

Our Notion of Quality

Quality Control Process employed in laboratories consists of three phases:

1. Incoming Quality Control
2. Process Quality Control
3. Output-Final Quality Control

Incoming Quality Control

All types of raw materials and auxiliary materials from our suppliers are subjected to Input Quality Control tests according to the quality-production standards set out by FIRAT. Samples randomly chosen from each lot of raw materials and auxiliary materials supplied in lots by our suppliers have to pass through Appearance Marking Compliance, Physical Compliance, Chemical Compliance and Functional Compliance tests in GKK Laboratories 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 FIRAT laboratories determined by national (TSE) 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 (for products to operate in pressurized lines)
- Longitudinal Variation (resistance against heat)
- Density Test
- Homogeneity Test
- Melt Flow Speed Test

At the phase of Process Quality Control; diameter, thickness and ovality measurements are conducted by ultrasonic measurement devices on all production lines in fully automated manner simultaneously with the production process and faulty production is not allowed upon activation of sound and light warning system under out of 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.

Output-Final Quality Control

Our products which obtained "Suitable for Sale" approval also have to get **"Suitable for Output"** approval passing through Packaging Compliance, Pack Compliance, Description and Label Compliance checks soon after automatic packaging and wrapping processes.

In addition to the quality control tests conducted in FIRAT 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 passed through all these tests and met the required quality conditions are offered to our customers.





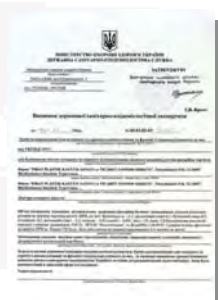
ЗАСТАПНИШТВО ЗА МАКЕДОНИЈА: ФИРАТ-ТУРЦИЈА
REPRESENTATIVE FOR MACEDONIA: FIRAT-TURKEY

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Our Quality Certificates

Quality and compliance with health and food regulations of PPRC Pipes and Fittings are approved by the following institutions:

- TSE – Turkish Standards Institute (Turkey)
- Rep. of Turkey, Ministry of Health (Turkey)
- TSEK – Turkish Standards Institute (Turkey)
- DVGW (Germany)
- TZW- Hygiene (Germany)
- AENOR – (Spain)
- GOST - R (Russia)
- GOST - Hygiene (Russia)
- BDS (Bulgaria)
- EMI (Hungary)
- SEPRO (Ukraine)



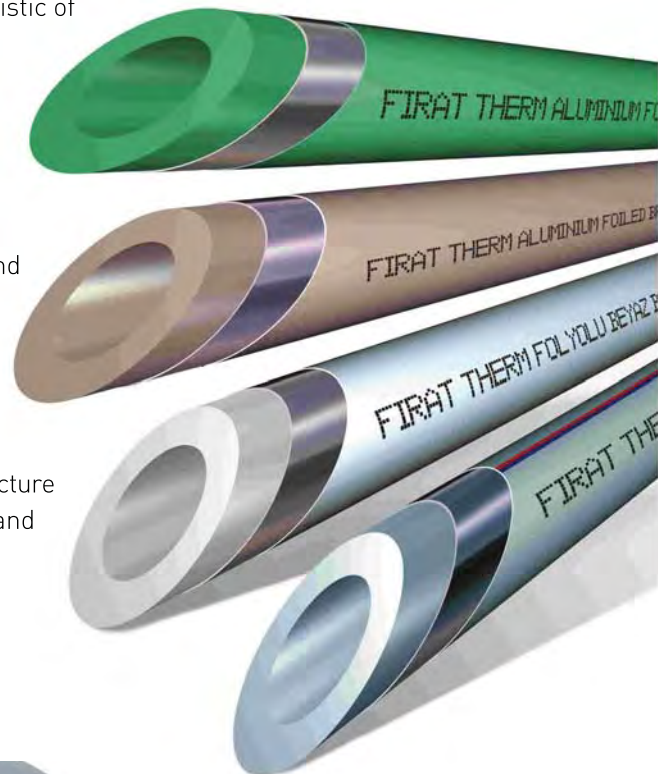
PPRC Pipes

Based on their advantages such as lightness and smoothness, luminous and slippery interior faces, calcification-free and stain-free nature, hygienic and easy-to-fit structure; **FIRAT PPRC Pipes and Fittings** produced from the raw material of PP-R (Polypropylene Random Copolymer) in compliance with TS 9937, TSEN ISO 15874, DIN 8077, DIN 8078, DVGW W544 standards superseded galvanized pipes and became an indispensable solution in today's interior building cold and hot water installations.

The most important characteristic of this raw material is the high resistance against heat and chemical effects. Thanks to this resistance, FIRAT PPRC Pipes and Fittings made of raw material of PP-R are successfully utilized in cold and hot water installations. Since monomer structure of the raw material PP-R forms a haphazard chain, it does not allow any biological material to settle inside its structure and thus, FIRAT PPRC Pipes and Fittings made of raw material PP-R achieve color, taste and smell-free superior qualities.

FIRAT PPRC Pipes and Fittings with aluminium foil are designed particularly for installations with water passage. Since aluminium foil used in FIRAT PPRC Pipes and Fittings five-fold reduces the thermo-expansion coefficient of pipe, it impedes heat-based expansion and sag. Additionally, it also restricts oxygen passage thanks to its non-porous surface.

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



PPRC Pipes Test Table *

Standard Number TS EN ISO 15874 - 2				
Name of Standard Plastic Pipe Systems – for Hot and Cold Water – Polypropylene (PP) – Section : 2 Pipes				
Tests	1 – Mechanical Properties			
	Hydrostatic Strength (MPa)	Test Temperature (OC)	Test Period (Hour)	Test Ppressure (Bar)
	16	20	1	65
	4.3	95	22	18
	3.8	95	165	15
	3.5	95	1000	14
2 – Physical and Chemical Properties				
	Necessity	Parameter	Duration (Hour)	
Longitudinal Consistency	≤ %2	135 °C	$e_n \leq 8 \text{ mm}$ → 1	
			$8 \text{ mm} < e_n \leq 16 \text{ mm}$ → 2	
			$e_n > 16 \text{ mm}$ → 4	
Hydrostatic Compression Test	Thermo-Cons. by Inter.	110 °C - 1,9 MPa	8760	
No explosion should occur	throughout the test			
Impact Strength	< %10	0 °C - 10 Pieces	$e_n \leq 8,6 \text{ mm}$ → 1	
			$8,6 \text{ mm} < e_n \leq 14,1 \text{ mm}$ → 2	
			$e_n > 14,1 \text{ mm}$ → 4	
MFI (Raw material)	≤ 0,5 gr / 10 min.	230 °C - 2,16 kg		
MFI (Pipe)	Not exceed %20 when compared to the raw material	230 °C - 2,16 kg		

* The table above is drawn up according to TSE (Turkish Standards Institute) data.

Advantages of the 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 slippy 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 deflagrates (Ref : DIN 19560 and DIN 4102.)
- Environmental friendly.



Composite Pipes



FIRAT Composite Pipes and Fittings that manufactured through combining the PP-R (Polypropylene Random Copolymer) with glass fiber reinforced polypropylene raw materials); become an indispensable solution in cold and hot waterworks today thanks to the advantageous features such as slippery and glossy inner surface, resistance to calcification and corrosion, being hygienic and the ease of assembling.

FIRAT Composite Pipes and Fittings that is being used in all kinds of indoor hot and cold waterworks are manufactured from Type 3 raw material that called as PP-R (Polypropylene Random Copolymer).

The most important feature of the raw material PP-R is its high resistance to heat and chemical effects. FIRAT Composite Pipes and Fittings that are manufactured from the raw material PP-R due to this resistance are being used in cold and hot water installations successfully. As the monomer structure of the raw material PP-R constitutes a random chain, it does not keep any biological materials within and this provides superior properties which do not give color, odor or flavor to the Fittings that are derived FIRAT Composite

Pipes and from the raw material PP-R.

FIRAT Composite is specifically designed for the installations that feature hot water passage. The middle layer with its high isolation feature that is used in Composite Pipes and Fittings prevents the expansion and sagging of the pipe.

