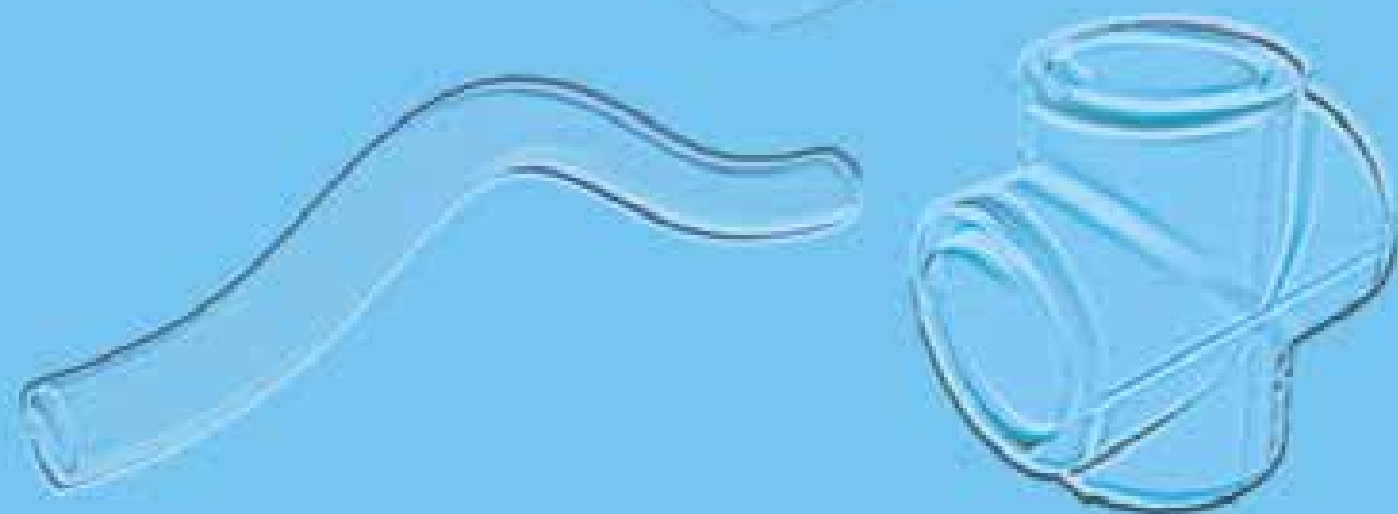




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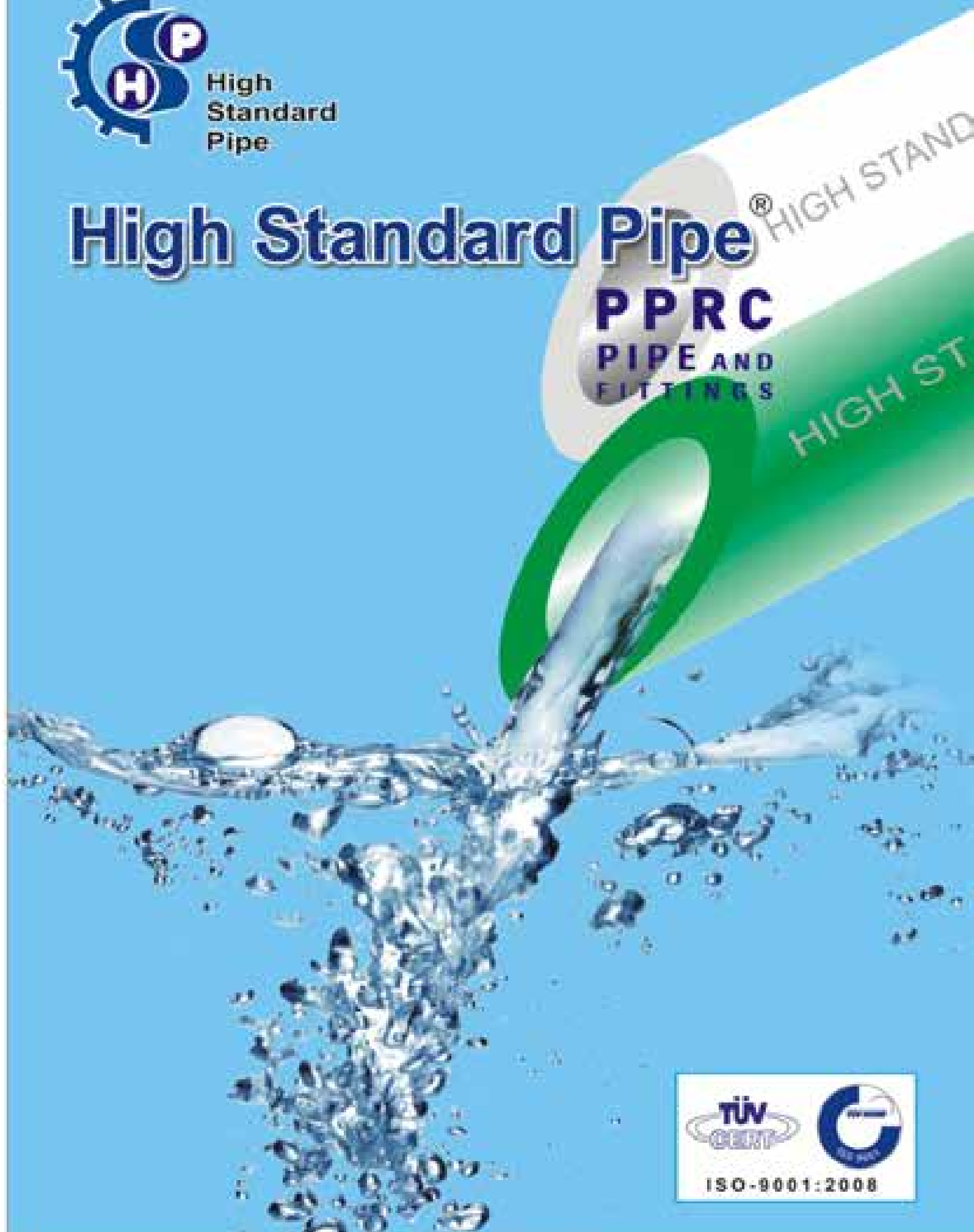
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High Standard Pipe

PPRC
PIPE AND
FITTINGS



HSP Sales Branches in



➔ **HSP Kabul 1st Distributor**
Between Haji Yaqoob Square and Ansari Square, Shar-e-Naw
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Ø D (mm)	34.2
d (mm)	33.3
L (mm)	127
Weight kg/box	0.113

Ø D (mm)	20	25
L (mm)	23	23
AA	23	24
G	1/2"	3/4"
Weight kg/box	0.007	0.009

Ø D (mm)	20	25	32	40
d (mm)	19	24	30	39
e (mm)	13	13	13	13
b (mm)	27.3	31.3	36.7	44.7
L (mm)	30	30	40	34
Weight kg/box	0.005	0.006	0.009	0.010

Ø D (mm)	20	25
d (mm)	19	24.2
b (mm)	26.8	30.7
L (mm)	34.4	36.7
Weight kg/box	0.013	0.016

Ø D (mm)	20	25	32	40	50	63	75	90	110
d (mm)	19.1	24.2	31.5	39.5	49.5	62.5	74.25	89.2	108.00
L ₁ (mm)	14.2	16	16	20.5	23.5	27.5	31	35.5	41.4
L (mm)	25.8	27.5	30	42	47	54.4	70	80	90
Weight kg/box	0.013	0.016	0.020	0.026	0.040	0.060	0.100	0.274	0.600

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High Standard Pipe (HSP) one of those establishments that produces the best quality of pipes in kind of UPVC & HDPE in Afghanistan.

