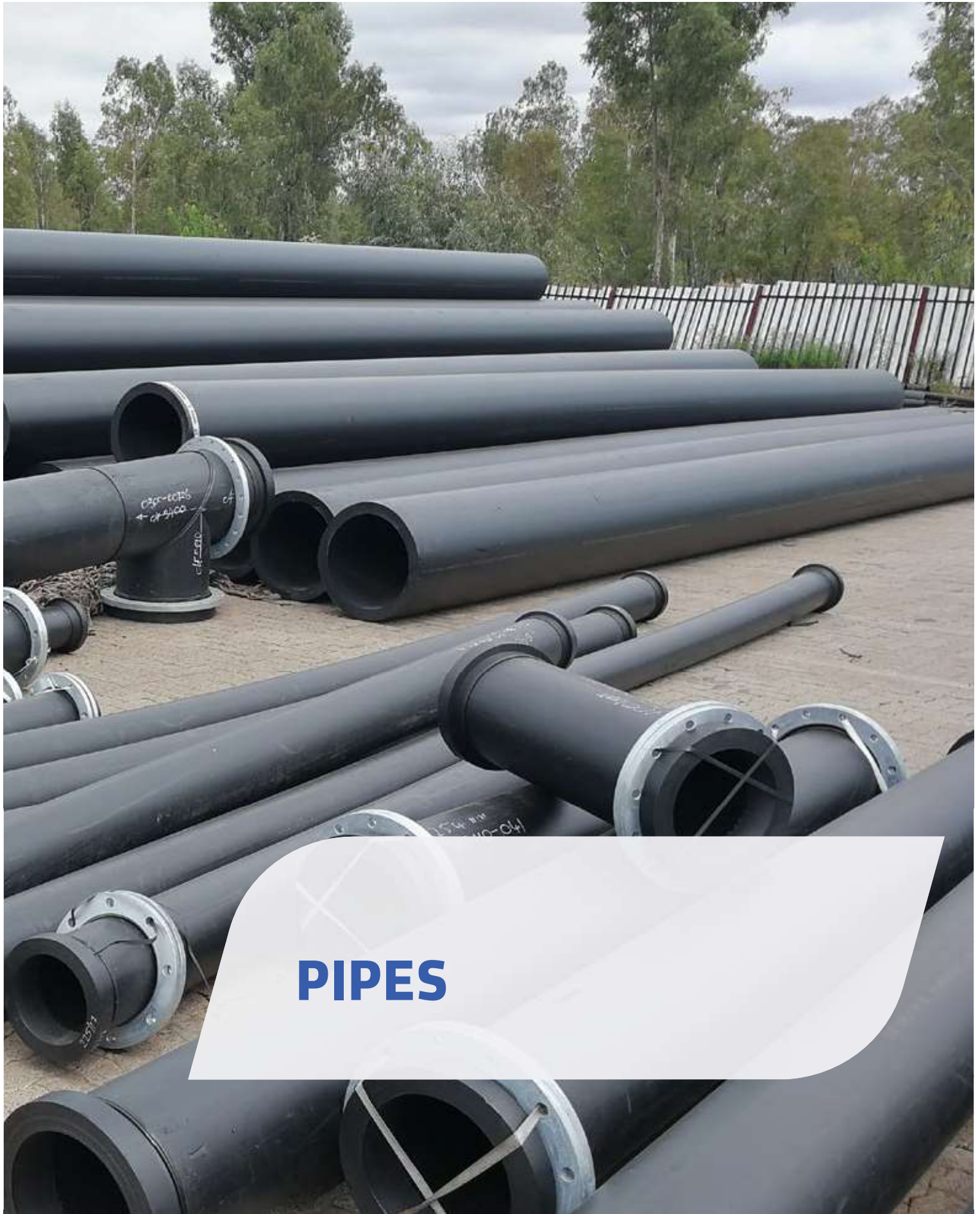




FLO-TEK[®]
Flow better with us

HDPE *Products*



PIPES

PIPES

SANS 4427-1

We manufacture PE100 HDPE piping as per SANS 4427. We currently manufacture from 20mm-1000mm diameter pipes. We are also a proud member of SAPPMA.

Flow Rates, Velocities & Friction Losses

Approximate flow rates, flow velocities and friction losses in straight HDPE pressure pipes without fittings.

Physical and Mechanical Properties

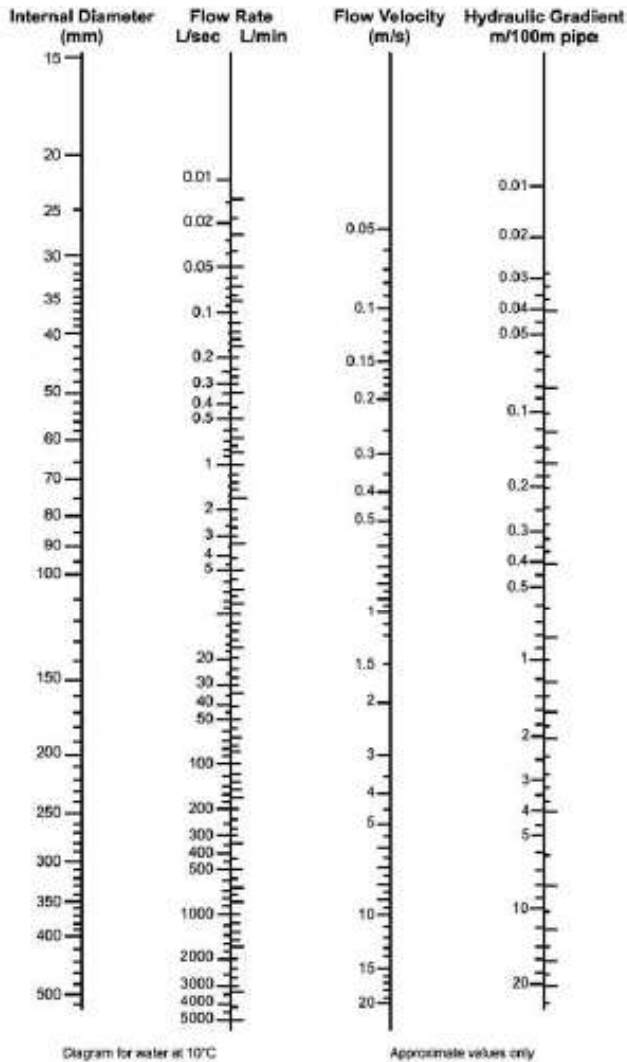
Physical Properties

Physical Properties	Test Mode	Values	Unit
Density	ISO 1183	0.958	g/cm ³
Melt Flow Index [190°C / 21.6Kg]	ISO 1133	6.5	g/10 min.
Melt Flow Index [190°C/5Kg]	ISO 1133	0,23	g/10 min.
Vicat Softening point [5Kg]	ISO 306	67	°C
Crystalline Melting Range	ISO 3146-85	130- 133	°C
Viscosity Number	ISO 1628-3	390	cm ³ /g

Mechanical Properties

Physical Properties	Test Mode	Values	Unit
Shore D. Hardness	ISO 868	61	-
Tensile @ Yield	ISO 527	26	MPa
Ultimate Tensile	ISO 527	35	MPa
Ultimate Elongation	ISO 527	>600	%
Elastic Modules	ISO 527	900	MPa
Flexural Stress [3.5% Deflection]	ISO 178	19	MPa
Notched Impact [Charpy] acN 23°C	ISO 119	20	KJ/m ³
Notched Impact [Charpy] acN 30°C	ISO 179	6	KJ/m ³
Thermal Stability 210°C	ISO 10837	>60	min.
Carbon Black Content	ASTM D 1603	>2	%





Pressure Pipe Dimensions

Nominal Size DN/DO	Nominal outside diameter	Mean outside diameter		Maximum out-of-roundness (ovality)
		min	max	
20	20	20.0	20.3	1.2
25	25	25.0	25.3	1.2
32	32	32.0	32.3	1.3
40	40	40.0	40.4	1.4
50	50	50.0	50.4	1.4
63	63	63.0	63.4	1.5
75	75	75.0	75.5	1.6
90	90	90.0	90.6	1.8
110	110	110.0	110.7	2.2
125	125	125.0	125.8	2.5
140	140	140.0	140.9	2.8
160	160	160.0	161.0	3.2
180	180	180.0	181.1	3.6
200	200	200.0	201.2	4.0
225	225	225.0	226.4	4.5
250	250	250.0	251.5	5.0
280	280	280.0	281.7	9.8
315	315	315.0	316.9	11.1
355	356	355.0	357.2	12.5
400	401	400.0	402.4	14
450	451	450.0	452.7	15.6
500	502	500.0	503.0	17.5
560	562	560.0	563.4	19.6
630	632	630.0	633.8	22.1

How to use a Nomogram

You will need a straight edge and at least two of the four values. Place the straight edge across all four columns so that it intersects the two known values. Read off the other two values.