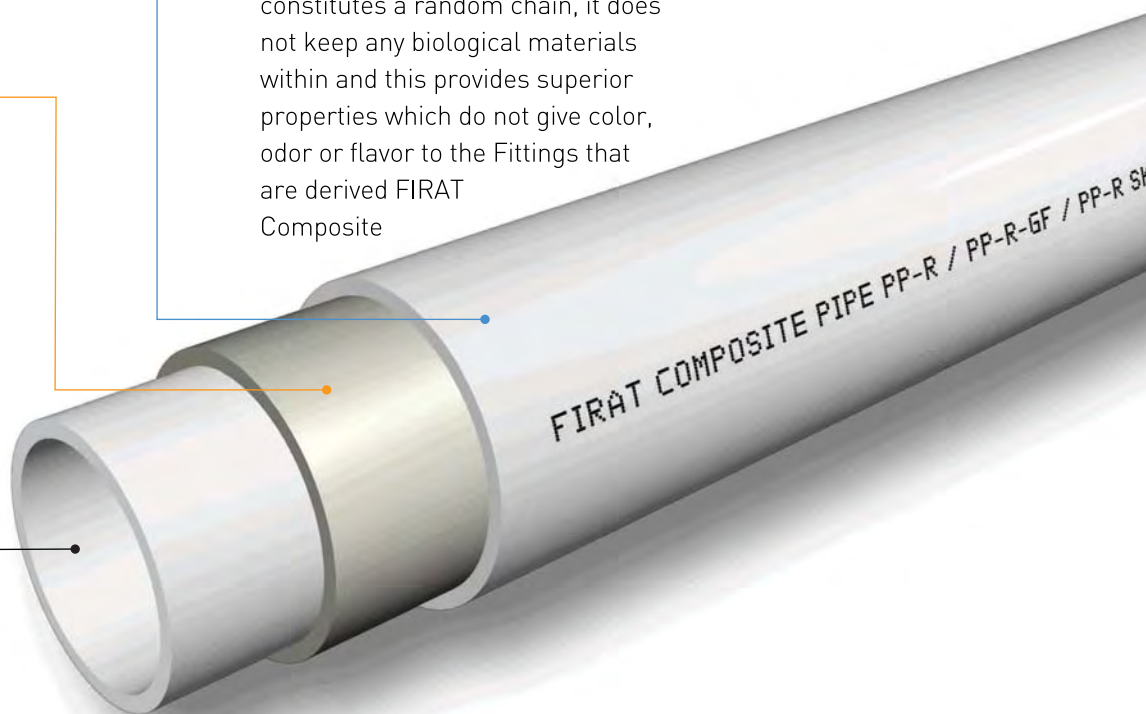
FIRAT Composite Pipes and Fittings are a pressure pipe system that is used in indoor cold hot water systems. It has a multi-layer structure. Middle layer is composed of glass fiber reinforced PP-R (polypropylene random copolymer), outer and inner layer of the raw material PP R. Application clow is 1 and 10 bar according to EN ISO 15874-1. It is designed to serve at 20°C under the pressure of 20 bar for 50 years.

In case that proper pressure and temperature values are used, the service life of the Composite Pipes and Fittings are over 50 years.

PP-R Outer Layer

Glass Fiber Reinforced PP-R Middle Layer

PP-R Inner Layer



Physical and Chemical Properties of the Composite Pipes

Feature	Value	Test Parameters		Test Method
		Parameter	Value	
Dimensional Stability	%2	Test Temperature (C°)	135	EN 743
		Test Duration (h°)		
		For e>8 mm	1	
		8 mm< e < 16 mm	2	
		For e>16 mm	4	
Falling Ball Test – Impact Resistance	There should not be breakage, cracks.	Test Part/Piece	3	
		Test Temperature (C°)	0	
		Test Part/Piece	10	
		Height (cm)	50	
		Test mass (gram)		
		For dn 20 mm;	250	
		For dn 25 mm;	500	
		For dn 32 mm;	800	
		For dn 40 mm;	1,250	
		For dn 50 mm;	2,000	
For dn 63 mm;	3,200			
For dn 75 mm;	10,000			
For dn >90 mm;	16,000			
Melt Mass Flow Rate (Raw Material)	<0,5 gram / 10 minutes	Test Temperature (C°)	230	ISO 1133
		Mass (kg)	2,16	
		Test Part/Piece	3	
Melt Mass Flow Rate (Pipe)	Compared with the raw material result, the difference should be %30 at maximum.	Test Temperature (C°)	230	ISO 1133
		Mass (kg)	2,16	
		Test Part/Piece	3	

Advantages of the Composite Pipes and Fittings

- Service Life is 50 years at 20C and 20 bar pressure.
- As the Composite Pipes have low expansion coefficients, they are fit for use within the range of - 20 C and +90 C. (Isolation should be applied considering the freezing degree of the fluid in the pipe).
- According to the DIN 4102 standard it is within the B2 class.
- Composite Pipes do not create perspiration and stretching problem in systems where heating and cooling is used together.
- Highly resistant to chemical agents.
- Resistant to corrosion. Does not cause calcify and corrode.
- Does not change the color, odor or flavor of the water.
- Has slippery and glossy inner surfaces.
- No diameter narrowing in the welding places occurs. It shows high welding performance.
- As there is no clear cut in composite pipes, this provides the opportunity of quick and serial assembly.
- Can be used in surface applications with its aesthetical view.
- Environmental friendly.
- No assembling loss.

PPR-C Boiler Set



Water Bearing Capacity of PP Pipes

Movable quantity of water*

Diameter (Ø)	Amount (lt/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)



Metallic additional part produced by injection covering technique in a form of providing a hundred percent impermeability

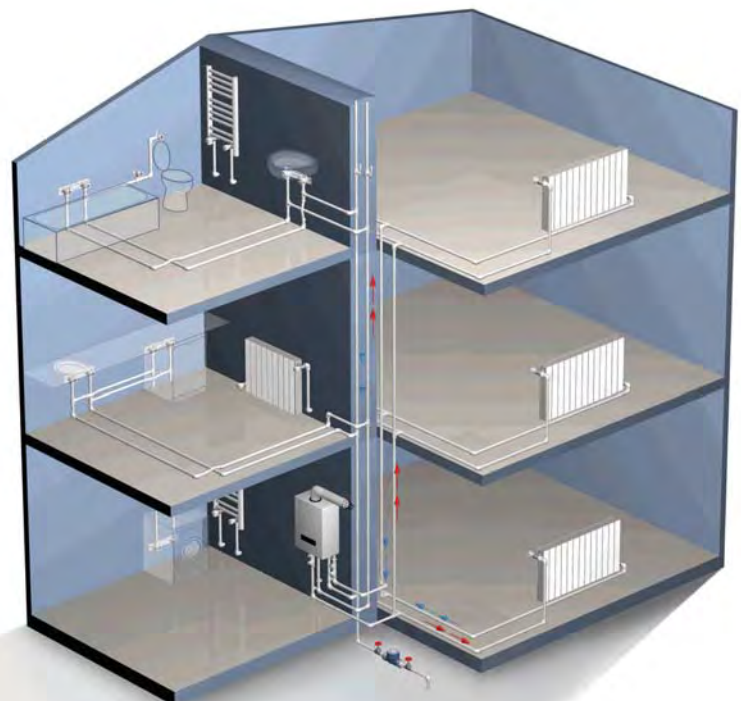


BALL VALVE

SOCKET WITH LOOSE NUT

Y - FILTER

Code	Packing Type		
8790000010	Standard Box		
Fitting Name	D (mm)	G (Inch)	Pieces
BALL VALVE	20		1
BALL VALVE	25		1
Y - FILTER	20	1/2"	1
Y - FILTER	25	3/4"	1
SOCKET WITH LOOSE NUT	20	1/2"	2
SOCKET WITH LOOSE NUT	25	3/4"	2



Considerations

- At the end of folio stripping process, no foil particles should remain at welding distance.
- For turnings over 30° returns 45° elbow should be used.
- For the fittings applications applications, excessive tightening should be avoided and Teflon tape should be used.
- Pipes should be cut vertical to the pipe axis with a sharp pipe cutter.
- Contaminated pipes and Fittings should not be welded; pipes and Fittings which are deformed and cracked by the section should not be used.
- Pipes should be protected against all kinds of impact and collisions.
- Conical gears should not be used in couplings.
- Installations should be protected against freezing risk.
- After the test process is over in case that the installation will not be used, water in the installation should be absolutely discharged against the risk of freezing.
- In case that the Teflon on sheets are worn out or damaged, welding should not be performed. (The service life of Teflon is as much as 2-3 housing applications).
- Deadlock duration should be observed, pipes and Fittings should not be rotated/turned during melting.
- For gas heater installations proper measures should be taken against steam compression.
- Pipes and Fittings should not be exposed to direct sunlight for long time.
- The raw material PP-R does not contain a stabilizer for resistance against UV rays. Maximum storage life in an environment which contacts with sunlight is six months.
- After the installations are furnished pipes and Fittings which are outside the building should be isolated against UV rays and freezing.



