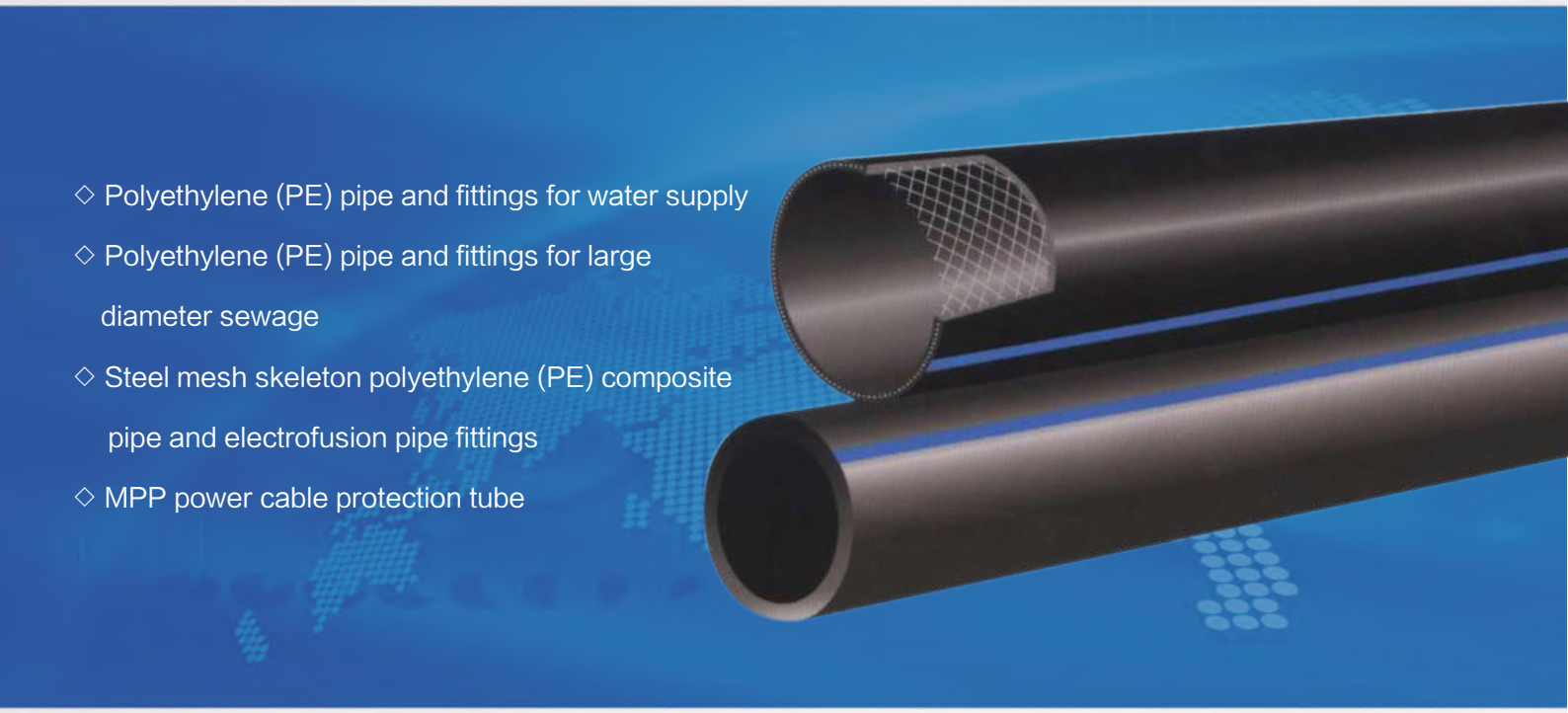
HIGH MOUNTAIN

HAIWEI PIPE



- ◇ Polyethylene (PE) pipe and fittings for water supply
- ◇ Polyethylene (PE) pipe and fittings for large diameter sewage
- ◇ Steel mesh skeleton polyethylene (PE) composite pipe and electrofusion pipe fittings
- ◇ MPP power cable protection tube

WUXI HIGH MOUNTAIN HI-TECH DEVELOPMENT CO.,LTD

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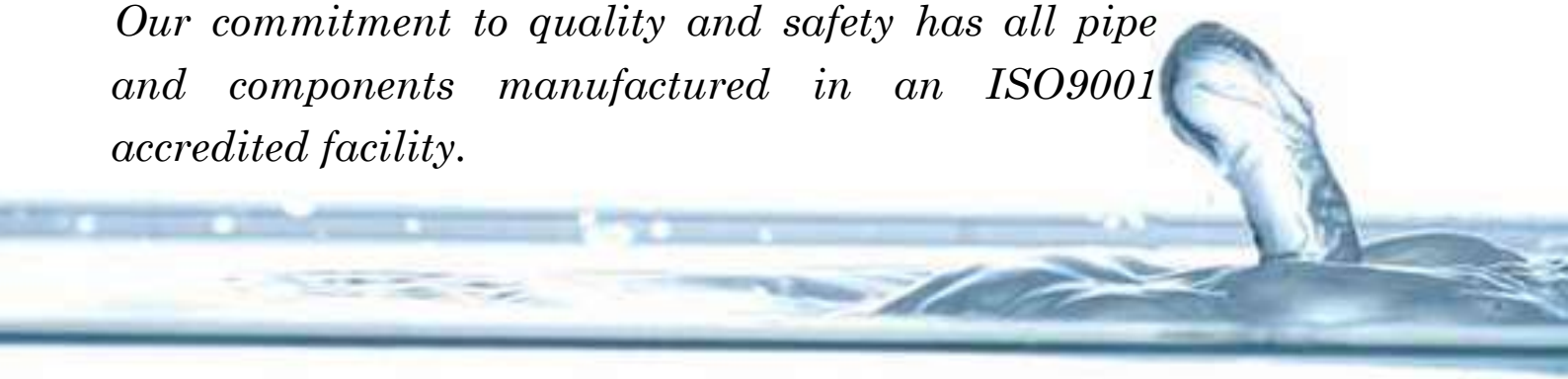
JIANGSU HAIWEI PLASTICS TECHNOLOGY CO.,LTD.

HighMountain(Haiwei) Pipe Systems have been manufacturing ISO 4427 approved products since consumer protection was irst mandated in the industry.

In keeping with international trends, Haiwei is a market leader in converting to lead free materials.

Our commitment to quality and safety has all pipe and components manufactured in an ISO9001 accredited facility.



Contents

Company Profile

Wuxi High Mountain Hi-tech Development Co., Ltd., has a strategic partnership with Haiwei Plastic, we are the exclusive sales representative for their international market, we specialized in PE water supply pipe, large diameter PE drainage pipe, steel mesh framework PE composite pipe, fused pipe fittings, MPP power cable protection pipe and other materials research and development and production.

The company covers an area of about 50,000 square meters and has fixed assets of about 130 million yuan. It is a comprehensive enterprise integrating science, industry and trade. The industries involved are: research, production, development, manufacturing, and polymer materials of plastic pipes. They provide customers with polyethylene (PE) pipes and fittings for water supply, and polyethylene (HDPE) pipes for large-diameter sewage. Pipe fittings, wire mesh skeleton polyethylene (HDPE) pipe and electrofusion pipe fittings and other products. The company uses domestic and foreign well-known raw materials to organize production. All products meet the requirements of national inspection standards or enterprise inspection standards. The current annual productivity has reached more than 30,000 tons, with assets of over 100 million yuan and more than 100 sets of equipment.

The company established Jiangsu Haiwei Pipeline Engineering Co., Ltd. in 2017, providing customers with one-stop service from production, sales, after-sales and construction.

The company and Alibaba signed a strategic partnership and established the Ministry of Foreign Trade. The products are exported to the Middle East, Southeast Asia, Australia and Africa. The quality of the products has won the recognition of users.

With the slogan of “Haiyang Pipe and Harmony with Nature”, Haiwei people take the mission of “leading the direction of the pipeline industry and innovating the development path of the pipeline industry”, adhering to the principle of professional operation and adhering to the brand development road. Has obtained ISO9001 quality management system, ISO14001 environmental management system, ISO10012 measurement management system, OHSAS18001 occupational health and safety management system, China environmental label, Beijing Xinhua water saving and five-star after-sales service certification and other certifications, so that the company's products towards the brand goal A step up!

Your affirmation is our best return; the responsibility is our source of continuous improvement.

Let us work together to create a better tomorrow and contribute to the improvement of people's quality of life!

The construction of Jiangsu Haiwei's corporate culture system is centered on the “harmony” culture. This "harmony" culture stems from the traditional values of the China Pavilion, and reflects the core value of Jiangsu Haiwei's "joining peers, innovation and win-win". It is the refinement of the advanced cultural value that promotes Jiangsu Haiwei's rapid development in recent years. It is also the Jiangsu Sea. We strive to create a harmonious,

Overview

HDPE Pipe Material Advances

Considerable strides have been made in improving the quality of HDPE material and its long term ability to withstand pressure. The current ISO specification, ISO 4427, covers 3 different material grades (PE 63, PE 80 and PE 100). These three material grades have different properties which enable them to be classified with minimum required strengths (MRS) of 6.3 MPa, 8,0 MPa and 10.0 MPa respectively. Applying a design coefficient of 1.25 (safety factor) to the MRS gives the design stress used by SANS 4427 for these materials (5.0 MPa, 6.3 MPa and 8.0 MPa respectively) with the result that the wall thickness for a particular size and class becomes progressively less as the change is made to a material with a higher MRS.

Applications

Highmountain(Haiwei) Pipe Systems have for several years been confidently supplying their range of HDPE pipes, fittings and saddles for successful use in a variety of applications in the Civil, Agricultural, Municipal, Mining and Industrial sectors. Because of the good chemical resistance and abrasion resistance properties they are also extensively used in chemical, waste and slurry applications.

Quality Assurance

Highmountain Pipe Systems (and Haiwei Pipe Systems) has been an ISO mark holder for over 20 years. Products are manufactured to the relevant ISO specifications at plants in Jiangyin Jiangsu, China. Both manufacturing facilities conform to the ISO 9001 Quality Management system. Fully audited Quality Control laboratories are operational at both facilities, where scheduled and random testing of products is carried out.

Features and Benefits

- Good impact strength: Little handling and installation damage
- Excellent corrosion resistance: Long and efficient service life
- Good chemical resistance: Wide variety of applications
- Low mass: Easy handling
- Flexibility: Easy installation
- Long lengths available: Fewer joints
- Good abrasion resistance: Can be used to pump slurries
- Good UV resistance: Can be used in exposed locations
- Low friction losses: Lower pumping costs
- Several jointing methods: Wide variety of applications
- Extensive range of fittings: Wide variety of installations

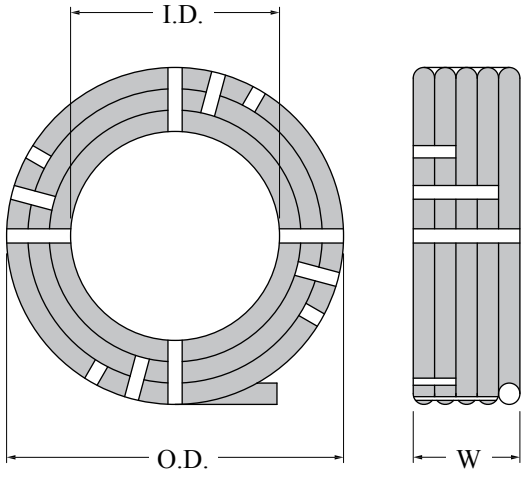
Pipe Speci ication

Specifications

The HDPE pipes manufactured by Highmountain(Haiwei Pipe) Systems are manufactured to, and carry the mark for, ISO 4427. These pipes are manufactured from three different designated materials viz: PE 63, PE 80 and PE 100. See tables on page 7. In these tables it can be seen that ISO 4427 have grouped together the different pressure classes, produced from different material designations, under a common heading known as the Standard Diameter (Dimension) Ratio or SDR. The minimum wall thicknesses specified are not exactly that which would be derived from a calculation using Barlow's formula or the SDR but are the rounded up values of the highest minimum wall thickness calculated for any size and class in the SDR group (see Design Stress and Safety Factor on page 9).

Coil Dimensions

		Coil Dimensions				
		I.D.	O.D.		Width (W)	
		mm	mm	mm	mm	mm
O.D.	SDR's	Coil Length - metres				
mm		50/100m	50m	100m	50m	100m
16	7.4/9/11	600	n/a	860	n/a	180
20	7.4/9/11/13.6	600	n/a	860	n/a	180
25	7.4/9/11/13.6/17	600	n/a	890	n/a	200
32	7.4/9/11/13.6/17	700	n/a	1090	n/a	220
40	7.4/9/11/13.6/17/26	700	n/a	1090	n/a	220
50	7.4/9/11/13.6/17/26	1300	1410	1560	150	220
63	7.4/9/11/13.6/17/26	1300	1780	1960	190	280



Hydrostatic Design Stress (HDS)

Designation of material	MRS at 50 years and 20°C - Mpa	Maximum allowable hydrostatic design stress, σ – Mpa
PE 63	6.3	5
PE 80	8	6.3
PE 100	10	8

Notes on Pipe Dimension tables:

- HDS (Hydrostatic Design Stress), in (MPA), is obtained by applying a design factor of not less than 1.26 to the minimum required strength value of the pipe.
- Out of roundness (Ovality) Grade N.
- PE 63 material is NLA. Therefore PE 80 material is used to manufacture PE 63 specification, increasing the design safety factor from 1,26 to 1,6.
- SDR = Standard Dimension Ratio
  = Outside diameter / wall thickness

Pipe Dimensions Tables (ISO 4427)

Working Pressure PE 63				PN 2.5				PN 3.2				PN 4				PN 5			
Working Pressure PE 80				PN 3.2				PN 4				PN 5				PN 6			
Working Pressure PE 100				PN 4				PN 5				PN 6				PN8			
Standard Diameter Ratio (SDR)				SDR 41				SDR 33				SDR 26				SDR 21			
Nom Size mm	Mean Outside Diameter		Ovality	Wall thickness-t		Pipe ID & Weight		Wall thickness-t		Pipe ID & Weight		Wall thickness-t		Pipe ID & Weight		Wall thickness-t		Pipe ID & Weight	
	Min	Max	Max	Min	Max	ID	Kg/m	Min	Max	ID	Kg/m	Min	Max	ID	Kg/m	Min	Max	ID	Kg/m
16	16	16.3	1.2																
20	20	20.3	1.2																
25	25	25.3	1.2																
32	32	32.3	1.3																
40	40	40.4	1.4													2	2.3	36	0.24
50	50	50.4	1.4									2	2.3	46	0.31	2.4	2.8	45	0.37
63	63	63.4	1.5									2.5	2.9	58	0.49	3.0	3.4	57	0.57
75	75	75.5	1.6									2.9	3.3	69	0.67	3.8	4.1	67	0.84
90	90	90.6	1.8									3.5	4.0	83	0.97	4.3	4.9	81	1.17
110	110	110.7	2.2									4.2	4.8	101	1.42	5.3	6.0	99	1.76
125	125	125.8	2.5									4.8	5.4	115	1.83	6.0	6.7	112	2.25
140	140	140.9	2.8									5.4	6.1	128	2.3	6.7	7.5	126	2.82
160	160	161	3.2									6.2	7	147	3.02	7.7	8.6	144	3.69
180	180	181.1	3.6									6.9	7.7	165	3.76	8.6	9.6	162	4.64
200	200	201.2	4									7.7	8.6	184	4.67	9.6	10.7	180	5.75
225	225	226.4	4.5									8.6	9.6	207	5.86	10.8	12	202	7.27
250	250	251.5	5									9.6	10.7	230	7.27	11.9	13.2	225	8.89
280	280	281.7	9.8									10.7	11.9	257	9.06	13.4	14.9	252	11.23
315	315	316.9	11.1	7.7	8.6	299	7.46	9.7	10.8	295	9.32	12.1	13.5	289	11.54	15.0	16.6	283	14.11
355	355	357.2	12.5	8.7	9.7	337	9.49	10.9	12.1	332	11.79	13.6	15.1	326	14.59	16.9	18.7	319	17.91
400	400	402.4	14	9.8	10.9	379	12.04	12.3	13.7	374	15.02	15.3	17	368	18.5	19.1	21.2	360	22.84
450	450	452.7	15.6	11.0	12.2	427	15.18	13.8	15.3	421	18.91	17.2	19.1	414	23.39	21.5	23.8	405	28.89
500	500	503	17.5	12.3	13.7	474	18.9	15.3	17	468	23.32	19.1	21.2	460	28.72	23.9	26.4	450	35.64
560	560	563.4	19.6	13.7	15.2	531	23.53	17.2	19.1	524	29.35	21.4	23.7	515	36.17	26.7	29.5	504	44.61
630	630	633.8	22.1	15.4	17.1	598	29.77	19.3	21.4	589	37.03	24.1	26.7	579	45.83	30.0	33.1	567	56.35