Wall Thickness & Mass/Metre

PE63 [5MPa] SABS 533			PN 2.5				PN 3.2				PN 4			
PE80 [6.3MPa] ISO 4427			PN 3.2				PN 4				PN 5			
PE100 [8MPa] ISO 4427			PN 4				PN 5				PN 6.3			
Standard Dimension Ration			SDR 41				SDR 33				SDR 26			
OD			WALL THICKNESS			MASS	WALL THICKNESS			MASS	WALL THICKNESS			MASS
MIN	AVE	MAX	MIN	AVE	MAX		MIN	AVE	MAX		MIN	AVE	MAX	
mm	Flo-Tek	mm	mm	Flo-Tek	mm	kg/m	mm	Flo-Tek	mm	kg/m	mm	Flo-Tek	mm	kg/m
16.0	16.15	16.3												
20.0	20.15	20.3												
25.0	25.15	25.3												
32.0	32.15	32.3												
40.0	40.20	40.4	BLUE	NON	SABS	PIPES								
50.0	50.20	50.4	2.0	2.15	2.3	0.311					2.0	2.15	2.3	0.311
63.0	63.20	63.4	2.0	2.15	2.3	0.395					2.5	2.70	2.9	0.492
75.0	75.25	75.5	2.0	2.15	2.3	0.473					2.9	3.10	3.3	0.673
90.0	90.30	90.6	2.2	2.35	2.5	0.622					3.5	3.75	4.0	0.977
110.0	110.35	110.7	2.7	2.90	3.1	0.936					4.2	4.50	4.8	1.434
125.0	125.40	125.8	3.1	3.33	3.6	1.223					4.8	5.10	5.4	1.847
140.0	140.45	140.9	3.4	3.66	3.9	1.508					5.4	5.75	6.1	2.331
160.0	160.50	161.0	3.9	4.21	4.5	1.979					6.2	6.60	7.0	3.057
180.0	180.55	181.1	4.4	4.75	5.1	2.514					6.9	7.30	7.7	3.806
200.0	200.60	201.2	4.9	5.25	5.6	3.085					7.7	8.15	8.6	4.721
225.0	225.70	226.4	5.5	5.90	6.3	3.905					8.6	9.10	9.6	5.932
250.0	250.75	251.8	6.1	6.56	7.0	4.820					9.6	10.15	10.7	7.350
280.0	280.85	281.7	6.9	7.38	7.9	6.070					10.7	11.30	11.9	9.167
315.0	315.95	316.9	7.7	8.15	8.6	7.550	9.7	10.25	10.8	9.430	12.1	12.80	13.5	11.678
355.0	356.10	357.2	8.7	9.20	9.7	9.605	10.9	11.50	12.1	11.927	13.6	14.35	15.1	14.760
400.0	401.20	402.4	9.8	10.35	10.9	12.175	12.3	13.00	13.7	15.188	15.3	16.15	17.0	18.716
450.0	451.35	452.7	11.0	11.60	12.2	15.352	13.8	14.55	15.3	19.128	17.2	18.15	19.1	23.664
500.0	501.50	503.0	12.3	13.00	13.7	19.113	15.3	16.15	17.0	23.591	19.1	20.15	21.2	29.191
560.0	561.70	563.4	13.7	14.45	15.2	23.800	17.2	18.15	19.1	29.691	21.4	22.55	23.7	36.591
630.0	631.90	633.8	15.4	16.25	17.1	30.109	19.3	20.35	21.4	37.455	24.1	25.40	26.7	46.364
710.0	713.20	716.4	17.4	18.35	19.3	38.374	21.8	22.95	24.1	47.676	27.2	28.65	30.1	59.026
800.0	803.60	807.2	19.6	20.65	21.7	48.660	24.5	25.80	27.1	60.395	30.6	32.20	33.8	74.757
900.0	904.05	908.1	22.0	23.15	24.3	61.375	27.6	29.05	30.5	76.501	34.4	36.35	38.3	94.927
1000.0	1004.50	1009.0	24.5	25.80	27.1	75.995	30.6	32.05	33.5	93.802	38.2	40.20	42.2	116.668

Wall Thickness & Mass/Metre

PE63 [5MPa] SABS 533			PN 5				PN 6.3				PN 8			
PE80 [6.3MPa] ISO 4427			PN 6.3				PN 8				PN 10			
PE100 [8MPa] ISO 4427			PN 8				PN 10				PN 12.5			
Standard Dimension Ratio			SDR 21				SDR 17				SDR 13.6			
OD			WALL THICKNESS			MASS	WALL THICKNESS			MASS	WALL THICKNESS			MASS
MIN	AVE	MAX	MIN	AVE	MAX		MIN	AVE	MAX		MIN	AVE	MAX	
mm	Flo-Tek	mm	mm	Flo-Tek	mm	kg/m	mm	Flo-Tek	mm	kg/m	mm	Flo-Tek	mm	kg/m
16.0	16.15	16.3												
20.0	20.15	20.3												
25.0	25.15	25.3									2.0	2.15	2.3	0.149
32.0	32.15	32.3					2.0	2.15	2.3	0.194	2.4	2.60	2.8	0.231
40.0	40.20	40.4	2.0	2.15	2.3	0.246	2.4	2.60	2.8	0.294	3.0	3.25	3.5	0.361
50.0	50.20	50.4	2.4	2.60	2.8	0.372	3.0	3.20	3.4	0.453	3.7	3.95	4.2	0.550
63.0	63.20	63.4	3.0	3.20	3.4	0.578	3.8	4.05	4.3	0.721	4.7	5.00	5.3	0.876
75.0	75.25	75.5	3.6	3.85	4.1	0.827	4.5	4.80	5.1	1.018	5.6	5.95	6.3	1.241
90.0	90.30	90.6	4.3	4.60	4.9	1.186	5.4	5.75	6.1	1.463	6.7	7.10	7.5	1.778
110.0	110.35	110.7	5.3	5.65	6.0	1.780	6.6	7.00	7.4	2.177	8.1	8.60	9.1	2.634
125.0	125.40	125.8	6.0	6.35	6.7	2.278	7.4	7.85	8.3	2.91	9.2	9.75	10.3	3.394
140.0	140.45	140.9	6.7	7.10	7.5	2.849	8.3	8.80	9.3	3.487	10.3	10.90	11.5	4.250
160.0	160.50	161.0	7.7	8.15	8.6	3.737	9.5	10.05	10.6	4.551	11.8	12.45	13.1	5.547
180.0	180.55	181.1	8.6	9.10	9.6	4.696	10.7	11.30	11.9	5.756	13.3	14.05	14.8	7.041
200.0	200.60	201.2	9.6	10.15	10.7	5.818	11.9	12.55	13.2	7.103	14.7	15.50	16.3	8.635
225.0	225.70	226.4	10.8	11.40	12.0	7.353	13.4	14.15	14.9	9.009	16.6	17.50	18.4	10.966
250.0	250.75	251.5	11.9	12.55	13.2	8.997	14.8	15.60	16.4	11.040	18.4	19.40	20.4	13.508
280.0	280.85	281.7	13.4	14.15	14.9	11.358	16.6	17.50	18.4	13.870	20.6	21.70	22.8	16.925
315.0	315.95	316.9	15.0	15.80	16.6	14.273	18.7	19.70	20.7	17.565	23.2	24.45	25.7	21.450
355.0	356.10	357.2	16.9	17.80	18.7	18.123	21.1	22.25	23.4	22.356	26.1	27.50	28.9	27.197
400.0	401.20	402.4	19.1	20.15	21.2	23.109	23.7	24.95	26.2	28.253	29.4	30.95	32.5	34.488
450.0	451.35	452.7	21.8	22.65	23.8	29.224	26.7	28.10	29.8	35.795	33.1	34.85	36.6	43.685
500.0	501.50	503.0	23.9	25.15	26.4	36.056	29.7	31.25	32.8	44.228	36.8	38.70	40.6	53.904
560.0	561.70	563.4	26.7	28.10	29.5	45.127	33.2	34.95	36.7	55.407	41.2	43.35	45.5	67.628
630.0	631.90	633.8	30.0	31.55	33.1	57.006	37.4	39.35	41.3	70.175	46.3	48.70	51.1	85.479
710.0	713.20	716.4	33.9	35.65	37.4	72.697	42.1	44.30	46.5	89.183	52.2	54.90	57.6	108.771
800.0	803.60	807.2	38.1	40.10	42.1	92.144	47.4	49.85	52.3	113.086	58.8	61.80	64.8	137.972
900.0	904.05	908.1	42.9	45.10	47.3	116.590	53.3	56.05	58.8	143.050	66.2	69.60	73.0	174.793
1000.0	1004.50	1009.0	47.7	50.15	52.6	144.043	59.3	62.35	65.4	176.796	72.5	76.20	79.9	212.892

Wall Thickness & Mass/Metre

PE63 [5MPa] SABS 533			PN 10				PN 12.5			
PE80 [6.3MPa] ISO 4427			PN 12.5				PN 16			
PE100 [8MPa] ISO 4427			PN 16				PN 20			
Standard Dimension Ratio			SDR 11				SDR 9			
OD			WALL THICKNESS			MASS	WALL THICKNESS			MASS
MIN	AVE	MAX	MIN	AVE	MAX		MIN	AVE	MAX	
mm	FLO-TEK	mm	mm	FLO-TEK	mm	kg/m	mm	FLO-TEK	mm	kg/m
16.0	16.15	16.3					2.0	2.15	2.3	0.091
20.0	20.15	20.3	2.0	2.15	2.3	0.116	2.3	2.50	2.7	0.133
25.0	25.15	25.3	2.3	2.50	2.7	0.170	3.0	3.20	3.4	0.211
32.0	32.15	32.3	3.0	3.20	3.4	0.279	3.6	3.85	4.1	0.328
40.0	40.20	40.4	3.7	3.95	4.2	0.431	4.5	4.80	5.1	0.511
50.0	50.20	50.4	4.6	4.90	5.2	0.668	5.6	5.95	6.3	0.792
63.0	63.20	63.4	5.8	6.15	6.5	1.056	7.1	7.55	8.0	1.265
75.0	75.25	75.5	6.8	7.20	7.6	1.475	8.4	8.90	9.4	1.777
90.0	90.30	90.6	8.2	8.70	9.2	2.137	10.1	10.70	11.3	2.563
110.0	110.35	110.7	10.0	10.55	11.1	3.169	12.3	13.00	13.7	3.809
125.0	125.40	125.8	11.4	12.05	12.7	4.111	14.0	14.80	15.6	4.926
140.0	140.45	140.9	12.7	13.40	14.1	5.124	15.7	16.55	17.4	6.171
160.0	160.50	161.0	14.6	15.40	16.2	6.725	17.9	18.85	19.8	8.036
180.0	180.55	181.1	16.4	17.30	18.2	8.500	20.1	21.20	22.3	10.167
200.0	200.60	201.2	18.2	19.20	20.2	10.482	22.4	23.60	24.8	12.572
225.0	225.70	226.4	20.5	21.60	22.7	13.268	25.2	26.55	27.9	15.913
250.0	250.75	251.5	22.7	23.90	25.1	16.317	27.9	29.35	30.8	19.557
280.0	280.85	281.7	25.4	26.75	28.1	20.457	31.3	32.95	34.6	24.584
315.0	315.95	316.9	28.6	30.10	31.6	25.895	35.2	37.05	38.9	31.099
355.0	356.10	357.2	32.2	33.90	35.6	32.873	39.7	41.75	43.8	39.499
400.0	401.20	402.4	36.3	38.20	40.1	41.734	44.7	47.00	49.3	50.103
450.0	451.35	452.7	40.9	43.00	45.1	52.846	50.3	52.90	55.5	63.437
500.0	501.50	503.0	45.4	47.75	50.1	65.209	55.8	58.65	61.5	78.170
560.0	561.70	563.4	50.8	53.40	56.0	81.691	62.5	65.70	68.9	98.076
630.0	631.90	633.8	57.2	60.15	63.1	103.504	70.3	73.90	77.5	124.106
710.0	713.20	716.4	64.5	67.80	71.1	131.696	79.3	83.35	87.4	158.000
800.0	803.60	807.2	72.6	76.30	80.0	167.014	89.3	93.85	98.4	200.472
900.0	904.05	908.1	81.7	85.85	90.0	211.405				
1000.0	1004.50	1009.0	90.2	94.80	99.4	259.550				