Drinking Water



Radiator



Hot Water



Cold Water



Compressed Air



The Specifications of PPR-C Pipes

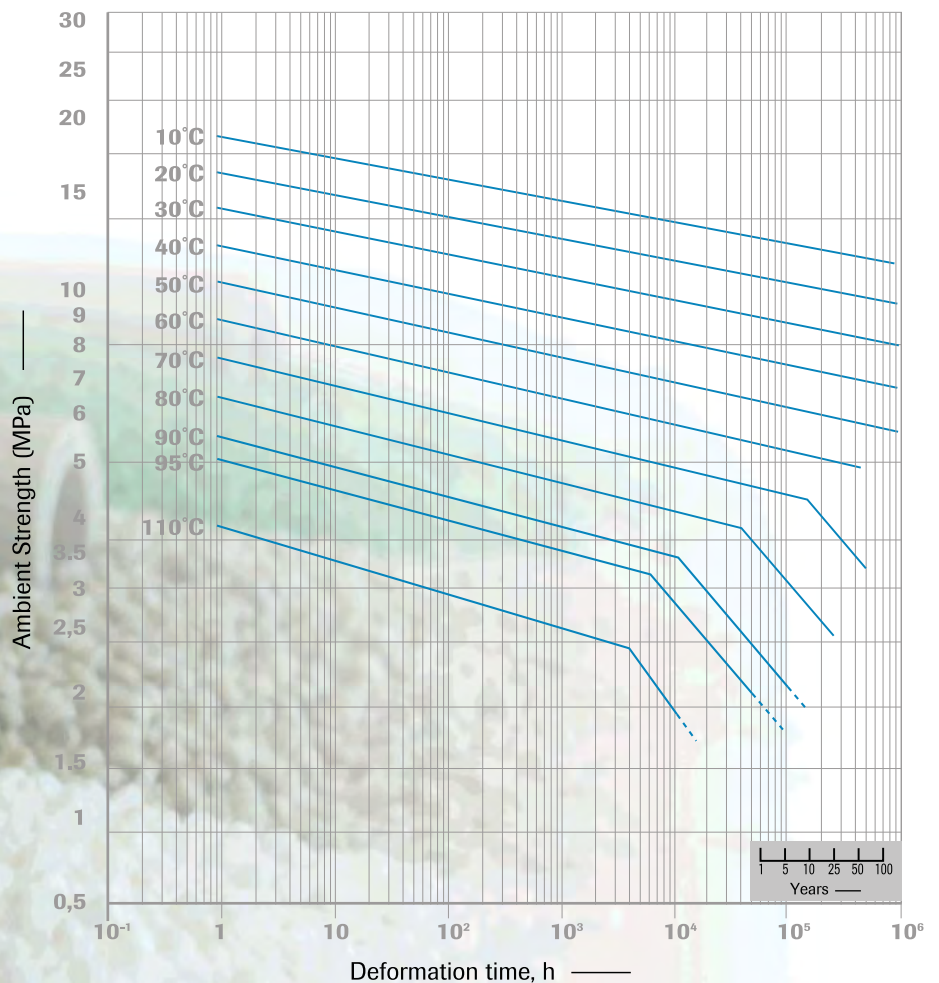
Raw Material

FIRAT PPRC and COMPOSITE Pipes do not have any adverse effects on human health. It is approved and certified that water does not change its taste and odor and contain any carcinogens by companies in Germany which serve internationally such as TZW and HYG.

Raw material of Polypropylene Copolymer (PP-R) and The raw material of Polypropylene Copolymer (PP-R) and raw material glass fiber reinforced polypropylene (PPR-GF) used in FIRAT Pipes and Fittings is procured from the world's proven highest quality raw material producers such as Saudi Basic Industries Corporation (SABIC) and Basell Holdings B.V. (BASEL) and all raw materials supplied are subjected to Incoming Quality Control tests in FIRAT laboratories.



PPRC Raw Material Resistance Curve

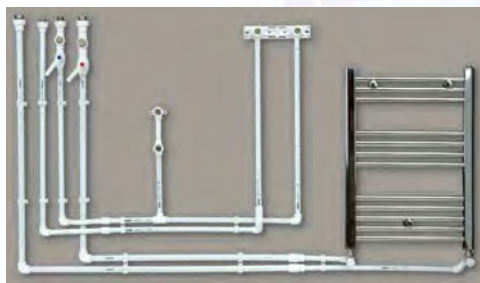


Service Lives of PPRC and COMPOSITE Pipes

Service Lives of PPRC, PPRC Aluminium Foiled and Composite Pipes used in Water Installations

Service Lives (Year)	Operating Pressure [Bar]							
	30.0	25.5	21.5	18.3	15.4	14.6	13.0	
1	30.0	25.5	21.5	18.3	15.4	14.6	13.0	
5	28.1	23.9	20.2	17.0	14.3	13.6	11.9	
10	27.3	23.2	19.6	16.5	13.8	13.1	11.7	
25	26.5	22.3	18.8	15.9	13.3	12.6	10.1	
50	25.7	21.8	18.3	15.4	12.7	11.1	08.5	
Temperature (°C)	20	30	40	50	60	65	70	
Cold water	Referans Standard: DIN 2000						Hot water	

Service Lives of PPRC&COMPOSITE Pipes used in Heating Systems



Usage Period	Temperature (°C)	Service Life (Year)	Operating Pressure (Bar)
30 days/year	75	5	17.27
		10	13.79
		25	11.74
		45	10.18
	80	5	13.50
		10	13.80
		25	11.14
		42.5	9.79
	85	5	12.42
		10	11.87
		25	10.14
		37.5	9.18
90	5	11.39	
	10	10.94	
	25	8.86	
	35	8.16	
60 days/year	75	5	14.11
		10	13.57
		25	11.58
		45	10.05
	80	5	13.12
		10	12.54
		25	10.56
		40	9.41
	85	5	12.03
		10	11.52
		25	9.22
		35	8.48
90	5	11.04	
	10	9.76	
	25	7.81	
	30	7.46	
90 days/year	75	5	14.02
		10	13.38
		25	11.33
		45	9.82
	80	5	12.90
		10	12.35
		25	10.05
		37.5	9.08
	85	5	11.81
		10	10.72
		25	8.58
		32.5	8.03
90	5	10.59	
	10	8.96	
	25	7.17	

Specifications of PPR Pipes

PPRC and COMPOSITE 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)

L: Pipe Length (m)

ΔT : Temperature Difference

a: Linear Expansion Coefficient for;

PPRC Aluminium Foiled Pipes (a = 0,030 mm/mK)

PPRC Pipes (a = 0,150 mm/mK)

PPRC Composite Pipes (a = 0,040 mm/mK)

Linear Expansion Table for Composite Pipes

Pipe Length (m)	Temperature Difference ΔT (°C)							
	10	20	30	40	50	63	70	80
5	2	4	6	8	10	12	14	
10	4	8	12	16	20	24	28	
15	6	12	18	24	30	36	42	
20	8	16	24	32	40	48	56	

Linear Expansion Δl (mm)

Linear Expansion

Linear Expansion Table for PPRC Pipes

Pipe Length L (m)	Temperature Difference ΔT (°C)							
	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	7.00	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)

Linear Expansion Table for PPRC Aluminium Foiled Pipes

Pipe Length L (m)	Temperature Difference ΔT (°C)							
	10	20	30	40	50	60	70	80
1.0	0.30	0.60	0.90	1.20	1.50	1.80	2.10	2.40
2.0	0.60	1.20	1.80	2.40	3.00	3.60	4.20	4.80
3.0	0.90	1.80	2.70	3.60	4.50	5.40	6.30	7.20
4.0	1.20	2.40	3.60	4.80	6.00	7.20	8.40	9.60
5.0	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00
6.0	1.80	3.60	5.40	7.20	9.00	10.80	12.60	14.40
7.0	2.10	4.20	6.30	8.40	10.50	12.60	14.70	16.80
8.0	2.40	4.80	7.20	9.60	12.00	14.40	16.80	19.20
9.0	2.70	5.40	8.10	10.80	13.50	16.20	18.90	21.60
10.0	3.00	6.00	9.00	12.00	15.00	18.00	21.00	24.00

Linear Expansion Δl (mm)



