HI-TECH PPR TECHNICAL CATALOGUE

mir holding

Dizayn Group is a Mir Holding company.

DİZAYN GROUP

www.dizayngroup.com

DIZAYN GROUP

Dizayn Group was established in 1987 for developing and applying projects in sanitary piping sector and started to manufacture floor heating pipes in September 1992, then indoor clean water pipes. Now, Mir Holding is the largest one of the group companies.

Dizayn Group organized many educational and promotional activities for popularizing plastic pipe use and in a short term of 12 years, the Group has become a company making production in 3 facilities, two in Beylikdüzü and one in Çorlu, in a total closed area of 35.000 m^2 and open area of 100.000 m^2.

Dizayn Group reserves 5% of its turnover every year for R&D and every product developed by the Group bears certificates, each received from international independent institutions. Some of these institutions are:

MEYER ISO 9001:2008, WQC (UK), DVGW (Germany), Hygiene Institute (Germany), CMA (China), GOST (Russia), IMA (Germany), ZIK (Croatia), EMI (Hungary), GOST (Ukraine)

Dizayn Group exports to more than 80 countries, most important regions being the Middle East, South America, West and East Europe, Russia, Turkic Republics, North Africa, Far East and Australia. Dizayn Group also has more than 100 patents for products developed. In addition, Dizayn Group has been awarded in July 2004 by Turkish Patent Institute for its contribution in development of technology in our country and the world.

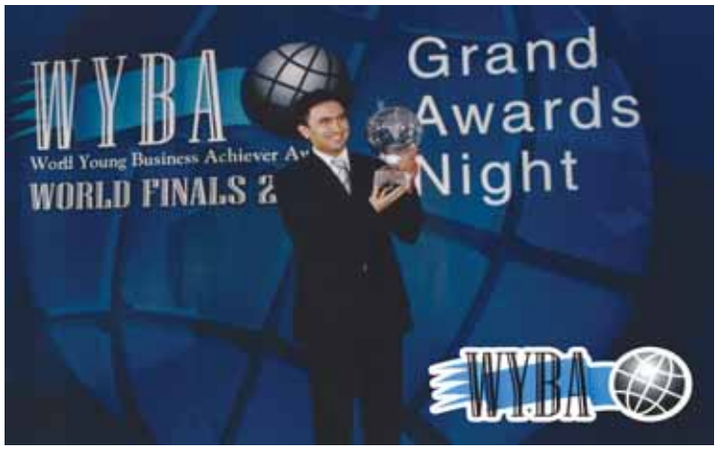
The reason for Dizayn Group to achieve such a success in a very short time is the three separate missions. With **Product Development** mission, Dizayn Group manufactures 12 mm to 1600 mm diameter high pressure, 50 mm to 8000 diameter low pressure, Polyethylene and Polypropylene raw material resilient to high soil and traffic load, 23 different systems with flow and more than 4.000 product varieties.

Product groups developed by Dizayn Group can be sorted as follows:

- **Superstructure Product Group**
  Indoor clean water systems
  Indoor waste water systems
  Indoor heating installation systems
  Radiator product group

- **Infrastructure Product Group**
  Drinking water systems
  Sewerage systems
  Natural gas systems
  Pre-isolated city heating systems

- **Agricultural Irrigation Product Groups**
  Drip irrigation systems
  Sprinkle irrigation systems
  Drill pipes



Dizayn Group has achieved a world first and **broke a world** record by manufacturing 1600 mm diameter pipe under PN 12,5 pressure in October 2001. Dizayn Group has perfectly manufactured this product, which the rivals in the world said to be impossible, by developing a completely different technology. Also with this record, Dizayn Group manufactured the first industrial product from Turkey being a world first.

In recent years, Dizayn Group has been supporting tens of doctorate, masters, license and project studies continuing in various universities of Turkey. Project and test subjects of these studies are in Dizayn Group's area of expertise. Again, more than 30 articles issued by Dizayn Group have taken part in various national and international publications.

With **Investment Mission**, Dizayn Group invests regarding the products developed. Objective of Dizayn Group in future years is to become an international company active in international arena with internal and external investments.

With **Project Development** mission, Dizayn Group develops projects for supplying city heating, drinking water needs, agricultural irrigation by carrying fluids (water, gas, etc.) from where it is in abundance to where it is lacking. At the same time, the Group designs a complete new system with primary and secondary distributions and establishes systems for the project.

Dizayn Group, as a part of many domestic and international projects, has been awarded by UNESCO with **"Water and Water Management"** for its project of bringing water to Sudan. Award Ceremony held place in "Water Symposium" organized in Cannes, France. Most important specialty of this award is that it has been given to a private company for the first time, Dizayn Group.

On the other hand, Dizayn Group has been qualified to participate in the Turkey Final of World Young Entrepreneur Businessmen Competition as the winner of **Universal Participation Award** and the World Final as the winner of **Grand Award** for all developed projects, products, patents, quality certificates and other achievements since established. In the World Final, which was an international organization that took part in Philippines with participation of 12 countries such as Germany, UK, Netherlands, Mir Holding Chairman of the Board Mr. İbrahim Mirmahmutoğulları successfully represented our country and won **Grand Award of World Young Entrepreneur Businessmen Competition.**

Another project successfully organized by Dizayn Group is **"Encouragement of Brain Power Against Brain Drain"** campaign. The aim of this campaign, which was first organized in 2002, is to prevent productive minds from leaving abroad and to support projects that can contribute to the economy.

Dizayn Group, able to create its own know-how with its strong R&D staff, put into practice the project of "Local Production Points" in various locations of Anatolia and the first production facilities in this project's extent were established in Çorum and Sivas.

Last investment of Dizayn Group was in Azerbaijan, putting into practice the production facilities.

General Product Information and Application Areas

Solution Type	Raw Material				Pressure Class		Joint Type							Main Application Areas															
	PPR	PP	PEX	PE																								
SANITARY SYSTEM SOLUTIONS																												
Flush Mounted Sanitary System	*					*	*							*							*	*		*				
Mobile System Sanitary System			*			*		*	*					*							*	*	*	*				
WASTE WATER AND SEWERAGE SOLUTIONS																												
Indoor Waste Water System		*			*					*						*									*			
Sewerage System		*		*	*						*		*				*								*			
Downspout Installation		*			*					*						*	*								*			
HEATING INSTALLATION SOLUTIONS																												
Combi Conversion Installation		*				*	*											*										
Mobile System Heating Installation			*			*		*	*									*										
Floor Heating Installation			*			*		*	*										*	*	*				*			
CLEAN WATER SYSTEM SOLUTIONS																												
Clean Water System				*		*						*	*		*							*	*	*	*			
Attachment Parts-1 Face Welded				*		*						*																
Attachment Parts-2 Electrofusion				*		*							*															
NATURAL GAS SYSTEM SOLUTIONS																												
Natural Gas System				*		*						*	*												*			
Attachment Parts													*															
AGRICULTURAL IRRIGATION SOLUTIONS																												
Sprinkle Irrigation				*		*				*															*			
Drip Irrigation				*		*																				*		
Deep Drilling				*	*			*																			*	

Table 1: General Product Information and Application Areas

Pressure Class
- Non-Pressurized
- Pressurized

Joint Type
- Screw System
- Button System
- Spigot Assembly
- Socket Welding
- Collar Gasket
- Face Welding
- Electrofusion

Main Application Areas
- Drinking Water
- Indoor Waste Water
- Downspout
- Underground
- Combi Radiator Heating
- Anti-Icing Applications in Sports Arenas, Roads and Pavements
- Floor Heating
- Wall Heating
- Pure Water Line
- Cooling Water Line
- Cold Water Line
- Industrial Applications
- Sprinkle Irrigation
- Drip Irrigation
- Drilling

RAW MATERIAL

Polypropylene Random Copolymer

Dizayn HI-TECH PPR pipes and fittings are manufactured using low melt flow index, high molecular weight and high flexibility PPR 100 raw material. PPR 100 raw material is recommended for pressurized pipe manufacturing for many applications such as raw clean water transport lines, hot and cold water transport lines, heating system lines, chemical industry lines. Features such as long term pressure resilience, high chemical resistance, application convenience of PPR pipes in hot and cold water transport systems provide advantage over conventional systems.

Dizayn Group ensures economical, hygienic and safe transport of water with PPR raw material. Also, Dizayn Group provides its customers 100% reliability in PPR pipes and fittings with international quality certificates.

Quality Standards Regarding PPR Products

TS EN ISO 15874-2 : Polypropylene Pipes for Cold and Hot Water
TS EN ISO 15874-3 : Polypropylene Attachments for Cold and Hot Water
TS 11755–5,6 : Polypropylene Attachments
W 544 : Polypropylene Pipes
W 534 : Polypropylene Attachments
DIN 8077 : Polypropylene Pipes, Sizes
DIN 8078 : Polypropylene Pipes, General Quality Conditions and Tests
DIN 1988 : Indoor Drinking Water Lines
DIN 16928 : Locations of Pipe Joints and Parts
DVS 2207 : Welding Regulations for Plastic Pipes
DVS 223 : Thermoplastics Welding Joint Tests
DIN 16962 : Polypropylene Pipe Joints and Parts for Pressurized Pipes
DVS 2208 : Machinery and Devices for Welding Processes of Plastic Pipes
DVGW 308 : Regulations and Conditions for Fittings, Pipes and Drinking Water Installations
EnEV : Energy Saving Law
Heiz-Anl.V : Heating Facility Decree

SOME OF THE TESTS PERFORMED IN DIZAYN LABORATORIES FOR ENSURING PERMANENT QUALITY

1 MFI (Melt Flow Index) Test

This test is used for simulating the flow movement of the material in extruder and injection machines before processing. The test provides unit temperature and time based information on the material's flow index. Test results provide information on possible behavior of the material during manufacturing process. Quality standard for the test is ISO 1133.

2 Density Test

The material is passed through MFI device and its weight is determined seperately in air and in a fluid with known density according to ISO 1183 standard. After these weight values are obtained, the density of the material is determined.

3 Impact (Izod-Charpy) Test

This test determines the amount of energy absorption and possible applicable force on a unit area by free fall of materials with different weights. This test provides information about the behavior of material against various loads in sudden impacts. Standards in effect for this test are ISO 179 and ISO 180.

4 Thermal Cycle Test

Pipes, attachments or joints must not leak when subjected to testing according to EN 12293 using parameters stated in TS EN ISO 15874–5. The test for flexible pipes is performed only upon declaration by the manufacturer that the pipe may be bent as shown. Bending radius must not be smaller than the declared smallest bending radius. The test for all other cases is performed for rigid pipes.

SOME OF THE TESTS PERFORMED IN DIZAYN LABORATORIES FOR ENSURING PERMANENT QUALITY

5 Thermal Stability Test

When subjected to thermal stability test via hydrostatic pressure test at 110°C for 8760 hours according to EN 921 using a fitting fixed to the pipe or a pipe shaped test piece, there must be no explosion observed in the test piece. The test must be performed in water and in air by applying an inner pressure equivalent to the hydrostatic tension used in thermal stability test on pipe material. If a fitting on pipes is used as a test piece and there is damage on the pipe joint, the thermal stability test must be repeated using a pipe shaped test piece.

6 Internal Structure Image (Microscope) Test

This test is used for observing the fiber structure of the material. Purpose of the test is to ensure that the material has a homogenous structure. If the structure of fibers is not linear, this means there is a problem caused by the manufacturing process or by the raw material's own quality.

7 Thermal Elongation Test

This test is used for checking whether or not the longitudinal length changes on the materials due to temperature differences are within standard levels. Standard for this test is EN743.

8 Pressure Test

Hydrostatic internal pressure resistance test for PPR pipes is performed according to TS EN ISO 1167–1 and TS EN ISO 1167-2. Time and temperature values must be as stated in the table below according to TS EN ISO 15874–2 standards.

Table 2: Internal Pressure Resistance Test Values

Hydrostatic Ring Tension	Testing Temperature	Testing Duration	Test Pieces
Mpa	°C	h	Units
16,0	20	1	3
4,3	95	22	3
3,8	95	165	3
3,5	95	1000	3

9 Momentum Strength Test

In addition to leak test, a resistance test is performed to determine whether or not the metal fittings and plastic behave as a single piece. For PPR systems to operate at 95°C temperature, metal fittings must endure 4 kgm momentums.

10 DSC and OIT Test

DSC test is used for determining the melting temperature, crystallinity ratio and whether or not the material has a homogenous structure. OIT test is used for measuring the material's oxygen transfer duration.