Wall Thickness & Mass/Metre

PE63 [5MPa] SABS 533			PN 16				PN 20			
PE80 [6.3MPa] ISO 4427			PN 20				PN 25			
PE100 [8MPa] ISO 4427			PN 25				PN 34			
Standard Dimension Ration			SDR 7.4				SDR 6			
OD			WALL THICKNESS			MASS	WALL THICKNESS			MASS
MIN	AVE	MAX	MIN	AVE	MAX		MIN	AVE	MAX	
mm	FLO TEK	mm	mm	FLO TEK	mm	kg/m	mm	FLO TEK	mm	kg/m
16.0	16.15	16.3	2.3	2.50	2.7	0.103	3.0	3.20	3.4	0.125
20.0	20.15	20.3	3.0	3.20	3.4	0.163	3.4	3.65	3.9	0.181
25.0	25.15	25.3	3.5	3.75	4.0	0.242	4.2	4.40	4.6	0.275
32.0	32.15	32.3	4.4	4.70	5.0	0.388	5.4	5.75	6.1	0.457
40.0	40.20	40.4	5.5	5.85	6.2	0.605	6.7	7.10	7.5	0.707
50.0	50.20	50.4	6.9	7.30	7.7	0.943	8.3	8.80	9.3	1.096
63.0	63.20	63.4	8.6	9.10	9.6	1.482	10.5	11.10	11.7	1.741
75.0	75.25	75.5	10.3	10.90	11.5	2.111	12.5	13.20	13.9	2.465
90.0	90.30	90.6	12.3	13.00	13.7	3.024	15.0	15.85	16.7	3.551
110.0	110.35	110.7	15.1	15.95	16.8	4.532	18.3	19.30	20.3	5.289
125.0	125.40	125.8	17.1	18.05	19.0	5.832	20.8	21.90	23.0	6.822
140.0	140.45	140.9	19.2	20.25	21.3	7.326	23.3	24.55	25.8	8.563
160.0	160.50	161.0	21.9	23.05	24.2	9.535	26.6	28.00	29.4	11.166
180.0	180.55	181.1	24.6	25.90	27.2	12.055	29.9	31.45	33.0	14.113
200.0	200.60	201.2	27.4	28.85	30.3	14.913	33.2	34.95	36.7	17.424
225.0	225.70	226.4	30.8	32.40	34.0	18.849	37.4	39.35	41.3	22.069
250.0	250.75	251.5	34.2	36.00	37.8	23.268	41.5	43.65	45.8	27.207
280.0	280.85	281.7	38.3	40.30	42.3	29.176	46.5	48.90	51.3	34.136
315.0	315.95	316.9	43.1	45.35	47.6	36.933	52.3	55.00	57.7	43.195
355.0	356.10	357.2	48.5	51.00	53.5	46.830	59.0	62.00	65.0	54.878
400.0	401.20	402.4	54.7	57.50	60.3	59.479				
450.0	451.35	452.7	61.5	64.65	67.8	75.242				
500.0	501.50	503.0								
560.0	561.70	563.4								
630.0	631.90	633.8								
710.0	713.20	716.4								
800.0	803.60	807.2								
900.0	904.05	908.1								
1000.0	1004.50	1009.0								



FLO-TEK[®]
Flow better with us

PVC *Pressure Pipes & Fittings*

UPVC | MPVC | High Impact |

OVERVIEW

Composition of PVC Pipe Materials

Polyvinyl Chloride or PVC is one of the most versatile types of pipe materials. It is produced by the polymerisation of vinyl chloride which is made from coal (or oil) and common salt. In fact, salt makes up over 50% of the polymer, thus making PVC one of the most environmentally friendly plastic materials, being least dependent on increasingly scarce hydrocarbon resources.

The unique properties of PVC can be enhanced by the addition of special additives, for example, to create strong yet tough pipe materials such as modified PVC (PVC-M), foamed multilayer sewer and drainage pipes, and weather resistant, above ground drainage pipes. These additives, as well as heat stabilisers and lubricants, which are necessary to facilitate the extrusion of the pipes, are added to the PVC raw material in a special high speed mixer to produce a dry blend specially formulated for the pipe extrusion process.

During the manufacture of the pipe the dry blend is mixed in the extruder and through a combination of heat and shear, the material is 'gelled' into a homogeneous molten mass ready for passage through the die and calibrator to form a pipe which has tight tolerances in terms of the outside diameter, wall thickness and mechanical properties.

It should be noted that in recent years heat stabilisers and lubricants have been changed from lead based compounds to alternative, environmentally friendly materials such as organic and calcium/zinc compounds.

Flo-Tek's PVC Pipe Systems

SANS 966 Part 1 UPVC

Below-ground pressure applications for the conveyance of potable water in reticulation systems and for other applications in which continuous temperatures in excess of 25 °C are not encountered.

SANS 966 Part 2 (MPVC)

Below-ground pressure applications for the conveyance of potable water in reticulation systems and for other applications in which continuous temperatures in excess of 25 °C are not encountered.

SANS 1283 High Impact

Suitable for the conveyance of non-potable water at temperatures between 5 °C and 50 °C for underground use in mines.

SANS 1452-2

For water supply and for buried and above ground drainage and sewerage under pressure.

Features and Benefits

- Environment-friendly & Lead-free material.
- Excellent flow characteristics: reduces friction losses.
- Best long-term strength (serves in excess of 50 years).
- Long-term strength, toughness and stiffness.
- Large bore and high flow capacity.
- Durability and toughness.
- Resistant to acids and alkalis.
- Resistant to abrasion, scouring and modern cleaning methods.
- Light mass: for easy handling and installation.
- Elastomeric locked-in sealing ring system.
- Inflammable: Does not support combustion



3. SANS 1283 High Impact PVC Pipes

The Southern African mining industry presents one of the most demanding applications for PVC pressure pipes anywhere in the world. Plastic pipes are preferred over conventional steel pipes because of their light mass, quick and easy installation and most importantly, their resistance to the most corrosive of environments.

In addition, because they are poor conductors of heat they offer an ideal pipe for the conveyance of chilled water in underground mines in order maintain a reasonable, safe working environment. Modified PVC pipes are also self extinguishing hence improving safety.

Given harsh mining environments, rough handling and installation, as well as strict safety considerations, it is necessary to produce a toughened, impact resistant PVC pipe by the incorporation of impact modifiers. In addition, as the pipes are suspended in the haulage ways and not buried; an end thrust resistant joint is required to prevent pipes from pulling apart under pressure.

A Victaulic shouldered end produced from cast and machined SG iron is fitted to the end of each pipe and joined by standard Victaulic clamps and rubber seals.

The steel Victaulic stub end is precision machined with gripping teeth on the inside to provide a mechanical interference fit with the pipe that is resistant to high pressures. The shouldered end is galvanised to provide protection against corrosion.

The toughened PVC-M pipe and Victaulic jointing system has been used in the mining industry since the late 1970's and proven itself over the past 30 years as a

cost effective and lasting piping systems. The Victaulic stub allows for jointing to steel pipes as well as the use of standard corrosion protected mild steel fittings such as tees, bends and saddles, etc. Victaulic clamps and seals and fittings are generally standard stock items in mining stores.

A full range of fabricated fittings with Victaulic shouldered ends made from tough, modified PVC pipe is also available. The following photographs illustrate the pipe system.

The victaulic jointing system (minus rubber seal).



High impact PVC-M pipes are made to the SANS 1283 specification which ensures consistent, high quality products. The result of the high speed impact test from a height of 20m [carried out according to the procedure detailed in SANS 966 Part 2 and SANS 1283] illustrates the toughness properties exhibited by PVC-M pipes. Note the ductile nature of the 'failure' where a hole is formed with stress whitening as opposed to brittle-type failure.



Note: Toughness of PVC-M pipes (20m High Impact test)

These tough pipes offer easy installation, long trouble free life and the end thrust resistant joints provide advantages in the way of minimising anchor thrust blocks. Johannesburg Water has used this pipe system since the early 1980's and today this pipe is being used to replace the very problematic asbestos pipes which are now failing in many cities and towns in Southern African countries. A typical installation is shown below.



Applications

- Underground Mining Pipe Systems

Pipe Standards

Designation	Standard	MRS [Mpa]	Design Stress	Safety Factor
PVC-M [110mm, 160mm & 200mm]	SANS 1283	25	12.5	2.0

Pipe Dimensions

All pipes are made to provide an effective length of 9.0 meters after installation; the outside diameters are the same for all pressure classes of the same size and there are 6 classes of pipe. The minimum wall thickness [as per the applicable SABS standard] and mass per meter are given in the tables below.

SANS 1283 PVC-M MINING AND HIGH IMPACT PRESSURE PIPE														
MINIMUM WALL THICKNESS AND MASS PER METER FOR EACH SIZE AND PRESSURE CLASS														
OUTSIDE DIAMETER		EFFECTIVE LENGTH	CLASS 6		CLASS 9		CLASS 12		CLASS 16		CLASS 20		CLASS 25	
Min.	Max.	m	mm	Kg	mm	Kg	mm	Kg	mm	Kg	mm	Kg	mm	Kg
105.0	105.3	9	2.50	1.226	3.70	1.793	4.80	2.301	6.40	3.019	7.80	3.627	9.50	4.340
110.0	110.3	9	2.60	1.336	3.90	1.979	5.10	2.559	6.70	3.311	8.20	3.993	10.00	4.784
155.0	155.4	9	3.60	2.607	5.40	3.864	7.10	5.023	9.40	6.547	11.50	7.894	14.10	9.504
160.0	160.4	9	3.80	2.839	5.60	4.136	7.40	5.402	9.70	6.974	11.90	8.431	14.60	10.155
200.0	200.5	9	4.70	4.391	7.00	6.463	9.20	8.397	12.10	10.876	14.90	13.193	18.20	15.828
210.0	210.5	9	5.00	4.903	7.30	7.078	9.70	9.294	12.70	11.987	15.60	14.507	19.10	17.442
250.0	250.6	9	5.90	6.889	8.70	10.042	11.50	13.120	15.10	16.968	18.60	20.589	22.80	24.780
315.0	315.6	9	7.40	10.889	11.00	15.997	14.50	20.844	15.10	21.100	XX	XX	XX	XX

NOTE: NOTE: ABOVE WALL THICKNESS BASED ON σ_s of 12.5 MPa [SAFETY FACTOR 2]

Features and Benefits

- Modified polymers achieve improvement in resistance to cracking.
- Minimization of the effect of stress concentrators such as scratches.
- Higher wall stresses are allowable.
- PVC-M pipes will not affect the taste, smell, appearance or health aspects of drinking water.
- Environment-friendly & Lead-free material.
- Excellent flow characteristics: reduces friction losses.
- Best long-term strength [serves in excess of 50 years].
- Long-term strength, toughness and stiffness.
- Large bore and high flow capacity.
- Durability and toughness.
- Resistant to acids and alkalis.
- Resistant to abrasion, scouring and modern cleaning methods.
- Light mass: for easy handling and installation.
- Inflammable: Does not support combustion

DESIGN CONSIDERATIONS

Durability and the Long-Term Safety Factor

It should be noted that the stress — time line does not indicate a loss of strength with time rather that the material can support lower stresses for longer times. With each new loading, for example, water hammer or pressure surges, the material acts according to the short-term strength properties. Short-term strength is independent of how much time has passed since the first loading - the pipe acts as a new pipe.