Working Pressure PE 63				NA				PN 8				PN 10				NA				NA			
Working Pressure PE 80				PN 8				PN 10				PN 12.5				PN 16				PN20			
Working Pressure PE 100				PN 10				PN 12.5				PN 16				PN20				PN25			
Standard Diameter Ratio (SDR)				SDR 17				SDR 13.6				SDR 11				SDR 9				SDR 7.4			
Nom Size mm	Mean Outside Diameter		Ovality	Wall thickness-t		Pipe ID & Weight		Wall thickness-t		Pipe ID & Weight		Wall thickness-t		Pipe ID & Weight		Wall thickness-t		Pipe ID & Weight		Wall thickness-t		Pipe ID & Weight	
	Min	Max	Max	Min	Max	ID	Kg/m	Min	Max	ID	Kg/m	Min	Max	ID	Kg/m	Min	Max	ID	Kg/m	Min	Max	ID	Kg/m
16	16	16.3	1.2													2	2.3	12	0.09	2.3	2.7	11	0.10
20	20	20.3	1.2									2	2.3	16	0.11	2.3	2.7	15	0.13	3	3.4	14	0.15
25	25	25.3	1.2					2	2.3	21	0.17	2 .3	2.7	20	0.17	3	3.4	19	0.20	3.5	4.0	18	0.24
32	32	32.3	1.3	2	2.3	28	0.19	2.4	2.8	27	0.23	3	3.4	26	0.27	3.6	4.1	24	0.32	4.4	5	23	0.38
40	40	40.4	1.4	2.4	2.8	35	0.29	3	3.5	34	0.36	3.7	4.2	32	0.43	4.5	5.1	30	0.5	5.5	6.2	28	0.60
50	50	50.4	1.4	3	3.4	44	0.45	3.7	4.2	42	0.54	4.6	5.2	40	0.66	5.6	6.3	38	0.78	6.9	7.7	35	0.93
63	63	63.4	1.5	3.8	4.3	55	0.71	4.7	5.3	53	0.87	5.8	6.5	51	1.04	7.1	8	48	1.25	8.6	9.6	45	1.46
75	75	75.5	1.6	4.5	5.1	65	1.01	5.6	6.3	63	1.23	6.8	7.6	61	1.46	8.4	9.4	57	1.76	10.3	11.5	53	2.09
90	90	90.6	1.8	5.4	6.1	79	1.45	6.7	7.5	76	1.76	8.2	9.2	73	2.11	10.1	11.3	69	2.53	12.3	13.7	64	2.99
110	110	110.7	2.2	6.6	7.4	96	2.15	8.1	9.1	93	2.6	10.0	11.1	89	3.13	12.3	13.7	84	3.76	15.1	16.8	78	4.48
125	125	125.8	2.5	7.4	8.3	109	2.74	9.2	10.3	106	3.35	11.4	12.7	101	4.06	14	15.6	95	4.87	17.1	19	89	5.76
140	140	140.9	2.8	8.3	9.3	122	3.45	10.3	11.5	118	4.2	12.7	14.1	113	5.06	15.7	17.9	106	6.18	19.2	21.3	100	7.24
160	160	161	3.2	9.5	10.6	140	4.5	11.8	13.1	135	5.48	14.6	16.2	129	6.65	17.9	19.8	122	7.94	21.9	24.2	114	9.42
180	180	181.1	3.6	10.7	11.9	157	5.69	13.3	14.8	152	6.96	16.4	18.2	145	8.4	20.1	22.3	138	10.05	24.6	27.2	128	11.91
200	200	201.2	4	11.9	13.2	175	7.02	14.7	16.3	169	8.54	18.2	20.2	162	10.36	22.4	24.8	153	12.42	27.4	30.3	142	14.74
225	225	226.4	4.5	13.4	14.9	197	8.90	16.6	18.4	190	10.84	20.5	22.7	182	13.11	25.2	27.9	172	15.72	30.8	34	160	18.62
250	250	251.5	5	14.8	16.4	219	10.91	18.4	20.4	211	13.35	22.7	25.1	202	16.13	27.9	30.8	191	20.15	34.2	37.8	178	23.05
280	280	281.7	9.8	16.6	18.4	245	13.71	20.6	22.8	237	16.73	25.4	28.1	227	20.22	31.3	34.6	214	24.29	38.3	42.3	199	28.83
315	315	316.9	11.1	18.7	20.7	276	17.36	23.2	25.7	266	21.2	28.6	31.6	255	25.59	35.2	38.9	241	30.73	43.1	47.6	224	36.5
355	355	357.2	12.5	21.1	23.4	311	22.1	26.1	28.9	300	26.88	32.2	35.6	287	32.49	39.7	43.8	271	39.03	48.5	53.5	253	46.27
400	400	402.4	14	23.7	26.2	350	27.93	29.4	32.5	338	33.18	36.3	40.1	324	41.25	44.7	49.3	306	49.52	54.7	60.3	285	58.78
450	450	452.7	15.6	26.7	29.5	394	35.38	33.1	36.6	380	43.18	40.9	45.1	364	52.23	50.3	55.5	344	62.69	61.5	67.8	321	74.35
500	500	503	17.5	29.7	32.8	438	43.72	36.8	40.6	423	53.28	45.4	50.1	405	64.45	55.8	61.5	383	77.25				
560	560	563.4	19.6	33.2	36.7	490	54.77	41.2	45.5	473	66.84	50.8	56	453	80.74	62.5	68.9	429	96.92				
630	630	633.8	22.1	37.4	41.3	551	69.37	46.3	51.1	533	84.49	57.2	63.1	510	102.3	70.3	77.5	482	122.65				

Physical Properties

High Density Polyethylene (HDPE) is a thermoplastic material which is supplied by the manufacturer in a 'ready to use' pelletised form. The grades suitable for pipe manufacture are PE 63, PE 80 and PE 100. The pipe manufacturer converts this material into pressure pipe.

Table of Physical Properties

The properties given below are for HDPE grades used to manufacture pipe. It should be noted that many of these properties are relative to temperature and the duration of stress application.

Property		Value	Unit	Test Method	Test Specimen
Density at 23 °C		0.958	g/cm³	ISO 1183	10mm x 10mm x 4mm
Viscosity Number		380	ml/g	ISO 1628-3	0.1% solution of granules in decahydronaphthalene
Melt Flow Rate	MFR 190/5	0.23	g/10min	ISO 1133	granules sample weight 3g to 6g
	MFR 190/21.6	6.5	g/10min		
Tensile Properties	Yield Stress	26	N/mm²	ISO 527, Test Rate 50 mm/min	ISO 3167, 4mm thick (test specimen no. 3, 4mm thick according to DIN 53 455
	Enlonggation at Yield Stress	10	%	ISO 527, Test Rate 50 mm/min	
	Tensile modulus of Elasticity (secant between 0.05 & 0.25% strain)	900	N/mm²	ISO 527	
	Tensile Creep Modulus (1 hour value)	650	N/mm²	ISO 899, Test Load 2 N/mm²	
	Tensile Creep Modulus (1000 hour value)	350	N/mm²		
Flexural Properties	Flexural Creep Modulus (1 min value)	1100	N/mm²	DIN 54852-Z4 σb=2 N/mm²	110mm x 10mm x 4mm loaded flat
	Flexural Stress (3.5% deflection)	20	N/mm²	ISO 178, Test Rate 2 mm/min	80mm x 10mm x 4mm
Stiffness in Torsion		180	N/mm²	DIN 53447	60mm x 6.35mm x 3mm
Hardness	Ball Indentation Hardness	41	N/mm²	ISO 2039 part 1 Test Load 132N	4mm sheet
	Shore Hardness D (3 sec value)	61	~	ISO 868	6mm sheet
	Shore Hardness D (15 sec value)	59	~		
Notched Impact Strength acN (test specimen from compression moulded sheet)	at 23 °C	20	kJ/m²	ISO 179/1eA	80mm x 10mm x 4mm
	at -30 °C	10	kJ/m²		
Vicat softening Point VST/B/50		67	°C	ISO 306	4mm sheet
Oxidation Induction Time	200 °C in O_2	>=60	min	ISO TR 10837	granules

Comparison with Other Plastic Materials

Property	HDPE	PP	PVC	PVC-C*	PB*
Surface feel	Waxy	Waxy	Smooth	Smooth	Waxy
Appearance (water pipes)	Black	Pale grey-beige	Blue	Grey-beige	Black
Sound produced when dropped	Medium clatter	High clatter	High clatter	High clatter	Dull thud
Combustibility and appearance of flame	Bright flame: Drops continue to burn after falling	Bright flame: Drops continue to burn after falling	Carbonises in flame: Extinguishes away from flame	Carbonises in flame: Extinguishes away from flame	Bright flame; Drops continue to burn after falling
Odour of smoke after flame is extinguished	Like candles	Like resin	Pungent like hydrochloric acid	Pungent like hydrochloric acid	Like candles but more acrid than HDPE
Nail test (impression made by fingernail)	Impression possible	Very light impression possible	Impression not possible	Impression not possible	Impression easily poduced
Special features					Smears when sawn
Floats in water	Yes	Yes	No	No	Yes
Notch sensitivity	No	Slight	Yes	Yes	Yes
Weather resistance	Stabilised, good	Stabilised, good	Stabilised, good	Stabilised, good	Stabilised, good
Method of permanent jointing	Fusion	Fusion	Solvent cement	Solvent cement	Fusion
Suitable for mechanical jointing	Yes	Yes	Yes	Yes	Yes
Stress crack sensitivity with regard to jointing with safe media, e.g water	Some	Slight	None	None	None
Linear expansion mm/m/°C	0.2	0.15	0.08	0.07	0.12
Thermal conductivity kcal/mh°C	0.4	0.19	0.14	0.14	0.2
Specific heat kcal/mh°C	0.42	0.4	0.23	0.23	0.47
Specific weight kg/cm²	0.955	0.905	1.42	1.5	0.92
Tensile strength at 20 °C kp/cm²	240	320	550	550	200
Modulus of elasticity at 20 °C kp/cm²	8000	15000	30000	30000	5000

The Stress Regression Line

The traditional method of portraying the primary mechanical property of HDPE, tensile strength, is by means of a graph of log stress vs. log time to failure. This is known as the stress regression line. It is a plot of the circumferential hoop stress in the wall of the pipe (from internal pressure) against time to failure.

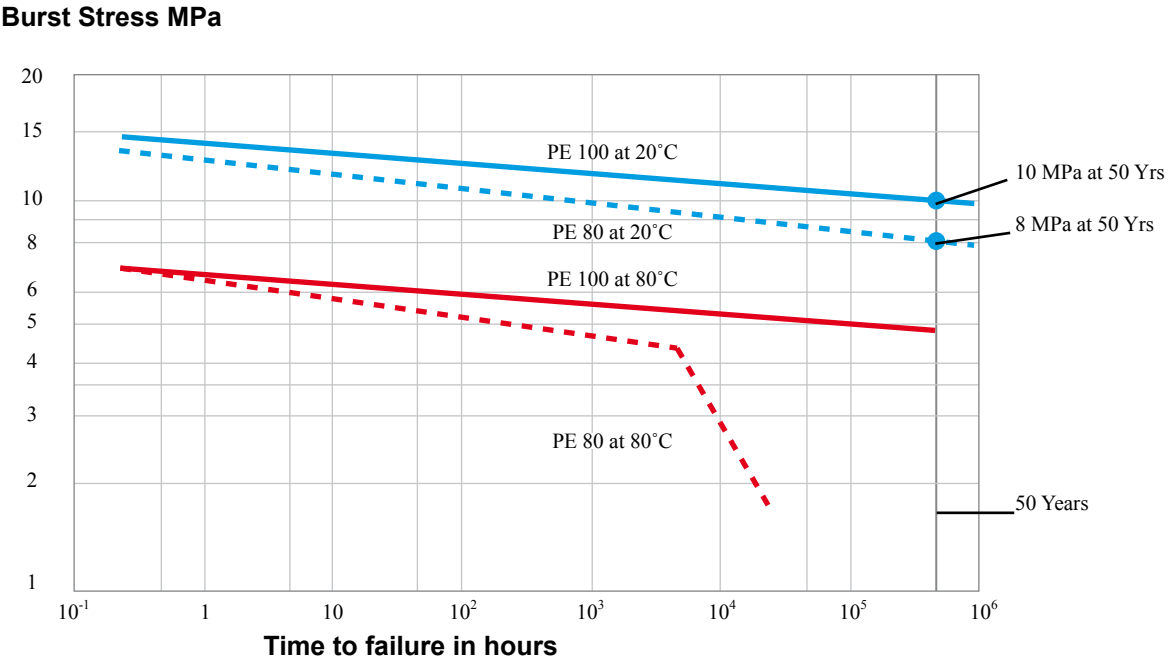
Numerous actual test results, measured at 20 °C and 60 °C, over a range of times up to 10,000 hours, are plotted on a log scale and a regression line is calculated to fit this data. The resultant regression line is then extrapolated to 50 years (438,000 hours). The method of calculation is an internationally accepted procedure described in ISO/TR 9080. The required values of stress and time are specified in ISO 4427.

The internationally accepted method for calculating circumferential hoop stress is derived from Barlow's formula and is as follows:

$$\sigma = p(d - t)/2t$$

where:
- p = internal pressure (MPa)
- t = minimum wall thickness (mm)
- d = mean external diameter (mm)
- σ = circumferential hoop stress in wall of pipe (MPa)

The Stress Regression Line for HDPE is given below.



Principal stress/time curves for PE 80 and PE 100 pipes at 20˚C and 80˚C. The standard curve for HDPE Type 2 at 80˚C (acc. to DIN 8075) is shown in comparison. The minimum required strength (MRS) at 20˚C and 50 years is 10 MPa for PE 100 and 8 MPa for PE 80 giving the design stress 8 MPa and 6 MPa respectively.

Design Stress and Safety Factor (service factor)

Safety factors take into account handling conditions, service conditions and other circumstances not directly considered in the design. In terms of ISO 4427 the minimum safety factor is 1.25. This factor, when applied to the Minimum Required Strength (MRS), for the particular material classification (e.g. PE 80, PE 100), gives the maximum allowable hydrostatic design stress for the designated material.

Designation of material	MRS at 50 years and 20°C Mpa	Maximum allowable hydrostatic design stress, σ – Mpa
PE 100	10	8
PE 80	8	6.3
PE 63	6.3	5

The table below illustrates the relationship between MRS and σ for various design coefficients at 20 °C.

Hydrostatic design stress of pipe, σ - MPa	MRS of material - MPa		
	10	8	6.3
	Design coefficient, C		
8	1.25		
6,3	1.59	1.27	
5	2	1.6	1.26

The design engineer may wish to apply a greater safety factor depending on operating conditions and environmental considerations. Applying Barlow's formula (below) it is possible to calculate the minimum wall thickness for any given size and pressure class of pipe.

$$t = \frac{p \times d}{(2\sigma + p)}$$

where:
t = minimum wall thickness (mm)
p = internal pressure (MPa)
d = mean external diameter (mm)
σ = design stress (MPa)

For example the minimum wall thickness for a 250 mm Class 10 HDPE pipe made from PE 80 material is:

$$t = 1.0 \times 250/\{(2 \times 6.3) + 1.0\}$$
$$= 18.38 \text{ mm}$$

Round up to 18.4 mm for manufacture and/or the appropriate SDR for the Class and Material designation.

Melt Flow Index

The melt flow index of polyethylene materials is a measure of the mass of melted material, at 190 °C, that will pass through a specific orifice in 10 minutes when subjected to a specific pressure. The melt flow index (MFI) is largely dependant on the molecular mass. Higher molecular masses result in lower MFI because long, well packed molecules do not flow as easily as short, less packed molecules.

Since both density and MFI are decisive for the strength properties, they are regulated in most standards for polyethylene pipes. In terms of the SABS specification the Melt Flow Index must conform to the raw material manufacturers pipe grade specification. This information can be obtained from the raw material manufacturers data sheets.
(See Table of Physical Properties on page 8)

Tensile Strength

The tensile strength of polyethylene materials increases with an increase in molecular mass since long, well packed molecules are more difficult to separate.
This property is also effectively regulated by standards.
(See Table of Physical Properties on page 8)

Effect of Temperature Change

Working Pressure

The standard design temperature for HDPE pipes is 20°C and working pressures are usually quoted for this temperature. HDPE pressure pipes function perfectly well below 20 °C right down to freezing point and can in fact, withstand higher pressures than those quoted at 20 °C.

As can be seen from the stress regression lines, the creep rupture strength diminishes with increasing temperature and working pressures must be down-rated if the same factors of safety are to be maintained. The applicable reduction factors are given under "Temperature Considerations" on page 59.

Sub Zero Temperatures

Water has been known to freeze in HDPE pipes without causing fractures, but permanent strain can result, leading to severe reduction in the working life of the pipe. Hence HDPE pipes - like other pipes - should be protected against sub zero temperatures.

Expansion and Contraction

All plastics have high a co-efficient of expansion and contraction, several times those of the metals. This must be allowed for in any installation by the use of expansion joints, expansion loops etc.

Material	Co-efficient of expansion (K-l)
MPVC	8×10^{-5}
HDPE	20×10^{-5}
LDPE	20×10^{-5}
Steel	$1,2 \times 10^{-5}$
Copper	$2,0 \times 10^{-5}$

Impact Resistance

It should be noted that it is possible to change the impact strength of certain plastic materials, however this usually comes at the expense of properties such as tensile strength, hardness or stiffness. This property is therefore effectively regulated (as with density and MFI) by most standards.

Ultra Violet Resistance

HDPE pipes, when manufactured to SANS ISO 4427, contain 2.5% (by mass) of carbon black. This provides exceptional protection against the effects of ultra violet light.

Flammability

As with impact resistance, it is possible to improve the fire resistance of HDPE by the addition of various compounds. Again this comes at the expense of other properties. Fire resistance is measured by a limiting oxygen index (LOI).

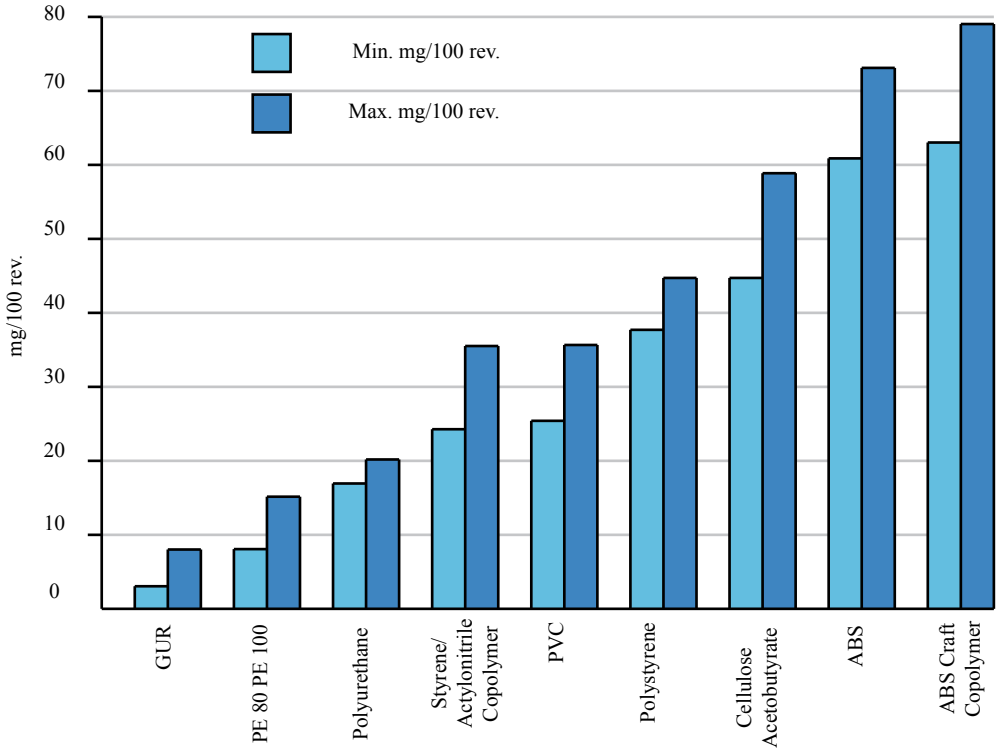
Abrasion Resistance

A number of international investigations to assess the abrasion resistance of various plastic materials have been carried out. Generally the results of such investigations are expressed as a loss of volume in relation to the original wall thickness. The results to date have varied in regard to the abrasion resistance of various pipe materials. However, what they all show is that plastics possess superior abrasion resistance relative to other pipe materials.

For example, in one investigation, HDPE pipes suffered wear to the extent of 4 mm after 1600 hours while the corresponding wear occurred in steel pipes after 1000 hours.

The graph below provides a further indication of relative wear rates.