CERTIFICATES

ZURICH INSURANCE
Liability Insurance

TS EN ISO 15874-2
PPR Pipes

TS EN ISO 15874-3
PPR Fittings

HIFZISIHHA
PPR Pipe Test Report

Hygiene Institute (GERMANY)
PPR Pipes Hygiene Certificate

DVGW (GERMANY)
PPR Pipes and Fittings
Product Certificate

GOST CERTIFICATE (RUSSIA)
PPR Pipes and Fittings

UKRAINE
PPR Pipes and Fittings
Conformity Certificate

IMA (GERMANY)
PPR Pipes PN 25 Test CERTIFICATE

ISO 9001:2008 QUALITY CERTIFICATE

AGREMENT TEHNIC (ROMANIA)
PPR Pipes and Fittings

Outer Diameter	Diameter Tolerance	Wall Thickness	Thickness Tolerance	Minimum Weight Per Unit
d	-	S	-	-
(mm)	(mm)	(mm)	(mm)	(kg/m)
Ø16	+0,3	2,7	+0,5	0,101
Ø20	+0,3	3,4	+0,6	0,159
Ø25	+0,3	4,2	+0,7	0,247
Ø32	+0,3	5,4	+0,8	0,406
Ø40	+0,4	6,7	+0,9	0,631
Ø50	+0,5	8,3	+1,1	0,978
Ø63	+0,6	10,5	+1,3	1,558
Ø75	+0,7	12,5	+1,5	2,208
Ø90	+0,9	15,0	+1,7	3,179
Ø110	+0,9	18,3	+2,1	4,742
Ø125	+1,2	20,8	+2,3	6,125

Table 3: Manufacturing Tolerances and Measurements

Feature	Test Method	Unit	Value
Density at 23˚C	ISO R 1183	g/cm^3	0,90
Melt flow index 190˚C/5 kg	ASTM D 1238	g/10 min	0,70
Melt flow index 230˚C/2,16 kg	ISO R 1133	g/10 min	0,2-0,45
Melt flow index 230˚C/5 kg	DIN 53 735	g/10 min	0,6-1,2
Fusion point		^{0}C	146

Table 4: Physical Characteristics

Feature	Test Method	Unit	Value
Thermal conductivity coefficient at 10-60°C	DIN 52612	W/m.K	0,24
Specific heat at 23°C	TS 4048	KJ/KgK	2,0
Thermal expansion coefficient (0-110°C)	DIN 53752	m/mK	1,5-1,8x10^{-4}
Temperature of deformation under weight	ASTM D 648		
1,8 N/mm^2	ISO 75	^{o}C	44
0,45 N/mm^2	DIN 53 461	^{o}C	72
Brittle temperature	ASTM D 746	^{o}C	-13
VICAT Softening point	ASTM D 1525		
(1 kg)	ISO 306	^{o}C	130
(5 kgs)	DIN 53 460	^{o}C	60

Table 5: Heating Characteristics

Feature		Test Method	Unit	Value
Tensile stress at yield point (23˚C)		ISO R527		
Test speed: 50 mm/min			N/mm²	25
Test speed: 100 mm/min			N/mm²	23
Unit elongation at yield (23˚C)				
Test speed: 50 mm/min			%	13,5
Test speed: 100 mm/min			%	18
Tensile stress at breaking point (23˚C)		DIN 53 455		
Test speed: 50 mm/min			N/mm²	21,5
Test speed: 100 mm/min			N/mm²	34
Unit elongation at break (23˚C)				
Test speed: 50 mm/min			%	>400
Test speed: 100 mm/min			%	>400
Elasticity modulus at 23˚C		ASTM D 790	N/mm²	800
Flexural modulus at 23˚C		DIN 53 447	N/mm²	874
Shore D hardness (15 s value)		ASTM D740 ISO R 868 DIN 53 505		60
IZOD Impact resistance (notched)	at 23˚C	ISO R 180	J/m²	22,5
	at 0˚C	ASTM D 256	J/m²	5,6
CHARPY Impact resistance (notched)	at 23˚C	DIN 53453	KJ/m²	20
	at 0˚C	ISO R 179/1eA	KJ/m²	3,5
CHARPY Impact resistance (notched)	at 23˚C	DIN 53 453	KJ/m²	No Break
	at 0˚C	ISO R 179	KJ/m²	
Impact resistance	at 0˚C	DIN 8078 Part 2		No Break

Table 6: Mechanical Characteristics

Dizayn Pipes and Fittings ensure your health.

Dizayn Group is a leading company with the hygiene certificate given by Germany Institute of Hygiene. With this certificate, Dizayn Group has ensured the health of customers from raw material to the product. This is why the important hospitals of Turkey prefer only Dizayn brand sanitary system products.

Certified Quality!
• Our company has OAS, DVGW, GOST-R, IMA, KIWA, WRC and EMI certificates.
• For these certificates, authorities visit our company and give sufficiency approval for our facilities and laboratories.
• They test the products for one year and certify the 50 year guarantee. Then, every three months the products are tested. If the result is not successful, the certification is cancelled.
• Necessary samples for the test are provided from the market by the concerning laboratory. The purpose here is to check the marketed product.

HI-TECH Difference!
• Dizayn HI-TECH metal fittings are manufactured via the manufacturing method protected by **3 European patents.** Thus metal and plastic are ensured to work as a unit and the problem of metal-plastic leaking is removed.
• Our researches show that as of today, in Turkey only Dizayn brand PPR fittings are designed conically according to German DIN standards.
• Pressure losses are minimal in installations with Dizayn HI-TECH Series.

Benefits of our differences for the installer

• HI-TECH PPR Series provide time saving and high quality welding for the user.
• Prevents leaking problems in the installation with their 3 patent manufacturing methods.
• If the fittings are not conical shaped, the extra material at the face accumulates on the base during entry and the flow diameter of the hole significantly narrows.
• Because Dizayn fittings are conical, no problems such as noise generation or energy loss occur in the installation.

HI-TECH PPR Series / OUR SUPERIORITIES

1 Point Where Technology and Aesthetics Meet

Dizayn HI-TECH Series are series of products that enable correct, reliable and economical transport of water in indoor clean water systems, which bring together technology and Aesthetics as a result of long-term studies by Dizayn R&D. This superior compatibility of PPR pipes and fittings, with their visual structure as well as technical differences, will both ease the installer's work and provide users healthy installations where esthetic worries are gone.

2

Spectacular Colors for Modern Installations

HI-TECH PPR Series are presented to users in colors of gold, silver and ivory as well as white, grey and green.

3 1 Day is 48 Hours with Dizayn HI-TECH Series

Time to forget all you know!
With Dizayn HI-TECH Series, our plumbers will be able to weld twice the amount using normally available products in a day. We know that time is of the essence for our plumbers. You are ahead of everyone else with savings during heating with Dizayn HI-TECH Series. Now, one day is 48 hours for plumbers using Dizayn HI-TECH Series!

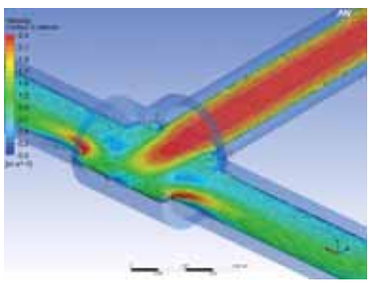
4

Weldings Are Now Clearer with Dizayn HI-TECH Series

Ugly looks of plastic remainders swelling while melting the die plate are no more with Dizayn HI-TECH pipes. It is not desired for the remaining material on the joint of pipes and attachments to look unseemly in an installation. With the special design of Dizayn HI-TECH pipes, the melted material does not swell over the die plate; it stays between the pipe and attachment, so it provides a long life welding.

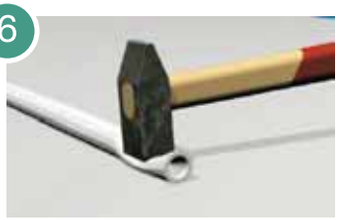
5 Let Your Installation Work Easily with Dizayn HI-TECH Series

Local loss factors are 30% less with Dizayn HI-TECH fittings. Water flowing through the fitting leaves the attachment with minimal loss via the ease of passage provided in Dizayn HI-TECH fittings. Each fitting is designed by testing with fluid analysis on computer program. Total loss in fittings comprise a significant part of total pressure loss in the installation. Clean water and heating installations with Dizayn HI-TECH work with minimal energy.



HI-TECH PPR Series / OUR SUPERIORITIES

6



No More Fracturing Pipes with Dizayn HI-TECH Series
It is unavoidable for PPR pipes to fracture upon impact in cold. Dizayn HI-TECH PPR pipes absorb impact forces thanks to its design, providing 30% more impact strength than normal pipes.

7

Metal Fittings of Dizayn HI-TECH Series Do Not Leak
Water leaking from between plastic and metal in metal fittings is a big problem. Conventional methods are not used in manufacturing of metal fittings in Dizayn HI-TECH Series. A very advanced technology called HIGH PRESSURE INJECTION is used in metal fittings of Dizayn HI-TECH Series. This product, protected by three European patents, are not designed as two pieces of metal and plastic, but so as to work as a single unit. Now metal and plastic are not two separate materials, they are one single material. DİZAYN HAS ELIMINATED THE LEAKING PROBLEM.

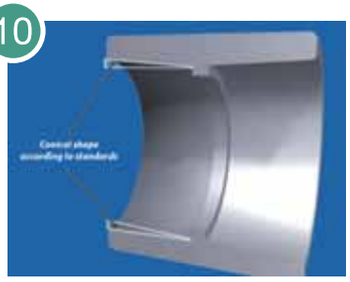
8

"Heavy Metals" In The Metal Used In Metal Fittings Are Prevented From Infusing Into Water
In the German DIN 50930–6 (EN 12502) standard published in 2004, because coatings over brass material include heavy metals, these kinds of coatings have been forbidden to be used in drinking water transportation. As known, heavy metals are "CANCEROGENIC". DIN standards mandate that brass materials are used in MS 63 alloys and naked.

9

HI-TECH Metal Fittings Have Above Standard Torque Values
One of the most important features showing the joint quality between metal and plastic is the torque strength. Torque strengths of all metals in HI-TECH Series are significantly improved. For example; rotation does not occur as shedding of metal and plastic intermediate surface, but as plastic deformation.

10

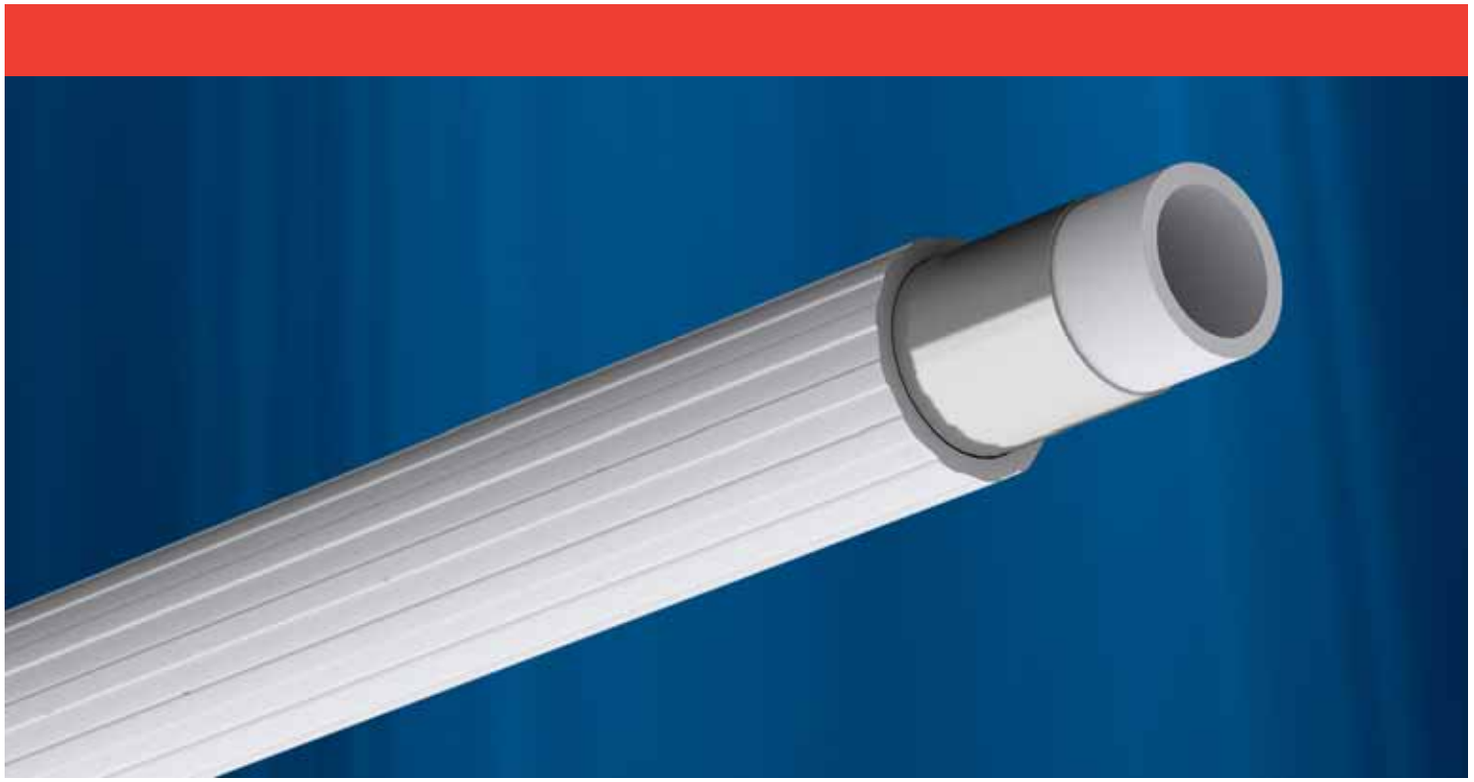


Fittings are Conical
The most important factor ensuring welding quality is the conical shape of the joint area of the plastic. Thus an intermediate surface pressure ensuring a good welding is obtained and a more reliable welding is performed at the joint points.

11

Perfect Trowel Coating Compliance with Dizayn HI-TECH Pipes
Thanks to the threaded geometry of the outer surface of HI-TECH pipes, the pipes integrate with the trowel coating. Thus the risk of pipes moving inside the trowel coating is eliminated. Also, thanks to this threaded surface, an ease in assembly is achieved and it is easier for the plumber to grip the pipe.

HI-TECH Oxy Plus Combi Pipe / General Specifications



Certified Quality!
• Our company has QAS, DVGW, KIWA, WRC and EMI certificates.
• For these certificates, authorities visit our company and give sufficiency approval for our facilities and laboratories.
• They test the products for one year and certify the 50 year guarantee. Then, every three months the products are tested. If the result is not successful, the certification is cancelled.
• Necessary samples for the test are provided from the market by the concerning laboratory. The purpose here is to check the marketed product.

HI-TECH Oxy Plus Difference!
• HI-TECH Oxy Plus Combi Pipe; a patent product of Dizayn.
• HI-TECH Oxy Plus Combi Pipe is compliant with national and international quality standards (TS EN ISO 15874, DIN 8077, DIN 8078).
• With HI-TECH Oxy Plus Combi Pipe, oxygen isolation in heating installations is much lower than the value set forth by DIN 4726 standard.
• HI-TECH Oxy Plus Combi Pipe has a pressure class of PN32.