Numerous studies conducted on PVC-U pipes excavated at various times up to 60 years service, have shown the exceptional durability of these 'old' pipes, with little or no difference in mechanical properties to recently manufactured pipes. Tensile strength, impact strength, burst pressure and elastic modulus show virtually no change with time in service . A study conducted on 60 year old PVC-U pipes states: 'although the plastics industry is a relatively young materials segment PVC-U pipe is now about 70 years old, which is more than the predicted service lifetime of 50 years for PVC pipe applications.



Short -Term Safety Factor

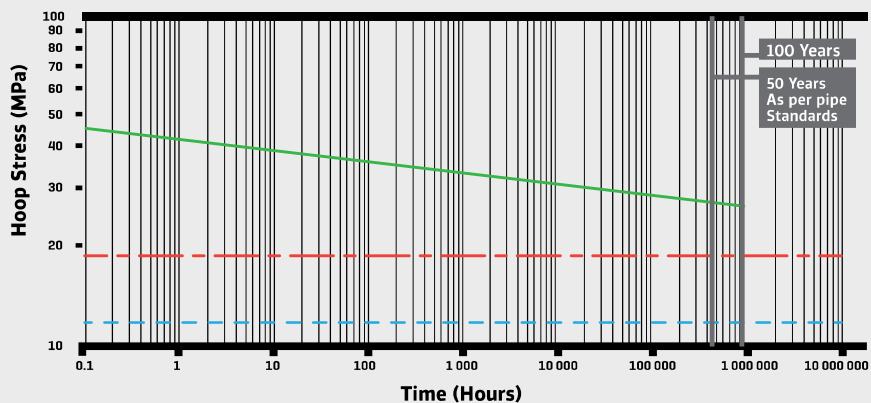
The question is often asked, "how do PVC-U and PVC-M pressure pipes withstand sudden surges in pressure caused, for example, by water hammer"? The short answer is, "extremely well"! The question usually results from a consideration of the safety factors of 2.0 and 1.4 applied in the design of the two materials, PVC-U and PVC-M, respectively. However, it should be noted that these are long-term, i.e. 50 year safety factors, while their short-term safety factors are much greater.

The polymer molecular structure ensures that the more rapid the pressure increase the greater the strength exhibited by these materials; the molecular structure reacts so as to resist the stress.

The short-term safety factors of PVC-U and PVC-M are over 3 times the design operating pressure and can be as high as 4 or 5 times depending on the rate of the pressure surge.

Long -Term Hydrostatic Strength Properties and The Long-Term Safety Factor

The strength of plastics pipes can be defined in terms of the maximum stress to cause failure in a given time, usually 50 years, and is determined at various extended times according to the procedure described in ISO 9080. The results are graphically illustrated by plotting the hoop stress against the time to fail on a log scale, as shown below.



Stress-Time line for PVC-U and PVC-M at 20°C. [1]

- PVC-U and PVC-M regression line as per SANS 966 Parts 1 and 2
- - - PVC-M design stress, SANS 966-2 [18 MPa]
- - - PVC-U design stress, SANS 966-1 [12.5 MPa]

Pressure Variation and Surge Pressures

The stress-time lines are derived using constant stresses; in pipelines the stress on the material is rarely constant, varying as the pressure varies and as superimposed loads vary. The latter stabilise fairly quickly, usually within the first year or two of the network life, but pressure variations are there forever. As with any other pipe material, due allowance for this must be made in designing a water reticulation network with PVC pipes.

Anti-surge devices such as air vessels, non-return valves, programmed use of pumps etc, should be incorporated where necessary. Lower surge pressures develop in PVC pipes as a result of lower surge wave velocities and this has enabled PVC pipes to be used in areas where water hammer has caused pipes manufactured from other materials to fracture. Above all, it enables one to operate with lower pressure classes for PVC.

Considerable research has been done on the fatigue properties of plastic pipelines. Recently work has been published on fatigue properties of PVC-M related to actual site conditions in water distribution systems. It concludes that PVC-M pipes will not fail under conditions of dynamic and static stress within 50 years provided the total stress does not exceed 18 MPa and the stress amplitude over one million pressure cycles [equal to 55 cycles per day for 50 years] is below 3,0MPa.



The Effect of Temperature Changes on Working Pressure

The pressure classes of PVC pipes carrying the SABS mark have been allocated on the basis of design at 20°C. PVC pressure pipes perform well at temperatures below 20°C and can withstand higher pressures at lower temperatures. Pipes used in applications where operating temperatures exceed 25°C should be de-rated to ensure that the 50 year design life is not adversely affected. The following pressure reduction factors should be applied.

WORKING TEMPERATURE (°C)	MULTIPLICATION FACTORS
25	1.0
30	0.9
35	0.8
40	0.7
45	0.6
50	0.5
55	0.4
60	0.3

Expansion and Contraction

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

MATERIAL	CO-EFFICIENT OF EXPANSION (K ⁻¹)
PVC	8 x 10 ⁻⁵
HDPE	20 x 10 ⁻⁵
LDPE	20 x 10 ⁻⁵
Steel	1.2 x 10 ⁻⁵
Copper	2.0 x 10 ⁻⁵

Examples based on the above are as follows:

- A PVC pipe will expand or contract by 0.06mm per metre per °C change in temperature.
- A HDPE pipe will expand or contract by 0.2mm per metre per °C change in temperature.
- A 30° rise in temperature will cause an increase in length of 10.8mm [0.06 x 30 x 6] on a 6m length of PVC pipe and an increase of 36mm [0.2 x 30 x 6] on a 6m length of HDPE pipe.

Calculating Water Hammer

The Wave Celerity for PVC-U and PVC-M which is used in the calculation of water hammer in pipelines is given in the table below.

Higher wave celerity values result in higher levels of water hammer. Each class of pipe has a constant value of wave celerity. By comparison the wave celerities for materials such as steel and fibre cement are much higher - by multiples of 3 or more.

CLASS	PVC-U	PVC-M
6	263	249
9	325	270
12	378	312
16	439	363
20	495	407
25	559	458

DESIGN CONSIDERATIONS ...

Resistance to Weathering (Ultraviolet Light)

Most plastics are affected by UV light. PVC pressure pipes have pigments and light stabilisers incorporated in their formulation and if pressure pipes have to be exposed for an indefinite period, they should be painted, preferably with one coat of white alkyd enamel or PVA, or suitable covering should be provided. Paint containing solvent thinners should be avoided.

Long-term exposure [more than 4 - 6 months, but dependent on climatic conditions] to UV light can cause discolouration of the pigments in the pipe and, in severe cases, lead to some embrittlement. Such embrittlement affects the ability to withstand impacts but does not reduce pressure handling capabilities.

It is recommended that pipes should be buried wherever possible.

Compressed Air

Normal forms of PVC pipes should NOT be used for the reticulation of compressed air.

Bending

An important feature of PVC pipes is that they may be deliberately bent, within limits, thus eliminating the need, in some cases, for separate bend fittings. As a rule of thumb the radius of such a bend must not be less than 300 times the pipe diameter.

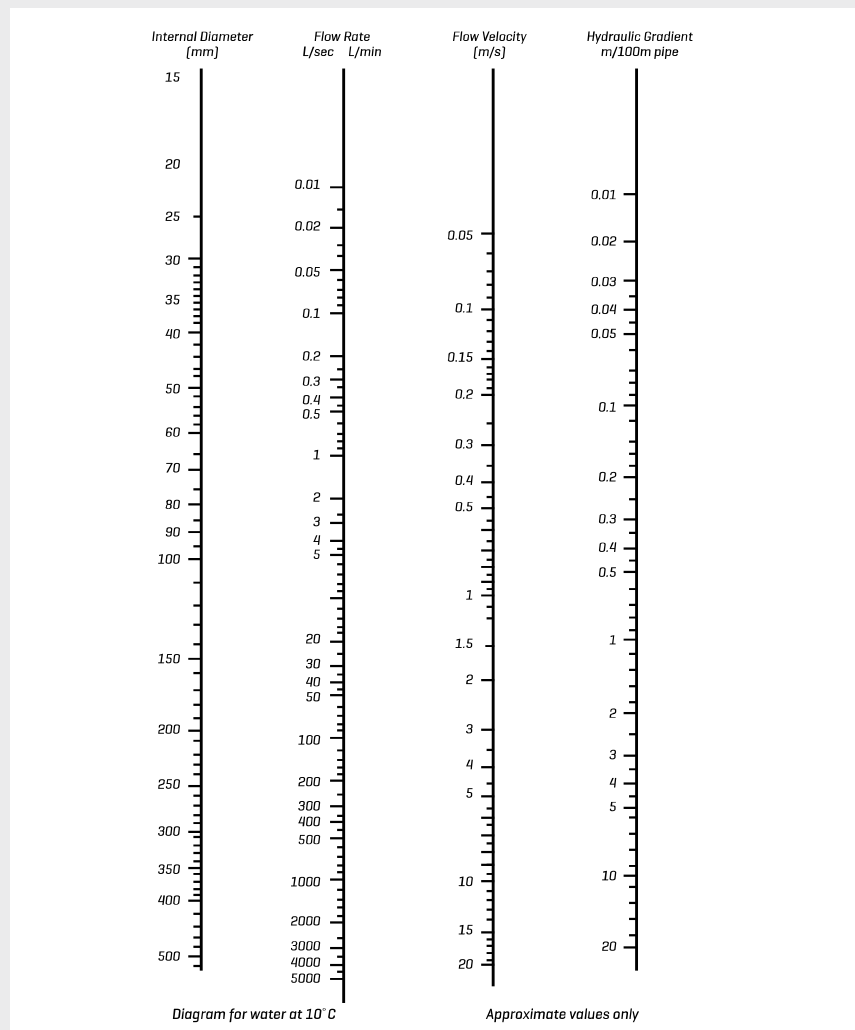
In addition each rubber ring joint can accommodate a further 2° of bend. This feature significantly reduces costs and speeds up installation times when compared to some traditional pipe materials.