We are one of the leading manufacturers of UPVC & HDPE Pipes in Afghanistan.

The Company employs the latest technologies in the extrusion and injection molding industries and provides adequate training to its staff to cope with changes. Our team of experts provides technical advices to our client to the correct application of HSP products. The Quality Management System of the company is certified to ISO 9001-2008. The company has capacity and expertise to produce pipes and fittings to meet international standards like British Standards (BS), International Organization for Standardization (ISO), (ASTM), (DIN) and individual requests.

This is appreciated by our customers and also certified by international certifying agencies.

Leading Laboratories and institutions out of the country such as TUV NORD Lahore, Pakistan have confirmed our claim of quality products. Due to our proven record of being a high quality manufacturer, the leading architects and consultants, feel very comfortable in recommending "High Standard Pipe" for their projects.

We take this opportunity to extend our whole hearted gratitude and thanking to our valuable customers for bestowing their trust and confidence on High Standard Pipe Company.

Permissible exclusions

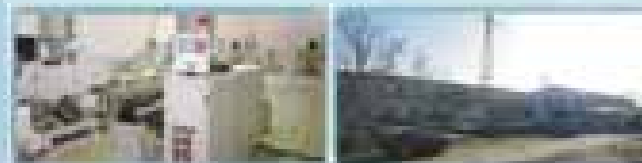
The following sub-clauses of Product Realization (Clause 7 of ISO 9001:2008) have been excluded from the scope of HIGH STANDARD PIPE Co.

ISO sub clause 7.3:2008 (E) Design & Development

This sub clause is not applicable because HIGH STANDARD PIPE does process and blend the product as per customer's specifications.

To develop, grow, struggle to achieve perfection through advanced technology and utilize all its resources in order to ensure long lasting customer satisfaction are the objectives of HSP.

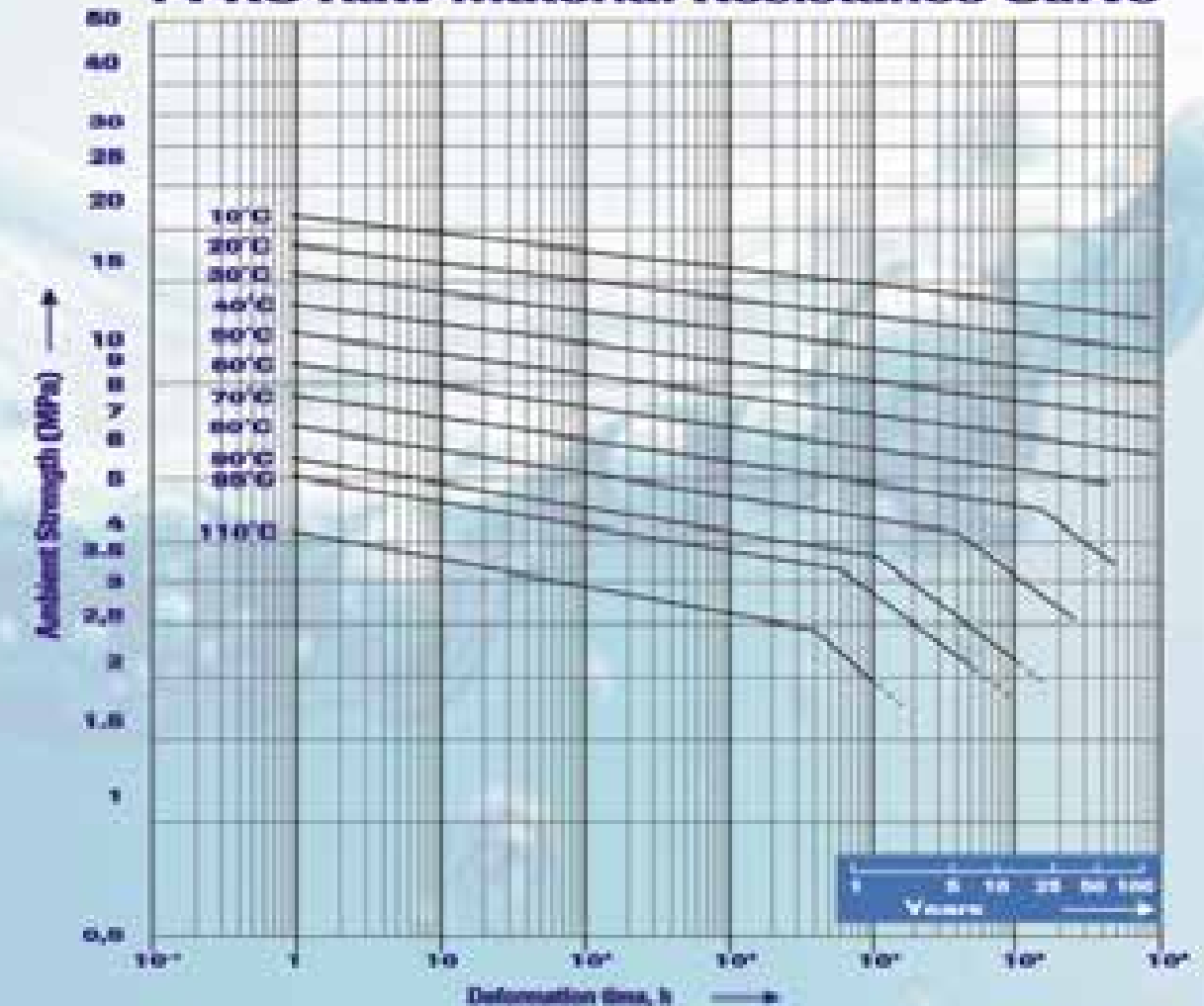
Thanks to reliable, strong, easily accessible and easy-to-use products and perfect aftersale support, HSP achieves its target of perfection.



HSP PPRC pipes and fittings pose no negative effect on human health. The facts that it does not downgrade color, taste and smell of water and not contain any carcinogens have been confirmed and certified by international institutions such as TZW, HYW and DVGW in Germany.

Raw material of PP-R (polypropylene Copolymer) used in HSP pipes and fittings is procured from the world's proven highest quality raw material producers such as Saudi basic industries corporation (SABIC) and Basell Holding B.V. (BASEL) and all raw materials supplied are subjected to incoming Quality control tests in HSP laboratories.

PPRC Raw Material Resistance Curve



Quality control process employed in laboratories of three phases

1. Incoming quality control
2. Processes quality control
3. Out put –final quality control

Incoming quality control

All types of raw material and auxiliary materials from our suppliers are subject to input quality control tests according to the quality production standards set out by HSP. Samples randomly chosen from each lot of raw materials and auxiliary materials supplied in lots by our suppliers have to pass through by our suppliers have to pass through appearance marking functional compliance tests and obtain "suitable for production" approval.

Process quality control

In the production process implemented with raw materials and auxiliary materials bearing "suitable for production" approval samples taken on production lines during or soon after production are passed through process quality control tests in HSP laboratories determined by national and international (DVGW, SKZ, EN, DIN, etc.) standard institutions and recorded regularly. Main process quality control tests are as follows:

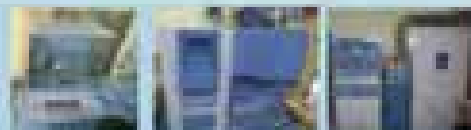
- **Blow strength test**
- **Hydrostatic compression test of products to operate in pressurized lines**
- **Longitudinal variation resistance against heat**
- **Density test**
- **Melt flow speed test**

At the phase of process quality control: diameter, thickness and quality measurements are conducted by ultrasonic measurement devices on all production lines in fully automated manner not allowed upon activation of sound and light warning system under out standard cases. Our products have to pass through all tests conducted in accordance with the control frequency and numbers set out in the standards and obtain "suitable for sale" approval.