Benefits of Our Differences for the Installer
• HI-TECH Oxy Plus Combi pipe minimizes the labor cost by removing the foil peeling process called trimming.
• In HI-TECH Oxy Plus Combi Pipe applications, even the shortest pieces are usable in the installation, so wastage is eliminated.
• HI-TECH Oxy Plus Combi Pipe is ensured to not have any remaining foils on the welding area. By preventing the outer diameter value to fall out of tolerance range because of trimming, all problems occurring during the welding are eliminated.
• HI-TECH Oxy Plus Combi Pipes provide time saving and high quality welding for the user.

	Oxygen Entering the System N_A (mg/day)	Oxygen Transition Allowed by System's DIN 4726 Norm N_A (mg/day)
HI-TECH Oxy Plus Combi Pipe	**1,79**	2.38
Conventional Aluminum Foil Pipe	4,91	2.38

Table 7: Oxygen Transition Values in Heating Installations

HI-TECH Oxy Plus Combi Pipe /OUR SUPERIORITIES

1

Dizayn HI-TECH Oxy Plus Combi Pipe is Oxygen-Proof
Because the parts inside the fitting of HI-TECH Oxy Plus Combi Pipes are also foil covered, oxygen transition level is lower than the 0,1 g/m^{3}xday level set forth by DIN 4726 standard.

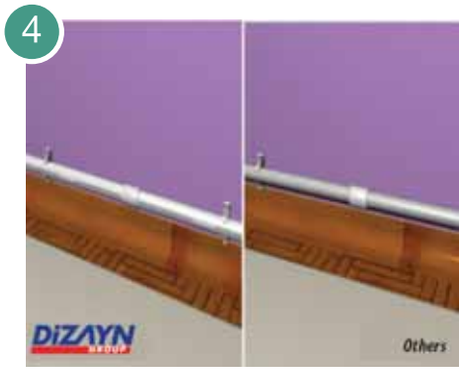
2

Dizayn HI-TECH Oxy Plus Combi Pipe Does Not Require Trimming
With its unique technology, the aluminum foil is moved to the middle of wall thickness in Dizayn HI-TECH Oxy Plus Combi Pipe and thus the foil peeling process called trimming is eliminated. After cutting the pipe, it becomes ready for welding with a simple face correction.

3

Dizayn HI-TECH Oxy Plus Combi Pipe is Wastage Free
In HI-TECH Oxy Plus Combi Pipe applications, even the short pieces are easily used and thus there is no waste.

4



Dizayn HI-TECH Oxy Plus Combi Pipe is Aesthetic
HI-TECH Oxy Plus Combi Pipes and fittings are manufactured in white color. Because the foil is close to the surface in available products, the visible color is grey. Because this greyish color of the pipe does not match the fittings color, the color aesthetics in the installations are ruined.

HI-TECH Oxy Plus Combi Pipe /OUR SUPERIORITIES

5

Dizayn HI-TECH Oxy Plus Combi Pipe is Resilient Against Elongation
Because the aluminum foil of HI-TECH Oxy Plus Combi Pipe is in the middle, there are equal layers on both sides of the foil and each layer are equally resilient against elongation.

6

More Work in Less Time with Dizayn HI-TECH Oxy Plus Combi Pipe
The installer prepares the pipe for welding without any muscle fatigue and loss of time by a small face correction with a face correction kit. Thus the labor time is halved and the installation can be done in the same time with less plumbers.

7

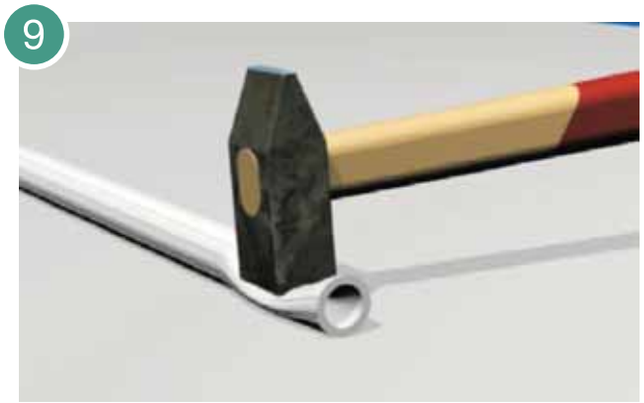
Pressure Resilience with Dizayn HI-TECH Oxy Plus Combi Pipe is 32 bar/50 Years
Another superiority is added to HI-TECH Oxy Plus Combi Pipe, which already is equipped with superior features. Aluminum foil in the middle of the pipe is continuously welded and this contributed to the pressure resilience of the pipe. Pressure resilience, which changes radically with temperature, will stay stable and the pressure class will reach up to 32 bar.

8

1 Day is 48 Hours with Dizayn HI-TECH Oxy Plus Combi Pipe
Time to forget all you know!
With Dizayn HI-TECH Oxy Plus Combi Pipe, our plumbers will be able to weld twice the amount in a day using normally available products. We know that time is of the essence for our plumbers. You are ahead of everyone else with savings during heating with Dizayn HI-TECH Oxy Plus Combi Pipes. Now, one day is 48 hours for plumbers using Dizayn HI-TECH Oxy Plus Combi Pipes!

HI-TECH Oxy Plus Combi Pipe /OUR SUPERIORITIES

9



No More Fracturing with Dizayn HI-TECH Oxy Plus Combi Pipes

It is unavoidable for PPR pipes to fracture upon impact in cold. Dizayn HI-TECH Oxy Plus Combi Pipes absorb impact forces thanks to its design, providing 30% more impact strength than normal pipes.

10

Weldings Are Now Clearer with Dizayn HI-TECH Oxy Plus Combi Pipes

Ugly looks of plastic remainders swelling while melting the die plate are no more with Dizayn HI-TECH Oxy Plus Combi Pipes. It is not desired for the remaining material on the joint of pipes and fittings to look unseemly in an installation. With the special design of Dizayn HI-TECH Oxy Plus Combi Pipes, the melted material does not swell over the die plate; it stays between the pipe and fitting, so it provides a long life welding.

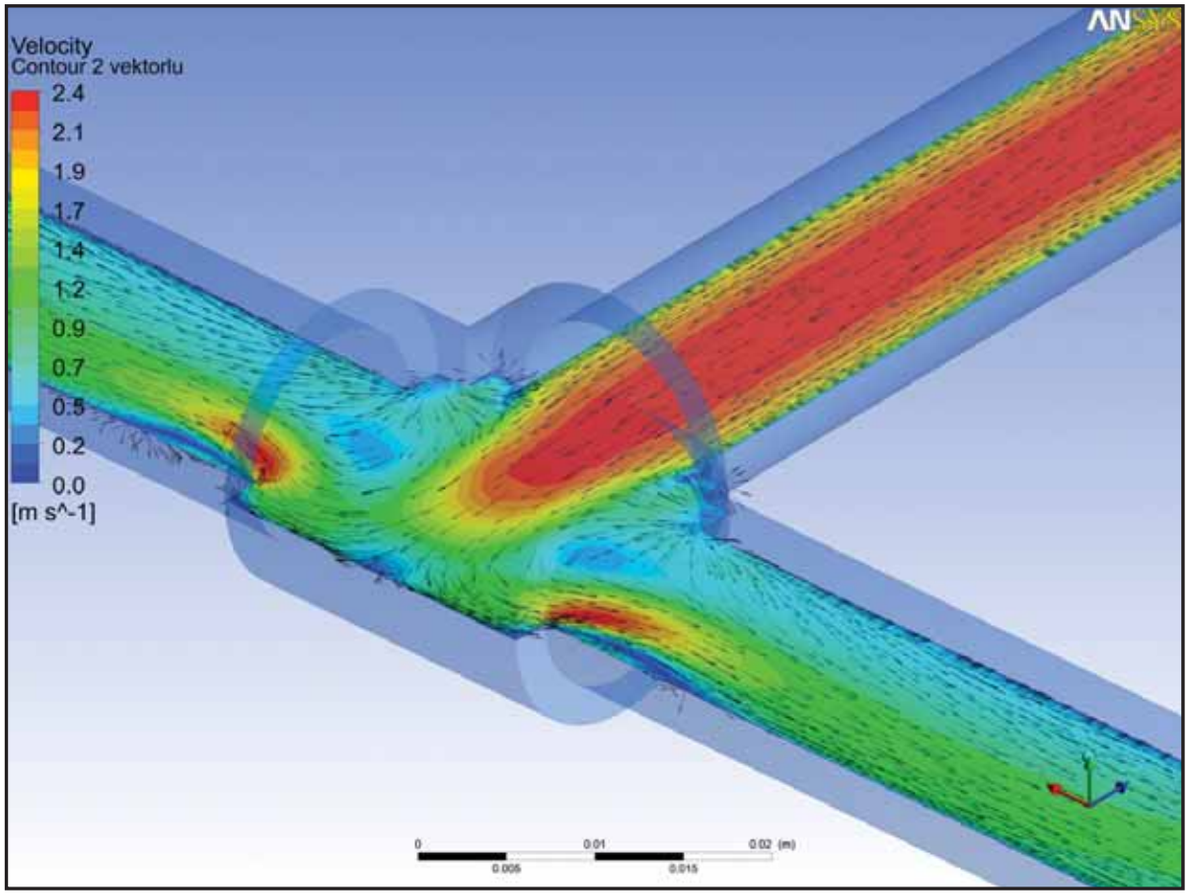
11

Perfect Alum Compliance with Dizayn HI-TECH Oxy Plus Combi Pipes

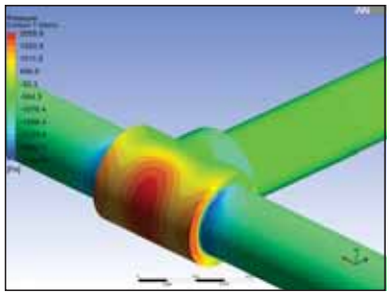
Thanks to the threaded geometry of the outer surface of Dizayn HI-TECH Oxy Plus Combi Pipes, the pipes integrate with the alum. Thus the risk of pipes moving inside the alum is eliminated. Also, thanks to this threaded surface, an ease in assembly is achieved and it is easier for the plumbers to grip the pipe.

Easily Working Installations with HI-TECH Series

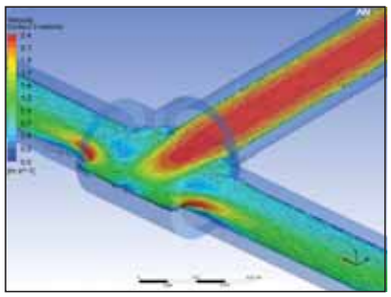
- Local loss factors are 30% less with Dizayn HI-TECH fittings.
- Water passing through the fitting leaves the fitting with minimal loss thanks to the ease of passage specific to Dizayn technology.
- HI-TECH Series fittings are designed by testing with fluid analysis on computer program.
- Clean water and heating installations with Dizayn HI-TECH pipes and fittings work with minimum energy.
- Dizayn HI-TECH pipes and fittings minimize any possible installation problems.
- HI-TECH Series fittings optimize the project costs.



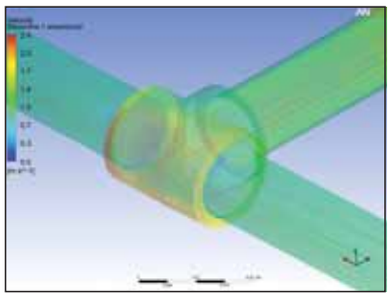
View of speed distribution and flow lines in the fitting



Pressure distribution inside the surface of fitting



View of speed distribution and vector image in the fitting



Flow lines colored according to speed in the fitting

HI-TECH OXY PLUS COMBI PIPE WELDING METHOD

1

Check that the welding machine is heated up to 260°C, the thermostat lamp is off and die plate is clean.

2

Cut HI-TECH Oxy Plus Combi Pipe perpendicular to its axis with pipe cutters.

3

Place HI-TECH Oxy Plus Combi Pipe into the face correction kit. Remember that the face of the pipes cannot always be cut perpendicular to their axis with pipe cutters. Tilted cutting of the pipe face causes problems in welding. Face correction kit is an elegant engineering product well designed for eliminating this problem. Face correction kit must always be used.

4

Correct the pipe face using the face correction kit and ensure a canal is opened in the foil section. Face of the pipe must be corrected until the whole face surface of the pipe touches the face correction kit's bottom. Installations established without using face correction

HI-TECH OXY PLUS COMBI PIPE WELDING METHOD

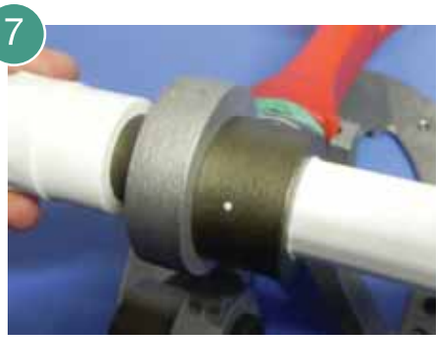
5

HI-TECH Oxy Plus Combi Pipe with Face Corrected.

6

Push HI-TECH Oxy Plus Combi Pipe and fitting at the same time vertically towards the special welding die plate. Special welding die plate is developed to eliminate possible errors by installation workers.