Expansion Chambers

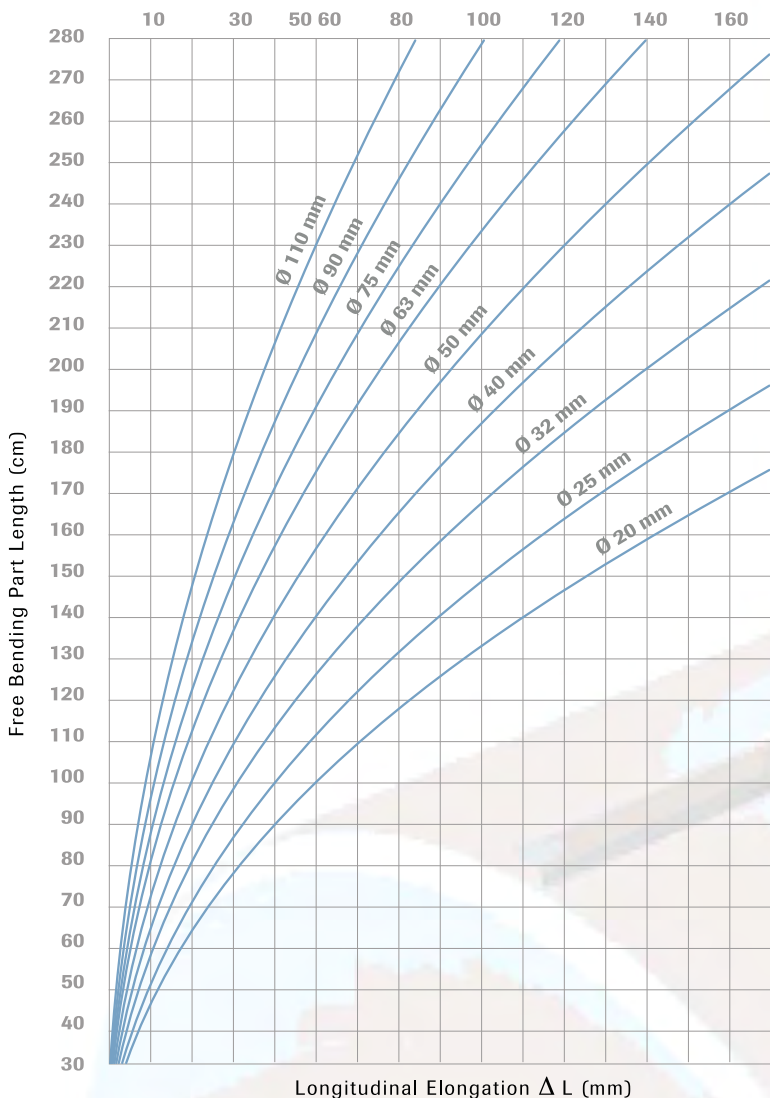
If linear expansion cannot be removed by direction change, an expansion chamber must be designed. Shape of this expansion chamber is given below.

Calculation of minimum width of expansion chamber :

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

Installation expands total of 2 D L, one D L 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+2D.

Free Expansion



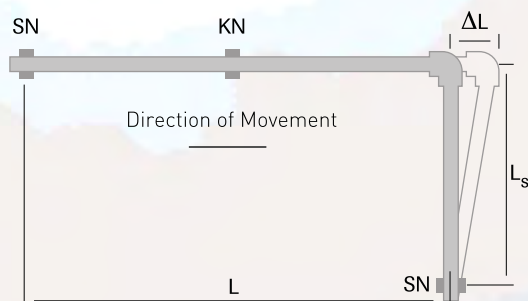
Free expansion parts are formed in order to prevent the installation from linear expansions which may arise in the pipes due to temperature variations.

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

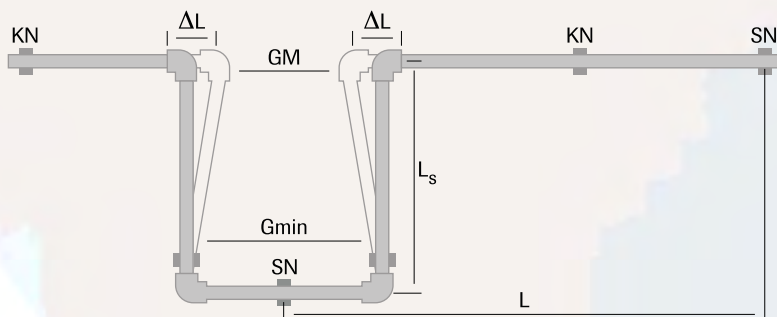
$$L_s = K \times \sqrt{d \times \Delta l}$$

- L_s : 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



Width of Expansion Chambers



Expansion chambers is calculated according to the following formula;

$$G_{min} = (2 \times \Delta l) + GM$$

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

Specifications of PPR Pipes

Distance Between Clamps

Fixed distance between clamp at horizontally installed PPRC and COMPOSITE Pipes can be found by the help of the table below. Distance between clamp 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.

Distance Between Clamp in PPRC Pipe Installations

Temperature Difference T (°C)	Pipe Diameter [mm]								
	20	25	32	40	50	63	75	90	110
0	85	105	125	140	165	190	205	220	250
20	60	75	90	100	120	140	150	160	180
30	60	75	90	100	120	140	150	160	180
40	60	70	80	90	110	130	140	150	170
50	60	70	80	90	110	130	140	150	170
60	55	65	75	85	100	115	125	140	160
70	50	60	75	80	95	105	115	125	140

Distance Between Clamps (cm)

Distance Between Clamp in PPRC Aluminium Foiled Pipe Installations

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

Distance Between Clamps (cm)



Composite Pipe Clamp Spacings

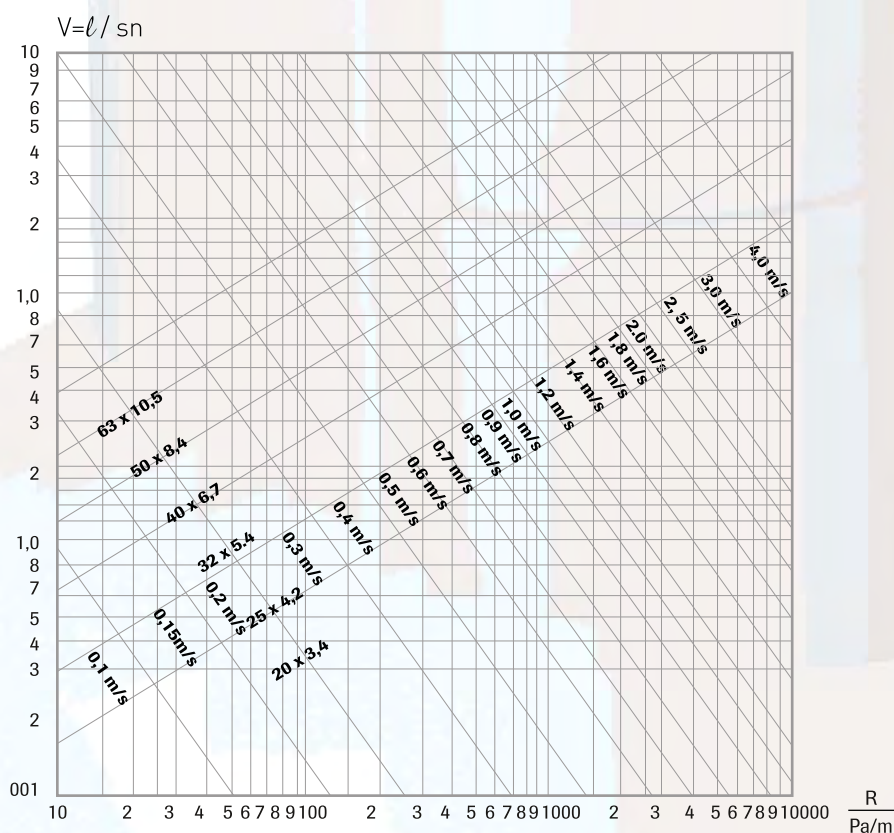
Temperature Difference T (°C)	Pipe Diameter [mm]								
	20	25	32	40	50	63	75	90	110
0	115	130	150	165	185	215	240	260	280
20	90	100	115	130	145	165	185	200	215
30	90	100	115	130	145	165	185	200	210
40	80	90	105	120	135	155	175	190	200
50	80	90	105	120	135	155	175	190	180
60	75	85	100	115	130	145	165	180	175
70	65	75	90	105	120	135	155	175	140

Clamp Spacings (cm)

Diameter Selection

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 and COMPOSITE pipes.

Table Showing Pressure and Discharge Rates of PN 20 Pipe



Specifications of PPR Pipes

Welding Technique

Welding Technique for PPRC Aluminium Foiled Pipes



Cut the pipe perpendicular to the pipe axis only by special and sharp pipe clippers.

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

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



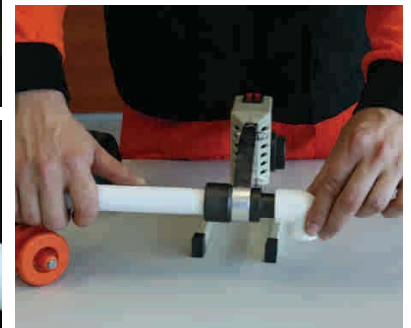
Heat the welding machine up to 260°C and use clean threaders.



Since 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.

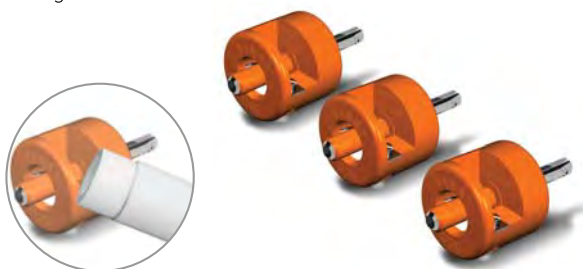


Welding together the pipe and the fitting removed from the threader immediately and without rotating. Do not perform any process on welded parts whose cooling periods are not over yet.



FOLYOMATİK

Folyomatik is a licensed folio-spreading equipment of FIRAT. Since the folyomatik is used with a drill, it performs stripping in a few seconds. It is light and sound.



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.