Graph of Relative Wear rates



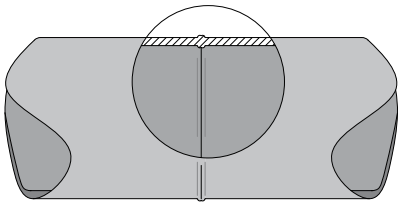
Dry sliding abrasion of a number of PE 80, PE 100 and some other grades of thermoplastic materials.
Taber Abrasion Method in accordance with DIN 53754 E

Jointing

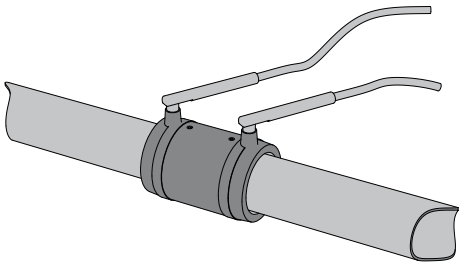
One of the greatest features of HDPE pipes is the fact that a wide variety of jointing systems is available to suit a whole range of applications. The jointing systems can be divided into permanent jointing and detachable jointing. The schematic below illustrates the available systems.

Permanent Jointing

Buttwelding



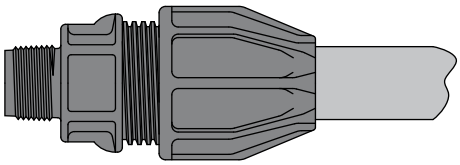
Electro-fusion



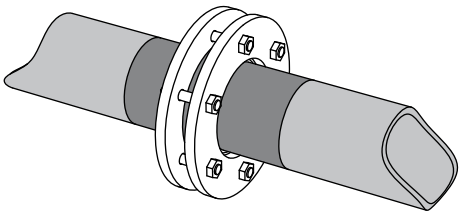
Both buttwelding and elec tro-fusion systems allow transition to detachable joints.

Non-Permanent (detachable) Jointing

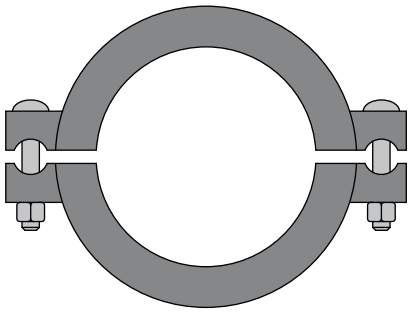
Compression Fittings*



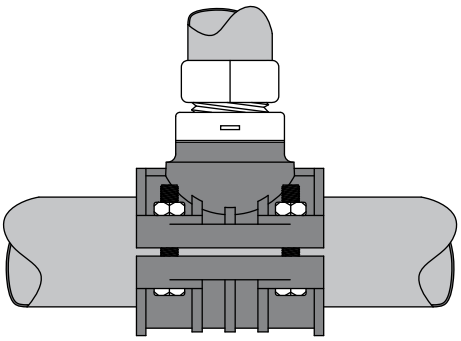
Flanging



Tak System



Magnum Saddles and Holderbats**



Buttwelding Principles

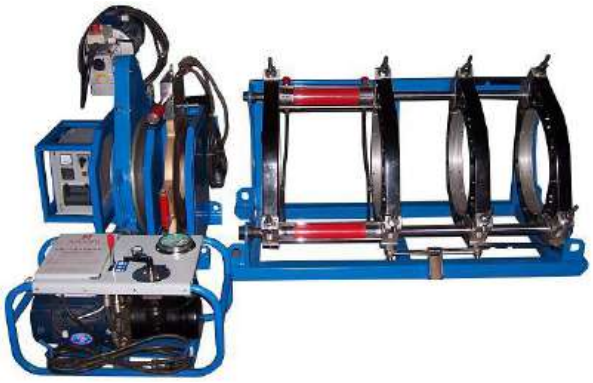
General

Butt-fusion jointing is a thermofusion process which involves the simultaneous heating of the ends of two components which are to be joined until a melt state is attained on each contact surface. The two surfaces are then brought together under controlled pressure for a specific cooling time and homogeneous fusion is formed upon cooling. The resultant joint is resistant to end thrust and has comparable performance under pressure to the pipe.

Refer to SABS 0269 welding code of practice.

This method of jointing requires an electrically heated plate to raise the temperature of the pipe ends to the required fusion temperature and is used for PE 63, PE 80 and PE 100 grades of material for pipe of size 32 mm and above of the same Standard Dimension Ratio (SDR). When joining pipes using butt-fusion techniques, the heater plate temperatures are the same for PE 63, PE 80 and PE 100, 195 °C to 200 °C.

The Site Fusion Jointing Specification WIS 4-32-08 Issue 2, 1994 emphasises the importance for the butt-fusion machine to be able to control the reduced secondary ram pressures that are now required for dual pressure butt-fusion jointing. For SDR 11 pipes of sizes 250 mm, 280 mm and 315 mm and for all pipe (SDRs 11, 17.6, 26) of size 355 mm and above the butt fusion pressures should be reduced after 10 seconds and therefore the use of an automatic butt fusion machine is required. (These conditions are tabulated on page 17)



The Marley System

Depending on the design and make, butt-fusion machines may or may not be capable of accepting fittings as moulded for direct welding to pipes. Marley therefore offers two ranges of fittings for butt-fusion systems to provide the greatest flexibility in this regard:

- long spigot fittings
- ‘pupped’ fittings

Pupped fittings are fabricated by butt-fusing, (in the factory), 0.5 m lengths of pipe to each leg of a spigot fitting, thereby allowing the straight length of pipe to be gripped by clamps of the butt-fusion machine.

The Marley butt-fusion system comprises, therefore:

- Straight polyethylene pipe
- Long spigot fittings
- Pupped fittings
- Accessories

Equipment

- Generator to supply the heater plate, trimmer and hydraulic pump
- Butt-fusion machine fitted with the correct size clamp shells, trimmer, heater plate, hydraulic pump and timer
- Pipe support rollers
- Welding tent
- Cleaning material, lint free cotton cloth or paper towel
- External/Internal debeading tool
- Bead gauge
- Digital thermometer with surface probe to check heater plate.
- Pipe end covers
- Baseboard
- Pipe cutters
- Air temperature thermometer
- Indelible marker pen
- Timer

Jointing Method

Pre-Welding Checks

Before commencing a welding operation check that:

- There is sufficient fuel for the generator to complete the joint and that it is functioning correctly before it is connected to the machine.
- The trimming tool and hydraulic pump are in working order.
- The heater plate is clean and residue from previous welds have been removed.
- A tent is available to provide shelter during welding.
- The machine is complete and undamaged.
- You know the correct welding parameters for the machine and pipe being welded.
- The heater plate is at the correct temperature. (Connect the heater plate to the power supply and retain for at least 20 minutes inside the thermally insulated guard). To remove dirt deposits the heater plate may be washed, when cold, with copious quantities of clean water at the start of the jointing session. Only clean, lint free materials must be used to clean the plate. To remove grease and oily films the plate may be wiped with lint free material dampened by a suitable solvent, eg. Isopropanol.
- Check that the pipes and/or fittings to be jointed are of the same size, SDR and material.

Dummy Welds

Even though washing may remove large deposits of dirt, very fine particles of dust may still remain on the heater plate. To remove such dust it is necessary to make a dummy joint at the start of each jointing session, whenever the plate has been allowed to cool below 180 °C, or at a change of pipe size. Two dummy joints will be made if the pipe size is greater than 180mm.

A dummy joint can be made using pipe off cuts of the same size, SDR and material as the pipe being installed. It is not necessary to complete the joint. The procedure can be discontinued after the full heat cycle.

Manual Welding Procedure

- Place the pipes in the clamps with the ends against the trimming tool and with the pipe markings aligned.
- Align and level the components using the support rollers.
- Tighten the pipe clamps to grip and re-round the pipes.
- Cover the free ends of the pipes to prevent cooling of the plate by internal draughts.
- Switch on the trimming tool and close the clamps slowly so that the pipe ends are moved against the trimming tool until continuous shavings are cut from each surface.
- Keep the trimming tool turning whilst opening the clamps to avoid steps on the trimmed surfaces.
- Remove the trimming tool taking care not to touch the trimmed ends.
- Remove loose shavings from the machine and component ends.

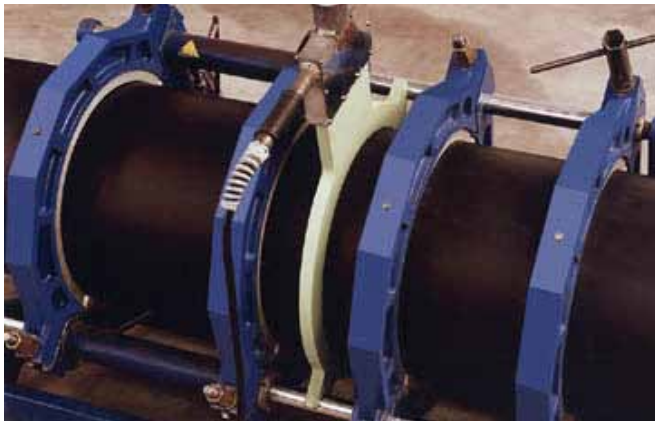
Do not touch the prepared surfaces.

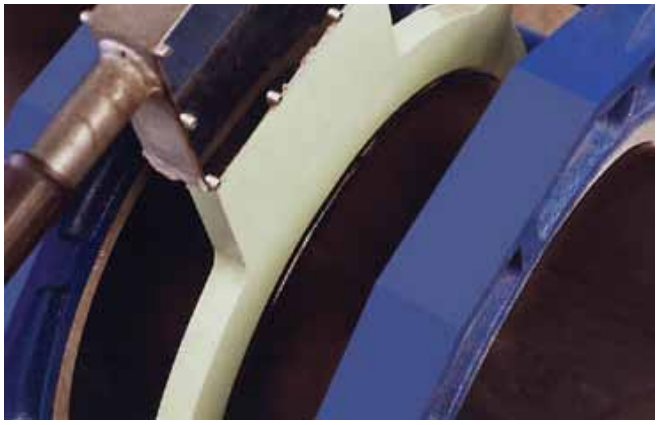
- Check that both surfaces are completely planed. If they are not then repeat the trimming process.
- Close the clamps and check that there is no visible gap between the trimmed faces.
- The maximum permitted outsider diameter mismatch is:
    - 1.0 mm for pipe sizes 90 mm to 315 mm
    - 2.0 mm for pipe sizes 316 mm to 800 mm

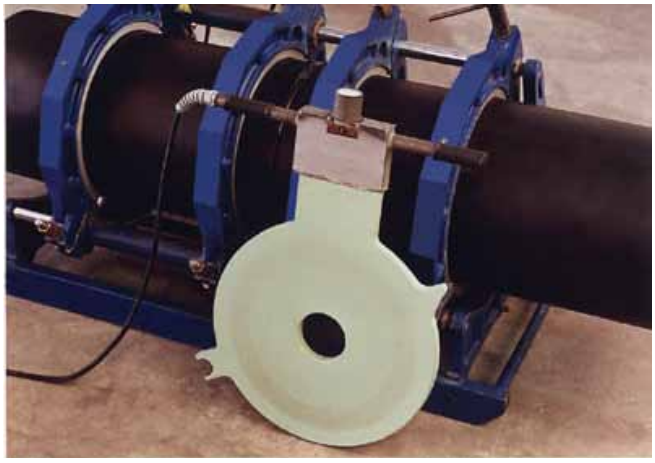
- If the mismatch is greater than these values then the pipe must be realigned and re-trimmed.
- Open and then close the clamps and note the drag pressure needed to move the pipes together using the hydraulic system.

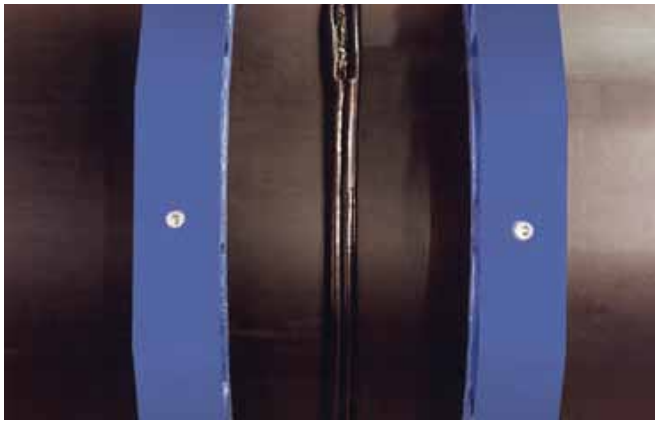
Drag pressure is the minimum gauge pressure required to overcome the sliding frictional drag on the rams due to the operation of the machine and the weight of the pipes/ fittings being jointed,

The drag pressure (in bar) must be assessed accurately prior to making each fusion joint and must be added to the basic ram pressure values shown on the machine. (When fully automatic machines are used this operation will normally be carried out automatically.)









- Remove the heater plate from its protective cover. Check that it is clean and up to temperature.
- Place the heater plate in the machine and close the clamps so that the surfaces to be joined are touching the plate. Using the hydraulic system apply the pressure previously determined.
- Maintain the applied pressure until the pipe begins to melt and a uniform bead of 2-3 mm is formed on each end.
- After the initial bead up, the pressure in the hydraulic system shall be released so that the pressure gauge registers between zero and the drag pressure so as to control the bead growth during the heat soak time. Check that the pipe does not slip in the clamps. The pipe ends must maintain contact with the heater plates.
- When the heat soak time is completed, open the clamps and remove the heater plate ensuring that the plate does not touch the melted surfaces.
- Immediately close the clamps (within 8 to 10 seconds of removing the plate) and bring the melted surfaces together at the previously determined pressure.
- Maintain the required pressure for the minimum cooling time as indicated in the table.
- After this time the assembly can be removed from the machine but should not be handled for a further period equal to the cooling times given on page 17.
- Examine the joint for cleanliness and uniformity and check that the bead width is within the specified limits.
- Remove the external bead and if required the internal beads using suitable debeading tools.

- The beads and joint shall be numbered/coded using an indelible marker pen.
- Twist the beads at several positions. If the bead is seen to split at any point then the joint must be cut out from the pipeline and remade. If a similar defect re-occurs, cease all further jointing until the equipment has been thoroughly cleaned, examined and new trial joints were made and shown to be satisfactory.

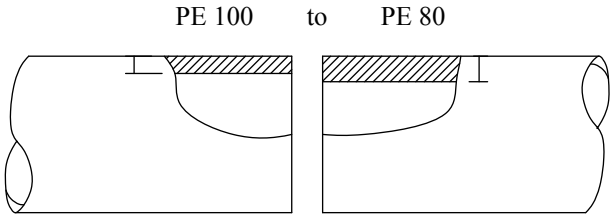
Rules for Butt-Fusion

NEVER

- Attempt to weld together pipes of different SDR (wall thickness).
- Touch trimmed pipe ends.
- Leave trimming swarf inside pipe or on welding machine.
- Allow equipment to get wet or dusty.
- Use non-approved machinery.
- Remove a weld from the machine before cooling time has elapsed.
- Allow untrained personnel to use welding equipment.
- Cut corners in any part of the welding procedure.
- Weld pipes of different material on site (In factory controlled conditions it may be possible to do this).
- Use a generator of inadequate capacity.

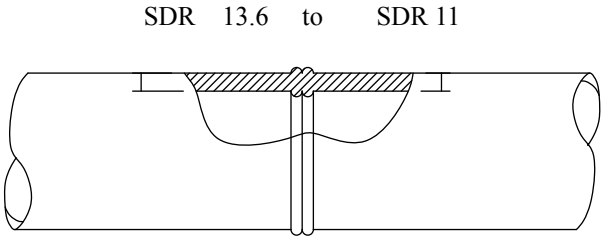
Summary

(a) Dissimilar materials and dissimilar wall thicknesses can be jointed by **electrofusion**.
(Please note that the maximum working pressure should not exceed the lower of the two pipes.)



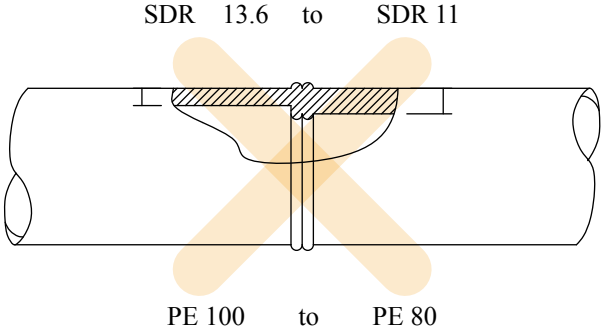
SDR 11 to SDR 11
SDR 17 to SDR 17

(b) Similar materials and/or wall thicknesses may be jointed by butt fusion or electrofusion. (Please note that SDR 17 can be butt fused to SDR 13.6.)



PE 100 to PE 100
PE 80 to PE 80

c) Dissimilar wall thicknesses must not be jointed by butt fusion. (PE 80 can be butt fused to PE 100 under closely controlled factory conditions.)