7

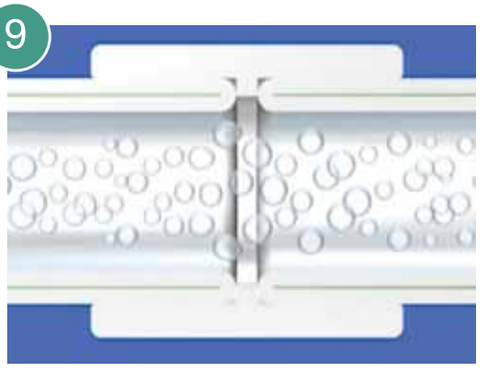


After seeing the melt material through the hole on the special welding die plate, remove the pipe and the fitting from die plate (it can be observed that the aluminum foil in the middle is left inside the plastic when looked at the pipe face out of the die plate). Special welding die plate must always be used in HI-TECH Oxy Plus Combi Pipe applications.

8

Pipe and fitting removed from the die plate must be quickly assembled. Do not twist the pipe or the fitting during assembly.

9

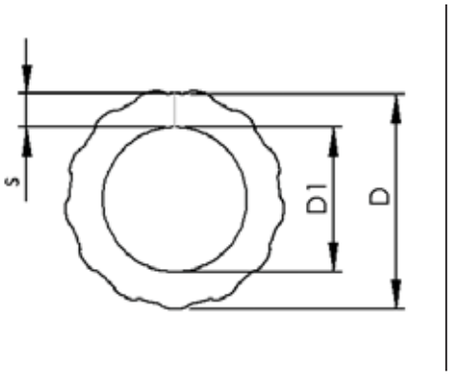


Our company guarantees the installations where Dizayn brand pipes are assembled with Dizayn brand attachments and those compliant with instructed rules.

Important Note:

Die plates used in welding applications must be compliant with DVS2208-1.

HI-TECH PPR PIPE PN 25



Perfect Trowel Coating Compliance with Dizayn HI-TECH Pipe

Thanks to the exterior surface with knurled geometry of HI-TECH pipes it is provided that pipe forms a wholeness with trowel coating. Therefore the risk of pipe's moving in the trowel coating is avoided. Also, with that knurled surface junction easiness is enabled and plumber can easily hold the pipe.

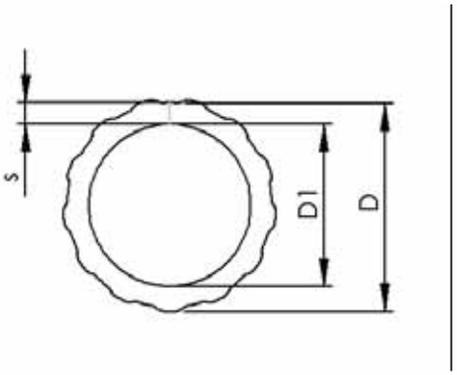
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	D1	S	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(m)	(kg)
13302	23302	33302	20	20	13,2	3,4	17x17x400	160	26,56
13304	23304	33304	25	25	16,6	4,2	17x18x400	120	31,20
13306	23306	33306	32	32	21,2	5,4	17x19x400	80	33,68
13308	23308	33308	40	40	26,6	6,7	17x18x400	60	39,12
13310	23310	33310	50	50	33,4	8,3	17x18x400	36	36,14
13312	23312	33312	63	63	42,0	10,5	17x19x400	24	39,58
10314	20314	30314	75	75	50,0	12,5	15x16x400	16	34,16
10316	20316	30316	90	90	60,0	15,0	17x17x400	12	38,57
10318	20318	30318	110	110	73,4	18,3	19x11x400	8	38,40
10320	20320	30320	125	125	83,2	20,9	12x13x400	4	24,83

ADVANTAGES

*Dizayn's Specific Design *Original PPR Raw Material *PN 25 Pressure Class *Low Heating Time *Easy and Fast Welding *Clear Welding *High Impact Resistance *High Compliance with Trowel Coating

CERTIFICATES

HI-TECH PPR PIPE PN 20



Attractive Colours for Modern Plumbing

All products of HI-TECH PPR series have more colours such as golden, silver and ivory apart from white, grey, green.

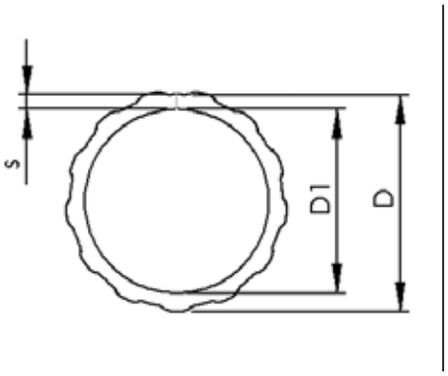
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	D1	S	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(m)	(kg)
13422	23422	33422	20	20	14,2	2,9	17x17x400	160	23,36
13424	23424	33424	25	25	18,0	3,5	17x18x400	120	26,16
13426	23426	33426	32	32	23,0	4,5	17x19x400	80	28,80
13428	23428	33428	40	40	29,0	5,5	17x18x400	60	33,54
13430	23430	33430	50	50	36,2	6,9	17x18x400	36	31,72
13432	23432	33432	63	63	45,8	8,6	17x19x400	24	32,33
10434	20434	30434	75	75	54,4	10,3	15x16x400	16	30,56
10436	20436	30436	90	90	65,4	12,3	17x17x400	12	32,86
10438	20438	30438	110	110	79,8	15,1	19x11x400	8	32,95
10440	20440	30440	125	125	90,8	17,1	12x13x400	4	21,30

ADVANTAGES

*Dizayn's Specific Design *Original PPR Raw Material *Larger Inner Diameter *PN 20 Pressure Class *Low Heating Time *Easy and Fast Welding *Clear Welding *High Impact Resistence *High Compliance with Trowel Coating

CERTIFICATES

HI-TECH PPR PIPE PN 16



Thanks to Dizayn HI-TECH Series No More Cracking Pipes

It is inevitable for PPR pipes to be cracked due to the impact in cold weather. Dizayn HI-TECH PPR pipe absorbs impact force, provides 30% more impact endurance than the regular pipes via its design.

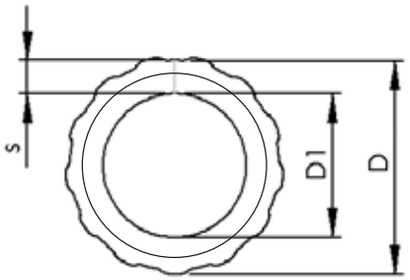
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	D1	S	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(m)	(kg)
13250	23250	33250	20	20	16,2	1,9	17x17x400	160	18,24
13252	23252	33252	25	25	20,4	2,3	17x18x400	120	19,56
13254	23254	33254	32	32	26,0	3,0	17x19x400	80	24,40
13256	23256	33256	40	40	32,6	3,7	17x18x400	60	25,26
13258	23258	33258	50	50	40,8	4,6	18x18x400	36	21,92
13260	23260	33260	63	63	51,4	5,8	18x19x400	24	46,90
10262	20262	30262	75	75	61,2	6,9	15x16x400	16	21,63
10264	20264	30264	90	90	73,6	8,2	17x17x400	12	23,14
10266	20266	30266	110	110	90,0	10,0	19x11x400	8	22,99
10268	20268	30268	125	125	102,2	11,4	13x13x400	4	14,98

ADVANTAGES

*Dizayn's Specific Design *Original PPR Raw Material *PN 16 Pressure Class *Low Heating Time *Easy and Fast Welding *Clear Welding *High Impact Resistance *High Compliance with Trowel Coating

CERTIFICATES

HI-TECH PLUS COMBI PIPE



Pressure Resistance with Dizayn HI-TECH Oxy Plus Combi Pipe is 32 bars/50 Years

One more quality is added to HI-TECH Oxy Plus Combi Pipe, which is equipped with great specifications. Aluminium folio at the centre of the pipe is welded continuous, it is hereby provided that it contributes to the pressure resistance of the pipe. Pressure resistance of the pipes which changes radically with the temperature will not change and pressure class can be increased to 32 bars.

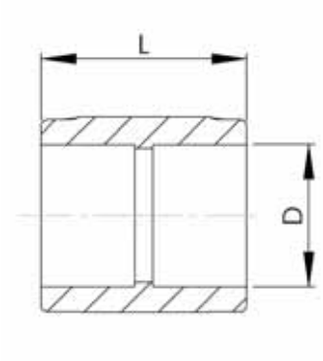
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	D1	S	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(m)	(kg)
13347	23347	33347	20	20	13,2	3,4	17x17x400	160	28,80
13349	23349	33349	25	25	16,6	4,2	17x18x400	120	32,64
13351	23351	33351	32	32	21,2	5,4	18x19x400	80	35,04
13353	23353	33353	40	40	26,6	6,7	17x18x400	60	40,26
13355	23355	33355	50	50	33,4	8,3	18x18x400	36	36,97
13357	23357	33357	63	63	42,0	10,5	18x19x400	24	38,88
10363	20363	30363	75	75	50,0	12,5	15x16x400	16	36,43
10359	20359	30359	90	90	60,0	15	17x17x400	12	41,18
10387	20387	30387	110	110	73,4	18,3	17x17x400	8	38,80

ADVANTAGES

*Dizayn's Specific Design *Oxygen Isolation Compliant with Standards *Original PPR Raw Material *PN 32 Pressure Class *Low Heating Time *Easy and Fast Welding *Clear Welding *High Impact Resistance *High Compliance with Trowel Coating

CERTIFICATES

HI-TECH SOCKET PN 25



ONLY DIZAYN FITTINGS' WELDING AREAS ARE CONICAL

- Sufficient temperature for ideal welding is ensured by die plate while pressure is ensured by the conical shape of the fittings.
- If the fitting is not conical, the welding will be poor. Extra material accumulates on the base and narrows the hole diameter.
- As a result a problematic installation with noise generation and energy loss is caused and 50 year life welding cannot be made.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
13402	23402	33402	20	20	32,3	14,6	40x40x20	800	7,20
13404	23404	33404	25	25	35,3	16,1	40x40x20	500	8,00
13406	23406	33406	32	32	39,5	18,1	40x40x20	250	7,00
13408	23408	33408	40	40	44,3	20,6	40x40x20	150	7,35
13410	23410	33410	50	50	50,3	23,6	40x40x20	75	6,30
13412	23412	33412	63	63	58,3	27,5	40x40x20	50	7,30
10414	20414	30414	75	75	64,0	30,0	40x40x20	35	8,58
10416	20416	30416	90	90	71,0	33,0	40x40x20	25	8,78
10418	20418	30418	110	110	90,0	37,0	40x40x20	10	7,08
10420	20420	30420	*125	125	86,0	40,0	40x40x20	10	5,22

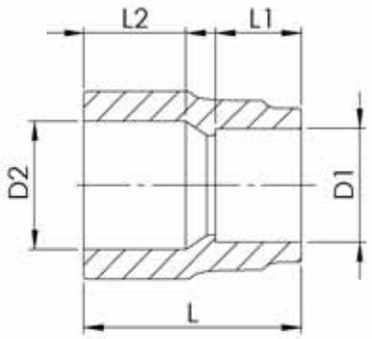
ADVANTAGES

*Dizayn's Specific Design
* Conical Shape at Welding Area
* Original PPR Raw Material
* PN 25 Pressure Class
* Low Local Loss Coefficient

CERTIFICATES

***This diameter is manufactured as PN 16.**

HI-TECH REDUCTION PN 25



HI-TECH DIFFERENCE!

- Dizayn HI-TECH metal fittings are manufactured via the manufacturing method protected by 3 European patents. Thus metal and plastic are ensured to work as a unit and the problem of metal-plastic leaking is removed.
- Our researches show that as of today, in Turkey only Dizayn brand PPR fittings are designed conically according to German DIN standards.
- Pressure losses are minimal in installations with Dizayn HI-TECH Series.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS					PACKAGING		
				D1	D2	L	L1	L2	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)					(cm)	(Units)	(kg)
13504	23504	33504	25-20	25	20	33,2	16	14,6	40x40x20	800	8,00
13506	23506	33506	32-20	32	20	37,2	18	14,6	40x40x20	500	7,00
13508	23508	33508	32-25	32	25	38,7	22,6	16,1	40x40x20	400	7,20
13510	23510	33510	40-20	40	20	42,1	20,5	14,6	40x40x20	300	6,30
13512	23512	33512	40-25	40	25	43,2	20,8	16,1	40x40x20	350	8,40
13514	23514	33514	40-32	40	32	45,3	20,9	18,2	40x40x20	200	6,60
13516	23516	33516	50-20	50	20	47,6	23,3	14,6	40x40x20	200	6,60
13518	23518	33518	50-25	50	25	49,1	24,3	16,1	40x40x20	200	7,20
13520	23520	33520	50-32	50	32	51,1	23,7	18,1	40x40x20	150	6,30
13522	23522	33522	50-40	50	40	56,2	23,6	20,6	40x40x20	120	7,56
13524	23524	33524	63-25	63	25	56,1	27,3	16,1	40x40x20	100	6,20
13526	23526	33526	63-32	63	32	58,1	27,4	18,1	40x40x20	100	6,70
13528	23528	33528	63-40	63	40	60,6	27,7	20,6	40x40x20	100	7,60
13530	23530	33530	63-50	63	50	63,6	27,6	23,6	40x40x20	70	6,93
10532	20532	30532	75-50	75	50	72,6	38,0	28,0	40x40x20	50	5,85
10534	20534	30534	75-63	75	63	70,0	25,0	29,0	40x40x20	50	6,50
10536	20536	30536	90-63	90	63	61,0	28,0	26,0	40x40x20	40	6,60
10538	20538	30538	90-75	90	75	66,0	33,5	29,0	40x40x20	40	7,60
10540	20540	30540	*110-90	110	90	77,0	39,0	33,0	40x40x20	20	8,32
10542	20542	30542	*125-110	125	110	88,0	51,0	36,0	40x40x20	15	6,09