Testing Welding Techniques

Welding Specifications for PPRC Pipes

Outer Diameter	Welding Depth (mm)	Heating Period (sec)*		Max. Idle Period (sec)**	Welding Period (sec)	Cooling Period (min)
20	14	5	8	4	6	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	8	30	6
75	29	30	45	8	30	6
90	32	40	60	8	40	6
110	35	50	75	10	50	8

* 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.

Welding Technique for PPRC and COMPOSITE Pipes



Cut the pipe perpendicular to the pipe axis only by special and sharp pipe clippers.



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.

Heat the welding machine up to 260°C and use clean threaders.



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

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:

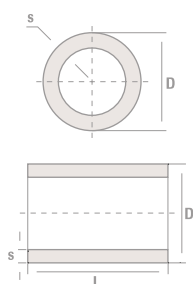
Entire piping installation in the building is subjected to impermeability test for a period of 30 minutes at a pressure of 1,5 times the highest planned pressure. Pressure drops and leakages are observed between 10th and 20th minutes. Pressure is increased again. No pressure drops higher than 0,6 bar 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 0,62bar and no leakage at any point should occur.

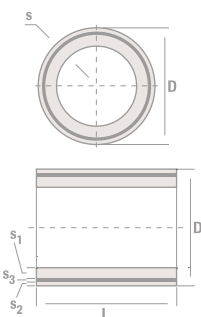
- If pressure at the manometer on which the test is monitored drops more than the values given above, it means a leakage exists. Leaking pipe line should be replaced or re-tightened.
- Entire installation should be washed out before beginning to use.
- Lines which will not be used should be closed and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

PPR-C Pipes and Fittings



PPRC PIPES

CODE NO	ØD (mm)	S (mm)	L (m)	Weight kg/m
7700020020	20	3.4	4	0.170
7700020025	25	4.2	4	0.266
7700020032	32	5.4	4	0.428
7700020040	40	6.7	4	0.659
7700020050	50	8.3	4	1.015
7700020063	63	10.5	4	1.620
7700020075	75	12.5	4	2.290
7700020090	90	15	4	3.290
7700020110	110	18.3	4	4.900
7700020126	125	20.8	4	6.725
7700020127	160	26.6	4	11.033

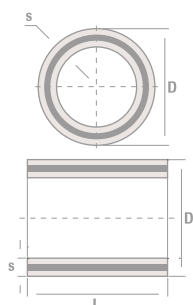


PPRC ALUMINIUM FOILED PIPES

CODE NO	ØD (mm)	S ₁ (mm)	L (m)	Weight kg/m
7700020120	20	3.4	4	0.198
7700020125	25	4.2	4	0.293
7700020132	32	5.4	4	0.453
7700020140	40	6.7	4	0.720
7700020150	50	8.3	4	1.105
7700020163	63	10.5	4	1.750
7700020175	75	12.5	4	2.780

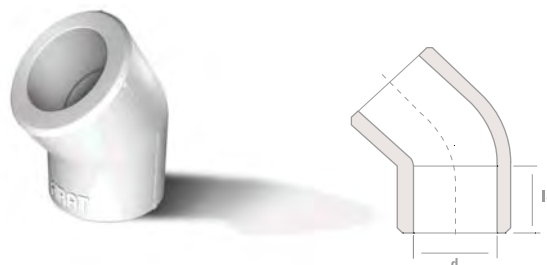
COMPOSITE PIPES

CODE NO	ØD (mm)	S (mm)	L (m)	Weight kg/m
7700023020	20	3.4	4	0.188
7700023025	25	4.2	4	0.274
7700023032	32	5.4	4	0.447
7700023040	40	6.7	4	0.687
7700023050	50	8.3	4	1.075
7700023063	63	10.5	4	1.715
7700023075	75	12.5	4	2.457
7700023090	90	15	4	3.527
7700023110	110	18.3	4	5.343
7700023126	125	20.8	4	6.725



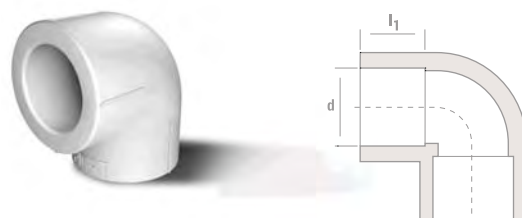
ELBOW (45°)

CODE NO	ØD (mm)	d (mm)	l ₁ (mm)	Weight kg/pcs
7711001020	20	19.5	14.5	0.013
7711001025	25	24.5	16	0.019
7711001032	32	31.5	18	0.031
7711001040	40	39.5	20.5	0.050
7711001050	50	49.5	23.5	0.110
7711001063	63	62.5	27.5	0.200



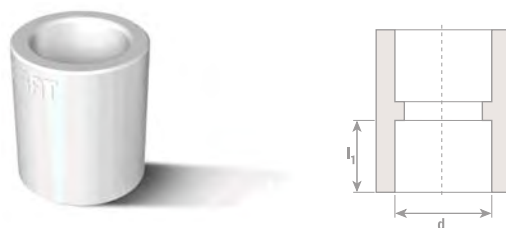
ELBOW (90°)

CODE NO	ØD (mm)	d (mm)	l ₁ (mm)	Weight kg/pcs
7711000020	20	19.5	14.5	0.016
7711000025	25	24.5	16	0.023
7711000032	32	31.5	18	0.040
7711000040	40	39.5	20.5	0.065
7711000050	50	49.5	23.5	0.128
7711000063	63	62.5	27.5	0.264
7711000075	75	74.3	32	0.365
7711000090	90	89.2	35.5	0.638
7711000110	110	109	41.5	1.098



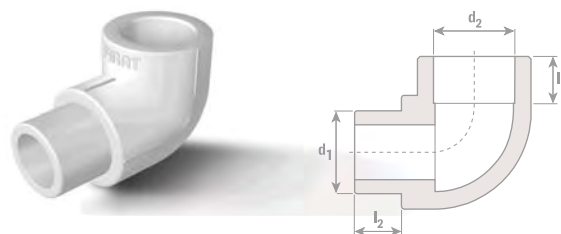
SOCKET

CODE NO	ØD (mm)	d (mm)	l ₁ (mm)	Weight kg/pcs
7721000020	20	19.5	14.5	0.010
7721000025	25	24.5	16	0.014
7721000032	32	31.5	18	0.028
7721000040	40	39.5	20.5	0.042
7721000050	50	49.5	23.5	0.074
7721000063	63	62.5	27.5	0.128
7721000075	75	74.3	32	0.210
7721000090	90	89.2	35.5	0.340
7721000110	110	109	41.5	0.568

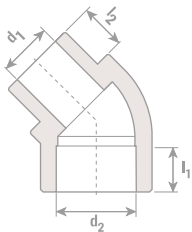


ELBOW (90° Female - Male)

CODE NO	ØD (mm)	d ₁ - d ₂ (mm)	l ₁ - l ₂ (mm)	Weight kg/pcs
7711002020	20	20 - 19.5	16 - 16	0.021
7711002025	25	25 - 24.5	16 - 16	0.034
7711002032	32	32 - 31.5	18.1 - 18.1	0.047

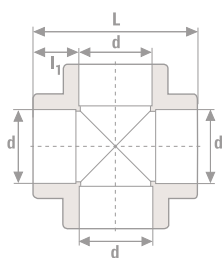


ELBOW (45° Female - Male)



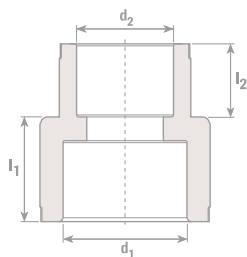
CODE NO	ØD (mm)	d ₁ - d ₂ (mm)	l ₁ - l ₂ (mm)	Weight kg/pcs
7711002120	20	20 - 19.5	16 - 16	0.0149
7711002125	25	25 - 24.5	16 - 16	0.0209
7711002132	32	32 - 31.5	18.1 - 18.1	0.0388

CROSS - T

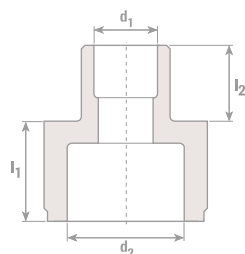


CODE NO	ØD (mm)	d (mm)	l ₁ (mm)	L (mm)	Weight kg/pcs
7735000020	20	19.5	14.5	51	0.027
7735000025	25	24.5	16	59	0.038
7735000032	32	31.5	18	70	0.064
7735000040	40	39.4	20.5	83	0.093

REDUCING SOCKET (Female - Male)