PE 100 to PE 80

Buttweld Time and Pressure Tables

Outside diameter	SDR	Wall Thick-ness (min)	Bead up interface stress	Initial bead size (approx)	Soak time	Min soak interface stress	Max plate removal time	Fusion and cooling interface stress	Cooling time in clamps	Cooling time out of clamps	Cooling time for coiled pipe in clamps	Typical final overall bead width	
mm		mm	Mpa	mm	sec	Mpa	sec	Mpa	min	min	min	min mm	max mm
90	26	3.5	0.15	2	95	0	10	0.15	10	5	15	8	15
90	17.6	5.1	0.15	2	110	0	10	0.15	10	5	15	8	15
90	11	8.2	0.15	2	140	0	10	0.15	10	5	15	9	16
110	26	4.2	0.15	2	100	0	10	0.15	10	5	15	8	15
110	17.6	6.3	0.15	2	125	0	10	0.15	10	5	15	9	16
110	11	10	0.15	2	160	0	10	0.15	10	5	15	10	17
125	26	4.8	0.15	2	110	0	10	0.15	10	5	15	8	15
125	17.6	7.1	0.15	2	130	0	10	0.15	10	5	15	9	16
125	11	11.4	0.15	2	175	0	10	0.15	10	5	15	10	17
160	26	6.2	0.15	2	120	0	10	0.15	10	5	15	9	16
160	17.6	9.1	0.15	2	150	0	10	0.15	10	5	15	9	16
160	11	14.6	0.15	2	205	0	10	0.15	10	5	15	11	18
180	26	6.9	0.15	2	130	0	10	0.15	10	5	15	9	16
180	17.6	10.2	0.15	2	160	0	10	0.15	10	5	15	10	17
180	11	16.4	0.15	2	225	0	10	0.15	10	5	15	11	18
225	26	8.6	0.15	2	145	0	10	0.15	10	5		9	16
225	17.6	12.8	0.15	2	190	0	10	0.15	10	5		10	17
225	11	20.5	0.15	2	265	0	10	0.15	10	5		12	19
250	26	9.6	0.15	2	155	0	10	0.15	10	5		9	16
250	17.6	14.2	0.15	2	200	0	10	0.15	10	5		10	17
280	26	10.7	0.15	3	170	0	10	0.15	10	5		13	22
280	17.6	15.9	0.15	3	220	0	10	0.15	10	5		14	23
315	26	12.1	0.15	3	180	0	10	0.15	10	5		13	22
315	17.6	17.9	0.15	3	240	0	10	0.15	10	5		14	23
	Tolerance		±0.02		±3			±0.02					

Table 1 — Single pressure butt-fusion jointing conditions for PE 63, PE 80 and PE 100
Heater Plate Surface Temperature: 195 ˚C to 200 ˚C

Outside diameter	SDR	Wall Thick-ness (min)	Bead up interface stress	Initial bead size (approx)	Soak time	Min soak interface stress	Max plate removal time	Fusion interface stress (after 10 sec)	Cooling interface stress (after 10 sec)	Cooling time in clamps	Cooling time out of clamps	Typical final overall bead width	
mm		mm	Mpa	mm	sec	Mpa	sec	Mpa	min	min	min	min mm	max mm
250	11	22.7	0.15	2	285	0	10	0.15	0.025	15	7.5	15	24
280	11	25.4	0.15	3	315	0	10	0.15	0.025	15	7.5	16	25
315	11	28.6	0.15	3	345	0	10	0.15	0.025	15	7.5	17	26
355	26	13.6	0.15	3	195	0	10	0.15	0.025	10	5	13	22
355	17.6	20.1	0.15	3	260	0	10	0.15	0.025	15	7.5	15	24
355	11	32.3	0.15	3	385	0	10	0.15	0.025	15	7.5	18	27
400	26	15.3	0.15	3	215	0	10	0.15	0.025	10	5	14	23
400	17.6	22.7	0.15	3	285	0	10	0.15	0.025	15	7.5	15	24
400	11	36.4	0.15	3	425	0	10	0.15	0.025	20	10	18	27
450	26	17.2	0.15	3	235	0	10	0.15	0.025	10	5	14	23
450	17.6	25.6	0.15	3	315	0	10	0.15	0.025	15	7.5	16	25
450	11	41	0.15	3	470	0	10	0.15	0.025	20	10	19	28
500	26	19.1	0.15	3	250	0	10	0.15	0.025	10	5	15	24
500	17.6	28.3	0.15	3	345	0	10	0.15	0.025	15	7.5	16	25
500	11	45.5	0.15	3	515	0	10	0.15	0.025	20	10	20	29
560	26	21.4	0.15	3	275	0	10	0.15	0.025	15	7.5	15	24
560	17.6	31.7	0.15	3	380	0	10	0.15	0.025	15	7.5	17	26
560	11	50.8	0.15	3	570	0	10	0.15	0.025	20	10	22	31
630	26	24.1	0.15	3	300	0	10	0.15	0.025	15	7.5	16	25
630	17.6	35.7	0.15	3	420	0	10	0.15	0.025	15	7.5	18	27
630	11	57.2	0.15	3	635	0	10	0.15	0.025	25	12.5	23	32
710	26	27.2	0.15	3	335	0	10	0.15	0.025	15	7.5	16	25
710	17.6	40.2	0.15	3	465	0	10	0.15	0.025	20	10	19	28
800	26	30.6	0.15	3	370	0	10	0.15	0.025	15	7.5	17	26
800	17.6	45.3	0.15	3	515	0	10	0.15	0.025	20	10	20	29
900	26	34.6	0.15	3	405	0	10	0.15	0.025	20	10	18	27
900	17.6	50.9	0.15	3	570	0	10	0.15	0.025	20	10	22	31
1000	26	38.4	0.15	3	445	0	10	0.15	0.025	20	10	19	28
1000	17.6	56.6	0.15	3	630	0	10	0.15	0.025	25	12.5	23	32
	Tolerance		±0.02		±3			±0.02	±0.01				

Table 2 — Dual pressure butt-fusion jointing conditions for PE 63, PE 80 and PE 100
Heater Plate Surface Temperature: 195 ˚C to 200 ˚C

All jointing pressure must be calculated by using the effective ram area of the machine in relation to the cross sectional area of the pipe wall. Effective ram area should be marked on each model

Electrofusion Principles

Introduction

The Haiwei system comprises a complete range of polyethylene pipes, electrofusion fittings (couplers, elbows, tees, tapping tees and branching saddles), together with long spigot fittings. A range of accessories and ancillary equipment complements the system.

Refer to SABS 0269 welding code of practice.

Technology and Product Design

All electrofusion fittings employ the same basic principle. The socket of the fitting incorporates an electrical heating coil. An electrofusion control unit (ECU) supplies the electrical energy necessary to heat the coil. When the coil is energised the material adjacent to it melts and forms an expanding pool which comes into contact with the surface of the pipe. The continued introduction of heat energy causes the pipe surface to melt and a mixing of pipe melt and fitting melt takes place; this is vital to produce a good weld. Following the termination of the heat cycle, the fitting and pipe are left to cool and the melted material solidifies to form a sound joint.

High integrity, consistently reproducible electrofusion joints will only be achieved if the following criteria are met:

- Heating coils are as close to the joint surfaces as possible.
- Wire position is accurately controlled during manufacture and during the subsequent fusion process.
- Heat distribution is uniform over the length of the hot zone.
- Melt pressure and temperature are both accurately controlled.
- Coils are protected from damage prior to, during and after fusion.
- Spigot ends are scraped.

The design and unique manufacturing technique of the electrofusion system ensures positive compliance with all these criteria.

Electrofusion Principles

Hot and cold zones, sometimes called melt and freeze zones, are formed after energising the coil. The length of these zones is particularly important. Each zone ensures that fusion is controlled to a precise length of the socket of the fitting and that the melt pressure is also controlled throughout the entire jointing process. The precisely controlled pitch and positioning of the coil in relation to the inner surface of the socket ensures uniform heat distribution.

Electrofusion fittings are supplied for mainly 39.5 volt operation although some sizes and materials are available for 80 volt operation.

Electrofusion Control Unit

Marley Pipe Systems supply electrofusion control units to meet all conceivable needs. In addition, a comprehensive range of accessories is also offered. Electrofusion control units are designed to operate from an electrical mains or field generator supply having an output of 220 volt and a rating of generally 3 to 3.5 kVA for 39.5 volt fittings and 6 to 7 kVA for 80 volt fittings. Electrofusion control units can also be obtained combined with an integral generator. All units have been designed for arduous site conditions. They are equipped with combined carrying and protective frames.

Bar Coded Electrofusion Fittings

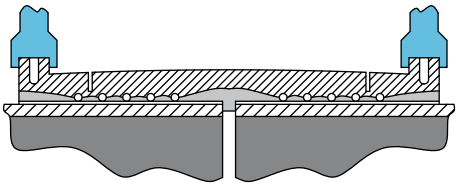
Technology is now available which eliminates the need to enter the fusion time manually. Special control units can be supplied with the ability to read a bar code where fixed to an electrofusion fitting. These machines have a ‘light pen’ attached which the operator uses to input the data contained within the bar code. Bar code control units also have data logging facilities to ensure traceability of welding parameters. An output socket allows the downloading of this information onto a computer database or printer to obtain a complete record of the joints which have been made. This information can be downloaded daily, or on completion of the project. The units will store up to 200 operations.

The ECU will display a description of the fitting which includes three digits to denote size and this should be read and checked by the operator before proceeding.

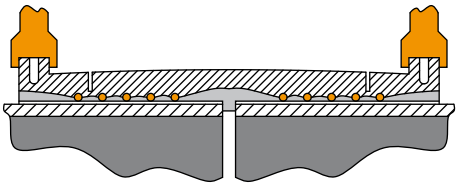
1. Fitting information barcode; scanned into fusion unit before welding and supplier's fitting type, welding time and resistance.
2. Fitting type and size.
3. Pipe SDR range where the fitting is safe to use.
4. The cooling times given in the bar code, and identified by the additional letters "C.T.", are the times in minutes during which the fused joint should not be moved. Cooling times required before pressurization can be found on page 20.
5. Fitting traceability barcode; when using the FRIAMAT® Prime or Memo fusion units, components can be automatically traced back to source via a special barcode containing specific fittings data such as manufacturer dimension, raw material and batch. The tracing data can be electronically archived together with the fusion processing data.
6. Emergency barcode information for manual input.

Electrofusion Sequence

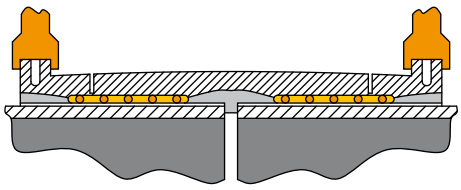
The sectional drawings show the jointing sequence from energising the coil until completion of fusion. The whole cycle is electronically monitored by the electrofusion control unit (ECU).



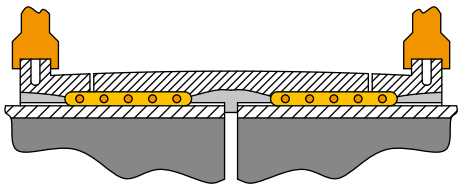
1. Pipe positioned in coupler prior to energising coil.



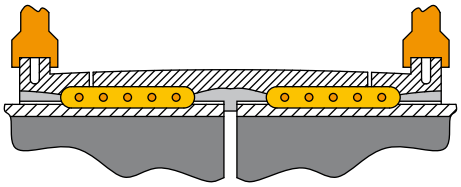
2. Coil energised.



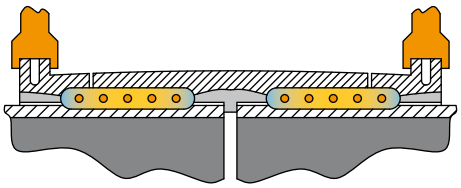
3. Material surrounding coil starts to melt.



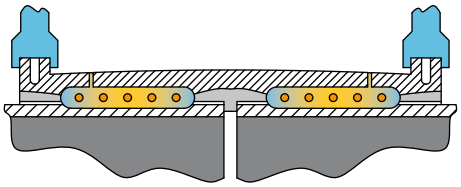
4. Area of melt extends leading to expansion towards pipe surface.



5. Heat transfers to pipe wall and material starts to melt



6. Melt solidifies at the start of the cold zones, thereby sealing the melt zone. Further input of energy causes increase in melt pressure.



7. Melt pressure reaches optimum value at end of energising cycle. Emergence of the melt at the indicator holes shows that fusion is complete.

Temperature/Fusion Time Compensation

The fittings are designed to work on a fixed fusion time for temperatures between -5 °C and +23 °C. Where the time is being entered manually, temperature compensation is not normally necessary within these parameters. The bar code system will automatically adjust the fusion time by small amounts to compensate for variations in ambient temperatures. Additional data relating to extremes of temperature can be obtained from Marley Technical Support Department.

Electrofusion Jointing Procedures

Jointing using electrofusion is simple, quick and efficient. Successful joints can be consistently reproduced after very simple training. Similar procedures are used for all electrofusion systems with respect to preparation and assembly. Some fittings require the fusion time to be entered into the ECU manually and are therefore described as manual. Some fittings incorporate auto-recognition aids and the ECUs are therefore described as automatic. The majority of fittings require a 39.5 volt supply but some larger couplers are designed to accept 80 volt supply.

The instructions that follow describe the electrofusion fittings used to joint adjacent lengths of pipe and long spigot fittings. Procedures described must be read in conjunction with any Code of Practice affecting a particular industry, for example: British Gas Code of practice and IGE/TD/3 WIS 4-32-08 Issue 2 1994 WRc Manual for PE pipe systems for water supply applications, 2nd Edition 1994.

Fitting diameter (mm)	Cooling times in minutes		
	Before joint can be moved	Before pressure test at 6 Bar	Before maximum pressurisation
20 – 32	5	8	10
40 – 63	7	15	25
75 – 110	10	30	40
125 – 140	15	35	45
160 – 225	20	60	75

Equipment

- 220 volt generator generally of 3 to 3.5 kVA output for 39.5 volt fittings and 6 to 7 kVA for 80 volt fittings.
- Electrofusion control unit (ECU).
- Clamping equipment.
- Pipe scraping/preparation tool capable of removing 0.2 to 0.4 mm from the outer surface of the pipe.
- Ancillary equipment such as marker pen, solvent wipe and clean cloth/paper towel.
- A shelter to protect the pipe, fittings and ancillary equipment against adverse weather conditions and contamination.

Procedure

- Cut the pipe square and remove burrs.
- Wipe loose dirt from pipe ends.
- Without removing the protective wrap, place the centre of the electrofusion fitting alongside the pipe end and mark the pipe around the circumference, approximately 15 mm beyond the extremity of the socket depth, using a felt tip pen.

- Using the pipe end preparation tool, remove the entire surface of the pipe over the marked area, preferably as a continuous ribbon or strip.

The use of mechanical end preparation tools is preferred as hand scraping requires great care and can be time consuming especially on larger diameter pipes. It is essential that material is removed by scraping or peeling; scratching or abrading is not sufficient.

- Remove the fitting from its packaging and check that the bore of the fitting is clean and dry.
- Clean the scraped area of the pipe with isopropanol wipes.
- Insert the pipe ends into the fitting so that they are in contact with the centre stop.
- For all socket electrofusion fittings (couplers, reducers, elbows and tees) it is recommended that clamps be used. The clamps must be adjusted to suit the particular size and type of fitting being welded so the pipes cannot move during the fusion cycle. If possible, rotate the fitting to check that the pipe ends are correctly aligned.
- Remove the terminal protection caps from the terminal shrouds.
- Connect the ECU output leads to the fitting terminals.

It does not matter which lead is connected to each terminal. The connections are not live and neutral.

- Check that there is sufficient fuel in the generator to complete the joint. Start the generator and check for correct operation.
- Operate the ECU according to the instructions, which should have been thoroughly read and understood prior to any welding operations. The ECU will either have some form of automatic operating system or require manual operation. Whichever system the ECU uses, all fittings are marked with both fusion and cool times in seconds plus the necessary input voltage
- If the fitting has melt indicators check that they have risen. The molten material should have risen to a point just above, or just below, the surface of the fitting.
- It is recommended that the joint be left in the clamps for the cooling time specified on the fitting, although the terminal leads may be removed carefully without disturbing the joint.
- If the fusion cycle terminates before completion of the countdown, check for faults as indicated by the ECU display.
- Once the fault has been rectified the welding process can be recommenced, but the timer has to be reset to zero.
- If using a transformed supply, make sure that the supply lead to the ECU is not of excessive length. NEVER extend the length of the leads from the ECU to the fitting.
- Do not pressurise the system until the joints have cooled to ambient temperatures.

Electrofusion Jointing of Coiled Pipe
Up to 63 mm diameter: Clamps must be used which align and restrain the pipes.
Greater than 63 mm diameter: To electrofuse coiled pipe with a diameter greater than 63 mm, the pipe must be rerounded.

Material Compatibility

Marley electrofusion fittings and long spigot fittings are compatible with pipes made from any of the following materials:

Manufacturer	Product Name	Material Type
BP	Riddex	PC2040; 002-50; 001-55; PC3100; PC4100
Ato Fina	Finathene	3902; XS10
Basell	Hostalen	CPR100
Solvay	Eltex	TUB171; TUB174 TUB121; TUB124
Repsol	Alcudia	3802
DOW	MS010	PE 80; PE 100
Polymers from other major producers may be expected to perform to equivalent standards but have not been tested by Marley Pipe Systems.		

Compatibility of Eletrofusion Jointing and Pipe SDR

As a general rule, electrofusion fittings can be used to join pipes of diffirent SDRs; for example to join SDR 11 to SDR 17.6 pipe. However, with some of the more unusual SDR sizes extra care needs to be taken.

Water Supply PE Pipe

Executive Standard: ISO 4427-2:2007 **Socket Joint**

Remark	Specifications (mm)	Remark	Specifications (mm)	Remark	Specifications (mm)
Equal Coupling	20	Female Thread Coupling	20 x 1/2"	Male Thread Union	20 x 1/2"
	25		25 x 1/2"		25 x 1/2"
	32		25 x 3/4"		25 x 3/4"
	40		32 x 3/4"		32 x 3/4"
	50		32 x 1"		32 x 1"
	63		32 x 1" hexagonal		32 x 1" hexagonal
	75		40 x 5/4"		40 x 5/4"
	90		40 x 5/4" hexagonal		40 x 5/4" hexagonal
	110		50 x 3/2"		50 x 3/2"
Equal Elbow 45°	20		50 x 3/2" hexagonal		50 x 3/2" hexagonal
	25		63 x 2"		63 x 2"
	32		63 x 2" hexagonal		63 x 2" hexagonal
	40		75 x 5/2" hexagonal		75 x 5/2" hexagonal
	50		90 x 3" hexagonal		90 x 3" hexagonal
	63		110 x 4" hexagonal		110 x 4" hexagonal
	75				
	90				
	110				

Remark	Specifications (mm)	Remark	Specifications (mm)	Remark	Specifications (mm)
Reducing Coupling	25 x 20	Reducing Tee	25 x 20	Equal Coupling	20
	32 x 20		32 x 20		25
	32 x 25		32 x 25		32
	40 x 20		40 x 20		40
	40 x 25		40 x 25		50
	40 x 32		40 x 32		63
	50 x 20		50 x 20		75
	50 x 25		50 x 25		90
	50 x 32		50 x 32		110
	50 x 40		50 x 40	Equal Tee	20
	63 x 20		63 x 20		25
	63 x 25		63 x 25		32
	63 x 32		63 x 32		40
	63 x 40		63 x 40		50
	63 x 50		63 x 50		63
	75 x 32		75 x 32		75
	75 x 40		75 x 40		90
	75 x 50		75 x 50		110
	75 x 63		75 x 63		
	90 x 40		90 x 50		
	90 x 50		90 x 63		
	90 x 63		90 x 75		
	90 x 75		110 x 40		
	110 x 50		110 x 50		
	110 x 63		110 x 63		
	110 x 75		110 x 75		
	110 x 90		110 x 90		

Remark	Specifications (mm)	Remark	Specifications (mm)	Remark	Specifications (mm)
Female Thread Elbow	20 x 1/2"	Male Thread Elbow	20 x 1/2"	Plastic Ball Valve	20
	25 x 1/2"		25 x 1/2"		25
	25 x 3/4"		25 x 3/4"		32
	32 x 3/4"		32 x 3/4"		40
	32 x 1"		32 x 1"		50
	32 x 1" hexagonal		32 x 1" hexagonal		63
	40 x 5/4"		40 x 5/4"		75
	40 x 5/4" hexagonal		40 x 5/4" hexagonal		90
	50 x 3/2"		50 x 3/2"		110
	50 x 3/2" hexagonal		50 x 3/2" hexagonal	Abutting Joint Flange	25
	63 x 2" hexagonal		63 x 2" hexagonal		32
Flange	F50	Anticorrosion Flange	50		40
	F63		63		50
	F75		75		63
	F90		90		75
	F110		110		90
					110

Remark	Specifications (mm)	Remark	Specifications (mm)	Remark	Specifications (mm)
Female Thread Union	20 x 1/2"	Male Thread Union	20 x 1/2"	Stop Valve	20
	25 x 3/4"		25 x 3/4"		25
	32 x 1"		32 x 1"		32
	40 x 5/4"		40 x 5/4"		40
	50 x 3/2"		50 x 3/2"		50
	63 x 2"		63 x 2"		63
Female Thread Tee	20 x 1/2"	Male Thread Tee	20 x 1/2"	Stop Valve (lift type)	20
	25 x 1/2"		25 x 1/2"		25
	25 x 3/4"		25 x 3/4"		32
	32 x 3/4"		32 x 3/4"		40
	32 x 1"		32 x 1"		50
	32 x 1" hexagonal		32 x 1" hexagonal		63
	40 x 5/4"		40 x 5/4"		75
	40 x 5/4" hexagonal		40 x 5/4" hexagonal		90
	50 x 3/2"		50 x 3/2"		110
	50 x 3/2" hexagonal		50 x 3/2" hexagonal		
	63 x 2"		63 x 2"		
	63 x 2" hexagonal		63 x 2" hexagonal		