At the phase of process quality control: diameter, thickness and quality measurements are conducted by ultrasonic measurement devices on all production lines in fully automated manner not allowed upon activation of sound and light warning system under out standard cases. Our products have to pass through all tests conducted in accordance with the control frequency and numbers set out in the standards and obtain "suitable for sale" approval.

Out put –final quality control

Our products which obtained "suitable for sale" approval also have to get "suitable for output" approval passing through packaging compliance. Description and label compliance checks soon after automatic packaging and wrapping processes. In addition to the quality control tests conducted in HSP laboratories all our products are sampled from our production lines regularly twice a year and subjected to quality and sanitary compliance tests by international test and certification institutions such as DVGW, SKZ, SABS. Our products which h passed through all these tests and met the required quality conditions are offered to our customers.



Density Melt flow rate Homogeneity
Quality Tests



Standard Number EN ISO 15874 - 2

me of Standard Plastic Pipe Systems – for Hot and Cold Water – Polypropilen (PP) – Section : 2 Pipes

Tests

1 - Mechanical Properties	Test Temperature (°C)	Test Period (Hour)
Hydrostatic Strength (MPa)		
16	20	1
4.3	95	22
3.8	95	168
3.5	95	1000

2 - Physical and Chemical Properties

	Necessity	Parameter	Duration (Hour)
			$e_s \leq 8 \text{ mm}$ ▶1
Longitudinal Consistency	$\leq 4\%$	135 °C	$8 \text{ mm} < e_s \leq 16 \text{ mm}$ ▶2 $e_s > 16 \text{ mm}$ ▶4
Hydrostatic Compression Test	Thermo-Cons. by Inter.	110 °C - 1.9 MPa	8760
No explosion should occur	throughout the test		
Impact Strength	$< 4/10$	0 °C - 10 Pieces	$8,6 \text{ mm} < e_s \leq 14,1 \text{ mm}$ ▶2 $e_s > 14,1 \text{ mm}$ ▶4
MFI (Raw material)	$\leq 0,5 \text{ gr} / 10 \text{ min.}$	230 °C - 2.16 kg	
MFI (Pipe)	Not exceed 4/20 when compared to the raw material	230 °C - 2.16 kg	



Producing by the use of "environmental friendly production technologies" since its foundation, HSP proves its sensitivity toward environmental health through its environmental management system Established in 2002 and considers this area as a "window of management"

Upon obtained ts EN ISO 14001 2004 "environment management system" certificate from SGS in 2003 HSP had its sensitivity toward environmental health confirmed national and international setting.

HSP not only retains its established environmental consciousness within its organization but also transforms this consciousness into an environmental policy and shares et with its neighbors, suppliers and customers , especially during domestic and foreign seminars held for its end-users, HSP shares its efforts made toward environmental problems and importance that should be attached to the environmental health primarily with its business partners.

95%of the products of HSP consist of re-cycled re-process able materials, it sends its non -household wastes and non - recyclable waste products to "Disposal facilities" licensed by the Rep. of turkey, ministry of environment and forests and implements recycling process in these facilities.

Environment management programs and projects oriented to environmental health protection drawn up by the environmental group Consisting of our environmental engineers are being realized within HSP organization.

Committing its compliance with all national and international Environment legislative directives and environmental regulations, HSP, fulfils all its legal liabilities and declares statutory assessment reports to the relevant ministry.

HSP awarded by "environment incentive reward" with its environmental project drawn up in 2011, always gives precedence to the importance of environmental health and shows necessary sensitivity in all its investments.



Based on their advantages such as lightness and smoothness, Luminous and sloppy interior faces, calcification-free and stain-free nature hygienic and easy-to-fit structure; HSP PPRC pipes and fittings produced from the raw material of PP-R (polypropylene random copolymer)in compliance with EN ISO-15874, DIN, 8078, DVGW W544 standards superseded galvanized pipes and became an indispensable solution in today's interior building cold and hot water installation HSP PPRC pipes and fitting used in all types of interior building cold and hot water installations are produced from type- 3 class of raw material defined as PP-R(polypropylene random copolymer).

Raw material PP-R is grouped into three classes according to the resistance against heat, compression and chemicals.

- Type -1: PP-H(polypropylene homopolymer)
- Type -2: PPB (polypropylene blok copolymer
- Type- 3: PPR (polypropylene random copolymer)

Raw material type -3 has higher performance and superior qualities with respect to raw material type- 1 and type - 2 from the points of physical and chemical characteristics.

The most important characteristic of the raw material is the High resistance against heat and chemical effects. Thanks to this resistance HSP PPRC pipes and fitting made of raw material PP-R are successfully utilized in cold and hot water installations since monomer stricture of the raw material PP-R forms a haphazard chain, it dose not allow any biological material to settle inside its stricture and thus, HDPE PPRC Pipes and Fittings made of raw material PP-R Achieve color tested and smell-free superior qualities.

When used at appropriate pressure and temperature values, useful life of PPRC Pipes and Fittings is more than 50 years.

General Characteristics and Advantages of PPRC Pipes and Fittings

- Operating life at 20 °C and pressure of 25 bar is 50 years.
- Available to use within the range of - 20 °C and +95 °C (Isolation should be employed taking into consideration the freezing degree of fluid inside the pipe).
- Offers high strength against chemical materials.
- Corrosion-resistant. No calcification and oxidation.
- Does not downgrade the color, smell and taste of water.
- Has slippery and luminous interior faces.
- No diameter-shrinkage at welding points. Offers high welding performance.
- Offers 70% saving in assembly and no assembly waste.
- Provides heat and voice insulation.
- Hardly delaminates (Ref : DIN 19560 and DIN 4102.)
- Environmental friendly

TECHNICAL CHARACTERISTICS OF PPRC PIPES

Characteristics	Unit	Test Method	Value
Density	+20°C g/cm ³	ISO 1183	0.909
Melt Index	MFR 190/5 g/10 min	ISO 1133	0.56
	MFR 250/2.16 g/10 min	ISO 1133	0.30
	MFR 250/5 g/10 min	ISO 1133	1.25
Volume Flow Index	MFR 200/2.16 cm ³ /10 min	ISO 1133	0.4
Break-off Strength	(30 mm/min) MPa	ISO 5271-2	25
Break-off Strain	(30 mm/min) %	ISO 5271-2	10
Stone D Toughness	(J sec value)	DIN 53558	45
Charpy Blow (Strength)	+20°C kJ/m ²	ISO 17916J	
	0°C kJ/m ²	ISO 17916J	
	-30°C kJ/m ²	ISO 17916J	40
Charpy Milled Impact Strength	+20°C kJ/m ²	ISO 17916A	52
	0°C kJ/m ²	ISO 17916A	7
	-30°C kJ/m ²	ISO 17916A	2.5
Vicat Softening Point	VST1A/50 °C	ISO 306	152
	VST1B/50 °C	ISO 306	89
Melting Range	°C	DSC	150-160
Linear Thermal Expansion Coefficient 1/K		DIN 53752	0.2110 ⁻⁴
Thermal Conductivity	W/mK	DIN 52912	0.24
Surface Strength	Chem	ISO 11833 1-104	