CODE NO	ØD (mm)	d ₁ - d ₂ (mm)	l ₁ - l ₂ (mm)	Weight kg/pcs
7723025020	25-20	19.5 - 25	15 - 18	0.013
7722032020	32-20	19.5 - 32	15 - 21.7	0.016
7723032025	32-25	24.5 - 32	18 - 21.7	0.009
7722040020	40-20	19.5 - 20	15 - 26.6	0.026
7722040025	40-25	24.5 - 40	18 - 26.6	0.027
7722040032	40-32	31.4 - 40	19.5 - 26.6	0.031
7722050020	50-20	19.5 - 50	16 - 31	0.037
7722050025	50-25	24.5 - 50	18 - 31	0.038
7722050032	50-32	31.4 - 50	20 - 31	0.043
7722050040	50-40	39.4 - 50	22 - 31	0.047
7722063025	63-25	24.5 - 63	18.5 - 41.5	0.069
7722063032	63-32	31.5 - 63	20.5 - 41.5	0.074
7722063040	63-40	39.4 - 63	22.5 - 41.5	0.076
7722063050	63-50	49.45 - 63	26.5 - 41.5	0.084
7722075050	75-50	49.45 - 75	26 - 44.5	0.125
7722075063	75-63	62.5 - 75	30 - 44.5	0.155
7722075075	90-75	74.25 - 90	31 - 45	0.258
7722075090	110-90	89.2 - 110	35.5 - 50	0.415

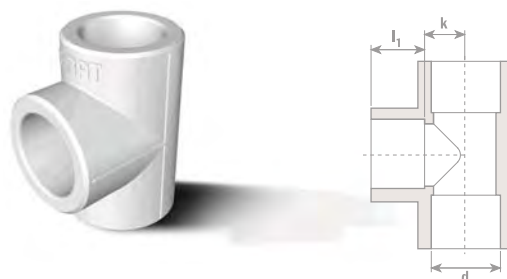


REDUCING SOCKET (Female - Female)

CODE NO	ØD (mm)	d ₁ - d ₂ (mm)	l ₁ - l ₂ (mm)	Weight kg/pcs
7722025020	25-20	24.5 - 19.5	18.5 - 16.5	0.013
7722032025	32-25	31.5 - 24.5	26.5 - 18.5	0.016

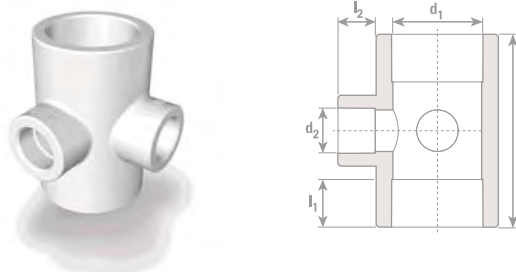
T - P I E C E

CODE NO	ØD (mm)	d ₁ (mm)	I ₁ (mm)	k (mm)	Weight kg/pcs
7741000020	20	19.5	14.5	11	0.025
7741000025	25	24.5	16	13.5	0.030
7741000032	32	31.5	18	17	0.050
7741000040	40	39.4	20.5	21	0.089
7741000050	50	49.4	25	26.7	0.168
7741000063	63	62.5	27.4	32.5	0.303
7741000075	75	74.2	32.3	41	0.477
7741000090	90	89.2	35.5	46	0.808
7741000110	110	109	41.5	56	1.367



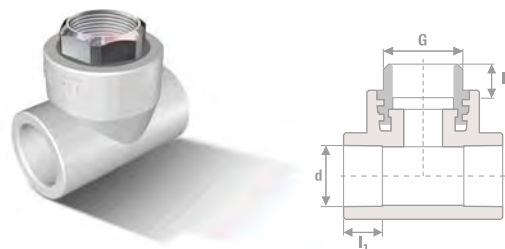
REDUCING CORNER T - P I E C E

CODE NO	ØD (mm)	d ₁ - d ₂ (mm)	I ₁ - I ₂ (mm)	L (mm)	Weight kg/pcs
7743322020	32-20-20-32	31.5 - 19.5	18.1 - 16	70	0.0594
7743322525	32-25-25-32	31.5 - 24.5	18.1 - 16	70	0.0600
7743402020	40-20-20-40	39.4 - 19.5	20.5 - 16	83	0.0848
7743402524	40-25-25-40	39.4 - 24.5	20.5 - 16	83	0.0867



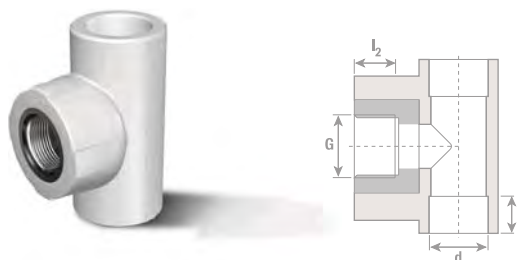
T - H E X A G O N A L (F e m a l e T h r e a d e d)

CODE NO	ØD (mm)	d (mm)	I ₁ - I ₂ (mm)	G"	Weight kg/pcs
7751032254	32	31.5	18 - 19	1"	0.205



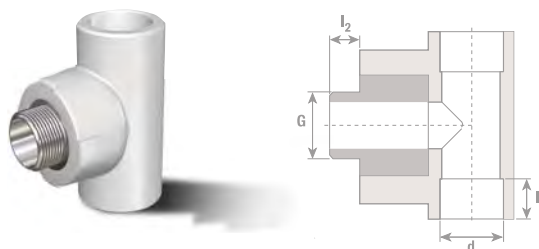
T - R O U N D (F e m a l e T h r e a d e d)

CODE NO	ØD (mm)	d (mm)	I ₁ - I ₂ (mm)	G"	Weight kg/pcs
7752020127	20	19.5	14.5 - 13	1/2"	0.060
7752020191	20	19.5	14.5 - 13.5	3/4"	0.085
7752025127	25	24.5	16 - 13	1/2"	0.078
7752040191	25	24.5	16 - 13.5	3/4"	0.090
7752032191	32	31.5	18 - 13.5	3/4"	0.125

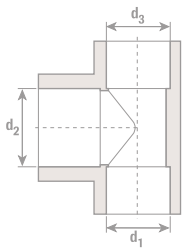


T - R O U N D (M a l e T h r e a d e d)

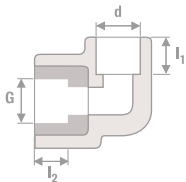
CODE NO	ØD (mm)	d (mm)	I ₁ - I ₂ (mm)	G"	Weight kg/pcs
7754020127	20	19.5	14.5 - 13.5	1/2"	0.076
7754025191	25	24.5	16 - 13.5	3/4"	0.130
7754020191	20	19.5	14.5 - 13.5	3/4"	0.122
7754025127	25	24.5	18 - 13.5	1/2"	0.123



REDUCING T-PIECE

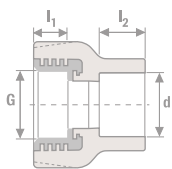


CODE NO	ØD (mm)	d ₁ (mm)	d ₂ (mm)	d ₃ (mm)	Weight kg/pcs
7742252020	25-20-20	24.5	19.5	19.5	0.029
7742252025	25-20-25	24.5	19.5	24.5	0.33
7742252520	25-25-20	24.5	24.5	19.5	0.031
7742322020	32-20-25	31.5	19.5	19.5	0.056
7742322025	32-20-25	31.5	19.5	24.5	0.045
7742322525	32-25-25	31.5	24.5	24.5	0.042
7742322032	32-20-32	31.5	19.5	31.5	0.056
7742322520	32-25-20	31.5	24.5	19.5	0.039
7742322532	32-25-32	31.5	24.5	31.5	0.057
7742402040	40-20-40	39.5	19.5	39.5	0.080
7742402540	40-25-40	39.5	24.5	39.5	0.081
7742403240	40-32-40	39.5	31.5	39.5	0.085
7742502050	50-20-50	49.4	19.5	49.4	0.167
7742502550	50-25-50	49.4	24.5	49.4	0.162
7742503250	50-32-50	49.4	31.5	49.4	0.167
7742504050	50-40-50	49.4	39.4	49.4	0.173
7742632563	63-25-63	62.5	24.5	62.5	0.301
7742633263	63-32-63	62.5	31.5	62.5	0.309
7742634063	63-40-63	62.5	39.4	62.5	0.340
7742635063	63-50-63	62.5	49.4	62.5	0.321



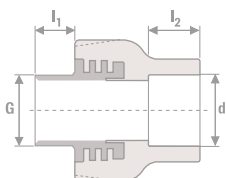
ELBOW UNDER PLASTER (Female Threaded)

CODE NO	ØD (mm)	d (mm)	l ₁ - l ₂ (mm)	G"	Weight kg/pcs
7772120127	20	19.5	14.5 - 13	1/2"	0.066
7772125127	25	24.5	16 - 13	1/2"	0.082



SOCKET (Female Threaded)

CODE NO	ØD (mm)	d (mm)	l ₁ - l ₂ (mm)	G"	Weight kg/pcs
7762020127	20	19.5	14.5 - 13	1/2"	0.054
7762020191	20	19.5	14.5 - 13.5	3/4"	0.067
7762025127	25	24.5	16 - 13	1/2"	0.072
7762040191	25	24.5	16 - 13.5	3/4"	0.085