Remark	Specifications (mm)	Remark	Specifications (mm)	Remark	Specifications (mm)
Flange Rubber Ring	50	Water Separator	DJ120−6−1/2 inside	Joint Coupling	DN110−63
	63		DJ120−6−3/4 inside		DN160−63
	75		DJ120−6−1/2 outside		DN160−110
	90		DJ120−6−3/4 outside		DN200−63
	110		DJ150−6−1/2 inside		DN200−110
	125		DJ150−6−3/4 inside		DN250−110
	160		DJ150−6−1/2 outside		DN315−110
	250		DJ170−6−3/4 inside	Repair Section	DN50
	315		DJ170−6−1/2 outside		DN63
	400	Pipe Cap	20		DN75
	450		25		DN90
	500		32		DN110
	560		40		DN125
	630		50		DN160
			63		DN200
			75		DN225
			90		DN250
			110		DN315

Water Supply PE Pipe

Executive Standard: ISO 4427-2:2007 Abutting Joint

Remark	Specifications (mm)	Specifications (mm)	Specifications (mm)	Specifications (mm)	Remark	Specifications (mm)
Reducing Coupling	75 x 50	180 x 125	280 x 250	450 x 315	Equal Tee	63
	75 x 63	180 x 140	315 x 110	450 x 355		75
	90 x 50	180 x 160	315 x 160	450 x 400		90
	90 x 63	200 x 63	315 x 200	500 x 200		110
	90 x 75	200 x 75	315 x 225	500 x 225		125
	110 x 50	200 x 90	315 x 250	500 x 250		140
	110 x 63	200 x 110	315 x 280	500 x 280		160
	110 x 75	200 x 160	355 x 110	500 x 315		180
	110 x 90	200 x 180	355 x 160	500 x 355		200
	125 x 63	225 x 110	355 x 200	500 x 400		225
	125 x 75	225 x 160	355 x 225	500 x 450		250
	125 x 90	225 x 200	355 x 250	560 x 315		280
	125 x 110	250 x 110	355 x 280	560 x 355		315
	140 x 63	250 x 160	355 x 315	560 x 400		355
	140 x 75	250 x 200	400 x 200	560 x 450		400
	140 x 90	250 x 225	400 x 225	560 x 500		450
	140 x 110	280 x 110	400 x 250	630 x 315		500
	160 x 63	280 x 125	400 x 315	630 x 355		560
	160 x 75	280 x 140	400 x 355	630 x 400		630
	160 x 90	280 x 160	450 x 200	630 x 450		710
	160 x 110	280 x 180	450 x 225	630 x 500		800
	160 x 125	280 x 200	450 x 250	630 x 560		
	180 x 110	280 x 225	450 x 280			

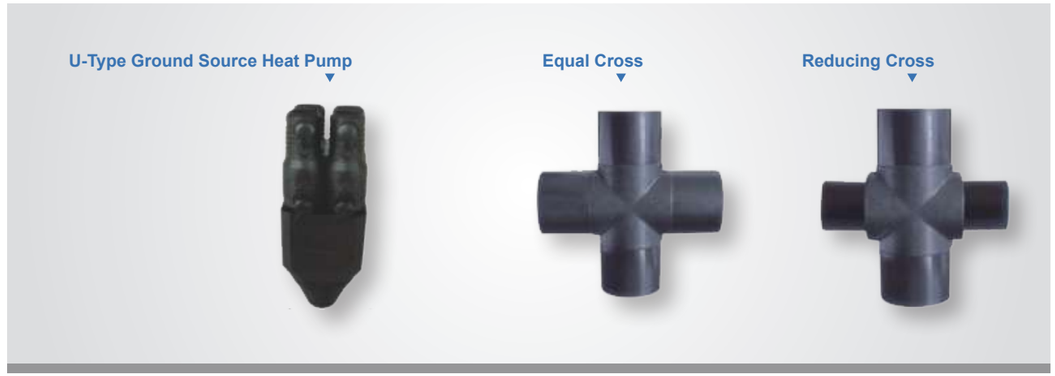
Reducing Tee ▸

Remark	Specifications (mm)	Specifications (mm)	Specifications (mm)	Specifications (mm)	Specifications (mm)
Reducing Coupling	75 x 50	160 x 125	280 x 200	450 x 250	630 x 225
	75 x 63	180 x 90	280 x 250	450 x 315	630 x 250
	90 x 50	180 x 110	315 x 63	450 x 400	630 x 315
	90 x 63	180 x 160	315 x 75	500 x 110	630 x 400
	90 x 75	200 x 63	315 x 90	500 x 160	630 x 450
	110 x 50	200 x 75	315 x 110	500 x 200	630 x 500
	110 x 63	200 x 90	315 x 160	500 x 225	710 x 110
	110 x 75	200 x 110	315 x 200	500 x 250	710 x 160
	110 x 90	200 x 160	315 x 250	500 x 315	710 x 200
	125 x 63	225 x 63	355 x 110	500 x 400	710 x 250
	125 x 75	225 x 75	355 x 160	500 x 450	710 x 315
	125 x 90	225 x 90	355 x 200	560 x 110	710 x 400
	125 x 110	225 x 110	355 x 250	560 x 160	710 x 500
	140 x 63	225 x 160	355 x 315	560 x 200	710 x 630
	140 x 75	225 x 200	400 x 110	560 x 225	800 x 110
	140 x 90	250 x 63	400 x 160	560 x 250	800 x 160
	140 x 110	250 x 75	400 x 200	560 x 315	800 x 200
	140 x 125	250 x 90	400 x 250	560 x 400	800 x 250
	160 x 50	250 x 110	400 x 315	560 x 450	800 x 315
	160 x 63	250 x 160	450 x 110	560 x 500	800 x 400
	160 x 75	250 x 200	450 x 160	630 x 110	800 x 500
	160 x 90	280 x 110	450 x 200	630 x 160	800 x 630
	160 x 110	280 x 160	450 x 225	630 x 200	800 x 710

Equal Elbow 90° ▾ Equal Elbow 45° ▾ Equal Elbow 22.5° ▾

Remark	Specifications (mm)	Remark	Specifications (mm)	Remark	Specifications (mm)
Equal Elbow 90°	63	Equal Elbow 45°	63	Equal Elbow 22.5°	110
	75		75		125
	90		90		140
	110		110		160
	125		125		180
	140		140		200
	160		160		225
	180		180		250
	200		200		280
	225		225		315
	250		250		355
	280		280		400
	315		315		450
	355		355		500
	400		400		560
	450		450		630
	500		500		710
	560		560		800
	630		630		
	710		710		
	800		800		

Remark	Specifications (mm)	Remark	Specifications (mm)	Remark	Specifications (mm)
Abutting Joint Flange	50	Anticorrosion Flange	50	Pipe Cap	75
	63		63		90
	75		75		110
	90		90		125
	110		110		160
	125		125		180
	140		140		200
	160		160		225
	180		180		250
	200		200		280
	225		225		315
	250		250		355
	280		280		400
	315		315		450
	355		355		500
	400		400		560
	450		450		630
	500		500		710
	560		560		800
	630		630		900
	710		710		1000
	800		800		1200
	900		900		
	1000		1000		
	1200		1200		



Remark	Specifications (mm)	Remark	Specifications (mm)	Remark	Specifications (mm)
Equal Cross	63	Reducing Cross	90 x 63	U– Type Ground Source Heat Pump	25 Single U
	75		110 x 63		32 Single U
	90		125 x 75		25 Single–Doule U
	110		225 x 160		32 Single–Doule U
	125		315 x 200		25 Double U holder
	160		355 x 200		32 Double U holder
	200		400 x 200		
	225		450 x 200		
	250		450 x 315		
	315		500 x 160		
	355		500 x 200		
	400		500 x 250		
	450		500 x 315		
	500		560 x 200		
	560		560 x 315		
	630		630 x 200		
	710		630 x 315		
	800		710 x 200		
			710 x 315		
			800 x 200		
			800 x 400		

PE Electrofused Fitting

Executive Standard: ISO 4427-2:2007

Remark	Specifications (mm)	Packing /Carton	Specifications (mm)	Packing /Carton	Specifications (mm)	Packing /Carton
Electrofused Reducing Coupling	63 x 50	200	125 x 110	32	200 x 110	8
	75 x 50	168	140 x 110	18	200 x 125	8
	75 x 63	120	160 x 50	18	200 x 160	8
	90 x 50	90	160 x 63	18	225 x 110	8
	90 x 63	90	160 x 75	24	225 x 160	8
	90 x 75	90	160 x 90	24	225 x 200	8
	110 x 50	48	160 x 110	24	250 x 110	5
	110 x 63	48	160 x 125	24	250 x 160	5
	110 x 75	48	200 x 50	12	250 x 200	5
	110 x 90	48	200 x 63	12	315 x 160	5
	125 x 75	32	200 x 75	12	315 x 200	5
	125 x 90	32	200 x 90	12	315 x 250	5
Fused Flange	50	252	160	27	400	4
	63	175	200	8	450	4
	75	150	225	8	500	4
	90	80	250	6	560	4
	110	48	280	6	630	1
	125	36	315	6		
	140	27	355	5		
Flange	50		140		250	
	63		160		315	
	75		200 (8 holes)		355	
	90		200 (12 holes)		400	
	110		225 (8 holes)		500	
	125		225 (12 holes)		630	

Remark	Specifications (mm)	Packing /Carton	Remark	Specifications (mm)	Packing /Carton
Female Thread Elbow	50	200	Plastic Ball Valve	50	128
	63	126		63	90
	75	96		75	60
	90	60		90	30
	110	36		110	20
	125	27		125	16
	140	27		140	12
	160	18		160	8
	200	8		200	4
	225	8		225	4
	250	5		250	2
	280	6		315	1
	315	6		355	1
	355	5		400	1
	400	2		500	1
	450	2	Electrofused Equal Elbow 90°	50	140
	500	2		63	90
	560	1		75	75
	630	1		90	40
Electrofused Pipe Cap	50			110	24
	75			125	18
	110			140	16
	160			160	10
				200	4
				225	4
				250	2
				315	2

PE Electrofused Fitting

Executive Standard: ISO 4427-2:2007

Fused Reducing Tee

Electrofused Equal Tee

Remark	Specifications (mm)	Packing /Carton	Specifications (mm)	Packing /Carton	Specifications (mm)	Packing /Carton
Plastic Ball Valve	50 x 40	102	160 x 90	7	315 x 160	2
	63 x 32	65	160 x 110	6	315 x 200	2
	63 x 40	65	160 x 125	6	315 x 250	1
	63 x 50	65	200 x 50	5	355 x 110	1
	75 x 40	50	200 x 63	5	355 x 160	1
	75 x 50	50	200 x 75	5	355 x 200	1
	75 x 63	50	200 x 90	5	355 x 250	1
	90 x 50	36	200 x 110	4	355 x 315	1
	90 x 63	30	200 x 125	4	400 x 110	1
	90 x 75	26	200 x 160	4	400 x 125	1
	110 x 50	24	225 x 90	2	400 x 160	1
	110 x 63	24	225 x 110	2	400 x 200	1
	110 x 75	24	225 x 160	2	400 x 250	1
	110 x 90	16	225 x 200	2	400 x 315	1
	125 x 75	10	250 x 90	2	500 x 110	1
	125 x 90	10	250 x 110	3	500 x 160	1
	125 x 110	10	250 x 125	2	500 x 200	1
	140 x 110	8	250 x 160	2	500 x 250	1
	160 x 50	7	250 x 200	2	500 x 315	1
	160 x 63	7	315 x 110	2	500 x 400	1
	160 x 75	7	315 x 125	2	500 x 450	1
Electrofused Equal Tee	50	102	125	10	250	2
	63	65	140	8	315	1
	75	50	160	6	355	1
	90	28	200	4	400	1
	110	16	225	2	500	1

PE Electrofused Fitting

Executive Standard: ISO 4427-2:2007

Haiyang brand steel mesh skeleton polyethylene (PE) composite pipe is a reinforcement body made of high-strength steel wire spirally wound around the core, with high-density polyethylene (HDPE) as the base and high-performance adhesive resin layer. The wire mesh frame is tightly joined to the outer layer of high density polyethylene. The bonding resin is a high-performance bonding material, belonging to HDPE modified material, and can be completely melted and integrated with HDPE under heating conditions. At the same time, its polar bond has strong bonding property with steel due to bonding. The use of the resin successfully solves the problem of no connection factor between steel and HDPE, and has a better composite effect.

Executive standard: GB/T 32439-2015 "Water supply wire mesh reinforced polyethylene composite pipe"

PE steel net skeleton plastic pipes

Executive Standard: ISO 4427-2:2007

The polyethylene (PE) pipe for water supply is made of high-density polyethylene resin or polyethylene as the main raw material, modified with appropriate amount of additives, and extruded by a unique molding process. The product performance is compounded by the requirements of the international advanced standard (European standard prEN13476).

Execution standard: polyethylene (PE) pipes and pipes for water supply are manufactured according to national standards GB/T 13663.3-2018 and GB/T 13663.3-2018.

Hot melt connection

Before and after the hot melt connection, the dirt on the heating surface of the connecting tool is wiped clean with a clean cotton cloth.

The hot melt connection heating time and heating temperature should be in accordance with the hot melt connection regulations.

The hot-melt connection pressure and cooling time shall be such that no external connection or any external force is applied to the joint during the pressure-maintaining cooling.

Hot melt socket connections shall comply with the following regulations:

(1) Cut the PE pipe with a cutter or scissors according to the installation requirements.

(2) Mark it at the pipe insertion.

(3) Warm the fuser at 230±10 ℃ (International Tube) and 200±5 ℃ (Enterprise Standard Tube).

(4) Simultaneously melt the PE pipe fittings (after leaving the socket in place for a while, it is forbidden to twist during heating, socket insertion and cooling).

(5) Keep a certain cooling time loose and the operation is completed.

(6) After the completion of the construction, it must be tested and accepted before being buried.

Hot melt butt joints shall comply with the following requirements:

(1) Place the two PE pipes that need to be installed and connected on the fuser clamp at the same time (the clamps can be changed according to the diameter of the pipe to be installed), and the other pipe of each pipe is lifted to the same level with the pipe bracket.

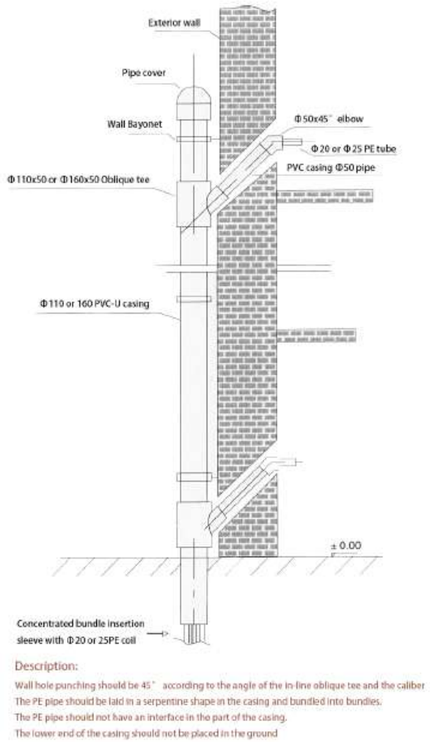
(2) Cut the end surface of the pipe with an electric milling cutter to ensure that the contact surfaces of the two pipes can be fully matched.

(3) The electric heating plate is heated to 230±10 ℃ (international tube), 200±5 ℃ (enterprise standard tube), and the middle end faces of the two pipes are placed. The electro-hydraulic device is operated to use both end faces and fully heated in contact with the electric heating plate.

(4) The heating plate is removed, and the hydraulic device is operated again to fully abut the molten two pipes and lock the hydraulic device (to prevent bounce).

(5) Keep a certain cooling time loose and the operation is completed.

(6) After the completion of the construction, it must be tested and accepted before being buried.



Welding parameters

Nominal wall thickness (mm)	Docking process				
	Step 1:Preheating	Step 2: Melting	Step 3:Switching	Step 4:Docking	Step 5:Cooling
	Preheating pressure: 0.15MPa Preheating temperature: 230±10° C international tube 200±5° C enterprise standard tube Preheating curl height h (mm)	Melting pressure: 0.02MPa Melting temperature: 230±10° C international tube 200±5° C enterprise standard tube Heating time (s)	Allow maximum switching time (s)	Allowable welding pressure 0.15MPa Pressurization time (s)	Allowable welding pressure 0.15MPa Cooling time (min)
< 4.5	45	5	5	5	6
4.5-7	45-70	5-6	5-6	5-6	6-10
7-12	70-120	7-8	6-8	6-8	10-16
12-19	120-190	8-10	8-10	8-11	16-24
19-26	190-260	10-12	10-12	11-14	24-32
26-37	260-370	12-16	12-16	14-19	32-45
37-50	370-500	16-20	16-20	19-25	45-60
50-70	500-700	20-25	20-25	25-35	60-80

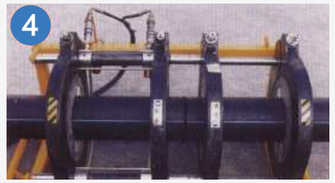
Hot melt connection icon

Hot melt butt joint: When joining by this method, hot melt butt welding is used. The specific steps are as follows:

① Prepare the required tools

② Place the pipe to be connected on the welder fixture and clamp it, clean the pipe to be connected and mill the joint surface, and straighten the two butt joints so that the misalignment is no more than 10% of the wall thickness.

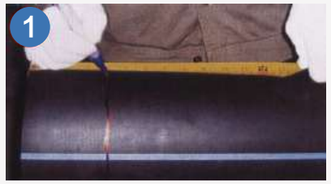
③ Put in the heating plate.



④ After the heating is completed, the heating plate is taken out, and the two heating surfaces are quickly joined, and the pressure is raised to the welding pressure and kept cool.

⑤ The hot melt is completed.

Electrofusion connection: The characteristics of the electrofusion socket connection are that the connection is convenient, rapid, and the external factors are small. It is economical to use in the case of small diameter pipes and difficult construction. The specific steps are as follows:



① Clean the dirt on the surface to be connected to the pipe and mark the insertion depth.

② Scrape its skin.

③ Place the electrofusion tube on the tube and straighten the tube to the same axis.

④ Conductive welding, there should be a little solution in the hole to be observed.

⑤ cooling, fused finish.

Note: When connecting, the voltage and heating time when heating and heating should be selected in accordance with the specifications of the manufacturer of electrofusion. Do not apply any pressure on the connector or connector during cooling of the fused connection.

Transitional connection

Note: This product is installed by electrofusion, hot melt and butt joint installation. Avoid transportation with sharp and hard objects during transportation. Store in a warehouse that avoids strong sunlight and should be away from heat sources. Pipes should avoid oil and chemical pollution. Leveling should be stacked neatly and the stacking height should not exceed 1.5 meters.