SERVICE LIVES OF PPRC PIPES

Service Life (Year)	Operating Pressure (Bar)								
	10	15	20	25	30	35	40	45	50
1	35.2	25.8	25.8	21.8	18.3	15.5	13.1	10.9	7.7
5	33.1	23.3	24.0	20.3	17.1	14.4	12.0	9.6	5.2
10	32.3	22.5	23.2	19.7	16.5	13.9	11.6	8.0	4.3
25	31.2	21.7	22.4	18.9	16.0	13.3	9.9	6.4	-
50	30.4	20.9	21.6	18.4	15.5	12.9	8.5	-	-
100	29.6	20.1	-	-	-	-	-	-	-
Temperature (°C)	10	20	30	40	50	60	70	80	95

WATER BEARING CAPACITY OF PPRC PIPES MOVABLE QUANTITY OF WATER

Pipe Diameter (Ø)	Amount of Water (lit/m)
20	0.137
25	0.216
32	0.353
40	0.556
50	0.876
63	1.385
75	1.963
90	2.827
110	4.231

(1m. inside)



BALL VALVE SOCKET WITH CAP NUT FILTER-T

PPRC BOILER SET

Code			Packing Type
EP90000000			Standard Box
Fitting Name	D (mm)	G (Inch)	Pieces
Ball Valve	20		1
Ball Valve	25		1
Filter T	20		1
Filter T	25		1
Socket Withcap Nut	20	1/2"	2
Socket Withcap Nut	25	3/4"	2



CHARACTERISTICS OF PPRC PIPES

Service Lives of PPRC Pipes used in Water Installations

Temperature (°C)	Service Life (Year)	Operating Pressure (Bar)
20	1	30.0
	5	28.1
	10	27.3
	25	26.5
	50	25.7
30	1	29.5
	5	27.6
	10	26.7
	25	25.9
	50	25.1
40	1	28.9
	5	27.0
	10	26.1
	25	25.3
	50	24.5
50	1	28.3
	5	26.4
	10	25.5
	25	24.7
	50	23.9
60	1	27.7
	5	25.8
	10	24.9
	25	24.1
	50	23.3
70	1	27.1
	5	25.2
	10	24.3
	25	23.5
	50	22.7
80	1	26.5
	5	24.6
	10	23.7
	25	22.9
	50	22.1
90	1	25.9
	5	24.0
	10	23.1
	25	22.3
	50	21.5
100	1	25.3
	5	23.4
	10	22.5
	25	21.7
	50	20.9

Service Lives of PPRC Pipes used in Heating Systems

°C	(Year)	(Bar)	
20	1	17.27	
	5	15.79	
	10	14.31	
	25	12.83	
	50	11.35	
	30	1	15.79
		5	14.31
		10	12.83
		25	11.35
		50	9.87
40		1	14.31
		5	12.83
		10	11.35
		25	9.87
		50	8.39
	50	1	12.83
		5	11.35
		10	9.87
		25	8.39
		50	6.91
60		1	11.35
		5	9.87
		10	8.39
		25	6.91
		50	5.43
	70	1	9.87
		5	8.39
		10	6.91
		25	5.43
		50	3.95
80		1	8.39
		5	6.91
		10	5.43
		25	3.95
		50	2.47
	90	1	6.91
		5	5.43
		10	3.95
		25	2.47
		50	0.99
100		1	5.43
		5	3.95
		10	2.47
		25	0.99
		50	-0.49

LINEAR EXPANSION OF PPRC PIPES

PPRC Pipes produced from raw material Type-3 PP-R elongate under heat and shrink under cold due to their physical nature. The rule of expansion should be considered in installations to be implemented at distances longer than 5 meters.

Linear expansion is calculated according to the following formula:

$$\Delta l = a \times L \times \Delta T$$

Δl : Amount of elongation (mm)
 a : Linear Expansion Coefficient ($a = 0,03 \text{ mm/mK}$)
 L : Pipe Length (m)
 ΔT : Temperature Difference

Linear Expansion Table for PPRC Flat Pipes

Pipe Length	Temperature Difference Dt (°C)							
L(m)	10	20	30	40	50	60	70	80
1.0	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00
2.0	3.00	6.00	9.00	12.00	15.00	18.00	21.00	24.00
3.0	4.50	9.00	13.50	18.00	22.50	27.00	31.50	36.00
4.0	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00
5.0	7.50	15.00	22.50	30.00	37.50	45.00	52.50	60.00
6.0	9.00	18.00	27.00	36.00	45.00	54.00	63.00	72.00
7.0	10.50	21.00	31.50	42.00	52.50	63.00	73.50	84.00
8.0	12.00	24.00	36.00	48.00	60.00	72.00	84.00	96.00
9.0	13.50	27.00	40.50	54.00	67.50	81.00	94.50	108.00
10.0	15.00	30.00	45.00	60.00	75.00	90.00	105.00	120.00

Linear Expansion Δl (mm)



High Standard Pipe

FREE EXPANSION IN PPRC PIPES

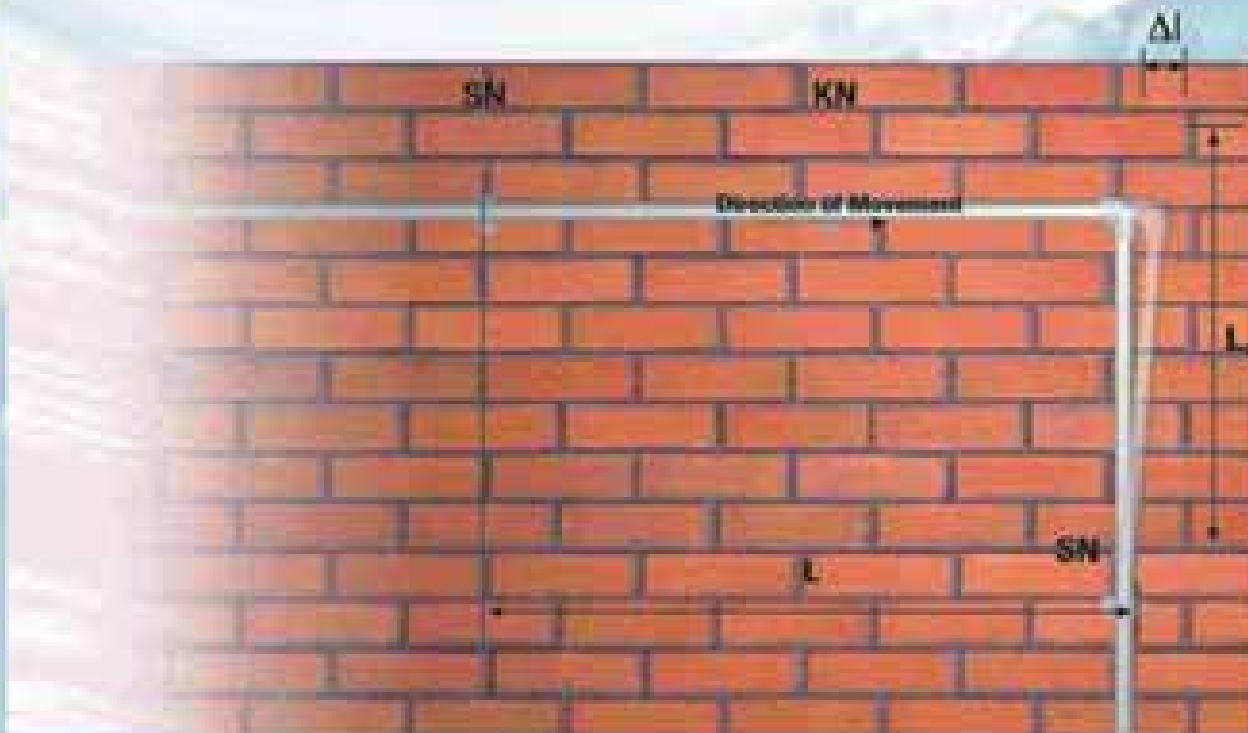
Free expansion parts are formed in order to prevent the installation from linear expansions which may arise in the pipes due to temperature variations.