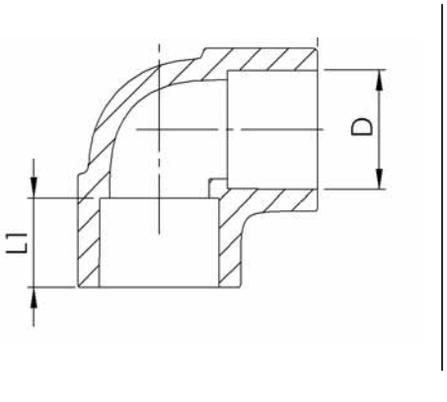
ADVANTAGES

*Dizayn's Specific Design *Conical Shape at Welding Area *Original PPR Raw Material *PN 25 Pressure Class *Low Local Loss Coefficient

CERTIFICATES

***This diameter is manufactured as PN 16.**

HI-TECH ELBOW 90° PN 25



With Dizayn HI-TECH Series Your Plumbing Runs Easily

In Dizayn HI-TECH fittings, local loss coefficients are lower than 30%. Water passing through the fitting leaves the fitting with minimum loss thanks to easy passage presented through the Dizayn HI-TECH fittings. Each fitting is designed after testing with liquid analysis through computer program. Total loss in fittings composes the large percentage of total pressure loss in plumbing. Fresh water and central heating systems, established with Dizayn HI-TECH fittings, run with minimum energy.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
13602	23602	33602	20	20	25,7	14,6	40x40x20	500	7,50
13604	23604	33604	25	25	29,7	16,1	40x40x20	300	7,80
13606	23606	33606	32	32	35,3	18,2	40x40x20	150	7,20
13608	23608	33608	40	40	41,7	20,6	40x40x20	75	6,53
13610	23610	33610	50	50	49,7	23,6	40x40x20	50	7,80
13612	23612	33612	63	63	60,2	27,6	40x40x20	25	7,40
10614	20614	30614	75	75	71,4	30,7	40x25x15	10	4,50
10616	20616	30616	90	90	92,5	30,7	40x40x20	6	5,44
10618	20618	30618	110	110	101,4	38,0	40x40x20	5	7,16
10620	20620	30620	*125	125	110,3	40,0	40x40x20	5	5,12

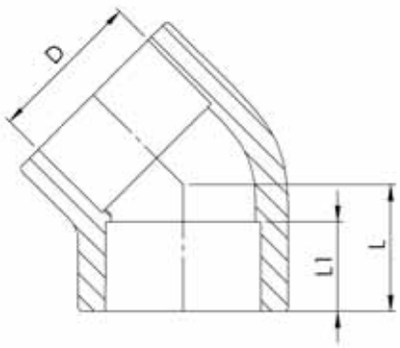
ADVANTAGES

*Dizayn's Specific Design
* Conical Shape at Welding Area
* Original PPR Raw Material
* PN 25 Pressure Class

***This diameter is manufactured as PN 16.**

CERTIFICATES

HI-TECH ELBOW 45° PN 25



1 Day is 48 Hours with Dizayn HI-TECH Series

It is the right time to forget everything about plumbing! With Dizayn HI-TECH Series our craftsmen will be able to weld double than with the available products under normal conditions in a day.
We know that time is so important for our plumbers. With the heating time savings of Dizayn HI-TECH series you will be one step ahead of everyone. For plumbers using Dizayn HI-TECH series one day is 48 hour from now on!

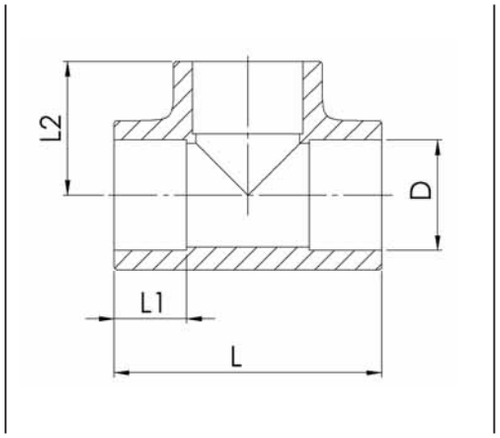
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
13624	23624	33624	20	20	19,7	14,6	40x40x20	600	6,60
13626	23626	33626	25	25	22,2	16,1	40x40x20	400	7,60
13628	23628	33628	32	32	25,8	18,2	40x40x20	200	7,20
14525	24525	34525	40	40	41,5	20,6	40x40x20	100	4,60
14526	24526	34526	50	50	50,0	23,6	40x40x20	50	5,35
14527	24527	34527	63	63	60,0	27,6	40x40x20	30	6,60

ADVANTAGES

*Dizayn's Specific Design
* Conical Shape at Welding Area
* Original PPR Raw Material
* PN 25 Pressure Class
* Low Local Loss Coefficient

CERTIFICATES

HI-TECH TEE PN 25



ONLY DİZAYN PİPES AND FİTTİNGS ARE PN 25

- Dizayn is the first company providing 50 year guarantee to customers with PN 25 bar product.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D	L	L1	L2	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
13702	23702	33702	20	20	51,4	14,6	25,7	40x40x20	400	7,20
13704	23704	33704	25	25	59,4	16,1	29,7	40x40x20	200	6,40
13706	23706	33706	32	32	70,4	18,1	35,2	40x40x20	100	6,20
13708	23708	33708	40	40	83,4	20,6	41,7	40x40x20	60	7,44
13710	23710	33710	50	50	99,4	23,6	49,7	40x40x20	30	6,00
13712	23712	33712	63	63	120,2	27,5	60,1	40x40x20	20	7,36
10714	20714	30714	75	75	144,0	32,5	72,5	40x40x20	12	8,22
10716	20716	30716	90	90	184,0	34,2	92,0	40x40x20	8	8,99
10718	20718	30718	110	110	208,0	38,0	101,8	40x40x20	4	7,50
10720	20720	30720	*125	125	223,0	40,0	110,3	40x40x20	4	5,90

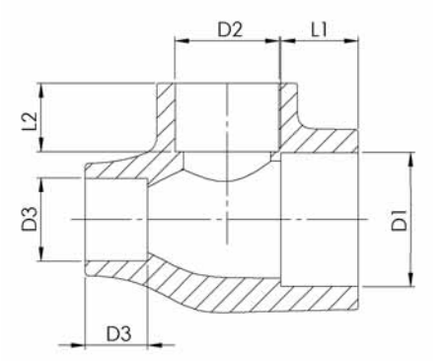
ADVANTAGES

*Dizayn's Specific Design
* Conical Shape at Welding Area
* Original PPR Raw Material
* PN 25 Pressure Class
* Low Local Loss Coefficient

CERTIFICATES

***This diameter is manufactured as PN 16.**

HI-TECH REDUCTION TEE PN 25



Welding is More Clear Thanks to Dizayn HI-TECH Series

With Dizayn HI-TECH pipe there is not any more nasty appearance of plastic waste which welding tool causes during melting process. That nasty appearance of waste material in the junction area of pipe and fitting is not wished. Material melted with special design of Dizayn HI-TECH pipe does not shed out of welding tool, squeezes between the pipe and fitting and long living welding is acquired.

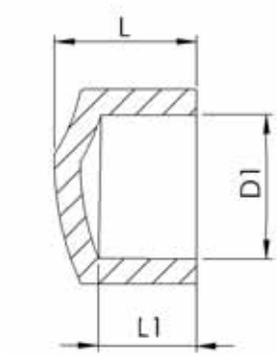
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS							PACKAGING		
				D1	D2	D3	L	L1	L2	L3	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)							(cm)	(Units)	(kg)
13736	23736	33736	25-20-20	25	20	20	55,4	16,1	14,6	14,6	40x40x20	300	9,30
13738	23738	33738	25-20-25	25	20	25	59,4	16,1	14,6	16,1	40x40x20	200	6,20
13754	23754	33754	32-25-20	32	25	20	64,1	18,2	16,1	14,6	40x40x20	150	7,05
13756	23756	33756	32-25-32	32	25	32	70,6	18,2	16,1	18,2	40x40x20	100	5,90
13748	23748	33748	32-20-20	32	20	20	72,0	18,2	14,6	14,6	40x40x20	200	6,40
13750	23750	33750	32-20-32	32	20	32	72,0	18,2	14,6	18.2	40x40x20	100	5,90
13728	23728	33728	40-20-40	40	20	40	82,0	33,0	14,6	33,0	40x40x20	60	4,62
13730	23730	33730	40-25-40	40	25	40	82,0	33,0	16,1	33,0	40x40x20	60	6,42
13732	23732	33732	40-32-40	40	32	40	82,0	33,0	18,2	33,0	40x40x20	60	6,54
13760	23760	33760	50-20-50	50	20	50	91,0	38,9	14,6	38,9	40x40x20	40	5,60
13762	23762	33762	50-25-50	50	25	50	91,0	38,9	16,1	38,9	40x40x20	40	5,80
13764	23764	33764	50-32-50	50	32	50	105,0	38,9	18,2	38,9	40x40x20	50	7,45
13766	23766	33766	50-40-50	50	40	50	105,0	38,9	33,0	38,9	40x40x20	30	4,53
13768	23768	33768	50-32-40	50	32	40	105,0	38,9	18,2	33,0	40x40x20	30	4,86
13770	23770	33770	63-32-50	63	32	50	126,0	48	18,2	38,9	40x40x20	20	6,30
13772	23772	33772	63-32-63	63	32	63	126,0	48	18,2	48	40x40x20	30	8,37
13774	23774	33774	63-40-63	63	40	63	126,0	48	33,0	48	40x40x20	20	6,56
13776	23776	33776	63-50-63	63	50	63	126,0	48	38,9	48	40x40x20	25	7,83

ADVANTAGES

*Dizayn's Specific Design *Conical Shape at Welding Area *Original PPR Raw Material *PN 25 Pressure Class *Low Local Loss Coefficient

CERTIFICATES

HI-TECH END CAP PN 25



ONLY DIZAYN FITTINGS' WELDING AREAS ARE CONICAL

- Sufficient temperature for ideal welding is ensured by die plate while pressure is ensured by the conical shape of the fittings.
- If the fitting is not conical, the welding will be poor. Extra material accumulates on the base and narrows the hole diameter.
- As a result a problematic installation with noise generation and energy loss is caused and 50 year life welding cannot be made.

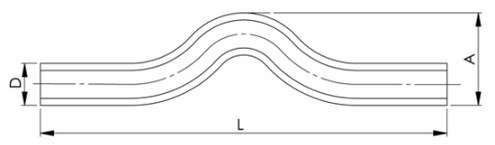
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
13802	23802	33802	20	20	29,9	14,6	40x40x20	1500	9,00
13804	23804	33804	25	25	23,8	16,1	40x40x20	750	7,50
13806	23806	33806	32	32	28,1	18,2	40x40x20	400	8,00
13808	23808	33808	40	40	33,0	20,6	40x40x20	250	9,00
13810	23810	33810	50	50	38,9	23,6	40x40x20	125	8,25
13812	23812	33812	63	63	48,0	27,6	40x40x20	70	8,68
13814	23814	33814	75	75	30,0	52,0	40x40x20	50	7,35

ADVANTAGES

*Dizayn's Specific Design
*Conical Shape at Welding Area
*Original PPR Raw Material
*PN 25 Pressure Class

CERTIFICATES

HI-TECH CROSSOVER PN 25

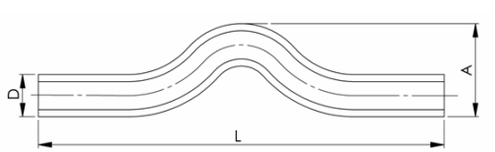


DIZAYN PIPES AND FITTINGS ENSURE YOUR HEALTH

Dizayn Group is a leading company with the hygiene certificate given by Germany Institute of Hygiene. With this certificate, Dizayn Group has ensured the health of customers from raw material to the product. This is why the important hospitals of Turkey prefer only Dizayn brand sanitary system products.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	A	L	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
13902	23902	33902	20	20	40	315	40x40x20	100	7,40
13904	23904	33904	25	25	50	315	40x40x20	75	7,88
13906	23906	33906	32	32	64	315	40x40x20	50	8,80

HI-TECH CROSSOVER PLUS PN 32 (WITH ALUMINIUM FOIL)



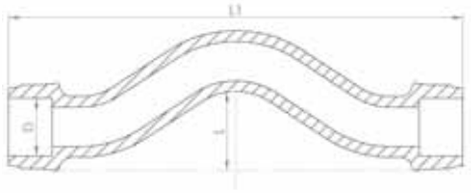
IMPORTANT NOTE

- Crossovers cover an important part in installations and if they are used without aluminium foil, oxygen keeps infusing into the system and causes many undesired problems such as oxidation, corrosion and drop in thermal efficiency. This is eliminated completely with crossover plus.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	A	L	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
13914	23914	33914	20	20	40	315	40x40x20	100	6,90
13916	23916	33916	25	25	50	315	40x40x20	75	8,10
13918	23918	33918	32	32	64	315	40x40x20	50	8,70

CERTIFICATES

HI-TECH SELF COLLAR ARCH PN 25

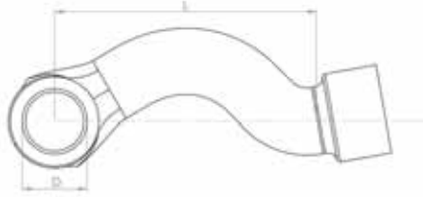


PATENTED PRODUCT

• With this product of ours, you will not experience diameter narrowing problems occurring in similar products.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
14110	24110	34110	20	20	26	152	40x40x20	100	4,40
14112	24112	34112	25	25	33	187	40x40x20	75	4,88

HI-TECH TEE PIECE WITH CROSSOVER (PATENTED)



PATENTED PRODUCT

• With Dizayn's specific Tee Piece with Crossover, cross transitions, which constitute a large problem in installations, are no problem.