In the connection with the metal pipe and pipeline accessories (such as valves, water meters, etc.), the transition pipe fittings such as threaded flanges or flanges are used for connection.

Our company takes "scientific management, technology leadership, high quality and efficiency, compliance and compliance" as the quality policy, providing customers with quality products on time, meeting and exceeding their hopes and requirements for quality commitment. To this end, a set of service systems has been established according to the ISO9000 family standards. The specific service procedures are as follows:

Service preparation

(1) According to the sales contract requirements or customer requirements, the technical department is responsible for preparing the necessary technical materials, instructions for use, etc., and if necessary, quality planning and quality planning.

(2) The sales department is responsible for publicizing and introducing the product performance, usage methods and use occasions. Responsible for collecting feedback information and requirements of users using products, investigating user needs, and timely transmitting information to relevant departments.

(3) According to the requirements of the contract, the production department is responsible for organizing the production and doing the delivery of the products. The sales department is responsible for delivering the products safely, accurately and completely to the designated location of the user.

After sales service

(1) According to the contract, establish a user profile, timely process the feedback from the user, and honor the promise to the user.

(2) Conducting visits to users from time to time, and soliciting opinions from users on the quality and service of the company. General users can solicit, inquire, and make records through letters or telephone calls.

(3) Implement a 24-hour emergency response and provide technical training.

(4) When quality problems occur, the company sends technicians to the product use site to deal with quality accidents and make investigation records. Add, refund or exchange depending on the product, and conduct management review if necessary.

quality promise

In strict accordance with the requirements of the product manual issued by the company, the company guarantees that the company will be responsible for the replacement of any damage caused by vandalism and irresistible natural disasters.

Pledge

The company adheres to the principle of credibility first, strictly in accordance with the contract, and delivers according to the location, time, specifications and quantity required by the contract. If the construction period is delayed due to the delivery of our company, our company is willing to bear all economic losses.

Production commitment

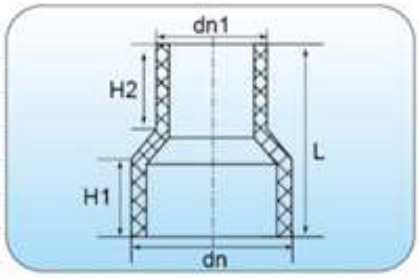
The company solemnly promises to ensure that the products supplied are manufactured by the company itself, and that it is fully capable of providing quality products to your company in a timely manner, and will never process or transfer them. Otherwise, the acquirer has the right to terminate the contract and pursue its economic losses.

Buttweld Fittings

Buttwelding is a very economical and reliable jointing technique for making permanent welded joints, requiring only buttwelding equipment. Buttwelding is particularly suitable for prefabricating pipe sections and special fittings. Both Akatherm fittings with short spigot ends and fittings with long spigot ends are suitable for buttwelding. Only pipes and fittings from the same wall thickness series can be buttwelded together.

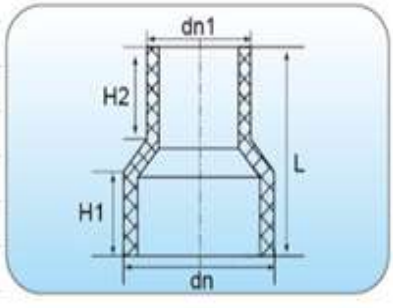
异径直通

Reducer

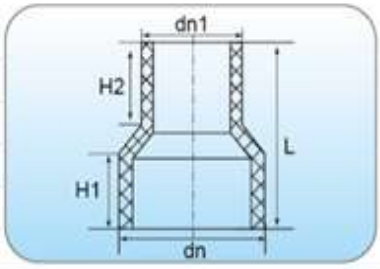


名称 ITEM	规格dn-dn1 SIZE(dn-dn1)	代号 MARK	L L	H1 H1	H2 H2	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	S75-50		130	56	58			√
	S75-63		130	59	64			√
	S90-50	B	132	55	55	√	√	√
		C	138	63	52		√	√
	S90-63	B	132	55	56	√	√	√
		C	138	63	53		√	√
	S90-75	B	132	55	62	√	√	√
		C	138	63	60		√	√
	S110-50	B	130	58	50	√	√	√
		C	172	78	60		√	√
	S110-63	B	130	58	52	√	√	√
		C	172	78	60		√	√
	S110-75	B	130	58	54	√	√	√
		C	172	78	65		√	√
	S110-90	B	130	58	56	√	√	√
		C	172	78	65		√	√
	S125-63		183	78	70		√	√
	S125-75		183	78	68		√	√
	S125-90		183	78	68		√	√
	S125-110		183	78	72		√	√
	S140-63		180	80	65		√	√
	S140-75		180	80	70		√	√
	S140-90		180	80	70		√	√
	S140-110		180	80	75		√	√
	S140-125		180	80	70		√	√
	S160-63		203	85	67		√	√
	S160-75		208	85	75		√	√
	S160-90		214	85	83		√	√
	S160-110		214	85	83		√	√
	S160-125		214	85	85		√	√
	S180-110		200	80	100		√	√
	S180-125		200	80	100		√	√
	S180-140		200	80	100		√	√
	S180-160		170	80	80		√	√
	S200-63		218	75	67		√	√
	S200-75		218	75	75		√	√
	S200-90		218	75	93		√	√
	S200-110		218	75	97		√	√
	S200-160		210	75	100		√	√
	S200-180		210	75	108		√	√

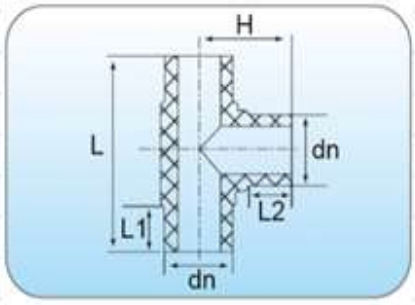
名称 ITEM	规格dn-dn1 SIZE(dn-dn1)	代号 MARK	L L	H1 H1	H2 H2	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	S225-110		218	80	87		√	√
	S225-160		218	80	80		√	√
	S225-200		218	80	90		√	√
	S250-110		260	90	100		√	√
	S250-160		230	90	93		√	√
	S250-200		230	90	97		√	√
异	S250-225		230	90	100		√	√
	S280-110		255	105	95		√	√
	S280-125		245	105	100		√	√
径	S280-140		245	105	100		√	√
	S280-160		245	105	105		√	√
	S280-180		245	105	105		√	√
直	S280-200		245	105	120		√	√
	S280-225		245	105	120		√	√
	S280-250		245	105	130		√	√
通	S315-110		235	90	87		√	√
	S315-160		235	90	85		√	√
	S315-200		240	90	90		√	√
Reducer	S315-225		240	90	105		√	√
	S315-250		240	90	100		√	√
	S315-280		240	90	110		√	√
	S355-110		270	105	100	√		√
	S355-160		275	105	110	√		√
	S355-200		260	105	110	√		√
	S355-225		255	105	110	√		√
	S355-250		240	105	110	√		√
	S355-280		235	105	110	√		√
	S355-315		230	105	110	√		√



名称 ITEM	规格dn-dn1 SIZE(dn-dn1)	代号 MARK	L L	H1 H1	H2 H2	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	S400-200		270	100	110	√		√
	S400-225		265	100	110	√		√
	S400-250		250	100	110	√		√
异	S400-315		230	100	110	√		√
	S400-355		225	100	110	√		√
	S450-200		270	105	100	√		√
径	S450-225		270	105	105	√		√
	S450-250		270	105	110	√		√
	S450-280		255	105	110	√		√
直	S450-315		250	105	110	√		√
	S450-355		245	105	110	√		√
	S450-400		245	105	120	√		√
通	S500-200		280	98	105	√		√
	S500-225		280	98	105	√		√
	S500-250		280	98	110	√		√
	S500-280		280	98	110	√		√
	S500-315		275	98	110	√		√
Reducer	S500-355		275	98	110	√		√
	S500-400		275	98	120	√		√
	S500-450		275	98	120	√		√
	S560-315		280	105	110	√		√
	S560-355		265	105	110	√		√
	S560-400		260	105	120	√		√
	S560-450		250	105	120	√		√
	S560-500		240	105	120	√		√
	S630-315		285	110	100	√		√
	S630-355		285	110	110	√		√
	S630-400		285	110	120	√		√
	S630-450		275	110	120	√		√
	S630-500		260	110	120	√		√
	S630-560		255	110	130	√		√

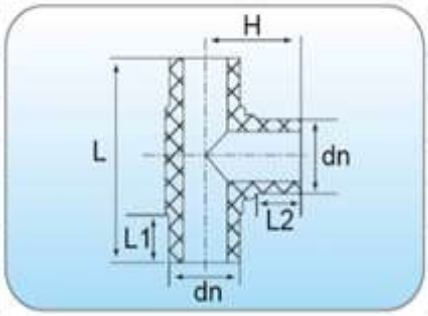


名称 ITEM	规格dn SIZE(dn)	代号 MARK	L	L1	L2	H	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
等径三通 butt tee	T63		182	58	56	90			√
	T75		232	70	70	117			√
	T90	B	240	70	70	120		√	√
		C	276	80	80	138			√
	T110	A	238	57	57	118	√	√	√
		B	265	70	70	133		√	√
		C	300	83	83	150		√	√
	T125		305	80	80	150		√	√
	T140		320	80	80	160		√	√
	T160	A	325	75	75	163	√	√	√
		B	348	85	85	176		√	√
		C	383	100	100	195		√	√
	T180		400	90	90	197		√	
		车Turnery	415	110	105	210	√		√
	T200	A	385	85	85	195	√	√	√
		B	420	95	95	205		√	√
		C	456	110	110	228		√	√
	T225		485	110	110	242		√	√
	T250	B	430	90	95	230	√	√	√
		C	505	110	110	250		√	√
		车Turnery	485	105	125	265	√		√
	T280		535	110	110	267		√	
		车Turnery	520	110	135	290	√		√
	T315	B	500	90	95	275	√	√	√
		C	575	102	110	285		√	√
		车Turnery	565	110	150	330	√		√
	T355		565	100	100	302	√		
		车Turnery	610	110	160	370	√		√
	T400		655	112	112	330	√		
		车Turnery	670	120	180	400	√		√
	T450	车Turnery	750	135	150	405	√		√
	T500	车Turnery	800	135	170	455	√		√
	T560	车Turnery	910	140	170	475	√		√
	T630	车Turnery	970	150	160	485	√		√
	T710	车Turnery	1140	210	210	570	√		
	T800	车Turnery	1260	230	230	630	√		



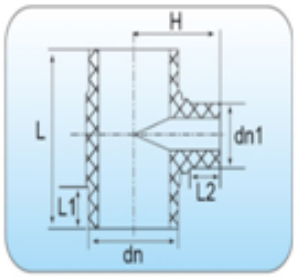
等径三通

butt tee

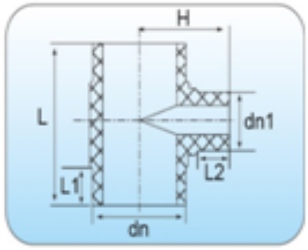


名称 ITEM	规格dn SIZE(dn)	代号 MARK	L	L1	L2	H	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	T63		182	58	56	90			√
	T75		232	70	70	117			√
	T90	B	240	70	70	120		√	√
		C	276	80	80	138			√
	T110	A	238	57	57	118	√	√	√
		B	265	70	70	133		√	√
		C	300	83	83	150		√	√
	T125		305	80	80	150		√	√
	T140		320	80	80	160		√	√
	T160	A	325	75	75	163	√	√	√
		B	348	85	85	176		√	√
		C	383	100	100	195		√	√
	T180		400	90	90	197		√	
		车Turnery	415	110	105	210	√		√
	T200	A	385	85	85	195	√	√	√
		B	420	95	95	205		√	√
		C	456	110	110	228		√	√
	T225		485	110	110	242		√	√
	T250	B	430	90	95	230	√	√	√
		C	505	110	110	250		√	√
		车Turnery	485	105	125	265	√		√
	T280		535	110	110	267		√	
		车Turnery	520	110	135	290	√		√
	T315	B	500	90	95	275	√	√	√
		C	575	102	110	285		√	√
		车Turnery	565	110	150	330	√		√
	T355		565	100	100	302	√		
		车Turnery	610	110	160	370	√		√
	T400		655	112	112	330	√		
		车Turnery	670	120	180	400	√		√
	T450	车Turnery	750	135	150	405	√		√
	T500	车Turnery	800	135	170	455	√		√
	T560	车Turnery	910	140	170	475	√		√
	T630	车Turnery	970	150	160	485	√		√
	T710	车Turnery	1140	210	210	570	√		
	T800	车Turnery	1260	230	230	630	√		

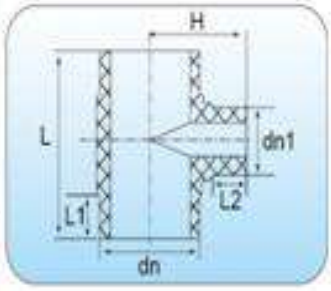
名称	规格dn-dn1	代号	L	L1	L2	H	壁厚	壁厚	壁厚
ITEM	SIZE(dn-dn1)	MARK					SDR17	SDR13.6	SDR11
	T75-50		199	70	55	94			√
	T75-63		220	70	65	107			√
	T90-50	B	213	75	60	110		√	√
	T90-63	B	213	70	60	110		√	√
	T90-75	B	238	80	70	118		√	√
	T90-50	C	276	80	50	108		√	√
	T90-63	C	276	80	65	123		√	√
	T90-75	C	276	80	73	130		√	√
	T110-50	A	178	58	60	120	√	√	√
	T110-63	A	178	58	60	120	√	√	√
	T110-75	A	206	60	65	120	√	√	√
	T110-90	A	206	60	60	120	√	√	√
	T110-50	B	213	75	70	138		√	√
	T110-63	B	228	75	70	138		√	√
	T110-75	B	258	70	65	135		√	√
异	T110-90	B	258	70	65	135		√	√
	T110-50	C	242	83	60	125		√	√
	T110-63	C	242	83	62	130		√	√
	T110-75	C	275	83	80	138		√	√
径	T110-90	C	275	83	82	140		√	√
	T125-63		305	80	70	145		√	√
	T125-75		305	80	70	145		√	√
	T125-90		305	80	75	150		√	√
三	T125-110		305	80	75	150		√	√
	T140-63		253	75	70	150		√	√
	T140-75		253	75	75	155		√	√
	T140-90		253	75	75	155		√	√
通	T140-110		253	70	80	160		√	√
	T140-125		320	80	80	160		√	√
	T160-50	A	250	90	70	170		√	√
Reducing	T160-63	A	250	85	75	165	√	√	√
tee	T160-75	A	250	80	75	165	√	√	√
	T160-90	A	255	75	75	165	√	√	√
	T160-110	A	275	75	80	170	√	√	√
	T160-63	B	278	90	75	170		√	√
	T160-75	B	277	90	75	170		√	√
	T160-90	B	272	85	85	170		√	√
	T160-110	B	294	85	85	170		√	√
	T160-63	C	333	100	80	175		√	
	T160-75	C	333	100	80	175		√	
	T160-90	C	333	100	80	175		√	√
	T160-110	C	333	100	80	175		√	√
	T160-125	C	380	98	100	190		√	√
	T160-140	C	383	100	100	195		√	√



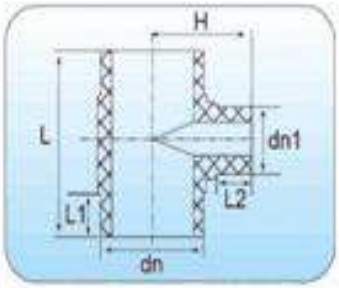
名称 ITEM	规格dn-dn1 SIZE(dn-dn1)	代号 MARK	L	L1	L2	H	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	T180-63		270	85	75	180		√	√
	T180-75		270	85	75	180		√	√
	T180-90		270	85	80	180		√	√
	T180-110		270	85	85	185		√	√
	T180-160		400	90	85	185		√	
	T180-90	车Turnery	326	110	103	205	√		√
	T180-110	车Turnery	344	110	103	205	√		√
	T180-125	车Turnery	365	110	103	205	√		√
	T180-140	车Turnery	376	110	103	205	√		√
	T180-160	车Turnery	415	110	103	205	√		√
	T200-63	A	278	85	85	200	√	√	√
	T200-75	A	278	85	85	200	√	√	√
	T200-90	A	310	85	85	200	√	√	√
	T200-110	A	310	85	85	200	√	√	√
	T200-160	A	353	85	85	200	√	√	√
异	T200-63	B	338	95	75	195		√	√
	T200-75	B	338	95	80	195		√	√
	T200-90	B	338	95	85	195		√	√
径	T200-110	B	338	95	85	195		√	√
	T200-160	B	368	95	85	200		√	√
	T200-160	C	420	110	100	215		√	√
三	T225-63		365	110	80	210		√	√
	T225-75		365	110	85	220		√	√
	T225-90		365	110	90	230		√	√
通	T225-110		365	110	100	230		√	√
	T225-160		485	110	110	242		√	√
	T225-200		485	110	110	242		√	√
	T250-63	B	257	90	95	228	√	√	√
	T250-75	B	255	90	95	228	√	√	√
	T250-90	B	283	90	95	228	√	√	√
Reducing tee	T250-110	B	285	90	95	228	√	√	√
	T250-160	B	342	90	95	228	√	√	√
	T250-200	B	380	90	95	228	√	√	√
	T250-63	C	365	110	85	235		√	√
	T250-75	C	365	110	90	235		√	√
	T250-90	C	365	110	100	245		√	√
	T250-110	C	365	110	110	245		√	√
	T250-160	C	505	110	110	250		√	√
	T250-200	C	505	110	110	250		√	√
	T250-110	车Turnery	336	100	103	240	√		√
	T250-125	车Turnery	345	100	103	240	√		√
	T250-140	车Turnery	366	100	103	240	√		√
	T250-160	车Turnery	386	100	103	255	√		√
	T250-180	车Turnery	405	105	110	255	√		√
	T250-200	车Turnery	425	105	110	260	√		√
	T250-225	车Turnery	456	105	120	265	√		√