Length of free bending part is calculated by the following formula:

$$L_f = K \times \sqrt{d \times \Delta l}$$

- L_f : Length of free bending part (mm)
- K : Specific Constant of Material ($K = 30$)
- d : Pipe Outer Diameter
- Δl : Amount of Elongation (mm)
- L : Pipe Length (m)
- KN : Varying Point
- SN : Fixed Point

Length of Free Bending Part

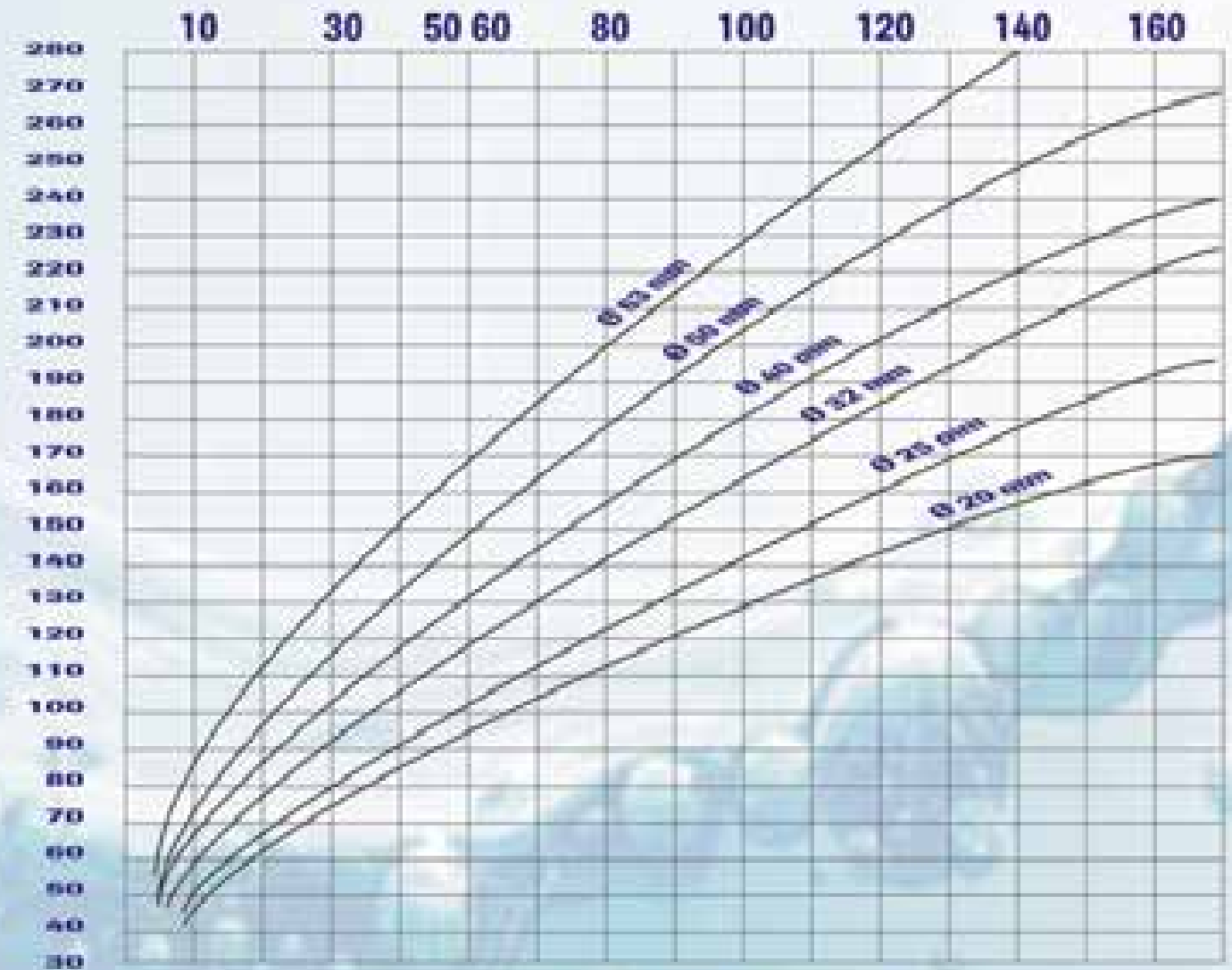


HIGH STANDARD PIPE



High Standard Pipe

LINEAR EXPANSION OF PPRC PIPES



Longitudinal Elongation ΔL (mm)





High Standard Pipe

EXPANSION CHAMBERS IN PPRC PIPES

If linear expansion cannot be removed by direction change, an expansion chamber must be designed. Shape of this expansion chamber is given below.

Calculation of minimum width of expansion chamber :

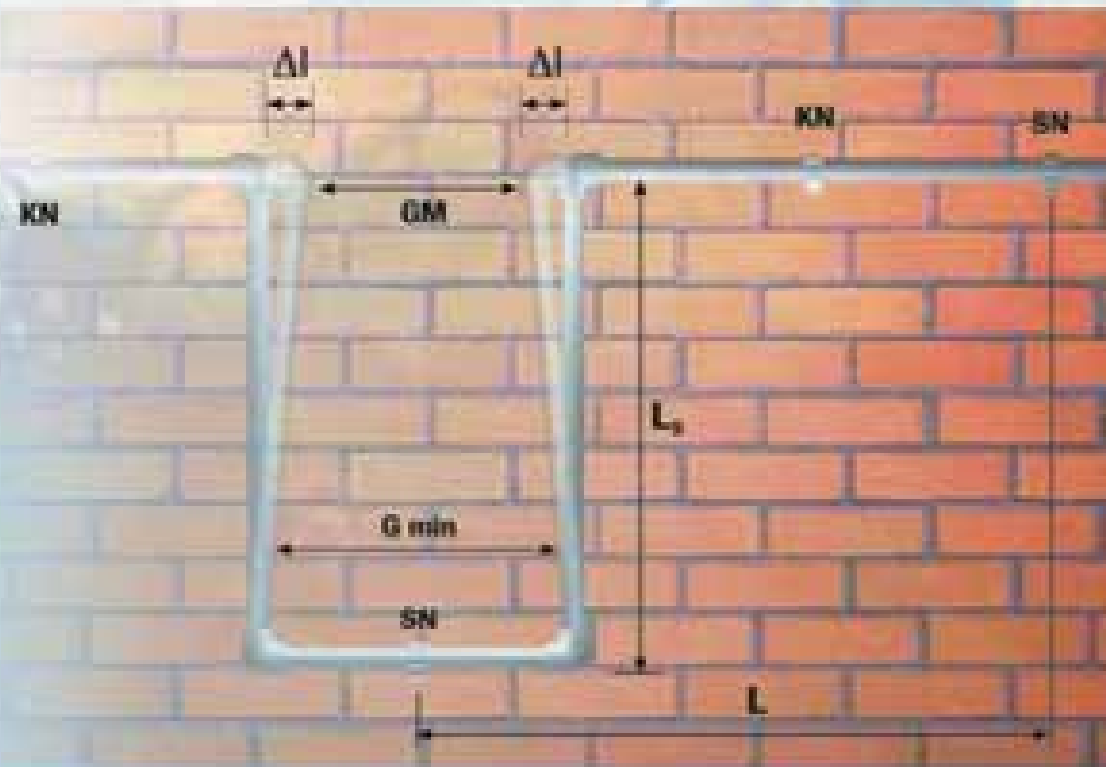
ΔL Elongation amount is found in table 1 by the use of temperature difference and the pipe.

