.78
900	25.40	304.8	63.5	149.225	101.6	32.0	47.625	240	44.45	2	69.85-67.61	44.68-42.65	8 UN	1295	104.78
1000	25.40	355.6	69.85	158.75	107.95	32.0	53.975	240	50.8	2	79.38-76.84	51.13-48.90	8 UN	1422	111.12
1200	25.40	273.5	60.325	142.875	98.425	32.0	44.45	240	41.275	4	65.07-63.02	41.45-39.52	8 UN	1244	101.6
1500	25.40	355.6	69.85	158.75	107.95	32.0	53.975	240	50.8	4	79.38-76.84	51.13-48.90	8 UN	1422	111.12
1600	25.40	355.6	69.85	158.75	107.95	32.0	53.975	240	50.8	4	79.38-76.84	51.13-48.90	8 UN	1422	111.12
1800	25.40	355.6	69.85	158.75	107.95	34.5	53.975	240	50.8	6	79.38-76.84	51.13-48.90	8 UN	1422	111.12

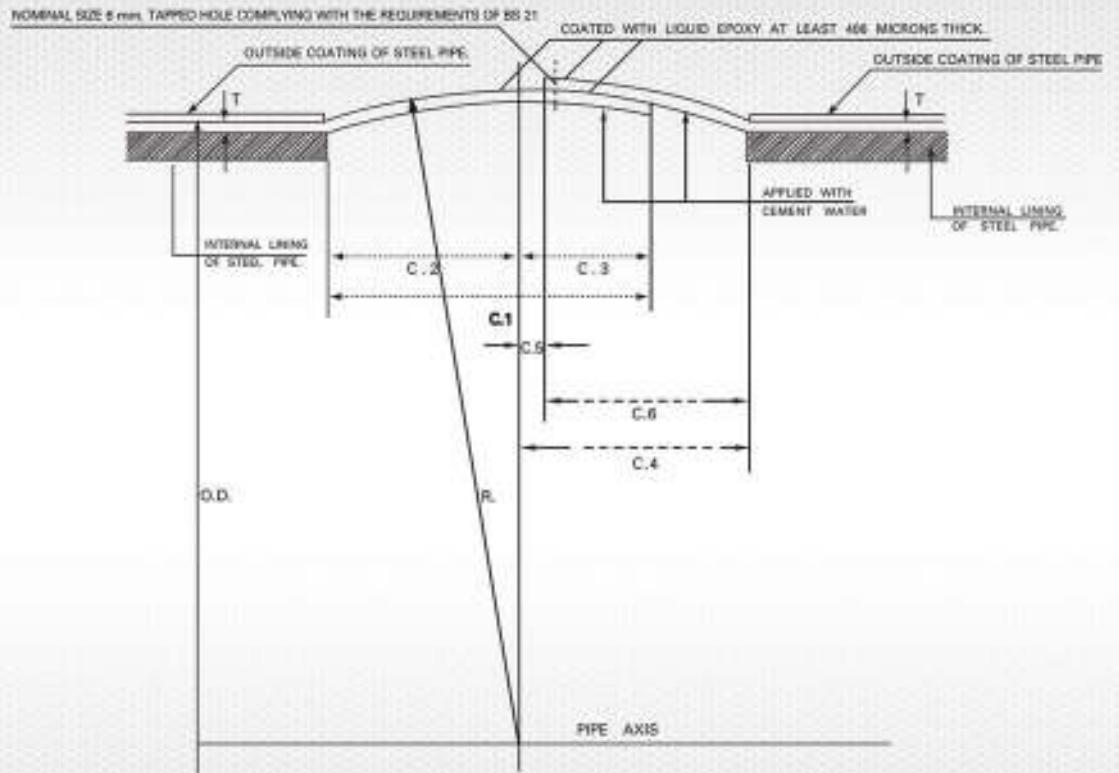
Note :

1. Steel Plates used in fabrication of harness and gusset plates shall have the same properties as the pipe.
2. Stud bolts and nuts shall be made of steel stud bolts conforming to ASTM A-193 grade B7. Nuts conforming to ASTM A-194 grade 2H or equal and shall be HOT-DIPPED Galvanized

DIMENSIONS OF SLEEVE WELDED JOINTS

JOINTS FOR STEEL PIPE

DIMENSIONS OF SPHERICAL SPIGOT AND SOCKET FOR SURFACED SLEEVE WELDED JOINT.