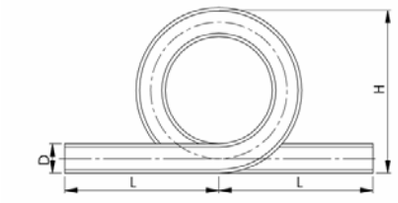
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS		PACKAGING		
				D1	L	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)		(cm)	(Units)	(kg)
13721	23721	33721	20	20	95	40x40x20	125	5,63
13722	23722	33722	25	25	100	40x40x20	80	5,76

CERTIFICATES

DIZAYN SANITARY SYSTEM PIPES and FITTINGS

Technical Information

HI-TECH OMEGA PN 25

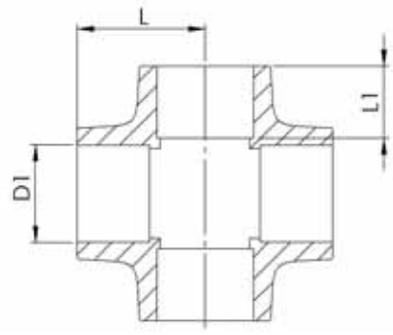


Thanks to Dizayn HI-TECH Series No More Cracking Pipes

It is inevitable for PPR pipes to be cracked due to the impact in cold weather. Dizayn HI-TECH PPR pipe absorbs impact force, provides 30% more impact endurance than the regular pipes via its design.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D	H	L	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
13908	23908	33908	20	20	130	167	40x40x20	20	2,84
13910	23910	33910	25	25	140	167	40x40x20	15	3,36
13912	23912	33912	32	32	160	167	40x40x20	10	3,57

HI-TECH CROSS PIECE PN 25



HI-TECH Difference!

- Dizayn HI-TECH metal fittings are manufactured via the manufacturing method protected by 3 European patents.

Thus metal and plastic are ensured to work as a unit and the problem of metal-plastic leaking is removed.

- Our researches show that as of today, in Turkey only Dizayn brand PPR fittings are designed conically according to German DIN standards.
- Pressure losses are minimal in installations with Dizayn HI-TECH Series.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D1	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
14000	24000	34000	20	20	26,2	14,6	40x40x20	250	5,50
14002	24002	34002	25	25	29,6	16,1	40x40x20	150	5,85
14004	24004	34004	32	32	35,2	18,1	40x40x20	90	6,39
14006	24006	34006	40	40	41,7	20,6	40x40x20	50	6,25
11106	21106	31106	50	50	52,0	23,6	40x40x20	30	6,30
11108	21108	31108	63	63	65,1	27,5	40x40x20	20	6,80

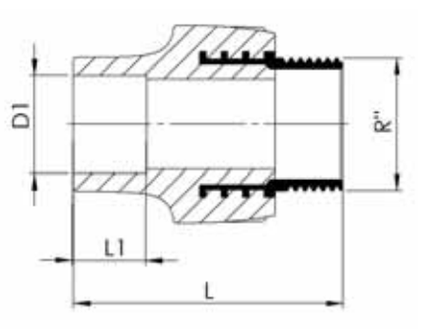
CERTIFICATES

ADVANTAGES

*Dizayn's Specific Design *Conical Shape at Welding Area *Original PPR Raw Material

* PN 25 Pressure Class

HI-TECH TRANSITION PIECE ROUND MALE PN 32

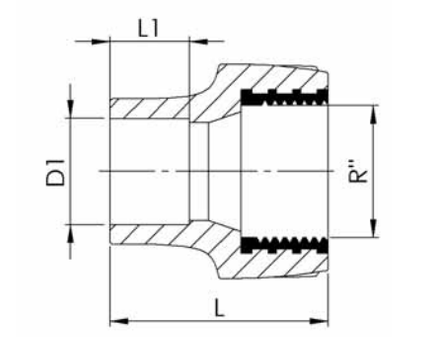


DIZAYN METAL FITTINGS NEVER LEAK!

- With 3 manufacturing methods belonging to only Dizayn, HI-TECH metal fittings never leak.
- They pass the tests of 1 hour, 64 bar at 25°C and 1000 hours, 18,8 bar at 95°C.
- Products without international certification cannot guarantee 50 years of life and cannot receive German DIN standards conformity certification.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L	L1	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14402	24402	34402	20 1/2"	20	40,1	14,6	1/2"	40x40x20	400	16,00
14404	24404	34404	20 3/4"	20	40,1	14,6	3/4"	40x40x20	300	17,10
14406	24406	34406	25 3/4"	25	41,6	16,1	3/4"	40x40x20	250	15,25
14408	24408	34408	25 1/2"	25	41,6	16,1	1/2"	40x40x20	300	14,10
14410	24410	34410	32 1"	32	51,2	18,1	1"	40x40x20	150	13,95

HI-TECH TRANSITION PIECE ROUND FEMALE PN 32



DIZAYN METAL FITTINGS HAVE THE HIGHEST TORQUE VALUE

One of the most important features showing the joint quality between metal and plastic is the torque resistance. Torque resistance of all metals in HI-TECH Series are significantly improved. For example; rotation does not occur as shedding of metal and plastic intermediate surface, but as plastic deformation.

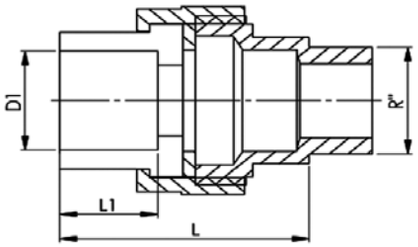
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L	L1	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14202	24202	34202	20 1/2"	20	40,1	14,6	1/2"	40x40x20	500	16,50
14204	24204	34204	20 3/4"	20	40,1	14,6	3/4"	40x40x20	400	17,20
14206	24206	34206	25 3/4"	25	41,6	16,1	3/4"	40x40x20	300	15,30
14208	24208	34208	25 1/2"	25	41,6	16,1	1/2"	40x40x20	400	15,20
14210	24210	34210	32 1"	32	51,2	18,1	1"	40x40x20	150	11,40

CERTIFICATES

ADVANTAGES

*Dizayn's Specific Design *Absolute Impermeability with Patented Manufacturing Technique * Brass Material without Heavy Metals * Conical Shape at Welding Area *Original PPR Raw Material *PN 32 Pressure Class *High Torque Value * Low Local Loss Coefficient

HI-TECH TRANSITION JOINT HEX MALE PN 25



Involvement of 'Heavy Metals" in Metal Used in Metal Fittings to Water is Prevented

In the standard of German DIN 50930-6 (EN 12502) published in 2004, since covering on brass material involves heavy metals, it is forbidden to use such coverings for carriage of drinking water. As it is known that heavy metals are 'CARCINOGEN'. DIN standards stipulate that brass material should be used in MS 63 alloy and also as bare.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L	L1	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14502	24502	34502	20 1/2"	20	39,5	15,2	1/2"	*30X20X15-**30X15X10	100	8,60
14504	24504	34504	25 3/4"	25	43,5	16,0	3/4"	*30X20X15-**30X15X10	50	6,30
14508	24508	34508	32 1''	32	46,0	18,5	1''	*30X20X15-**30X15X10	50	12,30
14512	24512	34512	20 1''	20	46,0	14,5	1''	*30X20X15-**30X15X10	50	13,00
14514	24514	34514	25 1''	25	46,0	15,3	1''	*30X20X15-**30X15X10	50	12,60
14516	24516	34516	40 1 1/4"	40	48,0	20,8	1 1/4"	*30X20X15-**30X15X10	25	11,95
14518	24518	34518	50 1 1/2"	50	51,0	23,8	1 1/2"	*30X20X15-**30X15X10	20	12,96

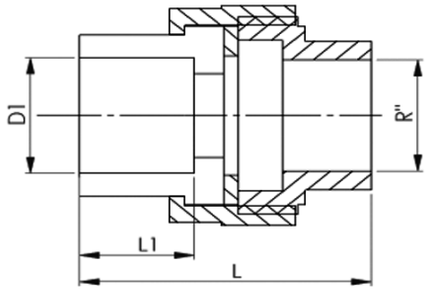
ADVANTAGES

* Dizayn's Specific Design
* Conical Shape at Welding Area
* Brass Material without Heavy Metals
* Original PPR Raw Material
* PN 25 Pressure Class

***Metal package sizes**
****Plastic package sizes**

CERTIFICATES

HI-TECH TRANSITION JOINT HEX FEMALE PN 25



HI-TECH DIFFERENCE!

• Dizayn HI-TECH metal fittings are manufactured via the manufacturing method protected by 3 European patents. Thus metal and plastic are ensured to work as a unit and the problem of metal-plastic leaking is removed.
• Our researches show that as of today, in Turkey only Dizayn brand PPR fittings are designed conically according to German DIN standards.
• Pressure losses are minimal in installations with Dizayn HI-TECH Series.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L	L1	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14302	24302	34302	20 1/2"	20	39,5	15,2	1/2"	*30X20X15-**30X15X10	100	7,90
14304	24304	34304	25 3/4"	25	43,5	16,0	3/4"	*30X20X15-**30X15X10	50	5,90
14306	24306	34306	32 1"	32	46,0	18,5	1"	*30X20X15-**30X15X10	50	10,55
14310	24310	34310	20 1"	20	46,0	14,5	1"	*30X20X15-**30X15X10	50	10,95
14312	24312	34312	25 1"	25	46,0	15,3	1"	*30X20X15-**30X15X10	50	10,85
14314	24314	34314	40 1 1/4"	40	48,0	20,8	1 1/4"	*30X20X15-**30X15X10	25	10,70
14316	24316	34316	50 1 1/2"	50	51,0	23,8	1 1/2"	*30X20X15-**30X15X10	20	16,26

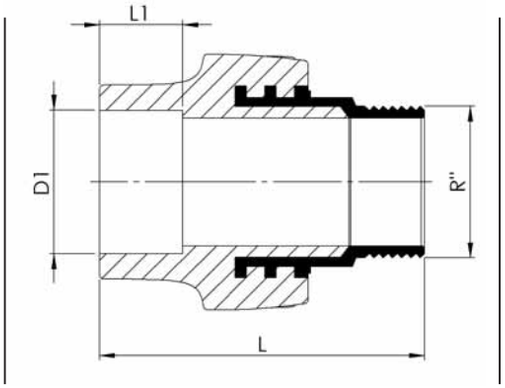
ADVANTAGES

*Dizayn's Specific Design
* Conical Shape at Welding Area
* Brass Material without Heavy Metals
* Original PPR Raw Material
* PN 25 Pressure Class

*Metal package sizes
**Plastic package sizes

CERTIFICATES

HI-TECH TRANSITION JOINT HEX MALE PN 32



1 DAY IS 48 HOURS WITH DIZAYN HI-TECH SERIES

It is the right time to forget everything about plumbing! With Dizayn HI-TECH Series our craftsmen will be able to weld double than with the available products under normal conditions in a day. We know that time is so important for our plumbers. With the heating time savings of Dizayn HI-TECH series you will be one step ahead of everyone. For plumbers using Dizayn HI-TECH series one day is 48 hour from now on!

CODES			NOMINAL DIAMETER		TECHNICAL DIMENSIONS				PACKAGING		
					D1	L	L1	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)		(mm)				(cm)	(Units)	(kg)
14411	24411	34411	32	1''	32	45,7	18,2	1''	40x40x20	100	17,80
14412	24412	34412	40	1 1/4"	40	48,1	20,6	1 1/4"	40x40x20	60	17,28
14414	24414	34414	50	1 1/2"	50	54,1	23,6	1 1/2"	40x40x20	40	14,88
14416	24416	34416	63	2''	63	59,1	27,6	2''	40x40x20	30	17,52
11418	21418	31418	75	2 1/2"	75	63,0	33,8	2 1/2"	40x40x20	12	14,74
11420	21420	31420	90	3''	90	76,9	44,0	3''	40x40x20	10	15,40
11422	21422	31422	*110	4''	110	79,4	37,0	4''	40x40x20	6	12,88
11424	21424	31424	125	5''	125	81,0	41,4	5''	40x40x20	4	10,72

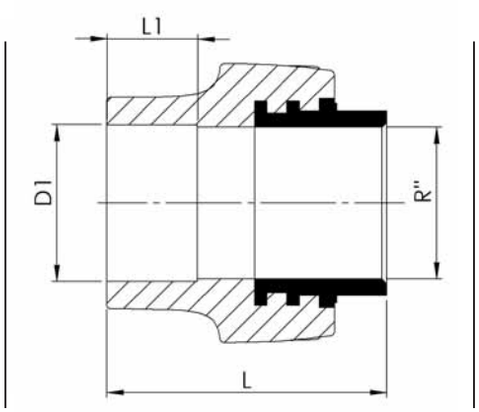
ADVANTAGES

*Dizayn's Specific Design
*Absolute Impermeability with Patented Manufacturing Technique
* Brass Material without Heavy Metals
* Conical Shape at Welding Area
* Original PPR Raw Material
* PN 32 Pressure Class
* High Torque Value
* Low Local Loss Coefficient

CERTIFICATES

***This diameter is manufactured as PN 16.**

HI -TECH TRANSITION JOINT HEX FEMALE PN 32



Metal Fittings of Dizayn HI-TECH Series Do Not Leak

In metal fittings leakage of water between the plastic and metal is a big problem. In the production of metal fittings in Dizayn HI-TECH Series, classic techniques are not used. In metal fittings of Dizayn HI-TECH Series, a developed high technology named as HIGH PRESSURE INJECTION is used. This product, protected with three European patents, is not designed to run as two separate parts consisted of metal and plastic, rather as one piece. And now, metal and plastic are not two separate parts; on the contrary it is a unique material. DİZAYN ENDS THE PROBLEM OF LEAKING.