Installation expands total of $2 \Delta L$, one ΔL at each ends. A safety margin (GM) of 150 mm is provided considering that elongation amount may increase under temperature differences. In this case, minimum width of expansion chamber becomes $150+2\Delta$.

$$G_{min} = 2 \times \Delta L \times GM$$

- G_{min} : Minimum Width of Expansion Chamber (mm)
- GM : Safety Margin (150 mm)
- ΔL : Elongation Amount (mm)
- L : Length of Free Bending Part (mm)
- L : Pipe Length (m)
- KN : Wyeing Point
- SN : Fixed Point

Width of Expansion Chambers



High Standard Pipe

CHARACTERISTICS OF PPRC PIPES

Clamp Spacings in PPRC Pipes

Fixed clamp spacings at horizontally installed PPRC Pipes can be found by the help of the table below. Clamp spacings in vertical installation should be the same with those in horizontal installation.

Fixed Points: Fixed points prevent non-controllable movements in the installation and separate entire installation into expansion sections. Elongation amount and weight of pipe, fluid inside the pipe and, if any, other forces play role in determination of the places of fixed points.

Fixed Points should be stronger than the repulsive force of the free bending part. Fixed points should be placed at appropriate distances for availability to expansion.

Fixed points are used to fix pipes tightly to a specified place. Fixed points should be implemented with connectors or double-sided attachment system. Bushing and fitting welding places are utilized in this double-sided attachment system.

PPRC Pipe Clamp Spacings

Temperature Difference T (°C)	Pipe Diameter (mm)									
	20	25	32	40	50	63	75	90	110	
0	90	105	120	140	160	180	200	220	250	
20	80	95	110	130	150	170	190	210	240	
30	70	85	100	120	140	160	180	200	230	
40	60	75	90	110	130	150	170	190	220	
50	50	65	80	100	120	140	160	180	210	
60	40	55	70	90	110	130	150	170	200	
70	30	45	60	80	100	120	140	160	190	

Clamp Spacings (cm)

PPRC Aluminium Foiled Pipe Clamp Spacings

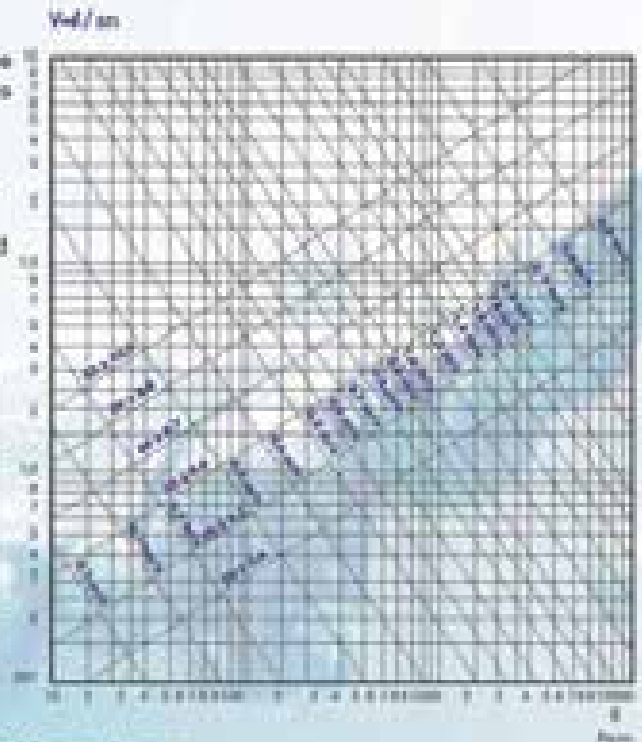
Temperature Difference T (°C)	Pipe Diameter (mm)									
	20	25	32	40	50	63	75	90	110	
0	155	170	195	220	245	270	285	300	325	
20	120	130	150	170	190	210	220	230	250	
30	120	130	150	170	190	210	220	230	240	
40	110	120	140	160	180	200	210	220	210	
50	110	120	140	160	180	200	210	220	210	
60	100	110	130	150	170	190	200	210	200	
70	90	100	120	140	160	180	190	200	200	

Clamp Spacings (cm)

Diameter Selection and Pressure Drop in PPRC Pipes

Pipe diameter selection in water installations is determined according to the pressure and discharge amount of existing water. Primarily, average discharge speed of water is calculated. Ratios between discharge speed amount and discharge and diameter are determined. Following table shows discharge amount and pressure per meter in PPRC pipes.

Table Showing Pressure and Discharge Rates of PPRC PN 30 Pipe





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Standard
Pipe

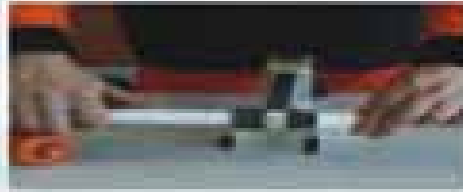
CHARACTERISTICS OF PPRC PIPES

HIGH STANDARD PIPE

WELDING TECHNIQUE FOR PPRC FLAT PIPES



Cut the pipe perpendicular to the pipe axis only by special and sharp pipe clippers. Heat the welding machine up to 260°C and use clean threaders.



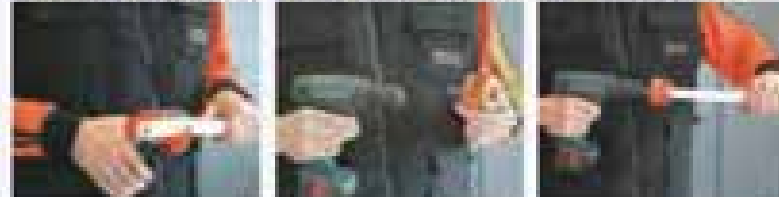
Push the pipe and fitting at the same axis simultaneously toward welding threader without rotating.

Please refer to welding information table for welding and cooling periods.



Assemble together the pipe and the fitting removed from the threader immediately and without rotating. Do not perform any process on welded parts whose cooling periods are not over yet.

WELDING TECHNIQUE FOR PPRC ALUMINIUM FOILED PIPES



Cut the pipe perpendicular to the pipe axis only by special and sharp pipe clippers. Heat the welding machine up to 260°C and use clean threaders.

Please attach the folyomatik to drill for foil-spreading process. Start to spread the aluminium foil with folyomatik.

Strip the foil with the folyomatik until the final distance inside the equipment is reached.



Once strip distance is already set, no absorption to the surface occurs and no foil particles remain on the pipe.

Push the pipe and fitting at the same axis simultaneously toward welding threader without rotating. Please refer to welding information table for welding and cooling periods.

Welding together the pipe and the fitting removed from the threader immediately and without rotating. Do not perform any process on welded parts whose cooling periods are not over yet.



Push the pipe and fitting at the same axis simultaneously toward welding threader without rotating. Please refer to welding information table for welding and cooling periods.

Pipe and fitting are now united and became a single material.



High[®]
Standard
Pipe

TESTING OF PPRC PIPES WITH WELDING TECHNIQUES

Welding Values of PPRC Pipes

Outer Diameter	Welding Depth (mm)	Heating Period (sec)*		Maks. Idle Period (sec)**	Welding Period (sec)	Cooling Period (min)
20	14	0	0	4	0	2
25	15	7	11	4	10	2
32	17	8	12	6	10	4
40	18	12	18	6	20	4
50	20	12	18	6	20	4
63	26	24	36	6	30	6
75	29	30	45	6	30	6
90	32	40	60	6	40	6
110	35	60	75	10	60	6

* If ambient temperature is below +5°C, Heating Period should be prolonged at a rate of 50%.
** This period of time corresponds to the period elapsed from removal of pipe and fitting from welding threaders until attachment.