名称	规格dn-dn1	代号	L	L1	L2	H	壁厚	壁厚	壁厚
ITEM	SIZE(dn-dn1)	MARK					SDR17	SDR13.6	SDR11
	T280-63		300	100	90	240		√	√
	T280-75		300	100	90	240		√	√
	T280-90		300	100	90	240		√	√
	T280-110		300	100	100	240		√	√
	T280-160		387	100	100	250		√	√
	T280-200		387	100	105	250		√	√
	T280-250		530	110	105	260		√	
	T280-110	车Turnery	330	105	103	255	√		√
	T280-125	车Turnery	350	105	103	255	√		√
	T280-140	车Turnery	366	105	103	255	√		√
异	T280-160	车Turnery	386	105	103	255	√		√
	T280-180	车Turnery	405	105	115	270	√		√
	T280-200	车Turnery	433	105	115	270	√		√
径	T280-225	车Turnery	453	105	125	280	√		√
	T280-250	车Turnery	485	105	125	280	√		√
	T315-63	B	255	90	95	275	√	√	√
三	T315-75	B	255	90	95	275	√	√	√
	T315-90	B	280	90	95	275	√	√	√
	T315-110	B	280	90	95	275	√	√	√
通	T315-160	B	336	90	95	275	√	√	√
	T315-200	B	378	90	95	275	√	√	√
	T315-250	B	428	90	95	275	√	√	√
	T315-63	C	370	110	90	270		√	√
Reducing	T315-75	C	370	110	90	270		√	√
tee	T315-90	C	370	110	100	280		√	√
	T315-110	C	370	110	110	280		√	√
	T315-160	C	460	110	110	285		√	√
	T315-200	C	460	110	110	285		√	√
	T315-250	C	575	103	110	285		√	√
	T315-110	车Turnery	370	110	105	290	√		√
	T315-125	车Turnery	370	110	105	290	√		√
	T315-140	车Turnery	390	110	105	290	√		√
	T315-160	车Turnery	406	110	105	300	√		√
	T315-180	车Turnery	430	110	115	310	√		√
	T315-200	车Turnery	450	110	120	310	√		√
	T315-225	车Turnery	472	110	120	315	√		√
	T315-250	车Turnery	496	110	125	320	√		√
	T315-280	车Turnery	513	110	130	330	√		√



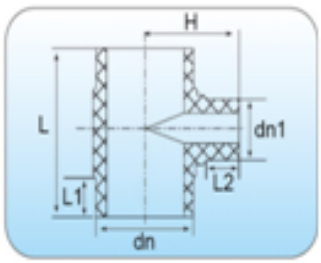
名称 ITEM	规格dn-dn1 SIZE(dn-dn1)	代号 MARK	L	L1	L2	H	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	T355-110		410	100	110	302	√		
	T355-160		410	100	110	302	√		
	T355-200		410	100	110	302	√		
	T355-250		565	100	110	302	√		
	T355-315		565	100	110	302	√		
	T355-110	车Turnery	360	110	95	300	√		√
	T355-125	车Turnery	385	110	95	300	√		√
异	T355-140	车Turnery	396	110	100	305	√		√
	T355-160	车Turnery	405	110	105	310	√		√
	T355-180	车Turnery	438	110	110	315	√		√
径	T355-200	车Turnery	448	110	115	325	√		√
	T355-225	车Turnery	478	110	125	340	√		√
	T355-250	车Turnery	492	110	130	345	√		√
三	T355-280	车Turnery	548	110	135	350	√		√
	T355-315	车Turnery	565	110	145	355	√		√
	T400-110		465	112	110	330	√		
通	T400-160		465	112	110	330	√		
	T400-200		465	112	110	330	√		
	T400-250		655	112	110	330	√		
	T400-315		655	112	110	330	√		
Reducing	T400-110	车Turnery	388	120	90	315	√		√
tee	T400-125	车Turnery	408	120	95	320	√		√
	T400-140	车Turnery	410	120	98	325	√		√
	T400-160	车Turnery	427	120	105	330	√		√
	T400-180	车Turnery	450	120	115	350	√		√
	T400-200	车Turnery	468	120	120	355	√		√
	T400-225	车Turnery	510	120	125	360	√		√
	T400-250	车Turnery	526	120	130	365	√		√
	T400-280	车Turnery	545	120	140	375	√		√
	T400-315	车Turnery	587	120	150	385	√		√
	T400-355	车Turnery	628	120	160	395	√		√



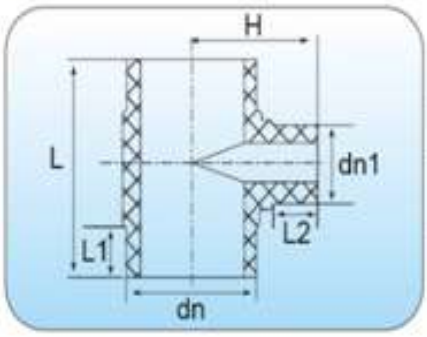
名称 ITEM	规格dn-dn1 SIZE(dn-dn1)	代号 MARK	L	L1	L2	H	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	T450-110	车Turnery	375	120	120	365	√		√
	T450-125	车Turnery	464	150	120	365	√		√
	T450-160	车Turnery	464	130	120	365	√		√
	T450-200	车Turnery	464	120	120	365	√		√
	T450-225	车Turnery	545	150	130	375	√		√
	T450-250	车Turnery	545	140	130	375	√		√
	T450-280	车Turnery	600	140	140	385	√		√
	T450-315	车Turnery	600	130	140	385	√		√
	T450-355	车Turnery	660	140	160	405	√		√
	T450-400	车Turnery	670	120	160	405	√		√
	T500-110	车Turnery	398	130	135	420	√		√
	T500-160	车Turnery	495	140	135	420	√		√
	T500-200	车Turnery	495	135	135	420	√		√
	T500-225	车Turnery	545	150	135	420	√		√
	T500-250	车Turnery	545	135	135	420	√		√
	T500-280	车Turnery	630	155	145	430	√		√
	T500-315	车Turnery	635	145	145	430	√		√
	T500-355	车Turnery	700	150	160	445	√		√
	T500-400	车Turnery	705	140	160	445	√		√
	T500-450	车Turnery	800	150	170	455	√		√
	T560-110	车Turnery	410	135	140	445	√		√
	T560-125	车Turnery	430	135	140	445	√		√
	T560-160	车Turnery	450	135	140	445	√		√
	T560-200	车Turnery	508	135	140	445	√		√
	T560-225	车Turnery	545	150	140	445	√		√
	T560-250	车Turnery	545	135	140	445	√		√
	T560-280	车Turnery	600	150	145	450	√		√
	T560-315	车Turnery	605	135	145	450	√		√
	T560-355	车Turnery	710	150	160	465	√		√
	T560-400	车Turnery	720	135	160	465	√		√
	T560-450	车Turnery	825	150	170	475	√		√
	T560-500	车Turnery	825	140	170	475	√		√
	T630-110	车Turnery	475	145	135	480	√		√
	T630-160	车Turnery	475	140	140	485	√		√
	T630-200	车Turnery	550	150	145	490	√		√
	T630-225	车Turnery	555	150	145	490	√		√
	T630-250	车Turnery	555	140	145	490	√		√
	T630-280	车Turnery	660	160	145	490	√		√
	T630-315	车Turnery	665	150	145	490	√		√
	T630-355	车Turnery	720	150	160	505	√		√
	T630-400	车Turnery	725	145	160	505	√		√
	T630-450	车Turnery	800	150	180	525	√		√
	T630-500	车Turnery	808	140	180	525	√		√

异径三通

Reducing Tee

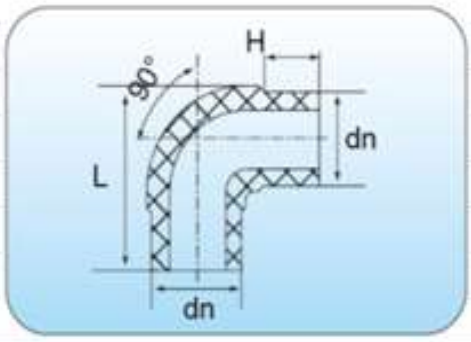


名称	规格dn-dn1	L	L1	L2	H	壁厚	壁厚	壁厚
ITEM	SIZE(dn-dn1)					SDR17	SDR13.6	SDR11
	T710-110	530	210	160	520	√		
	T710-160	585	210	160	520	√		
异	T710-200	630	210	160	520	√		
	T710-250	630	190	160	520	√		
径	T710-315	710	195	160	520	√		
	T710-400	790	195	175	535	√		
三	T710-500	890	195	200	560	√		
	T710-630	1020	195	210	570	√		
通	T800-110	590	230	160	570	√		
	T800-160	590	210	160	570	√		
Reducing tee	T800-200	630	210	160	570	√		
	T800-250	720	230	160	570	√		
	T800-315	800	230	160	570	√		
	T800-355	850	230	180	590	√		
	T800-400	850	220	180	590	√		
	T800-500	1020	195	210	620	√		
	T800-630	1100	230	210	620	√		
	T800-710	1100	195	210	620	√		



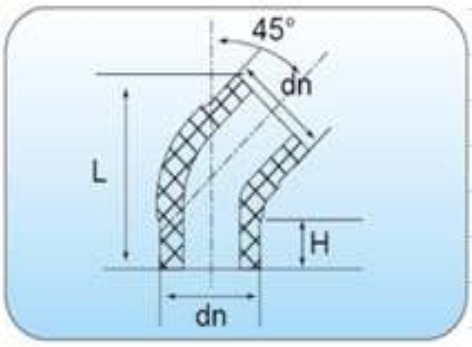
等径90°弯头

Elbow 90deg



名称 ITEM	规格dn SIZE(dn)	代号 MARK	L	H	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	L63-90°		133	65			√
	L75-90°		150	75			√
	L90-90°	B	160	65		√	√
		C	176	80			√
	L110-90°	A	170	58	√	√	√
		B	195	75		√	√
		C	200	80		√	√
	L125-90°		215	80		√	√
	L140-90°		225	80		√	√
	L160-90°	A	240	70	√	√	√
		B	255	85		√	√
		C	270	90		√	√
	L180-90°		280	90		√	√
	L200-90°	A	290	80	√	√	√
		B	305	95		√	√
		C	325	110		√	√
	L225-90°		350	110		√	√
	L250-90°	B	360	100	√	√	√
		C	370	110		√	√
	L280-90°		395	108		√	√
	L315-90°	B	415	100	√	√	√
		C	430	110		√	√
	L355-90°		460	100	√		√
	L400-90°		525	110	√		√
	L450-90°		590	120	√		√
		加长型	630	160	√		
	L500-90°		660	135	√		√
		加长型	705	180	√		
	L560-90°		720	140	√		√
		加长型	780	200	√		
	L630-90°		790	145	√		√
		加长型	865	220	√		
	L710-90°		900	170	√		
	L800-90°		990	170	√		

名称	规格dn	代号	L	H	壁厚	壁厚	壁厚
ITEM	SIZE(dn)	MARK	L	H	SDR17	SDR13.6	SDR11
	L63-45°		170	65			√
	L75-45°		190	70			√
	L90-45°	B	195	65		√	√
		C	205	75			√
等	L110-45°	A	190	58	√	√	√
		B	200	65		√	√
		C	260	85		√	√
径	L125-45°		238	80		√	√
	L140-45°		255	80		√	√
	L160-45°	A	255	70	√	√	√
45°		B	265	85		√	√
		C	325	100		√	√
	L180-45°		300	90		√	√
弯	L200-45°	A	300	80	√	√	√
		B	320	95		√	√
		C	360	110		√	√
头	L225-45°		365	110		√	√
	L250-45°	B	365	100	√	√	√
		C	385	110		√	√
Elbow	L280-45°		400	108		√	√
	L315-45°	B	405	100	√	√	√
45deg		C	430	110		√	√
	L355-45°		430	100	√		√
	L400-45°		490	110	√		√
	L450-45°		560	130	√		√
		加长型	610	160	√		√
	L500-45°		610	135	√		√
		加长型	685	180	√		
	L560-45°		650	135	√		√
		加长型	770	200	√		
	L630-45°		710	145	√		√
		加长型	845	220	√		
	L710-45°		830	170	√		
	L800-45°		900	170	√		



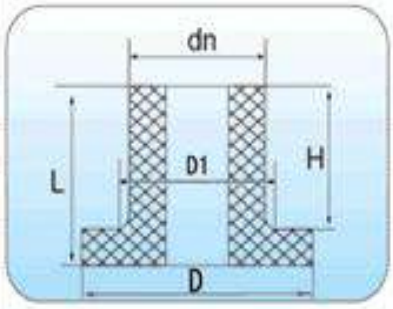
名称 ITEM	规格dn SIZE(dn)	代号 MARK	L	H	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
等径22.5°弯头 Elbow 22.5deg	L110-22.5°		190	70			√
	L125-22.5°		225	85			√
	L140-22.5°		240	90			√
	L160-22.5°		245	85			√
	L180-22.5°		280	105			√
	L200-22.5°		280	95			√
	L225-22.5°		320	120		√	√
	L250-22.5°		335	110		√	√
	L280-22.5°		380	135	√		√
	L315-22.5°		355	110		√	√
	L355-22.5°		450	160	√		√
	L400-22.5°		390	110	√		√
	L450-22.5°		450	120	√		√
	L500-22.5°		480	130	√		√
	L560-22.5°		520	135	√		√
	L630-22.5°		560	140	√		√
	L710-22.5°		690	170	√		
	L800-22.5°		720	170	√		

名称 ITEM	规格dn SIZE(dn)	代号 MARK	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
等径30°弯头 Elbow 30deg	L450-30°		√		√
	L500-30°		√		√
	L560-30°		√		√
	L630-30°		√		√
	L710-30°		√		
	L800-30°		√		

注塑法兰头

EF

stub end



名称 ITEM	规格dn SIZE(dn)	代号 MARK	L	H	D1	D	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	F50		73	64	55	80			√
	F63		82	70	68	96			√
		EF	84	69	75	102			√
	F75		86	74	80	110			√
		EF	95	79	89	122			√
	F90	B	95	80	95	127		√	
		C	103	84	95	128			√
		EF	100	83	105	138			√
	F110	A	97	83	115	138	√	√	
		B	105	88	115	143			√
		C	123	103	116	150			√
		EF	121	103	125	158	√		√
	F125		113	93	130	158		√	√
		EF	128	108	132	158	√		√
	F140		110	90	145	182		√	√
		EF	135	113	155	188	√		√
	F160	B	110	90	165	197	√	√	√
		C	127	105	165	203		√	√
		EF	147	123	175	212	√		√
	F180								
			135	110	190	212		√	√
		EF	154	130	185	212	√		√
	F200	B	125	105	205	243	√	√	
		C	143	120	205	252		√	√
		EF	165	140	232	268	√		√
	F225	B	134	108	230	268	√		
		C	135	112	230	268		√	√
		EF	173	148	235	268	√		√
	F250	A	150	125	255	305	√		
		C	168	136	255	320		√	√
		EF	191	163	285	320	√		√

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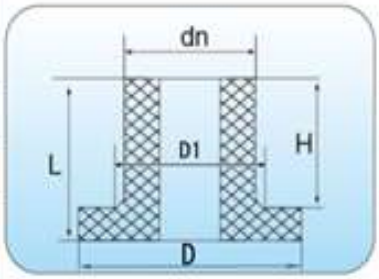
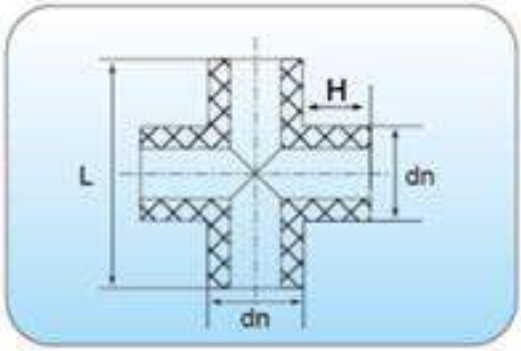
头

stub end

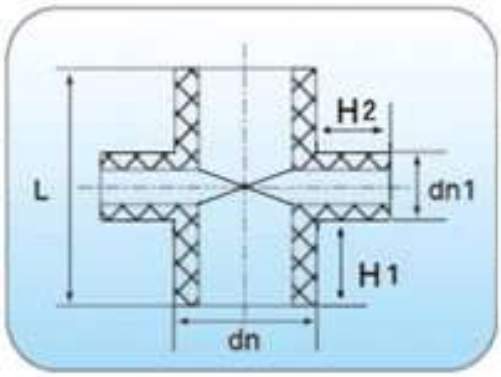


名称 ITEM	规格dn SIZE(dn)	代号 MARK	L	H	D1	D	壁厚 SDR21	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
	F280	B	150	125	285	315	√	√		
		C	160	133	285	320			√	√
		EF	200	168	291	320		√		√
	F315	A	150	125	320	365	√	√		
		C	168	135	320	370			√	√
		EF	205	168	335	370		√		√
	F355	B	165	135	360	408		√	√	
		C	155	125	360	430				√
	F400	B	170	135	410	473		√		
		C	172	135	410	482		√		√
		EF	230	185	427	482		√		√
	F450	B	175	135	465	522		√		
		C	175	137	465	524		√	√	√
	F500	B	200	155	515	590		√		
		C	215	170	515	585		√		√
	F560	B500	213	172	570	595		√		
		B630	213	172	570	625		√		
		B630宽	213	172	570	680		√		
		C500	220	172	570	595		√		√
		C630	220	172	570	625		√		√
	F630	B	230	175	645	690		√		
		C	230	175	645	685		√		√
	F710	B	215	172	725	800	√	√		
		C	230	170	725	800		√	√	
	F800	B	220	172	815	900	√	√		
		C	230	170	820	905		√	√	
	F900		230	170	920	1000		√		
	F1000		260	200	1020	1100		√		
	F1200		300	225	1220	1300		√		

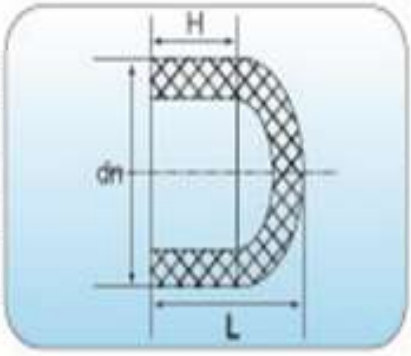
名称	规格dn	L	H	壁厚	壁厚	壁厚
ITEM	SIZE(dn)			SDR17	SDR13.6	SDR11
	+63	184	60			√
	+75	203	65			√
注	+90	240	75			√
塑	+110	275	85			√
正	+125	295	85			√
四	+160	370	105		√	√
通	+200	435	110		√	√
	+225	442	110		√	√
Cross tee	+250	493	120		√	√
	+315	558	120		√	√
	+355	640	140	√		√
	+400	685	140	√		√
	+450	740	140	√		
	+500	810	150	√		
	+560	875	150	√		
	+630	960	160	√		
	+710	1140	210	√		
	+800	1280	235	√		



名称	规格dn-dn1	L	H1	H2	壁厚	壁厚	壁厚
ITEM	SIZE(dn-dn1)				SDR17	SDR13.6	SDR11
	+90-63	240	85	75			√
	+110-63	225	80	75			√
	+125-75	295	110	80			√
	+160-110	370	105	80			√
	+200-110	433	110	80			√
	+200-160	435	110	100			√
	+225-160	380	110	110		√	√
	+250-110	355	110	80			√
	+250-160	405	105	100			√
注	+250-200	408	100	100			√
塑	+280-110	300	100	100		√	√
	+315-200	445	120	110		√	√
异	+355-200	485	140	120	√		√
四	+400-200	490	140	120	√		√
通	+450-200	490	140	120	√		
	+450-315	605	140	130	√		
	+500-110	420	150	140	√		
Reducer	+500-160	470	150	140	√		
Cross tee	+500-200	510	150	140	√		
	+500-250	565	150	140	√		
	+500-315	625	150	140	√		
	+560-200	515	150	140	√		
	+560-315	625	150	140	√		
	+630-200	530	160	140	√		
	+630-315	660	160	140	√		
	+710-200	630	210	160	√		
	+710-315	745	210	160	√		
	+800-200	630	210	160	√		
	+800-400	845	220	180	√		
	+800-630	1020	190	210	√		



名称 ITEM	规格 SIZE	价格 PRICE
管帽 Socket Cap 	D20	
	D25	
	D32	
	D40	
	D50	
	D63	
	D75	
	D90	
	D110	

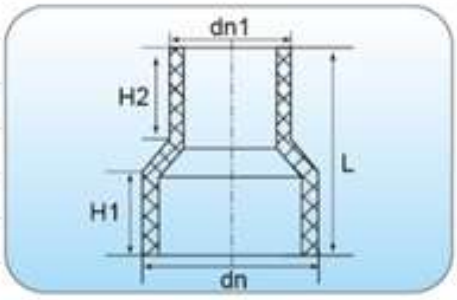
名称 ITEM	规格dn SIZE(dn)	代号 MARK	L	H	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
注塑管帽 end cap  	D75		45	35			√
	D90		70	60			√
	D110		70	55			√
	D125		60	48		√	
	D140		85	70			√
	D160		85	70		√	√
	D180		105	90		√	√
	D200		90	75		√	√
	D225		130	115		√	√
	D250		95	85		√	√
	D280		140	120		√	√
	D315		115	90		√	√
	D355		140	115	√		√
	D400		130	100	√		√
	D450		140	115	√		√
	D500		140	115	√		√
	D560		150	115	√		√
	D630		150	115	√		√
	D710		160	125	√		
	D800		160	125	√		
	D900		160	125	√		
	D1000		160	125	√		
	D1200		200	155	√		

Fabricated Fittings

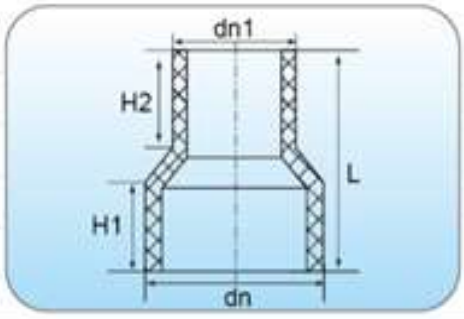
Dimensions

Pipe fittings can be manufactured from pipe in a wide variety of sizes and pressure classes but mostly from 75mm OD upwards and Class 6 or higher. The fittings can be plain ended (for buttwelding, electrofusion fittings or compression fittings) or have stubs fitted for flanges or Tak Clamps. Permissible working pressure is 60% of class of pipe used to fabricate fitting. e.g. 10 bar pipe produces a 6 bar fabricated fitting.