CODES			NOMINAL DIAMETER		TECHNICAL DIMENSIONS				PACKAGING		
					D1	L	L1	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)		(mm)				(cm)	(Units)	(kg)
14211	24211	34211	32	1"	32	45,7	18,2	1"	40x40x20	125	17,63
14212	24212	34212	40	1 1/4"	40	48,1	20,6	1 1/4"	40x40x20	80	19,20
14214	24214	34214	50	1 1/2"	50	54,1	23,6	1 1/2"	40x40x20	50	15,85
14216	24216	34216	63	2"	63	59,1	27,6	2"	40x40x20	40	20,96
11218	21218	31218	75	2 1/2"	75	63,0	33,8	2 1/2"	40x40x20	15	18,68
11220	21220	31220	90	3"	90	76,9	44,0	3"	40x40x20	10	16,00
11222	21222	31222	*110	4"	110	79,4	37,0	4"	40x40x20	10	18,90
11224	21224	31224	125	5"	125	81,0	41,4	5"	40x40x20	6	14,06

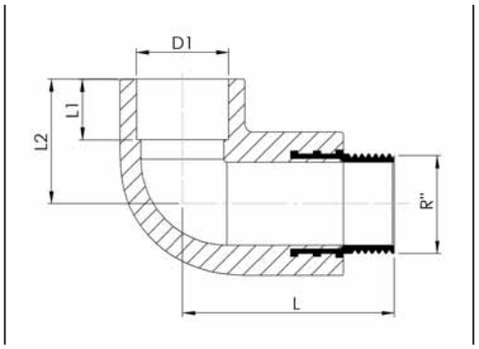
ADVANTAGES

*Dizayn's Specific Design
*Absolute Impermeability with Patented Manufacturing Technique
* Brass Material without Heavy Metals
* Conical Shape at Welding Area
* Original PPR Raw Material
* PN 32 Pressure Class
* High Torque Value
* Low Local Loss Coefficient

***This diameter is manufactured as PN 16.**

CERTIFICATES

HI-TECH ELBOW 90° MALE PN 32



ONLY DİZAYN HI-TECH PİPES AND METAL FİTTİNGS ARE PN 32

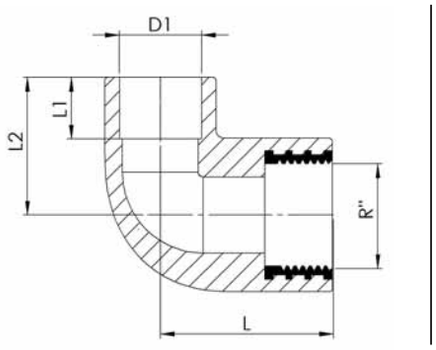
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS					PACKAGING		
				D1	L	L1	L2	R''	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)					(cm)	(Units)	(kg)
14616	24616	34616	20 1/2"	20	36,2	14,6	34,6	1/2''	40x40x20	250	11,75
14618	24618	34618	20 3/4"	20	36,2	14,6	34,6	3/4''	40x40x20	200	13,40
14620	24620	34620	25 1/2"	25	42,6	16,1	33,1	1/2''	40x40x20	200	12,00
14622	24622	34622	25 3/4"	25	42,6	16,1	33,1	3/4''	40x40x20	200	15,00
14624	24624	34624	32 3/4"	32	44,1	18,1	35,2	3/4''	40x40x20	150	12,75
14626	24626	34626	32 1''	32	44,1	18,1	35,2	1''	40x40x20	125	13,75

ADVANTAGES

*Dizayn's Specific Design
*Absolute Impermeability with Patented Manufacturing Technique
* Brass Material without Heavy Metals
* Conical Shape at Welding Area
* Original PPR Raw Material
* PN 32 Pressure Class
* High Torque Value
* Low Local Loss Coefficient

CERTIFICATES

HI-TECH ELBOW 90° FEMALE PN 32



With Dizayn HI-TECH Series Your Plumbing Runs Easily

In Dizayn HI-TECH fittings, local loss coefficients are lower than 30%. Water passing through the fitting leaves the fitting with minimum loss thanks to easy passage presented through the Dizayn HI-TECH fittings. Each fitting is designed after testing with liquid analysis through computer program. Total loss in fittings composes the large percentage of total pressure loss in plumbing. Fresh water and central heating systems, established with Dizayn HI-TECH fittings, run with minimum energy.

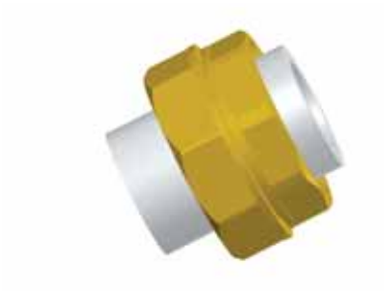
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS					PACKAGING		
				D1	L	L1	L2	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)					(cm)	(Units)	(kg)
14602	24602	34602	20 1/2"	20	36,2	14,6	34,6	1/2"	40x40x20	300	12,00
14604	24604	34604	20 3/4"	20	36,2	14,6	34,6	3/4"	40x40x20	250	14,00
14606	24606	34606	25 1/2"	25	42,6	16,1	33,1	1/2"	40x40x20	250	12,25
14608	24608	34608	25 3/4"	25	42,6	16,1	33,1	3/4"	40x40x20	200	12,80
14610	24610	34610	32 3/4"	32	44,1	18,1	35,2	3/4"	40x40x20	150	10,65
14612	24612	34612	32 1''	32	44,1	18,1	35,2	1''	40x40x20	125	11,25

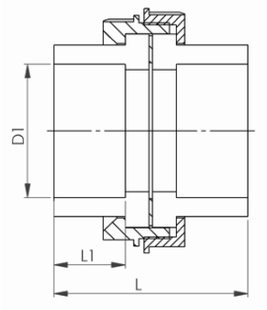
ADVANTAGES

*Dizayn's Specific Design
*Absolute Impermeability with Patented Manufacturing Technique
* Brass Material without Heavy Metals
* Conical Shape at Welding Area
* Original PPR Raw Material
* PN 32 Pressure Class
* High Torque Value
* Low Local Loss Coefficient

CERTIFICATES

HI-TECH TRANSITION JOINT TWO SIDE WELDED WITH BRASS PN 25 (COLD AND HOT WATER)



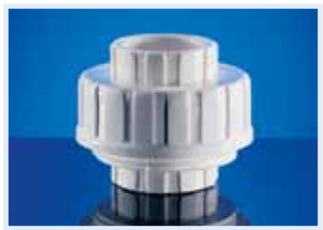


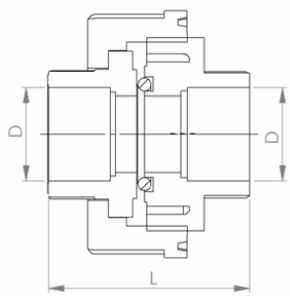
1 Day is 48 Hours with Dizayn HI-TECH Series

It is the right time to forget everything about plumbing! With Dizayn HI-TECH Series our craftsmen will be able to weld double than with the available products under normal conditions in a day. We know that time is so important for our plumbers. With the heating time savings of Dizayn HI-TECH series you will be one step ahead of everyone. For plumbers using Dizayn HI-TECH series one day is 48 hour from now on!

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D1	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
14520	24520	34520	20	20	39	15,2	*30X20X15-**30X15X10	100	10,80
14521	24521	34521	25	25	43	16,0	*30X20X15-**30X15X10	50	7,05
14522	24522	34522	32	32	47	18,5	*30X20X15-**30X15X10	50	10,15
14523	24523	34523	40	40	57	20,8	*30X20X15-**30X15X10	25	6,55
14524	24524	34524	50	50	53	23,8	*30X20X15-**30X15X10	20	7,66

HI- TECH TRANSITION JOINT TWO SIDE WELDED PN 25 (COLD WATER)





DIZAYN PIPES AND ATTACHMENTS ENSURE YOUR HEALTH.

Dizayn Group is a leading company with the hygiene certificate given by Germany Institute of Hygiene. With this certificate, Dizayn Group has ensured the health of customers from raw material to the product. This is why the important hospitals of Turkey prefer only Dizayn brand sanitary system products.

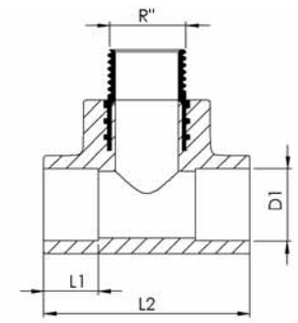
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS		PACKAGING		
				D	L	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)		(cm)	(Units)	(kg)
12010	22010	32010	63	63	67,0	43x35x22	10	3,84
12012	22012	32012	75	75	79,0	43x35x22	5	4,95

*Dizayn's Specific Design *Conical Shape at Welding Area *Brass Material without Heavy Metals *Original PPR Raw Material *PN 25 Pressure Class

CERTIFICATES

***Metal package sizes**
****Plastic package sizes**

HI-TECH TRANSITION TEE MALE PN 32

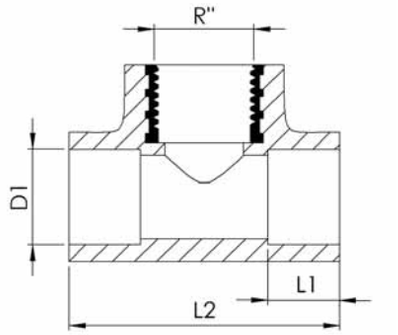


Involvement of 'Heavy Metals" in Metal Used in Metal Fittings to Water is Prevented

In the standard of German DIN 50930-6 (EN 12502) published in 2004, since covering on brass material involves heavy metals, it is forbidden to use such coverings for carriage of drinking water. As it is known that heavy metals are 'CARCINOGEN'. DIN standards stipulate that brass material should be used in MS 63 alloy and also as bare.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L1	L2	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14716	24716	34716	20 1/2"	20	14,6	55	1/2"	40x40x20	250	13,50

HI- TECH TRANSITION TEE FEMALE PN 32



Metal Fittings of Dizayn HI-TECH Series Do Not Leak

In metal fittings leakage of water between the plastic and metal is a big problem. In the production of metal fittings in Dizayn HI-TECH Series, classic techniques are not used. In metal fittings of Dizayn HI-TECH Series, a developed high technology named as HIGH PRESSURE INJECTION is used. This product, protected with three European patents, is not designed to run as two separate parts consisted of metal and plastic, rather as one piece. And now, metal and plastic are not two separate parts; on the contrary it is a unique material. DİZAYN ENDS THE PROBLEM OF LEAKING.

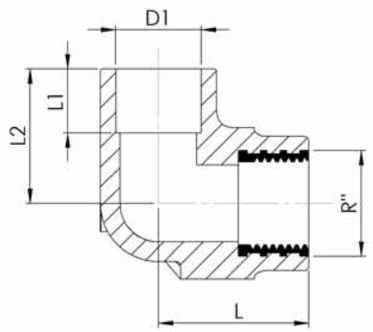
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L1	L2	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14702	24702	34702	20 1/2"	20	14,6	55	1/2"	40x40x20	300	12,30
14704	24704	34704	20 3/4"	20	14,6	55	3/4"	40x40x20	300	13,80
14706	24706	34706	25 1/2"	25	16,1	62,2	1/2"	40x40x20	200	11,20
14708	24708	34708	25 3/4"	25	16,1	62,2	3/4"	40x40x20	200	12,00
14710	24710	34710	32 3/4"	32	18,1	72,4	3/4"	40x40x20	100	9,40
14712	24712	34712	32 1''	32	18,1	72,4	1''	40x40x20	100	9,50

CERTIFICATES

ADVANTAGES

* Dizayn's Specific Design *Absolute Impermeability with Patented Manufacturing Technique
* Brass Material without Heavy Metals * Conical Shape at Welding Area
* Original PPR Raw Material *PN 25 Pressure Class
*High Torque Value * Low Local Loss Coefficient

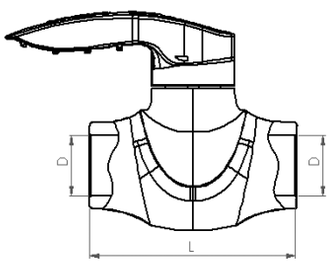
HI-TECH FLUSH WALL DISK PN32



ONLY DIZAYN HI-TECH PIPES AND METAL FITTINGS ARE PN 32.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS					PACKAGING		
				D1	L	L1	L2	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)					(cm)	(Units)	(kg)
14102	24102	34102	20 1/2"	20	34	16	27,0	1/2"	40x40x20	250	11,25

HI-TECH SPHERICAL VALVE PN 32 (COLD WATER)



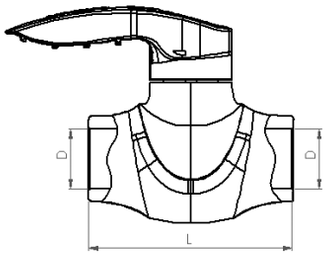
SUPERIORITIES

* Dizayn Specific Design
* Conical Shape at Welding Area
* Original PPR Raw Material
* PN 32 Pressure Class
* 100% Sealing

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS		PACKAGING		
				D	L	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)		(cm)	(Units)	(kg)
14836	24836	34836	20	20	67	40x40x20	150	13,05
14838	24838	34838	25	25	70	40x40x20	100	15,60
14840	24840	34840	32	32	86	40x40x20	50	9,75
14842	24842	34842	40	40	92	40x40x20	40	8,52

CERTIFICATES

HI-TECH SPHERICAL VALVE PN32 (HOT WATER)

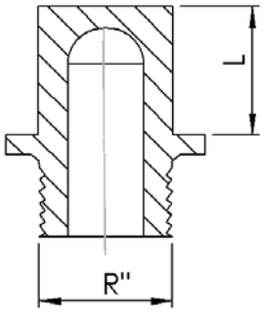


SUPERIORITIES

- This product, patented by Dizayn Group, meets all conditions required by standards in hot water.
- Provides convenience in installation.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS		PACKAGING		
				D	L	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)		(cm)	(Units)	(kg)
14826	24826	34826	20	20	67	40x40x20	150	13,05
14828	24828	34828	25	25	70	40x40x20	100	12,60
14830	24830	34830	32	32	86	40x40x20	50	9,75
14832	24832	34832	40	40	92	40x40x20	40	8,52

HI-TECH BLIND END PN 25



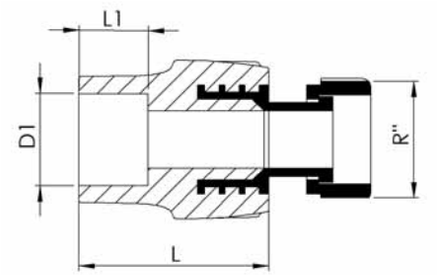
Certified Quality!