Pre-Delivery Testing of Installation

After completion of assembly, PPRC Pipe installation must absolutely be passed through quality control test by performing the following testing procedure:

- All valves in the installation are closed.
- Primarily the main valve is a little opened when filling the installation. Pipe lines are carefully vacuumed at the highest and farthest usage point in order to avoid strong pressure impacts.
- Valves of each section are opened and tested separately.

Pressure test is conducted in 2 steps:

1st Step:

Entire piping installation in the building is subjected to impermeability test for a period of 30 minutes at a pressure of 1,5 times the highest planned pressure. Pressure drops and leakages are observed between 10th and 20th minutes. Pressure is increased again. No pressure drops higher than 0,6 bar and no leakage at any point should occur within the period of 30 minutes.

2nd Step:

A pressure of 1,5 times the highest planned pressure is applied for a period of 2 hours. No pressure drops higher than 0,42bar and no leakage at any point should occur.

- If pressure at the manometer on which the test is monitored drops more than the values given above, it means a leakage exists. Leaking pipe line should be replaced or re-tightened.
- Entire installation should be washed out before beginning to use.
- Lines which will not be used should be closed and discharged against freezing.

Abbreviations and Symbols

ts – s Liquid at Technical Purity

ts – g Gas at Technical Purity

sat.sol Saturated Solution

o.sol Operating solution, the concentration most widely used in the industry

Sol. Solution

D Durable

SD Limited durability. Little corrosion may occur

DZ Weak



Ø D (mm)	20	25
d ₁ (mm)	19.5	25
L (mm)	14.5	18
Weight kg/pc	0.024	0.043

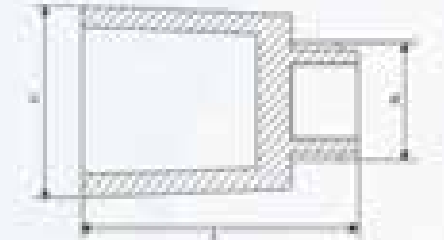
Ø D (mm)	20	25
d ₁ (mm)	19.5	24.5
d ₂ (mm)	20	25
h (mm)	14.5	18
h ₁ (mm)	14.5	18
Weight kg/pc	0.022	0.04

Ø D (mm)	20	25	32	40
d (mm)	19.5	24.5	31.5	40
G (mm)	100	200	300	400
Weight kg/pc	0.033	0.065	0.138	0.218

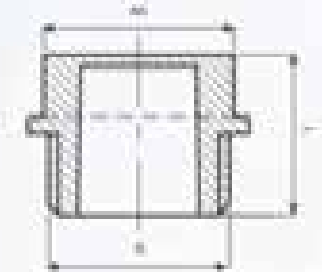
Ø D (mm)	20	25	32
L (mm)	280	290	310
Weight kg/pc	0.048	0.079	0.138



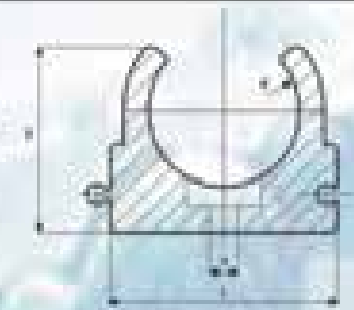
END CLOSUR WITH NUTHEAD



PLUG



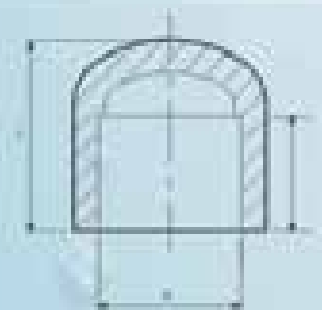
CLAMP



DOUBLE CLAMP



END CAP



Ø D (mm)	20	25	32	40	50	63	75	90	110
d (mm)	19.5	24.5	31.5	39.45	49.45	62.5	74.45	89.2	109.05
L ₁ (mm)	14.5	18	18	25.5	25.5	27.5	31	35.5	41.5
Weight kg/pc	0.014	0.023	0.040	0.058	0.128	0.231	0.380	0.628	1.155

Ø D (mm)	20	25	32	40	50	63
d (mm)	19.5	24.5	31.5	39.5	49.4	62.5
L ₁ (mm)	14.5	18	18	25.5	25.5	27.5
Weight kg/pc	0.013	0.018	0.031	0.050	0.110	0.200

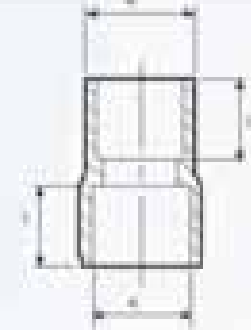
Ø D (mm)	20	25	32	40	50	63	75	90	110
d (mm)	19.5	24.5	31.5	39	49.45	62.5	74.25	89.2	109.05
L ₁ (mm)	14.5	18	18	25.5	25.5	27.5	31	35.5	41.5
Weight kg/pc	0.010	0.014	0.020	0.041	0.065	0.120	0.210	0.340	0.592

Ø D (mm)	20	25
d ₁ (mm)	19.5	24.5
d ₂ (mm)	19.5	24.5
L ₁ (mm)	18	18
L ₂ (mm)	18	18
L ₃ (mm)	20	20
Weight kg/pc	0.024	0.038

Ø D (mm)	20	25	32	40
d (mm)	19.5	24.5	31.5	39.2
L ₁ (mm)	14.5	18	18	25.5
L ₂ (mm)	18	20	20	30
Weight kg/pc	0.027	0.038	0.064	0.127

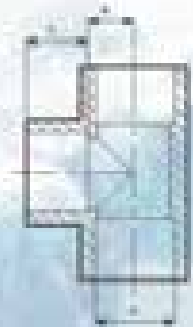


REDUCTION

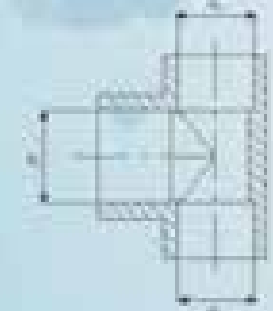


Ø D (mm)	25-20	32-20	32-25	40-20	40-25	40-32	50-20	50-25
d ₁ (mm)	24.5	31.5	31.5	39.45	39.45	39.45	49.45	49.45
d ₂ (mm)	20	20	25	20	25	32	20	25
L ₁ (mm)	18	18	18	25.5	25.5	25.5	25.5	25.5
L ₂ (mm)	18	20	20	32.5	32.5	32.5	25.5	25.5
Weight kg/pc	0.015	0.019	0.020	0.036	0.037	0.035	0.057	0.058

T PIECE



INEGAL T



Ø D (mm)	25-20-20	25-20-25	25-20-40	32-20-20	32-20-25	32-20-32	32-20-40	32-20-50
d ₁ (mm)	24.5	24.5	24.5	31.5	31.5	31.5	31.5	31.5
d ₂ (mm)	19.5	19.5	25.5	19.5	19.5	25.5	19.5	25.5
d ₃ (mm)	19.5	24.5	19.5	19.5	24.5	24.5	31.5	19.5
Weight kg/pc	0.020	0.023	0.025	0.030	0.030	0.042	0.042	0.040