Flow Rates, Velocities and Friction Losses

The flow velocities in pressure pipelines should fall in the range 0.8 to 2.5 m/s, the lower rate to maintain self-cleansing flow and assist in the removal of air and the upper limit to maximise air release at high points. Approximate flow rates, flow velocities and friction losses in straight PVC pressure pipelines without fittings can be read off the following Nomogram.

How to use a Nomogram:

1. You need a straight edge and at least two of the four values.
2. Place the straight edge across all four columns so that it intersects the two known values.
3. Read off the other two values.



PIPE JOINTING

JOINTING METHODS

1. Cutting

PVC pipes can be easily cut using a number of different cutting tools, such as proprietary cutting tools which cut, deburr and chamfer in one operation. Circular saws or hand saws may be used. It is important to ensure that, after cutting, the pipe end is thoroughly deburred.

2. Rubber Ring Joints

A rubber ring socket is integrally moulded on one end of the pipe and incorporates a factory fitted rubber sealing ring which is retained in position. The opposite end of the pipe (spigot end) is suitably chamfered and has a depth of entry mark near its end. Each joint is capable of handling expansion and contraction as well as angular deflection of up to 2°C and a pressure of up to 75 kPa below the ambient atmospheric pressure. The seal ring is designed to provide a watertight joint at high and low pressures.

3. Depth of Entry

The depth of entry mark is a guide to ensure correct depth of insertion of the spigot into the socket of the next pipe. If pipes are cut to measure on site it is necessary to remark the depth of entry according to the dimensions given in the following table or as per the pipe being installed at the same time.

Re-marking can be done with a permanent felt tipped marker pen. The correct depth of entry allows for expansion and contraction of the pipes in the pipeline.

PIPE SIZE (mm)	DEPTH OF ENTRY (mm)
50	110
63	120
75	130
90	135
110	150
125	160
140	165
160	175
200	200
250	225
315	230
355	240
400	250
450	265
500	275

4. Chamfering

The spigot end of all rubber ring jointed pipes is chamfered at the time of manufacture. Chamfering facilitates the insertion of the spigot end into the socket of the next pipe without damaging or dislodging the rubber ring. If however, the chamfering has been cut off it is important to re-chamfer the end correctly. Re-chamfering can easily be done using a file that leaves no sharp edges which may cut the rubber ring.

It should be at an angle of about 12° - 15° and the length of the chamfer should be such that at least half the wall of the thickness is removed. The chamfering should not be done to such an extent that a sharp edge is made at rim of the bore.

5. Lubricant

It is the most important to use correct lubricant when making a joint. The lubricant considerably reduces the effort required to insert the spigot into the socket and at the same time minimizes the possibility of dislodging the rubber ring. The lubricant should be water soluble, non-toxic and of a gel consistency. Alternative lubricants such as oil, grease, diesel, dish-washing liquid, etc. must under no circumstances be used.

Joints Per Lubricant		
PIPE SIZE (mm)	JOINTS / 2kg	JOINTS/ 5kg
50	290	725
63	250	625
75	220	550
90	180	450
110	140	350
125	130	325
140	120	300
160	110	275
200	75	188
250	60	150
315	50	125
355	35	88
400	30	75
150	25	70
500	25	60

JOINTING PROCEDURE

Rubber Ring Joints of Pipes

1. Check the spigot end of the pipe for correct chamfering (at an angle of approx. 15° and a half of the thickness). Ensure that the “depth of entry” mark is visible and that there are no burrs and damage present.
2. Wipe the spigot end clean.
3. Check the socket end of the pipe to ensure that the rubber ring is present and correctly fitted. Make sure that no dirt or mud is present.
4. Apply the thin film of lubricant evenly around the circumference of the spigot up to about half the distance to the “depth of entry” mark.
5. Lubricate the rubber ring sparingly.
6. Place the spigot end of the pipe into the socket so that it rests against the rubber ring.
7. Ensure the two pipes are correctly aligned both horizontally and vertically. Failure to do this could lead to the rubber ring being dislodged when the next step is carried out.
8. Push the spigot into the socket until the “depth of entry” mark is just visible at the end of the socket. It should not be necessary to use undue force — if this becomes necessary it is normally an indication that something is amiss and the joint making process should be started again.

Solvent Weld Joints of Pipes

It must be stressed that solvent cement jointing is a welding and not gluing process. It is important therefore that there is an interference-fit between the spigot and socket to be joined. Do not attempt to make a joint when an interference-fit between a dry spigot and socket is not achieved (ie. a rattle fit).

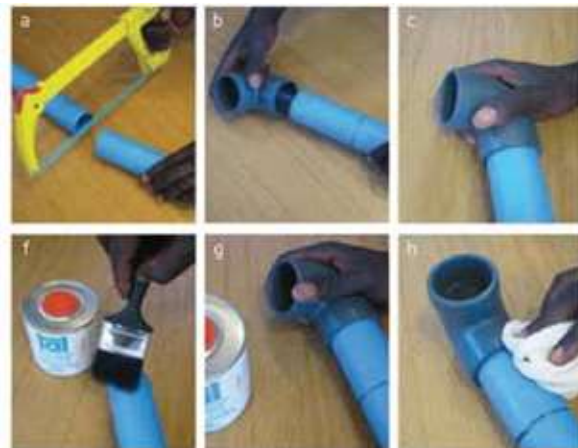
There are different types of solvent cement available for pressure pipes and for non-pressure applications. Make sure that the appropriate cement is being used. Do not dilute or add anything to the solvent cement.

Excellent solvent weld joints can be made to withstand high pressures, provided the correct welding procedure is followed.

Solvent Cement Joints of Pipes & Fittings

Assemble all the required fittings, pipes and equipment.
For the best results, follow the jointing procedure below.

- a. Make sure that the spigot has been cut square and that all burrs have been removed.
- b. Mark the spigot with a pencil line (or similar) at a distance equal to the internal depth of the socket.
- c. Check that, while dry, there is an interference fit between the spigot and the socket before the spigot reaches the full depth indicated by the pencil line.
- d. Ensure that both the spigot and the socket are properly dry (not illustrated).
- e. Degrease and clean both with an appropriate etch cleaner (not illustrated). This also acts as a primer first.
- f. With a suitable brush apply a thin film of solvent cement to the internal surface of the socket. Then apply the solvent cement in a similar manner up to the mark on the spigot. Do not use excess solvent cement. The brush width should be such that the solvent cement can be applied to both surfaces within about 30 seconds.
- g. Make the joint immediately. While inserting the spigot rotate it by about 90° and ensure that it is fully inserted up to the pencil mark, as there is a bead of excess solvent cement indicating the correct amount has been applied. Hold steady for at least 30 seconds. Mechanical assistance may be necessary for large pipes.
- h. Wipe off any excess solvent cement with a clean rag.
- i. Do not disturb for at least 5 minutes.
- j. Do not apply pressure for at least 24 hours.



RUBBER RING TYPE INTEGRAL PIPE END SOCKETS

Laying, backfilling and Hydrostatic test pressure Requirements

1. At the level of the top of the pipes, the trench should be not less than the external diameter of the pipe plus 300 mm.
 2. The bottom of the trench should be carefully leveled and cleared of any sharp edge sand stones. If this is not possible, apply suitable bedding material to a thickness of at least 100 mm over the bottom of the trench.
 3. Only stable backfill materials should be used. In general, sands and fine gravels are the best materials.
 4. If materials have been extracted from the trench which can be compacted sufficiently to fix the pipes properly in place, these may be used. This applies to sand, gravel, top soil and light soils.
 5. Pipes should not be encased in concrete.
 6. Correct assembly of the joint requires that the spigot end be chamfered and correctly lubricated prior to insertion into the socket
 7. The spigot shall be inserted into the socket up to the reference (depth-of-entry) mark made by the manufacturer.
 8. A confirmatory visual check of joints can be made on the bore of the pipe by using a lamp.
 9. If the elastomeric sealing ring is not in place at the time of delivery, clean the groove, remove any foreign bodies and then locate the ring correctly in the groove.
 10. After the pipe has been firmly and uniformly bedded, start backfilling the trench, up to the top level of the pipe, in layers of thickness not exceeding 100 mm. The same material should then be compacted in successive layers over the pipe until a thoroughly compacted layer of 300 mm above the pipe is achieved. Do not roll or use heavy mechanical compaction until at least 600 mm of material has been placed over the pipe.
 11. Pressure test requirements stipulate that pressure testing should take place with the pipes only partially backfilled, leaving the joints open for inspection during the pressure testing procedures.
 12. For large scale networks, the tests are done on sections of maximum length 500m.
 13. Air vents at high points should be open during the filling of the network.
 14. Pipes should be slowly filled with water starting from the lowest point to avoid any pressure surges (and water hammer).
 15. The air in the system should be allowed to escape during the filling with water.
 16. It should be ensured that no air is trapped in any part of the system.
 17. The test pressure should normally be not more than 1½ times the maximum working pressure of the system.
- Note:** These are just guide lines. For detailed procedure please refer SANS 10112 (The installation of polyethylene and poly [vinyl chloride] [PVC-U and PVC-M] pipes). *Please follow above points to achieve best result.*

STORAGE AND TRANSPORTATION

Storage

Pipes should be stored on level, flat ground, free of stones. They may be stored on timber supports of at least 75 mm width placed 1.5 metres apart with side supports. The height of pipe stacks should not exceed 1.5 metres.