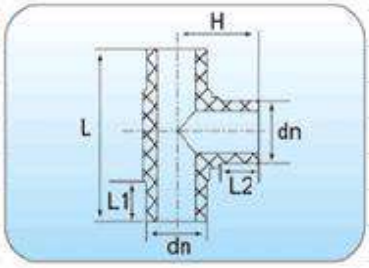
名称 ITEM	规格 SIZE	壁厚 SDR21	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
焊制异径直通 Reducer	S710×250		√		
	S710×315		√		
	S710×355		√		
	S710×400		√		
	S710×450		√		
	S710×500		√		
	S710×560		√		
	S710×630		√		
	S800×250		√		
	S800×315		√		
	S800×355		√		
	S800×400		√		
	S800×450		√		
	S800×500		√		
	S800×560		√		
	S800×630		√		
	S800×710		√		
	S900×315		√		
	S900×355		√		
	S900×400		√		
	S900×450		√		
	S900×500		√		
	S900×560		√		
	S900×630		√		
	S900×710		√		
	S900×800		√		



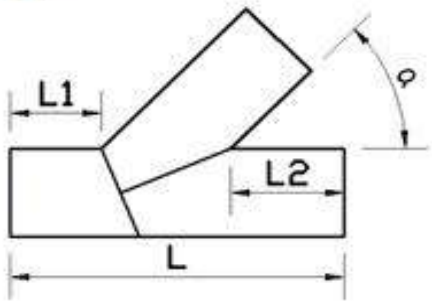
名称 ITEM	规格 SIZE	壁厚 SDR21	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
焊制异径直通 Reducer	S1000×315		√		
	S1000×355		√		
	S1000×400		√		
	S1000×450		√		
	S1000×500		√		
	S1000×560		√		
	S1000×630		√		
	S1000×710		√		
	S1000×800		√		
	S1000×900		√		
	S1200×315		√		
	S1200×355		√		
	S1200×400		√		
	S1200×450		√		
	S1200×500		√		
	S1200×560		√		
	S1200×630		√		
	S1200×710		√		
	S1200×800		√		
	S1200×900		√		
	S1200×1000		√		



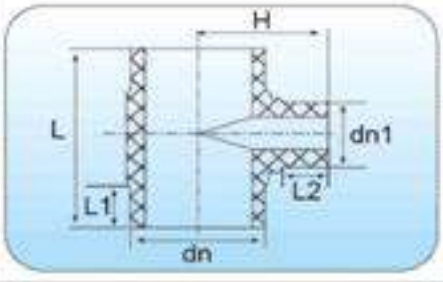
名称 ITEM	规格 SIZE	L	L1	L2	H	壁厚 SDR26	壁厚 SDR21	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
焊制正三通 welding Tee	T710	1280	280	280	635		√	√	√	√
	T800	1400	300	300	700		√	√	√	√
	T900	1540	320	320	770		√	√		
	T1000	1700	350	350	850		√	√		
	T1200	2000	400	400	1000	√	√	√		



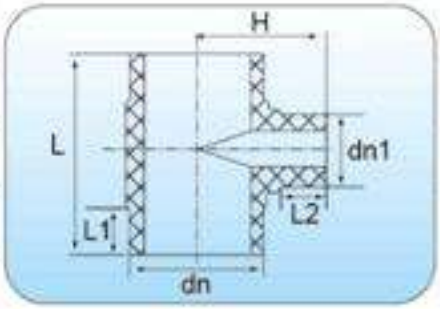
名称 ITEM	规格 SIZE	L	L1	L2	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11
焊制斜三通 welding Tilt Tee	YT110				√	√	√
	YT125				√	√	√
	YT140				√	√	√
	YT160				√	√	√
	YT180				√	√	√
	YT200				√	√	√
	YT225				√	√	√
	YT250				√	√	√
	YT280				√	√	√
	YT315				√	√	√
	YT355				√	√	√
	YT400				√	√	√
	YT450				√	√	√
	YT500				√	√	√
	YT560				√	√	√
	YT630				√	√	√



名称 ITEM	规格 SIZE	代号 MARK	壁厚 SDR26	壁厚 SDR21	壁厚 SDR17
	T900-110	A		√	√
	T900-125	A		√	√
	T900-160	A		√	√
	T900-200	A		√	√
	T900-225	A		√	√
	T900-250	A		√	√
	T900-280	A		√	√
	T900-315	A		√	√
	T900-355	A		√	√
焊	T900-400	A		√	√
	T900-450	A		√	√
	T1000-110	A		√	√
	T1000-125	A		√	√
制	T1000-160	A		√	√
	T1000-180	A		√	√
	T1000-200	A		√	√
	T1000-225	A		√	√
异	T1000-250	A		√	√
A	T1000-280	A		√	√
	T1000-315	A		√	√
	T1000-355	A		√	√
三	T1000-400	A		√	√
	T1000-450	A		√	√
	T1000-500	A		√	√
	T1200-110	A	√	√	√
通	T1200-125	A	√	√	√
	T1200-140	A	√	√	√
	T1200-160	A	√	√	√
	T1200-200	A	√	√	√
	T1200-225	A	√	√	√
	T1200-250	A	√	√	√
	T1200-280	A	√	√	√
	T1200-315	A	√	√	√
	T1200-355	A	√	√	√
	T1200-400	A	√	√	√
Welding reducer Tee	T1200-450	A	√	√	√
	T1200-500	A	√	√	√
	T1200-560	A	√	√	√
	T1200-630	A	√	√	√



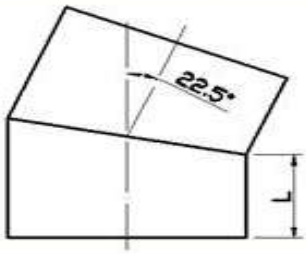
名称 ITEM	规格 SIZE	代号 MARK	壁厚 SDR26	壁厚 SDR21	壁厚 SDR17
	T900-500	B		√	√
	T900-560	B		√	√
	T900-630	B		√	√
焊	T900-710	B		√	√
	T900-800	B		√	√
制					
	T1000-560	B		√	√
异	T1000-630	B		√	√
	T1000-710	B		√	√
三	T1000-800	B		√	√
	T1000-900	B		√	√
通					
	T1200-630	B	√	√	√
	T1200-710	B	√	√	√
	T1200-800	B	√	√	√
	T1200-900	B	√	√	√
	T1200-1000	B	√	√	√
Welding					
reducer Tee					



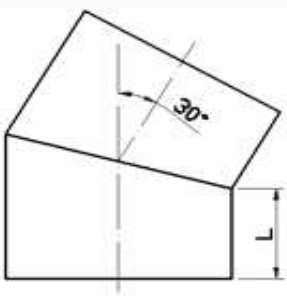
名称 ITEM	规格dn SIZE(dn)	L	壁厚 SDR26	壁厚 SDR21	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11	壁厚 SDR9
焊制90°弯头 welding Elbow 90deg	L110-90°				√	√	√	√
	L125-90°				√	√	√	√
	L140-90°				√	√	√	√
	L160-90°				√	√	√	√
	L180-90°				√	√	√	√
	L200-90°				√	√	√	√
	L225-90°				√	√	√	√
	L250-90°				√	√	√	√
	L280-90°				√	√	√	√
	L315-90°				√	√	√	√
	L355-90°				√	√	√	
	L400-90°				√	√	√	
	L450-90°				√	√	√	
	L500-90°				√	√	√	
	L560-90°				√	√	√	
	L630-90°				√	√	√	
	L710-90°				√	√		
	L800-90°				√	√		
	L900-90°			√	√			
	L1000-90°			√	√			
	L1200-90°		√	√	√			

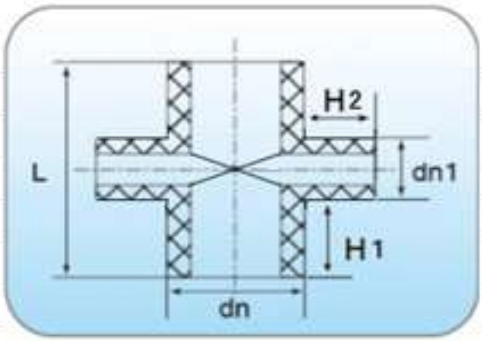
名称 ITEM	规格dn SIZE	L	壁厚 SDR26	壁厚 SDR21	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11	壁厚 SDR9
焊制45°弯头 welding Elbow 45deg	L110-45°				√	√	√	√
	L125-45°				√	√	√	√
	L140-45°				√	√	√	√
	L160-45°				√	√	√	√
	L180-45°				√	√	√	√
	L200-45°				√	√	√	√
	L225-45°				√	√	√	√
	L250-45°				√	√	√	√
	L280-45°				√	√	√	√
	L315-45°				√	√	√	√
	L355-45°				√	√	√	
	L400-45°				√	√	√	
	L450-45°				√	√	√	
	L500-45°				√	√	√	
	L560-45°				√	√	√	
	L630-45°				√	√	√	
	L710-45°				√	√		
	L800-45°				√	√		
	L900-45°			√	√			
	L1000-45°			√	√			
	L1200-45°		√	√	√			

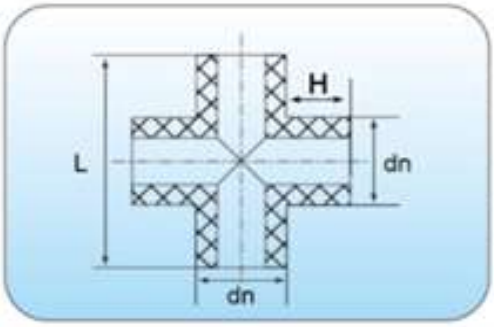
名称 ITEM	规格dn SIZE	L	壁厚 SDR26	壁厚 SDR21	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11	壁厚 SDR9
焊制22.5°弯头 Welding Elbow 22.5deg	L110-22.5°				√	√	√	√
	L125-22.5°				√	√	√	√
	L140-22.5°				√	√	√	√
	L160-22.5°				√	√	√	√
	L180-22.5°				√	√	√	√
	L200-22.5°				√	√	√	√
	L225-22.5°				√	√	√	√
	L250-22.5°				√	√	√	√
	L280-22.5°				√	√	√	√
	L315-22.5°				√	√	√	√
	L355-22.5°				√	√	√	
	L400-22.5°				√	√	√	
	L450-22.5°				√	√	√	
	L500-22.5°				√	√	√	
	L560-22.5°				√	√	√	
	L630-22.5°				√	√	√	
	L710-22.5°				√	√		
	L800-22.5°				√	√		
	L900-22.5°			√	√			
	L1000-22.5°			√	√			
	L1200-22.5°		√	√	√			



名称 ITEM	规格dn SIZE	L	壁厚 SDR26	壁厚 SDR21	壁厚 SDR17	壁厚 SDR13.6	壁厚 SDR11	壁厚 SDR9
焊制30°弯头 Welding Elbow 30 deg	L110-30°				√	√	√	√
	L125-30°				√	√	√	√
	L140-30°				√	√	√	√
	L160-30°				√	√	√	√
	L180-30°				√	√	√	√
	L200-30°				√	√	√	√
	L225-30°				√	√	√	√
	L250-30°				√	√	√	√
	L280-30°				√	√	√	√
	L315-30°				√	√	√	√
	L355-30°				√	√	√	
	L400-30°				√	√	√	
	L450-30°				√	√	√	
	L500-30°				√	√	√	
	L560-30°				√	√	√	
	L630-30°				√	√	√	
	L710-30°				√	√		
	L800-30°				√	√		
	L900-30°			√	√			
	L1000-30°			√	√			
	L1200-30°		√	√	√			



名称 ITEM	规格 SIZE(dn)	L	H1	壁厚 SDR26	壁厚 SDR21	壁厚 SDR17
焊制异四通 	+900-110A				√	√
	+900-125A				√	√
	+900-160A				√	√
	+900-200A				√	√
	+900-225A				√	√
	+900-250A				√	√
	+900-280A				√	√
	+900-315A				√	√
	+900-355A				√	√
	+900-400A				√	√
	+900-450A				√	√
A	+900-500B				√	√
	+900-560B				√	√
	+900-630B				√	√
	+900-710B				√	√
	+900-800B				√	√
	+1000-110A				√	√
	+1000-125A				√	√
	+1000-160A				√	√
	+1000-200A				√	√
	+1000-225A				√	√
	+1000-250A				√	√
	+1000-280A				√	√
	+1000-315A				√	√
	+1000-355A				√	√
	+1000-400A				√	√
B	+1000-450A				√	√
	+1000-500A				√	√
	+1000-560B				√	√
Reducer	+1000-630B				√	√
Cross tee	+1000-710B				√	√
	+1000-800B				√	√
	+1000-900B				√	√
	+1200-110A			√	√	
	+1200-160A			√	√	
	+1200-200A			√	√	
	+1200-250A			√	√	
	+1200-315A			√	√	
	+1200-400A			√	√	
	+1200-450A			√	√	
	+1200-500A			√	√	
	+1200-630A			√	√	
	+1200-710B			√	√	
	+1200-800B			√	√	
	+1200-900B			√	√	
	+1200-1000B			√	√	

名称 ITEM	规格 SIZE(dn)	L	H	壁厚 SDR26	壁厚 SDR21	壁厚 SDR17
焊制正四通   Cross tee	+900-900				✓	✓
	+1000-1000				✓	✓
	+1200-1200			✓	✓	

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TEL: 0086 18061522666 FAX: 0086 51086916108
website: http://www.jshwsy.cn/

PRODUCT WARRANTY

Haiwei Plastic Industry Technology Co., Ltd. (Haiwei) warrants its HDPE pipe and fittings against defective workmanship and material for a period of one year from date of applicable invoice. Haiwei's liability hereunder, either for breach of warranty or for negligence, is expressly limited, at Haiwei's option, to A) Replacement at the agreed point of delivery, at no cost to the Purchaser, of any product found by Haiwei to be defective or found not to conform to the applicable industry manufacturing standards, or B) to the refund or crediting to the Purchaser or the purchase price of such products, provided that Haiwei is notified immediately upon the discovery of any claimed defect and that representative samples of the allegedly defective product are returned, transportation prepaid, at Haiwei's request. No claim under this Product Warranty will be considered until the product and representative samplings thereof have been examined by Haiwei.

The above warranty constitutes the entire liability of Haiwei. Haiwei shall not be liable for any incidental or consequential damages directly or indirectly arising or resulting from the sale, transportation, handling, installation or use of the products sold, nor for product losses, reinstallation or labor costs.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATIONS OR LIABILITY ON THE PART OF NATIONAL.

Situations that void this Product Warranty:

1. Excessive pressure-temperature combination during test or operation.
2. Malfunction or improper use of line devices adversely affecting pipe performance.
3. Use of the product under conditions for which the product was not designed, including, but not limited to, improper system design, under-sizing, over-pressure, water hammer or other negative performance features.
4. Failure to adhere to Haiwei's General Instruction Sheets concerning the proper handling, installation and testing of the product.
5. Over insertion of pipe or insertion of pipe past the insertion mark on gasket pipe application.
6. Improper installation and/or design of Dredging system.
7. Use of other than applicable and recommended solvents and lubricants.
8. Installation of the product in the ground for use as well-casing, use of the product for the transmission or transportation of natural gas or any other gaseous element or use with any compressed air systems.
9. Haiwei must be notified of any defect prior to repair and such repair must be authorized by Haiwei.
10. Purchaser must provide National the opportunity to view and test pipe samples suspected to be defective including inspection of installation procedures and job site conditions.
11. If it is damaged during the installation process due to irregular use, the warranty is void.

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Jiangsu Haiwei Plastic Industry Technology Co. Ltd.

品牌产品代理销售授权书

Authorization for sales agent of branded products

特授权 **无锡瀚脉科技发展有限公司** 作为我司生产的品牌产品在其阿里巴巴商城及其官方网站进行外贸销售，并同意在其旗下网站使用我司产品的品牌商标。授权日期自 2021 年 3 月 1 日至 2024 年 3 月 1 日。

We hereby authorize **Wuxi High Mountain Hi-tech Development Co.,Ltd.** as the sales agent of International market for the branded products manufactured by us in their Alibaba and official websites, and agree with them to use our brand logo on their websites. The authorization date is effective from March 01, 2021 till March 01, 2024.

授权方：江苏海威塑业科技有限公司

Authorized Party: JiangSu HaiWei Plastics Industry Technology Co., Ltd.

公司盖章：

Company Stamp:

日期：2021 年 3 月 1 日

Date: March 01, 2021

Karl Shen

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