50-32	50-40	63-25	63-32	63-40	63-50	75-50	75-63	90-75	110-90
48.45	48.45	62.5	62.5	62.5	62.5	74.25	74.25	89.3	108.08
32	40	25	32	40	50	50	63	75	90
23.3	23.3	27.3	27.5	27.5	27.5	31	31	35.5	41.5
25.5	25.5	29.5	29.5	29.5	29.5	33	33	37.5	43.5
0.243	0.247	0.299	0.274	0.278	0.284	0.325	0.335	0.258	0.410

ØD (mm)	20	25	32	40	50	63	75	90	110
d (mm)	19.3	24.34	31.5	39.5	46.5	62.5	74.3	89.2	108.1
L (mm)	14.5	18	18	22	26	27.8	32	33.1	41.8
h (mm)	11	13.5	17	21	27	32.8	41	46	58
Weight (kg/pc)	0.025	0.038	0.060	0.100	0.160	0.274	0.478	0.705	0.950

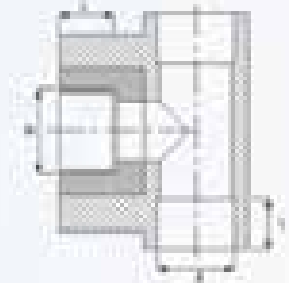
32-25-32	40-25-40	40-25-40	40-32-40	50-25-50	50-25-50	50-32-50	50-40-50	63-25-63	63-32-63	63-50-63
31.3	39.2	39.2	39.2	46.2	46.2	46.2	46.2	62.3	62.3	62.3
24.3	19.3	24.3	31.3	19.3	24.3	31.3	39.2	24.3	31.3	39.2
31.3	39.2	39.2	39.2	46.2	46.2	46.2	46.2	62.3	62.3	62.3
0.057	0.080	0.081	0.080	0.107	0.102	0.107	0.171	0.205	0.200	0.200



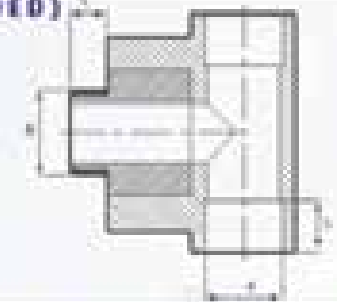
METAL FITTINGS



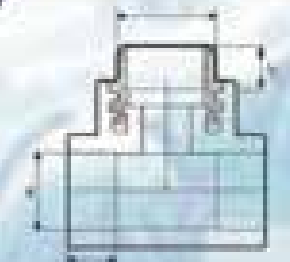
T-ROUND (FEMALE THREADED)



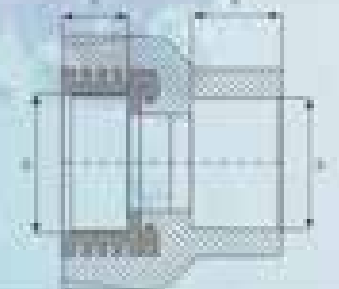
T-ROUND (MALE THREADED)



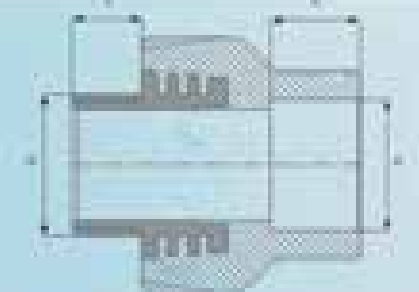
T-HEXAGONAL (FEMALE THREADED)



SOCKET (FEMALE THREADED)



SOCKET (MALE THREADED)



Ø D (mm)	20	25	32	40
d (mm)	19.5	24.5	31.5	39.5
L ₁ (mm)	14.5	19	25	32
L ₂ (mm)	15	19.5	25	32.5
Ø	1/2"	3/4"	1/2"	3/4"
Weight kg/box	0.880	0.880	0.879	0.880

Ø D (mm)	20	25	32	40
d (mm)	19.5	24.5	31.5	39.5
L ₁ (mm)	14.5	19		
L ₂ (mm)	13.5	19		
Ø	1/2"	3/4"	1/2"	3/4"
Weight kg/box	0.872	0.880	0.880	0.878

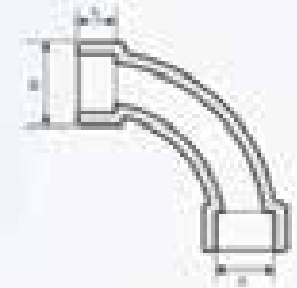
Ø D (mm)	32
d (mm)	31.5
L ₁ (mm)	19
L ₂ (mm)	19
Ø	1"
Weight kg/box	0.200

Ø D (mm)	20	25	32	40
d (mm)	19.5	24.5	31.5	39.5
L ₁ (mm)	14.5	19	25	32
L ₂ (mm)	15	19.5	25	32.5
Ø	1/2"	3/4"	1/2"	3/4"
Weight kg/box	0.874	0.887	0.872	0.880

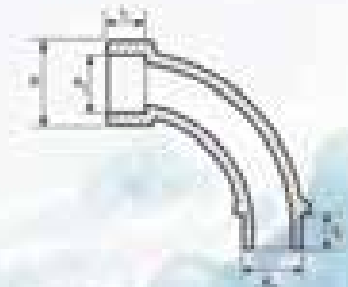
Ø D (mm)	20	25	32	40
d (mm)	19.5	24.5	31.5	39.5
L ₁ (mm)	14.5	19	25	32
L ₂ (mm)	13.5	19	25	32
Ø	1/2"	3/4"	1/2"	3/4"
Weight kg/box	0.886	0.880	0.886	0.881



CURVED ELBOW (FEMALE THREADED)



CURVED ELBOW (MALE THREADED)



BRIDGE



CORVED BRIDGE



Ø D (mm)	20	25
d ₁ (mm)	19.5	25
L (mm)	14.5	18
Weight kg/pc	0.024	0.043

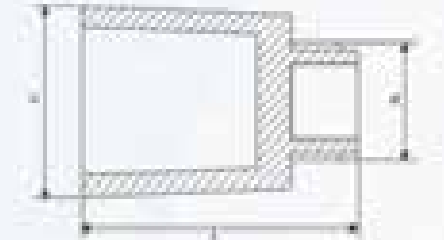
Ø D (mm)	20	25
d ₁ (mm)	19.5	24.5
d ₂ (mm)	20	25
h (mm)	14.5	18
h ₁ (mm)	14.5	18
Weight kg/pc	0.022	0.04

Ø D (mm)	20	25	32	40
d (mm)	19.5	24.5	31.5	40
G (mm)	100	200	300	400
Weight kg/pc	0.033	0.065	0.138	0.218

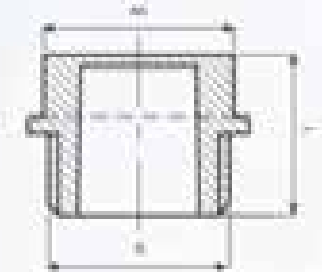
Ø D (mm)	20	25	32
L (mm)	280	290	310
Weight kg/pc	0.048	0.079	0.138



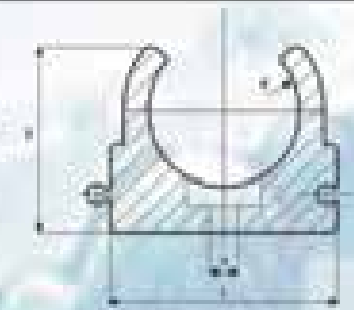
END CLOSUR WITH NUTHEAD



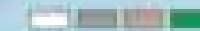
PLUG



CLAMP



DOUBLE CLAMP



END CAP