All pipe stacks and stored fittings should be covered to avoid prolonged exposure to direct sunlight

PIPE SELECTION CRITERIA

PRESSURE & NON-PRESSURE PIPES

A very good description of the criteria which may be used for the selection of the various plastics pipes available for each application is given in the SAPPMA Technical Manual [Second Edition, March 2009] [1].

The section in the Technical Manual covers the following:

HYDRAULIC REQUIREMENTS

- Basic Principles
- Operating Pressure, Hoop Stress and Wall Thickness
- Surge and Fatigue
- Factory Tests

EXTERNAL LOADS

- Design Basis
- Load Classification
- Pipe Stiffness
- Determining Required Pipe Stiffness
- Vertical Deflection

DURABILITY REQUIREMENTS SYSTEM COMPONENTS

- Secondary Loads
- Manholes
- Joints and Fittings
- Valves

PIPE INSTALLATION

An excellent section in the SAPPMA Manual covers the following on pipe installation procedures:

- Pre-construction Activities
- Excavation
- Embedment
- Pipe Laying and Jointing
- Backfilling
- Anchoring
- Support Spacing for Mine Pipes
- Support Spacing for Soil, Waste and Vent Pipes
- Site Tests

A COPY OF THE SAPPMA TECHNICAL MANUAL IS FREELY AVAILABLE FROM FLO-TEK PIPES AND IRRIGATION, EITHER IN HARD COPY OR ON CD. Please contact any of our Sales Offices or our Export Department.



FLO-TEK[®]

Flow better with us

HDPE *Products*



FITTINGS

Flo-Tek stocks a wide range of butt-weld, compression, electro-fusion and socket-weld fittings. All fittings are made from PE100 and sizes range from 16mm to 1000mm (Depends fitting). All moulded fittings conform to various international quality standards and certification.

JOINTING METHODS

One of the greatest features of HDPE pipe is that a wide range of jointing systems are available to suite any application. The jointing systems can be divided into two main categories with further sub-divisions in each category.

Permanent Jointing



Buttwelding



Electrofusion



Non-Permanent (detachable) Jointing



Tak / Vitaulic System



Compression Fittings



Flanging



Stubs

Moulded Fittings Range

1. Compression Fittings

- Coupling
- 90 Degree Elbow
- 90 Degree Elbow (Male / Female)
- Tees (Reducing / Female / Male)
- Endplugs
- Flanged Adaptor
- Reducing Coupling
- Male / Female Adaptor

2. PE100 Electrofusion Fittings

- Couplers

3. Clamp Saddles

- Reinforced Saddle
- Unreinforced Saddle
- *All Other Saddles Available On Request

4. Electrofusion Reducers

5. PP Flanges

6. Transition Fittings

7. Electrofusion Tees

8. Electrofusion Elbows

9. Electrofusion Branch Saddles

10. Electrofusion Tapping Saddles



Fabricated Fittings

Flo-Tek fabricates all types of fittings out of our PE100 piping. Laterals, Tees, Seamless bends, segmented bends and stubs. We can fabricate per drawing and as per requirements.

Product Range

1. PE100 Moulded Butt weld Fittings

- 90 Degree Elbow Long Spigot
- Tee Long Spigot
- End Cap Long Spigot
- Reducing Tee Long Spigot
- Reducer Long Spigot
- Stub Long Spigot Cross Long Spigot
- Reducing Cross Long Spigot

2. PE100 Fabricated Butt weld Fittings

- PE100 Fabricated Stubs
- Segmented Bends
- Seamless Bend
- Fabricated Tees
- Fabricated Lateral



Flanges

We have our own range of flanges, from 20mm upto 2000mm. The flanges are mildsteel, hot-dipped galvanised and conforms to SANS 1123. All other flanges are available on request.

Product Range

- 1000/3
- Table D
- 1600/3
- ASA150



Valves

We have a wide range of valves available in Steel and Thermo-Plastics.



Product Range

- Flanged Resilient Seated Gate Valve – SABS 664
- Socketed Resilient Seated Gate Valve – SABS 664
- Plain End Resilient Seated Gate Valve
- Manufactured Flanged Resilient Seated Gate Valve – PN16
- Flanged Wedge Gate Valve – PN16 – SABS 664
- Resilient Seated Gate Valve – Rising Spindle – SABS 665
- Wedge Gate Valve Industrial Pattern -Non Rising Spindle – PN 10
- Wedge Gate Valve Industrial Pattern – Rising Spindle – PN 10
- Shouldered Butterfly Valve – Rubber Lined Disc
- Shouldered Non Return Valve
- Shoulder Coupling
- Diaphragm Valve
- Butterfly Valve Wafer Nickel Plated Disc -PN16 Pinned
- Butterfly Valves Wafer Type 316SS Disc-PN16 Pinned
- Gearbox for Butterfly Valve Wafer type
- Butterfly Valve Wafer Type, 304 Stainless Steel Disc Pinned
- Butterfly Valve Wafer Type, 316SS disc, Pinless – PN25
- EPNS Butterfly Valves Wafer 316 Stainless Steel Body & Disc [Spline Shaft] PTFE Liner-PN16
- Double Eccentric Flanged Butterfly Valves
- Slurry Wafer Butterfly Valves

FIRE HYDRANTS





Application & Features

Suitable for Butt-welding plastic pipes and fittings made of PE, PP and PVDF materials. Consists of basic frame, Hydraulic unit, planing tool, Heating mirror, Carry case and optional extras, simple structure, small and user-friendly. Removable PTFE coated heating mirror with accurate temperature control systems. Changeable welding positions enables welding of various fittings. Low starting pressure ensures reliable welding of small bore pipes. High shockproof pressure meter with big face ensuring better readings, separate two-channel timer records time in soaking and cooling phases

Size Range	FHD160	FHD 250	FHD 315	FHD 355
Pipe Sizes mm	63, 75, 90, 110, 125, 140, 160	90, 110, 125, 140, 160, 180, 200, 225, 250	90, 110, 125, 140, 160, 180, 200, 225, 250, 280, 315	90, 110, 125, 140, 160, 180, 200, 225, 250, 280, 315
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C
Pressure Adjustable Range	0-6.3 Mpa	0-6.3 Mpa	0-6.3 Mpa	0-6.3 Mpa
Working Voltage	220V 50 Hz	220V 50 Hz	220V 50 Hz	220V 50 Hz
Heating Mirror	1 Kw	2 Kw	3 Kw	4 Kw
Planer Power	0.7 Kw	1.1 Kw	1.1 Kw	1.1 Kw
Hydraulic Power	0.75 Kw	0.75 Kw	0.75 Kw	0.75 Kw
Total Power	2.4 Kw	3.85 Kw	4.85 Kw	5.85 Kw
Weight	106 Kg	143 Kg	216 Kg	260 Kg
Packing	3 Cases 0.58 CBM	3 Cases 0.70 CBM	3 Cases 1.70 CBM	3 Cases 1.70 CBM



Application & Features

Suitable for Butt-welding plastic pipes and fittings made of PE, PP and PVDF materials. Consists of basic frame, Hydraulic unit, planing tool, Heating mirror, Carry case and optional extras, simple structure, small and user-friendly. Removable PTFE coated heating mirror with accurate temperature control systems. Changeable welding positions enables welding of various fittings. Low starting pressure ensures reliable welding of small bore pipes. High shockproof pressure meter with big face ensuring better readings, separate two-channel timer records time in soaking and cooling phases



Size Range	FHD 450	FHD 500	FHD 630	FHD 800
Pipe Sizes mm	200, 225, 250, 280, 315, 355, 400, 450	200, 225, 250, 280, 315, 355, 400, 450, 500	315, 355, 400, 450, 500, 560, 630	450, 500, 560, 630, 710, 800
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 5 Deg C	<=+- 7 Deg C	<=+- 7 Deg C	<=+- 7 Deg C
Pressure Adjustable Range	0 - 8 Mpa	0 - 8 Mpa	0 - 8 Mpa	0 - 16 Mpa
Working Voltage	380 Vac 50 Hz	380 Vac 50 Hz	380 Vac 50 Hz	380 Vac 50 Hz
Heating Mirror	5.38 Kw	6.5 Kw	9.35 Kw	12.5 Kw
Planer Power	1.5 Kw	1.5 Kw	1.5 Kw	2.2 Kw
Hydraulic Power	1.5 Kw	1.5 Kw	1.5 Kw	3 Kw
Crane Power	-	1.1 Kw	1.1 Kw	1.5 Kw
Total Power	8.38 Kw	9.5 Kw	12.35 Kw	18.2 Kw
Weight	560 Kg	700 Kg	780 Kg	1360 Kg
Packing	4 Cases 3.16 CBM	4 Cases 4.43 CBM	4 Cases 4.43 CBM	4 Cases 8.39 CBM



Application & Features

Suitable for Butt-welding plastic pipes and fittings made of PE, PP and PVDF materials Consists of basic frame. Hydraulic unit, planing tool, Heating mirror, Carry case and optional extras, simple structure, small and user-friendly. Removable PTFE coated heating mirror with accurate temperature control systems. Changeable welding positions enables welding of various fittings. Low starting pressure ensures reliable welding of small bore pipes. High shockproof pressure meter with big face ensuring better readings, separate two-channel timer records time in soaking and cooling phases



Size Range	FHD 1000	FHD 1200
Pipe Sizes mm	630, 710, 800, 900, 1000	630, 710, 800, 900, 1000, 1100, 1200
Heating Mirror Max Temp	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 7 Deg C	<=+- 7 Deg C
Pressure Adjustable Range	0 - 16 Mpa	0 - 16 Mpa
Working Voltage	380 Vac 50 Hz	380 Vac 50 Hz
Heating Mirror	17.5 Kw	21.5 Kw
Planer Power	3 Kw	4 Kw
Hydraulic Power	3 Kw	3 Kw
Crane Power	0.5 Kw	1 Kw
Total Power	24 Kw	29.5 Kw
Weight	2600 Kg	2740 Kg
Packing	5 Cases 15.0 CBM	5 Cases 19.54 CBM



Application & Features

Suitable for Butt-welding plastic pipes and fittings made of PE, PP and PVDF materials. Latest design for basic frame, hydraulic unit, planing tool, heating mirror, carry care and optional extras. Integrated oil-way design of hydraulic system, simple structure small and user-friendly. Simple design of electrical control system with high stability and reliability. sealed control box design making it dust proof and waterproof. Low starting pressure ensures reliable welding of small bore pipes. High shockproof pressure meter with big face ensuring better readings.