Dimensions in Millimeters

Nominal Diameter	Outside Dia. O.D.	Thickness T	R.	C.1 (C.2 + C.3)	C.2	C.3	C.4 (C.5 + C.6)	C.5	C.6
800	812.8	7.9	430	227	140	87	162	17	145
900	914.4	7.9	482	246	153	93	175	19	156
1000	1016.0	9.5	537	280	174	106	200	21	179
1200	1219.2	11.1	641	316	197	119	224	25	199
1500	1524.0	12.7	796	395	237	158	281	31	250

Note :

1. Tolerance for outside circumference of spigot shall be ± 0.6 mm.
2. Tolerance for inside circumference of socket shall be ± 0.6 mm.
3. In case of the pipe to be coated inside with liquid epoxy the coating shall extend to pipe ends.

Table 1. Minimum nominal thickness, mass per meter length and hydraulic test pressure for steel pipes

Outside Diameter	Minimum nominal thickness	Mass per meter length (plain end)	Hydraulic test pressure (steel 430)
mm.	mm.	kg.	bar
60.3	2.9	4.11	70
76.1	3.2	5.75	70
88.9	3.2	6.76	70
114.3	3.6	9.83	70
139.7	3.6	12.1	70
168.3	3.6	14.6	70
193.7	4.0	18.7	70
219.1	4.0	21.2	70
244.5	4.0	23.7	70
273	4.0	26.5	64
323.9	4.0	31.6	54
355.6	4.5	39.0	56
406.4	4.5	44.6	49
457	5.0	55.7	48
508	5.0	62.0	43
559	6.3	85.9	50
610	6.3	93.8	45
660	6.3	102	42
711	6.3	109	39
762	6.3	117	36
813	7.1	141	38
864	7.1	150	36
914	7.1	159	34
1016	7.1	177	31
1219	8.0	239	29
1422	8.8	307	27
1626	10.0	399	27
1829	11.0	493	26
2032	12.5	623	27
2235	14.2	778	28

BS 534:1990

Steel Pipes, Joints and Specials for water and sewage

Preparation of Ends

Unless otherwise specified, pipe and fitting ends shall be as follows:

- Underground pipes, 150 mm. to 700 mm. in diameter, shall be plain ends for jointing by means of mechanical couplings.
- Underground pipes, 800 mm. to 1500 mm. in diameter, shall be of spherical spigot and socket-ends for jointing by means of surface sleeve welded joints.
- Aboveground pipes 150 mm. and larger in diameter, underground pipe 1,800 mm. in diameter and sleeve pipes (wall thickness more than 6 mm.), shall be beveled-ends for jointing by means of butt-welding.
- Underground fitting shall be plain-ends for jointing by means of mechanical couplings and restrained joint.
- Aboveground fittings shall be beveled-ends for jointing by means of butt welding. Pipe end details shall be as shown on the drawings.

Hydrostatic Pressure Test

Before coating and lining; each length of pipe shall be tested to a hydrostatic pressure test as listed in below TABLE.

Hydrostatic Test Pressure for Steel Pipes

Nominal Diameter	Test Pressure, kg./cm.		
	Underground Pipe	Aboveground Pipe	Minimum Duration
100-250	50	50	5
300	40	50	5
400	35	50	5
500	30	35	10
600	25	35	10
700-800	20	35	10
900-1500	20	30	30
1800-2100	20	25	30

There shall be no leak

Before coating and lining, each fitting shall be tested to a hydrostatic pressure of at least 15 kg./cm². for 2 minutes. There shall be no leak.

Available Coating

1. **AWWA C203** Coal tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot - Applied
2. **AWWA C 205** Cement - Mortar Protective Lining and Coating for Steel Water Pipe 4 Inch and Larger (Shop Applied)
3. **AWWA C 210** Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
4. **AWWA C 214** Tape Coating Systems for the Exterior of Steel Water Pipelines.
5. **HOT DIPPED** Galvanized conforming to JIS H 8641, ASTM A123
6. **Coating as requested**



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