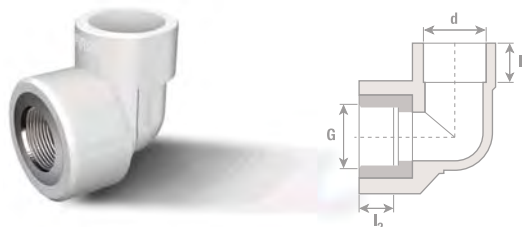


SOCKET (Male Threaded)

CODE NO	ØD (mm)	d (mm)	l ₁ - l ₂ (mm)	G"	Weight kg/pcs
7764020127	20	19.5	14.5 - 13	1/2"	0.024
7764020191	20	19.5	14.5 - 13.5	3/4"	0.050
7764025127	25	24.5	16 - 16	1/2"	0.041
7764025191	25	24.5	16 - 16	3/4"	0.048

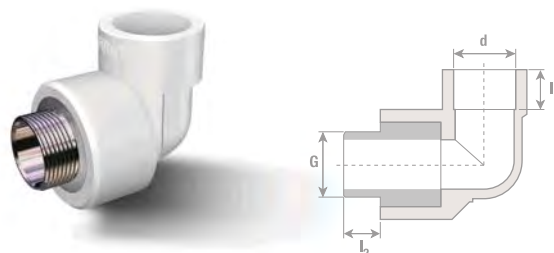
ELBOW (Female Threaded)

CODE NO	ØD (mm)	d (mm)	I ₁ - I ₂ (mm)	G"	Weight kg/pcs
7772020127	20	19.5	14.5 - 13	1/2"	0.021
7772020191	20	19.5	14.5 - 13.5	3/4"	0.047
7772025127	25	24.5	16 - 13	1/2"	0.028
7772040191	25	24.5	16 - 13.5	3/4"	0.041
7772032191	32	31.5	18 - 13.5	3/4"	0.092



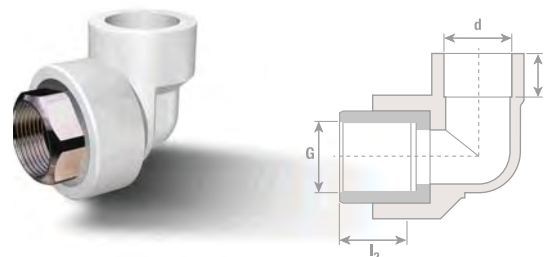
ELBOW (Male Threaded)

CODE NO	ØD (mm)	d (mm)	I ₁ - I ₂ (mm)	G"	Weight kg/pcs
7774020127	20	19.5	14.5 - 13.5	1/2"	0.068
7774020191	20	19.5	14.5 - 13.5	3/4"	0.078
7774025127	25	24.5	16 - 13.5	1/2"	0.071
7774025191	25	24.5	16 - 13.5	3/4"	0.071
7774032191	32	31.5	18 - 13.5	3/4"	0.104



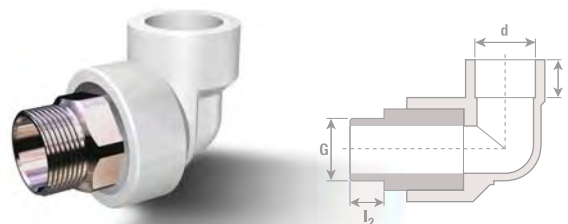
ELBOW HEXAGONAL (Female Threaded)

CODE NO	ØD (mm)	d (mm)	I ₁ - I ₂ (mm)	G"	Weight kg/pcs
7771032254	32	31.5	18 - 18	1"	0.270
7771040318	40	39.4	20.5 - 20	1.1/4"	0.291
7771050381	50	49.4	23.5 - 20	1.1/2"	0.368



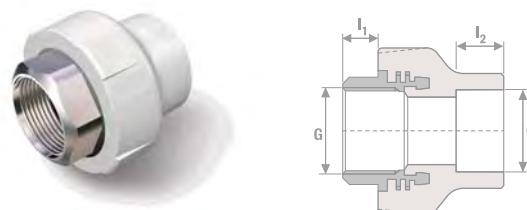
ELBOW HEXAGONAL (Male Threaded)

CODE NO	ØD (mm)	d (mm)	I ₁ - I ₂ (mm)	G"	Weight kg/pcs
7773032254	32	31.5	18 - 19	1"	0.392
7773040318	40	39.4	20.5 - 19	1.1/4"	0.361
7773050381	50	49.45	23.5 - 21.3	1.1/2"	0.458

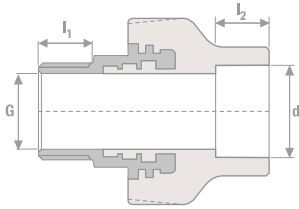


SOCKET HEXAGONAL (Female Threaded)

CODE NO	ØD (mm)	d (mm)	I ₁ - I ₂ (mm)	G"	Weight kg/pcs
7761032254	32	31.5	18 - 18.1	1"	0.210
7761040318	40	39.45	20.5 - 20	1.1/4"	0.400
7761050381	50	49.45	23.5 - 20	1.1/2"	0.403
7761063508	63	62.5	27.5 - 25	2"	0.661
7761075635	75	74.2	31 - 27.5	2.1/2"	0.832
7761090762	90	89.9	35.5 - 28.5	3"	1.000
77611101016	110	109	46 - 38.5	4"	2.174

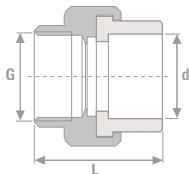


SOCKET HEXAGONAL (Male Threaded)



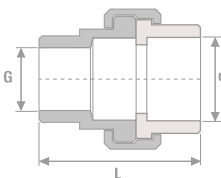
CODE NO	ØD (mm)	d (mm)	l ₁ - l ₂ (mm)	G"	Weight kg/pcs
7763032254	32	31,5	19 - 18	1"	0,197
7763040318	40	39,45	19 - 20,5	1,1/4"	0,664
7763050381	50	49,45	20,8 - 23,5	1,1/2"	0,690
7763063508	63	62,5	23 - 27,5	2"	0,727
7763075635	75	74,25	23 - 31	2,1/2"	0,963
7763090762	90	89,9	26 - 35,5	3"	1,440
77631101016	110	109	26 - 41,5	4"	2,578

TRANSITION SOCKET (Female Threaded)



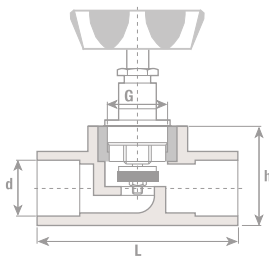
CODE NO	ØD (mm)	d (mm)	L (mm)	G"	Weight kg/pcs
7766020191	20	19,5	40	1/2"	0,113
7766025191	25	24,5	45	3/4"	0,208
7766032191	32	31,5	48,5	1"	0,225
7766040191	40	39,45	52	1,1/4"	0,365
7766050191	50	49,4	58,1	1,1/2"	0,519
7766063191	63	62,5	67,5	2"	0,835

TRANSITION SOCKET (Male Threaded)



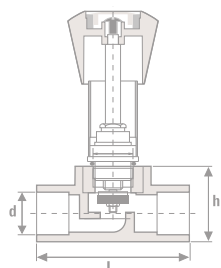
CODE NO	ØD (mm)	d (mm)	L (mm)	G"	Weight kg/pcs
7765020191	20	19,5	50,5	1/2"	0,204
7765025191	25	24,5	53	3/4"	0,406
7765032191	32	31,5	64	1"	0,525
7765040191	40	39,45	70,5	1,1/4"	0,650
7765050191	50	49,4	77,9	1,1/2"	0,625
7765063191	63	62,5	89,5	2"	0,881

STOP VALVE



CODE NO	ØD (mm)	d (mm)	h (mm)	L (mm)	G"	Weight kg/pcs
7782020127	20	19,5	41,5	64,5	1/2"	0,032
7782025191	25	24,5	45	88	3/4"	0,049
7782022254	32	31,5	56,5	94	1"	0,085
7782040318	40	39,4	67,7	94,6	1"	0,093

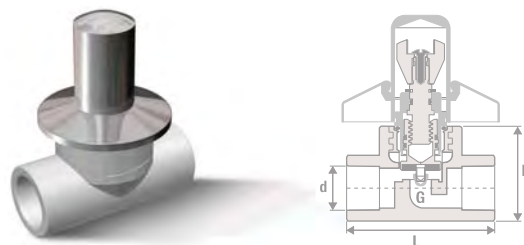
CHROME-PLATED VALVE



CODE NO	ØD (mm)	d (mm)	h (mm)	L (mm)	G"	Weight kg/pcs
7782010127	20	19,5	41,5	64,5	1/2"	0,433
7782015191	25	24,5	45	88	3/4"	0,464
7782012254	32	31,5	56,5	94	1"	0,600