Size Range	FHD 160-II	FHD 250-II	FHD 315-II	FHD 355-II
Pipe Sizes mm	63, 75, 90, 110, 125, 140, 160	63, 75, 90, 110, 125, 140, 160, 180, 200, 225, 250	90, 110, 125, 140, 160, 180, 200, 225, 250, 280, 315	90, 110, 125, 140, 160, 180, 200, 225, 250, 280, 315, 355
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C
Pressure Adjustable Range	0 - 7 Mpa	0 - 7 Mpa	0 - 7 Mpa	0 - 7 Mpa
Working Voltage	220 Vac 50 Hz	220 Vac 50 Hz	220 Vac 50 Hz	220 Vac 50 Hz
Heating Mirror	1 Kw	2 Kw	3 Kw	4 Kw
Planer Power	0.7 Kw	1.1 Kw	1.1 Kw	1.1 Kw
Hydraulic Power	0.75 Kw	0.75 Kw	0.75 Kw	0.75 Kw
Total Power	2.4 Kw	3.85 Kw	4.85 Kw	5.85 Kw
Weight	106 Kg	143 Kg	216 Kg	260 Kg
Packing	3 Cases 0.58 CBM	3 Cases 0.70 CBM	3 Cases 1.07 CBM	3 Cases 1.07 CBM



Application & Features

Suitable for butt-welding plastic pipes and fittings made of PE, PP and PVDF materials. Consists of basic frame. CNC control, hydraulic unit, planing tool, heating mirror, carry case and optional extras. Equipped with siemens PLC and touch screen control system. Real time data printing, recording function and USB port, CTSG, ISO, DVS, GIS etc. Welding standards pre-installed full automated system for the heating mirror BDS/GPS positioning and remote data transmission function available. Fingerprint identification for welders.

Size Range	FHD 160	FHD 250	FHD 315	FHD 355
Pipe Sizes mm	90, 110, 125, 160	90, 110, 160, 200, 250	110, 160, 200, 250, 315	160, 200, 250, 315, 355
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C
Pressure Adjustable Range	0.4 - 6 Mpa	0.4 - 6 Mpa	0.4 - 6 Mpa	0.4 - 6 Mpa
Working Voltage	220 VAC 50 Hz	220 VAC 50 Hz	220 VAC 50 Hz	220 VAC 50 Hz
Heating Mirror Power	1 Kw	2 Kw	3 Kw	4 Kw
Planer Power	0.7 Kw	1.1 Kw	1.1 Kw	1.1 Kw
Hydraulic Unit Power	0.75 Kw	0.75 Kw	0.75 Kw	0.75 Kw
Total Power	2.45 Kw	3.85 Kw	4.85 Kw	5.85 Kw



Application & Features

Suitable for butt-welding plastic pipes and fittings made of PE, PP and PVDF materials. Consists of basic frame. CNC control, hydraulic unit, planing tool, heating mirror, carry case and optional extras. Equipped with siemens PLC and touch screen control system. Real time data printing, recording function and USB port, CTSG, ISO, DVS, GIS etc. Welding standards pre-installed full automated system for the heating mirror BDS/GPS positioning and remote data transmission function available. Fingerprint identification for welders.

Size Range	FHD 160	FHD 250	FHD 315	FHD 355
Pipe Sizes mm	90, 110, 125, 160	90, 110, 160, 200, 250	110, 160, 200, 250, 315	160, 200, 250, 315, 355
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C
Pressure Adjustable Range	0.4 - 6 Mpa	0.4 - 6 Mpa	0.4 - 6 Mpa	0.4 - 6 Mpa
Working Voltage	220 VAC 50 Hz	220 VAC 50 Hz	220 VAC 50 Hz	220 VAC 50 Hz
Heating Mirror Power	1 Kw	2 Kw	3 Kw	4 Kw
Planer Power	0.7 Kw	1.1 Kw	1.1 Kw	1.1 Kw
Hydraulic Unit Power	0.75 Kw	0.75 Kw	0.75 Kw	0.75 Kw
Total Power	2.45 Kw	3.85 Kw	4.85 Kw	5.85 Kw



Application & Features

Suitable for butt-welding plastic pipes and fittings made of PE, PP and PVDF materials. Consists of basic frame. CNC control, hydraulic unit, planing tool, heating mirror, carry case and optional extras. Equipped with siemens PLC and touch screen control system. Real time data printing, recording function and USB port, CTSG, ISO, DVS, GIS etc. Welding standards pre-installed full automated system for the heating mirror BDS/GPS positioning and remote data transmission function available. Fingerprint identification for welders.

Size Range	FZD 450	FZD 630	FZD 800	FZD 1000	FZD 1200
Pipe Sizes mm	200, 225, 250, 280 315, 355, 400, 450	315, 355, 400, 450 500, 560, 630	450, 560, 630, 710, 800	630, 710, 800, 900, 1000	630, 710, 800, 900, 1000, 1100, 1200
Ambient Temperature	-5 Deg C to 45 Deg C	-5 Deg C to 45 Deg C	-5 Deg C to 45 Deg C	-5 Deg C to 45 Deg C	-5 Deg C to 45 Deg C
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 7 Deg C	<=+- 7 Deg C	<=+- 7 Deg C	<=+- 7 Deg C	<=+- 7 Deg C
Pressure Adjustable Range	0.4 - 8 Mpa	0.4 - 8 Mpa	0.4 - 12 Mpa	0.4 - 12 Mpa	0.4 - 16 Mpa
Working Voltage	380 VAC 50 Hz	380 VAC 50 Hz	380 VAC 50 Hz	380 VAC 50 Hz	380 VAC 50 Hz
Heating Mirror Power	5.38 Kw	9.35 Kw	12.5 Kw	17.5 Kw	21.5 Kw
Planer Power	1.5 Kw	1.5 Kw	2.2 Kw	3 Kw	4 Kw
Hydraulic Unit Power	2.2 Kw	2.2 Kw	4 Kw	4 Kw	5 Kw
Total Power	9.06 Kw	13.05 Kw	18.7 Kw	24.5 Kw	30.5 Kw



Application & Features

Suitable for butt-welding plastic pipes and fittings made of PE, PP and PVDF materials. Consists of basic frame. CNC control, hydraulic unit, planing tool, heating mirror, carry case and optional extras. Equipped with siemens PLC and touch screen control system. Real time data printing, recording function and USB port, CTSG, ISO, DVS, GIS etc. Welding standards pre-installed full automated system for the heating mirror BDS/GPS positioning and remote data transmission function available. Fingerprint identification for welders.



Size Range	CNC-FZD 450	CNC-FZD 630
Pipe Sizes mm	200, 225, 250, 280 315, 355, 400, 450	315, 355, 400, 450 500, 560, 630
Ambient Temperature	-5 Deg C to 45 Deg C	-5 Deg C to 45 Deg C
Heating Mirror Max Temp	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 7 Deg C	<=+- 7 Deg C
Pressure Adjustable Range	0.4 - 8 Mpa	0.4 - 8 Mpa
Working Voltage	380 VAC 50 Hz	220 VAC 50 Hz
Heating Mirror Power	5.38 Kw	9.35 Kw
Planer Power	1.5 Kw	1.5 Kw
Hydraulic Unit Power	2.2 Kw	2.2 Kw
Total Power	9.06 Kw	13.05 Kw



Application & Features

Suitable for butt-welding plastic pipes and fittings made of PE, PP and PVDF materials. Consists of basic frame. CNC control, hydraulic unit, planing tool, heating mirror, carry case and optional extras. Equipped with siemens PLC and touch screen control system. Real time data printing, recording function and USB port, CTSG, ISO, DVS, GIS etc. Welding standards pre-installed full automated system for the heating mirror BDS/GPS positioning and remote data transmission function available. Fingerprint identification for welders.

Size Range	CNC II-FZD 160	CNC II-FZD 250	CNC II -FZD 315	CNC II-FZD 355
Pipe Sizes mm	90, 110, 125, 160	90, 110, 160, 200, 250	110, 160, 200, 250, 315	160, 200, 250, 315, 355
Ambient Temperature	-5 Deg C to 45 Deg C	-5 Deg C to 45 Deg C	-5 Deg C to 45 Deg C	-5 Deg C to 45 Deg C
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C
Pressure Adjustable Range	0.4 - 6 Mpa	0.4 - 6 Mpa	0.4 - 6 Mpa	0.4 - 6 Mpa
Working Voltage	220 VAC 50 Hz	220 VAC 50 Hz	220 VAC 50 Hz	220 VAC 50 Hz
Heating Mirror Power	1 Kw	2 Kw	3 Kw	4 Kw
Planer Power	0.7 Kw	1.1 Kw	1.1 Kw	1.1 Kw
Hydraulic Unit Power	0.75 Kw	0.75 Kw	0.75 Kw	0.75 Kw
Total Power	2.45 Kw	3.85 Kw	4.85 Kw	5.85 Kw

Application & Features

Suitable for Buttwelding plastic pipes and fittings made of PE,PP and PVDF materials Consists of basic frame. Plainer, heating mirror , basket and optional parts. Removable PTFE coated heating mirror with separate temperature electric plainer. Made of lightweight high strength material, simple structure, small and user-friendly. FHDS B4 models use a gearbox to apply pressure more ergonomically.



Size Range	FHDS 110	FHDS 160A2	FHDS 200A2	FHDS 160A4
Pipe Sizes mm	40, 50, 63, 75, 90, 110	50, 63, 75, 90, 110, 125, 140, 160	63, 75, 90, 110, 125, 140, 160, 180, 200	50, 63, 75, 90, 110, 125, 140, 160
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C
Working Voltage	220 VAC 50 Hz	220 VAC 50 Hz	220 VAC 50 Hz	220 VAC 50 Hz
Heating Mirror Power	0.7 Kw	1 Kw	1.5 Kw	1 Kw
Plainer Power	0.7 Kw	0.7 Kw	0.7 Kw	0.7 Kw
Total Power	1.4 Kw	1.7 Kw	2.2 Kw	1.7 Kw
Weight	39 Kg	46 Kg	60Kg	46 Kg
Packing	1 Case 0.2 CBM	2 Case 0.31 CBM	2 Case 0.44 CBM	2 Case 0.6 CBM

Application & Features

Suitable for Buttwelding plastic pipes and fittings made of PE,PP and PVDF materials Consists of basic frame. Plainer, heating mirror , basket and optional parts. Removable PTFE coated heating mirror with separate temperature electric plainer. Made of lightweight high strength material, simple structure, small and user-friendly. FHDS B4 models use a gearbox to apply pressure more ergonomically.