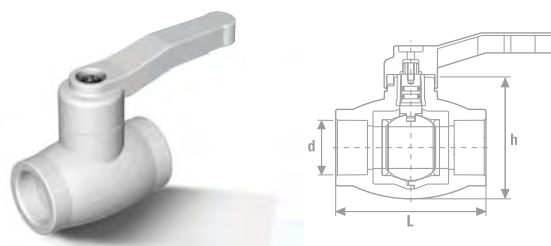
CHROME-PLATED HIDDEN VALVE

CODE NO	ØD (mm)	d (mm)	h (mm)	L (mm)	G"	Weight kg/pcs
7784010127	20	19.5	41.5	64.5	1/2"	0.248
7784025191	25	24.5	45	88.5	3/4"	0.296
7784032254	32	31.5	56.5	94	1"	0.427



BALL VALVE

CODE NO	ØD (mm)	d (mm)	h (mm)	L (mm)	G"	Weight kg/pcs
7783020127	20	19.5	55	69	1/2"	0.033
7783025131	25	24.5	62.9	76.5	3/4"	0.044
7783032254	32	31.5	70	87.5	1"	0.069
7783040318	40	39.5	88	103.5	1.1/4"	0.093



SOCKET WITH LOOSE NUT

CODE NO	ØD (mm)	G"	Weight kg/pcs
7775020127	20	1/2"	0.248
7775025191	25	3/4"	0.296



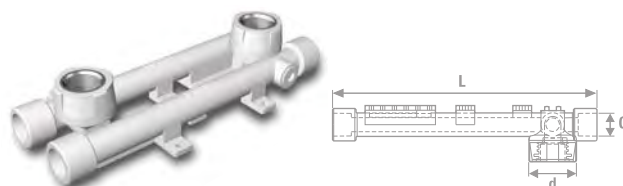
Y - FILTER

CODE NO	ØD (mm)	G"	Weight kg/pcs
7781020127	20	1/2"	0.248
7781025191	25	3/4"	0.296



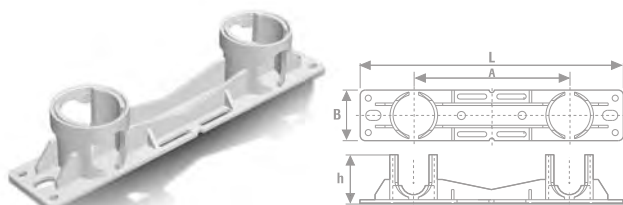
ADJUSTABLE ARMATURE CONNECTOR

CODE NO	ØD (mm)	d (mm)	L (mm)	G"	Weight kg/pcs
7780020127	20	19.5	225	1/2"	0.220



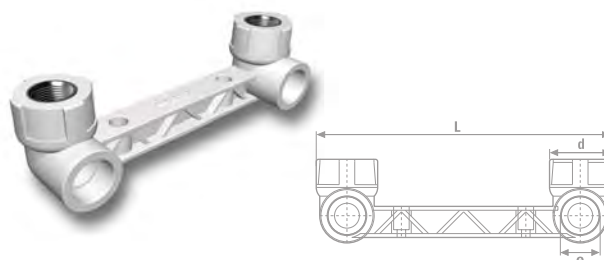
ARMATURE STABILIZER

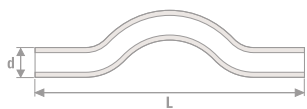
CODE NO	ØD (mm)	h (mm)	B (mm)	A (mm)	L (mm)	Weight kg/pcs
7734000000	26	48.5	50	154	260	0.625



ARMATURE CONNECTOR

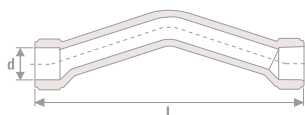
CODE NO	ØD (mm)	d (mm)	L (mm)	G"	Weight kg/pcs
7780025128	20	30.0	189	1/2"	0.135
7780025127	25	39.5	190	3/4"	0.150





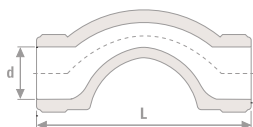
CURVED BRIDGE

CODE NO	ØD (mm)	d (mm)	L (mm)	Weight kg/pcs
7700120020	20	20	280	0.048
7700120025	25	25	280	0.079
7700120032	32	32	310	0.138
7700120040	40	40	310	0.208



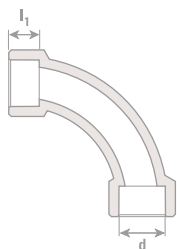
BRIDGE WITH SOCKET

CODE NO	ØD (mm)	d (mm)	L (mm)	Weight kg/pcs
7700120020	20	19.5	160	0.035
7700120025	25	24.5	200	0.065



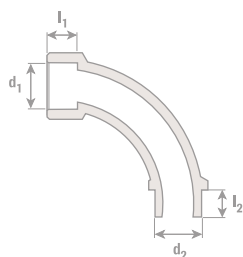
SHORT BRIDGE

CODE NO	ØD (mm)	d (mm)	L (mm)	Weight kg/pcs
7700150020	20	19.5	85	0.248
7700150025	25	24.5	97.5	0.296
7700150032	32	31.5	130	0.427



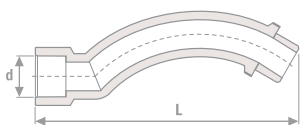
CURVED ELBOW (Female)

CODE NO	ØD (mm)	d ₁ (mm)	L (mm)	Weight kg/pcs
7711003020	20	19.5	14.5	0.024
7711003025	25	24.5	16	0.043



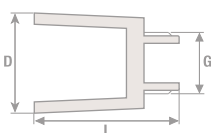
CURVED ELBOW (Male)

CODE NO	ØD (mm)	d ₁ - d ₂ (mm)	l ₁ - l ₂ (mm)	Weight kg/pcs
7711003120	20	19.5 - 20	14.5 - 14.5	0.022
7711003125	25	24.5 - 25	16 - 16	0.040



HALF CURVE WITH SOCKET

CODE NO	ØD (mm)	d (mm)	L (mm)	Weight kg/pcs
7700140020	20	19.5	120.81	0.028
7700140025	25	24.5	157.05	0.049



END CLOSURE WITH NUTHEAD

CODE NO	ØD (mm)	d (mm)	L (mm)	Weight kg/pcs
7732020020	34.2	49.5	1/2"	0.013

PLUG

CODE NO	ØD (mm)	L (mm)	AA (mm)	G"	Weight kg/pcs
7732000020	20	29	22	1/2"	0.007
7732000025	25	23	24	3/4"	0.008



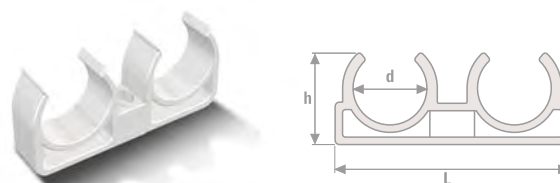
CLAMP

CODE NO	ØD (mm)	d (mm)	e (mm)	h (mm)	L (mm)	Weight kg/pcs
7733000020	20	19	5.5	27.3	30	0.005
7733000025	25	24	5.5	31.5	36	0.006
7733000032	32	30	5.5	36.7	45	0.009
7733000040	40	39	5.5	44.7	54	0.010



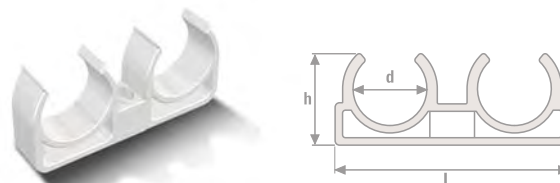
DOUBLE CLAMP

CODE NO	ØD (mm)	d (mm)	h (mm)	L (mm)	Weight kg/pcs
7733000021	20	19.8	29.6	64.4	0.013
7733000026	25	24.8	30.7	78.7	0.014
7733000034	32	31.5	37.5	87.5	0.016



DOUBLE CLAMP (For Aluminium Foiled Pipes)

CODE NO	ØD (mm)	d (mm)	h (mm)	L (mm)	Weight kg/pcs
7733000027	25	24.8	30.7	78.7	0.014
7733000033	32	31.5	37.5	87.5	0.016



END CAP

CODE NO	ØD (mm)	d (mm)	I ₁ (mm)	L (mm)	Weight kg/pcs
7731000020	20	19.5	14.5	25.8	0.013
7731000025	25	24.5	16	31.5	0.015
7731000032	32	31.5	18	36	0.026
7731000040	40	39.4	20.5	42	0.034
7731000050	50	49.4	23.5	47	0.048
7731000063	63	62.5	27.5	56.4	0.090
7731000075	75	74.2	31	70	0.190
7731000090	90	89.2	35.5	80	0.274
7731000110	110	109	41.5	95	0.600



FOLYOMATİK

CODE NO	ØD (mm)
8795063020	20
8795063025	25
8795063032	32



BOILER SET

CODE NO	BOX
7680000100	12 Box / Parcel