Size Range	FHDS 200A4	FHDS 160B4	FHDS 200B4
Pipe Sizes mm	63, 75, 90, 110, 125, 140, 160, 180, 200	50, 63, 75, 90, 110, 125, 140, 160	63, 75, 90, 110, 125, 140, 160, 180, 200
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 5 Deg C	<=+- 5 Deg C	<=+- 5 Deg C
Working Voltage	220 VAC 50 Hz	220 VAC 50 Hz	220 VAC 50 Hz
Heating Mirror Power	1.5 Kw	1 Kw	1.5 Kw
Planer Power	0.7 Kw	0.7 Kw	0.7 Kw
Total Power	2.2 Kw	1.7 Kw	2.2 Kw
Weight	69 Kg	57 Kg	71 Kg
Packing	2 Case 0.9 CBM	2 Case 0.6 CBM	2 Case 0.9 CBM



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Application & Features

Suitable for fabricating elbows, tees, crosses and Y-pieces (45° & 60°) fittings for PE, PP PVDF in workshops. Also used to lengthen injection moulded fittings and to make integrated fittings, integrated structure. Electric plainer with safety limit switch. Low starting pressure and high reliable structure. Separate two channel timer records time for soaking and cooling phases. High accurate and shockproof pressure gauge indicates cleaner readings. FHG 450 upward CNC equipped with PLC and touchscreen. Hydraulic open and close clamp system to improve ergonomics. Extension for data collection and transmission system. Extension for remote fault analysis. Extension for company MES management system.



Size Range	FHG 315	FHG 450	FHG 630
Pipe Sizes mm	90, 110, 125, 140, 160, 180 200, 225, 250, 280, 315	200, 225, 280, 315 355, 400, 450	315, 355, 400, 450, 500 560, 630
Application	0-90 Deg Elbows, Tees, Crosses 45 & 60 Deg Wyes (Optional Part to be used)	0-90 Deg Elbows, Tees, Crosses 45 & 60 Deg Wyes (Optional Part to be used)	0-90 Deg Elbows, Tees, Crosses 45 & 60 Deg Wyes (Optional Part to be used)
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 7 Deg C	<=+- 7 Deg C	<=+- 7 Deg C
Pressure Adjustable Ranges	6 MPa	0-14 MPa	0-14 MPa
Working Voltage	380 VAC 50 Hz	380 VAC 50 Hz	380 VAC 50 Hz
Heating Mirror Power	5 Kw	12.2 Kw	22.25 Kw
Planer Power	1.5 Kw	2.2 Kw	3 Kw
Hydraulic Unit Power	0.75 Kw	3 Kw	4 Kw
Total Power	7.25 Kw	17.4 Kw	29.25 Kw
Weight	884 Kg	2850 Kg	3510 Kg
Packing	4 Case 3.1 CBM	4 Case 14.66 CBM	9 Case 22.7 CBM



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Application & Features

Suitable for fabricating elbows, tees, crosses and Y-pieces (45° & 60°) fittings for PE, PP PVDF in workshops. Also used to lengthen injection moulded fittings and to make integrated fittings, integrated structure. Electric plainer with safety limit switch. Low starting pressure and high reliable structure. Separate two channel timer records time for soaking and cooling phases. High accurate and shockproof pressure gauge indicates cleaner readings. FHG 450 upward CNC equipped with PLC and touchscreen. Hydraulic open and close clamp system to improve ergonomics. Extension for data collection and transmission system. Extension for remote fault analysis. Extension for company MES management system. Note: Bigger sizes available on request.



Size Range	FHG 800	FHG 1000	FHG 1200
Pipe Sizes mm	400, 500, 560, 630 710, 800	630, 710, 800, 900 1000	630, 710, 800, 900, 1000, 1200,
Application	0-90 Deg Elbows, Tees, Crosses 45 & 60 Deg Wyes (Optional Part to be used)	0-90 Deg Elbows, Tees, Crosses 45 & 60 Deg Wyes (Optional Part to be used)	0-90 Deg Elbows, Tees, Crosses 45 & 60 Deg Wyes (Optional Part to be used)
Heating Mirror Max Temp	270 Deg C	270 Deg C	270 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 7 Deg C	<=+- 10 Deg C	<=+- 5 Deg C
Pressure Adjustable Ranges	0-14 MPa	0-14 MPa	0-15 MPa
Working Voltage	380 VAC 50 Hz	380 VAC 50 Hz	380 VAC 50 Hz
Heating Mirror Power	39.23 Kw	47.2 Kw	61.39 Kw
Planer Power	4 Kw	4 Kw	7.5 Kw
Hydraulic Unit Power	4 Kw	4 Kw	7.5 Kw
Total Power	347.23 Kw	44.5 Kw	76.39 Kw
Weight	4900 Kg	16000 Kg	18000 Kg
Packing	11 Case 23.3 CBM	11 Case 41.93 CBM	11 Case 45.93 CBM

Application & Features

Input or choose the pre-set welding parameters with keyboard or touch screen latest design for basic frame, hydraulic unit, planing tool heating mirror & carry case guiding operators to complete the whole welding process. Monitor all related welding parameters during the entire welding process form and save original records of various parameters during the welding process, print data welding and output through USB drive can be applied to all semi-Auto butt-welding machines.

Model	FHG 800
Input	100 – 240 Vac
Input Frequency	50 Hz / 60Hz
Power	24 W
Stored Records	2000 Welding Points
User Interface	USB Port
Protection Grade	IP54
Overall Size	390 x 255 x 175 MM
Weight	6.5 K.g

Application & Features

Suitable for cutting pipes according to specified angle and dimensions for making elbows, tees or crosses. Lowers material waste and improves welding efficiency. Cutting angles 0-67.5° accurate angle location. Applicable to solid wall pipes or structured wall pipes made of thermoplastics such as PE and PP also suitable for other non-metal materials. Self-inspection and stop of machine in case of blade break guarantees operator safety. Reliable low noise and easy to handle. FJC 1200 and higher PLC control available. Special designs subject to enquiry. Note: Bigger sizes available on request.



Size Range	FJC 315	FJC 630	FJC 800	FJC 1000	FJC 1200	FJC 1600
Working Ranges	<= 315 mm	<= 630 mm	<= 800 mm	<= 1000 mm	<= 1200 mm	<= 1600 mm
Cutting Angle	0 – 67.5 Deg	0 – 67.5 Deg	0 – 67.5 Deg	0 – 67.5 Deg	0 – 67.5 Deg	0 – 67.5 Deg
Cutting Angle Error	<= 1 Deg	<= 1 Deg	<= 1 Deg	<= 1 Deg	<= 1 Deg	<= 1 Deg
Line Speed	0 – 250 m/Min	0 – 250 m/Min	0 – 250m/Min	0 – 250m/Min	0 – 250m/Min	0 – 250m/Min
Feed Speed	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable
Working Voltage	380V 50Hz	380V 50Hz	380V 50Hz	380V 50Hz	380V 50Hz	380V 50Hz
Total Power	2.25 Kw	2.25 Kw	2.25 KW	3.7 KW	10.2 KW	10.2 KW
Weight	884 Kg	1900 Kg	1300 Kg	4000 Kg	7000 Kg	8000 Kg

Application & Features

Suitable for buttwelding of plastic pipes and fittings made from PE, PP and PVDF material. Removable PTEE coated heating plate with high accurate temperature control system. Electrical plaining tool with safety limit switch enables it to be started only when it is locked in operation position, Mechanical Lock to maintain welding pressure. Spring manometer provides correct welding pressure, pivoting plaining tool brings convenience for placing and removing



Model	FHG 160	FHG 315
Pipe Sizes mm	250, 63, 75, 90, 110, 125, 140, 160	50, 63, 75, 90, 110, 125, 140, 160
Application	Pipe > Pipe of Fittings & Fittings > Fittings	Pipe > Pipe of Fittings & Fittings > Fittings
Heating Mirror Max Temp	260 Deg C	260 Deg C
Temp Deviation Surface [170-250 Deg C]	<=+- 5 Deg C	<=+- 5 Deg C
Working Voltage	220V 50 Hz	220V/240V 50 Hz
Planer Power	0.7 Kw	1.1 Kw
Heating Plate Power	1 Kw	2.2 Kw
Total Power	1.7 Kw	3.3 Kw
Weight	54 Kg	183 Kg



Application & Features

Smart structure, small and delicate. User-friendly.
 The heating plate has adjustable temperature (te) or constant temperature (tf) options.
 Changeable heating plate, suitable for same diameter and socket pipe butt welding, robust and ergonomic clamp design, easy operation and ensures good pipeline alignment.

Technical Parameters	Fusion Welding	Technical Parameters	Socket Welding
Pipe Sizes mm	40, 50, 63, 75, 90, 110, 125, 140, 160	Pipe Sizes mm	40, 50, 63, 75, 90, 110, 125, 140, 160
Welding Angle	0 -30 Degrees	Applicable Material	PE, PP, PB, PVDF
Max Power	11 -33	Mould Care	Customisation
Heating Mirror Power	1900 W	Max Power	1000 W
Heating Mirror Power	1100 W	Heating Plate Power	1000 W
Planer Tool Power	800 W	Basic Frame Size	830 x 660 x 1090 mm
Basic Frame Size	830 x 660 x 1090 mm	Weight	75 Kg
Weight	65 Kg	Temp Deviation in Surface	180 – 280 Deg C
Temp Deviation in Surface	180 – 280 Deg C		



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Application & Features

Designed for vertical roof-mounted pipe systems.
 Manual gearbox, frame and hydraulic frame are available.
 Suitable for same diameter pipe joint and socket butt welding.

Technical Parameters	FPDS-160	FPD-315
Pipe Sizes mm	63, 75, 90, 110, 125, 140, 160	63, 75, 90, 110, 125, 140, 160
Ambient Temperatures	-5 to 45 Deg C	-5 to 45 Deg C
Input Power	220 AV 50 Hz	220 AV 50 Hz
Total Power	2.3 Kw	2.3 Kw
Heating Plate Power	1.5 Kw	1.5 Kw
Plaining Tool Power	0.8 Kw	0.8 Kw
Hydraulic Unit Power	-	0.75 Kw
Pressure Adjustable Ranges	-	6 MPa
Heating Plate Max Temperature	270 Deg C	270 Deg C
Temp eviation in Surface	<= +/- 5 Deg C	<= +/- 5 Deg C
Weight	30 Kg	40 Kg