- Our company has OAS, DVGW, GOST-R, IMA, KIWA, WRC and EMI certificates.
- For these certificates, authorities visit our company and give sufficiency approval for our facilities and laboratories.
- They test the products for one year and certify the 50 year guarantee. Then, every three months the products are tested. If the result is not successful, the certification is cancelled.
- Necessary samples for the test are provided from the market by the concerning laboratory. The purpose here is to check the marketed product.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS		PACKAGING		
				L	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)		(cm)	(Units)	(kg)
12100	22100	32100	20	6,6	1/2"	40x40x20	1000	9,00
12102	22102	32102	25	26,5	3/4"	60x39x39	2500	20,00

CERTIFICATES

HI-TECH TRANSITION PIECE WITH JOINT PN 32

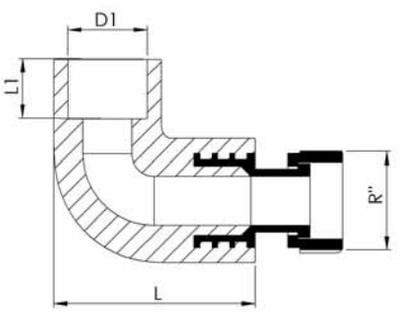


SUPERIORITIES

- Metal inside the plastic is a single piece
- Lighter
- Removable hexagonal nut
- 100% Impermeability (hot-cold)
- Less hydraulic losses
- Compliant with standards
- Compact design

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L	L1	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14426	24426	34426	20 1/2"	20	14,6	40,0	1/2"	40x25x15	400	29,20
14428	24428	34428	25 3/4"	25	16,1	41,6	3/4"	40x25x15	250	25,75

HI-TECH ELBOW WITH SLEEVE PN 32



SUPERIORITIES

- Metal inside the plastic is a single piece
- Lighter
- Removable hexagonal nut
- 100% Impermeability (hot-cold)
- Less hydraulic losses
- Compliant with standards
- Compact design

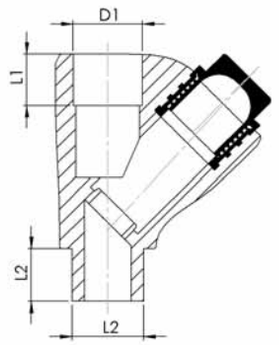
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L	L1	R"	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14430	24430	34430	20 1/2"	20	14,6	49,4	1/2"	40x25x15	250	20,75
14432	24432	34432	25 3/4"	25	16,1	58,5	3/4"	40x25x15	150	17,40

ADVANTAGES

*Dizayn's specific Design *Absolute Sealing with Patented Manufacturing Technique *Brass Material without Heavy Metals *Conical Shape at Welding Area *Original PPR Raw Material *PN 25 Pressure Class *High Torque Value *Low Local Loss Coefficient

CERTIFICATES

HI-TECH DIRT HOLDER PN 32



SUPERIORITIES

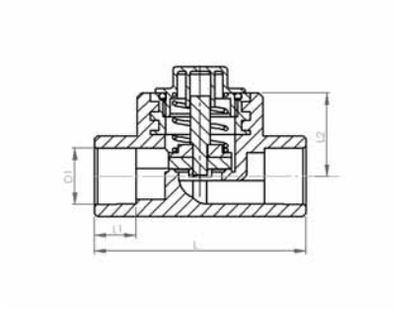
- Much less hydraulic losses
- Less stoppage
- 100% Impermeability (hot-cold)
- Compact design
- Compliant with standards
- Ease in cleaning

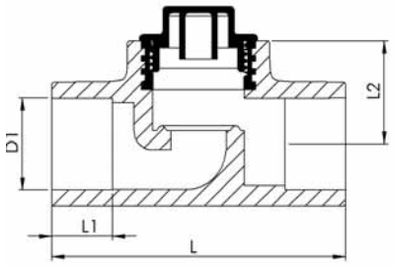
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	D2	L1	L2	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14434	24434	34434	20	20	20	14,6	15	30x20x15	50	5,80
14436	24436	34436	25	25	25	16,1	17	40x25x15	50	6,15

ADVANTAGES

*Dizayn's Specific Patented Design *Conical Shape at Welding Area *Original PPR Raw Material *PN 32 Pressure Class

HI-TECH CHECK VALVE





SUPERIORITIES

- Less hydraulic losses
- 100% Impermeability (hot-cold)
- Compact design
- Compliant with standards
- Convenient Installation

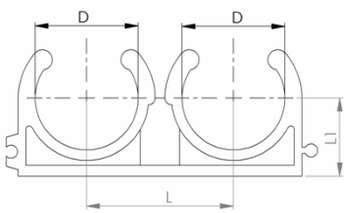
CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L	L1	L2	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14900	24900	34900	20	20	73,5	16,0	29,4	30x20x15	50	6,95
14902	24902	34902	25	25	73,5	16,5	31,2	40x25x15	50	7,25

ADVANTAGES

*Dizayn's Specific Patented Design *Conical Shape at Welding Area *Original PPR Raw Material *PN 25 Pressure Class

CERTIFICATES

DOUBLE CLAMP

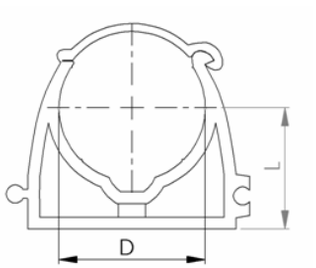


SUPERIORITIES

- Much less hydraulic losses
- Less stoppage
- 100% Impermeability (hot-cold)
- Compact design
- Compliant with standards
- Ease in cleaning

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D1	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
12228	22228	32228	20	20	32,0	18,0	60x39x39	2000	20,00
12230	22230	32230	25	25	37,0	20,0	60x39x39	1500	24,00
12232	22232	32232	32	32	45,0	24,0	60x39x39	1000	19,00

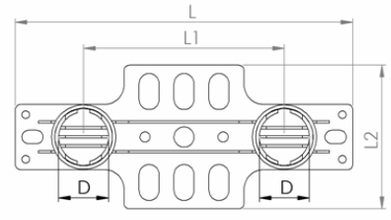
CLAMP WITH CAP



CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS		PACKAGING		
				D	L	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)		(cm)	(Units)	(kg)
12212	22212	32212	20	20	20,0	60x39x39	2000	12,00
12214	22214	32214	25	25	25,0	60x39x39	2000	16,00
12216	22216	32216	32	32	32,0	60x39x39	1000	11,00
12217	22217	32217	40	40	40,0	60x39x39	750	12,00
12218	22218	32218	50	50	50,0	60x39x39	500	14,50

CERTIFICATES

PLASTIC MOUNTING PLATE

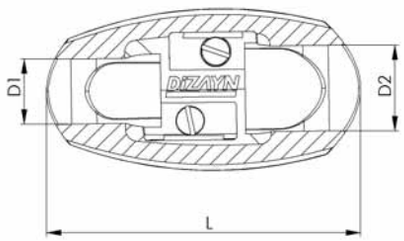


SUPERIORITIES

- Original PPR Raw Material
- Convenient Installation
- Dizayn's Specific Design

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D	L	L1	L2	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
00414	00415	00416	-	40	260	155	110	40x40x20	25	2,82

FACE SMOOTHING TOOL



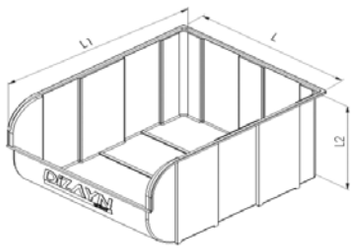
SUPERIORITIES

- Dizayn Face Smoothing Tool has a patented design.
- Does not tire the plumber during usage, prevents welding errors.

CODES	NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
		D1	D2	L	Package Sizes	Package Amount	Package Weight
	(mm)	(mm)			(cm)	(Units)	(kg)
46626	20-25	20	25	80	30x15x10	30	2,76
46627	32-40	32	40	90	30x15x10	15	3,45
46628	50-63	50	63	100	30x15x10	6	3,42
46629	75-90	75	90	110	30x15x10	2	2,31

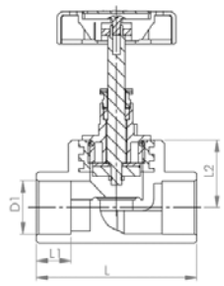
CERTIFICATES

PACKING BOX



CODES	NOMINAL DIAMETER	TECHNICAL DIMENSIONS	PACKAGING		
			Package Sizes	Package Amount	Package Weight
	(mm)	(mm)	(cm)	(Units)	(kg)
46652	-	-	33x44x22	1	1,20

HI-TECH THROTTLE HEADED VALVE PN 32



ONLY DIZAYN HI-TECH PIPES AND METAL FITTINGS ARE PN 32

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS				PACKAGING		
				D1	L	L1	L2	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)				(cm)	(Units)	(kg)
14800	24800	34800	20	20	73,5	16	29,4	*30X20X15-**30X20X15	50	10,35
14802	24802	34802	25	25	73,5	16,5	31,2	*30X20X15-**40X25X15	50	10,60
14803	24803	34803	32	32	73,5	18,5	35,1	*30X20X15-**40X25X15	60	12,42

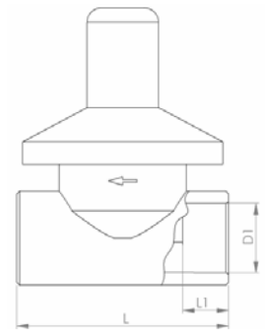
ADVANTAGES

*Dizayn's Specific Design *Conical Shape at Welding Area *Original PPR Raw Material *PN 32 Pressure Class *100% Impermeability

CERTIFICATES

*Metal package sizes
**Plastic package sizes

CHROME COATED VALVE PN 25

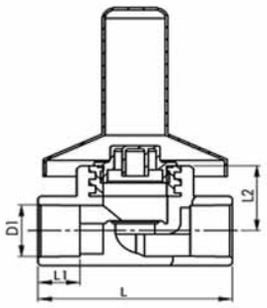


DIZAYN PIPES AND ATTACHMENTS ENSURE YOUR HEALTH

Dizayn Group is a leading company with the hygiene certificate given by Germany Institute of Hygiene. With this certificate, Dizayn Group has ensured the health of customers from raw material to the product. This is why the important hospitals of Turkey prefer only Dizayn brand sanitary system products.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D1	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
14804	24804	34804	20	20	73,5	16	*30X20X15-**40X25X15	50	13,65
14806	24806	34806	25	25	73,5	16.5	*30X20X15-**40X25X15	50	13,35

CHROME COATED VALVE LONG PN 25



FITTINGS ARE CONIC

The most important factor that guarantees the welding quality is the conicity of junction in plastic. So that interface pressure which guarantees a well welding is obtained and in junction areas more qualified welding is provided.

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS			PACKAGING		
				D1	L	L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)			(cm)	(Units)	(kg)
14805	24805	34805	20	20	73,5	16	*30X20X15-**40X25X15	50	21,90
14807	24807	34807	25	25	73,5	16,5	*40X25X15-**40X25X15	50	22,30

CERTIFICATES

*Metal package sizes
**Plastic package sizes

HI-TECH COMBI SET

ADVANTAGES

*100% Impermeability *Dizayn's Specific Patented Design *Original PPR Raw Material *Conical Structure

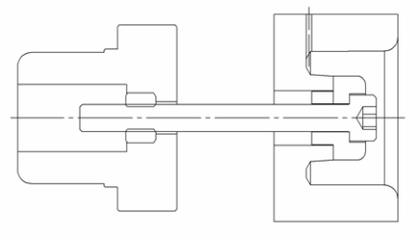
CODES		NOMINAL DIAMETER	TECHNICAL DIMENSIONS	PACKAGING		
				Package Sizes	Package Amount	Package Weight
	White	(mm)	(mm)	(cm)	(Units)	(kg)
8 PIECES WITH ELBOW	960	-	-	40x40x20	30	33,00
8 PIECES WITH JOINT	961	-	-	40x40x20	30	31,50

BATTERY CONNECTION BLIND END

CODES			NOMINAL DIAMETER	TECHNICAL DIMENSIONS	PACKAGING		
				L1	Package Sizes	Package Amount	Package Weight
Green	Grey	White	(mm)	(mm)	(cm)	(Units)	(kg)
00412	00413	00411	20	74	40x40x20	250	5,75

CERTIFICATES

SPECIAL WELDING TOOL



PATENTED DESIGN

• Dizayn Welding Tool prevents labor and machine errors with its patented design developed by R&D department.

PREVENTION OF HEATING PROCESS ERRORS

• Melted plastic coming out of the hole on the tool informs the plumber that the heating process is completed, and always ensures correct welding.
• Heating duration, which changes according to environment (pipe diameter, welding machine resistance, ambient temperature), is always adjusted correctly with Dizayn Special Tool and possible errors are prevented.

PREVENTING DIAMETER NARROWING

• The groove inside the welding tool prevents the melted plastic on the pipe face to scatter during welding and prevents diameter narrowing during assembly.

CODES	NOMINAL DIAMETER	TECHNICAL DIMENSIONS	PACKAGING		
			Package Sizes	Package Amount	Package Weight
	(mm)	(mm)	(cm)	(Units)	(kg)
46630	20	-	30x15x10	50	4,75
46631	25	-	30x15x10	50	5,40
46632	32	-	30x15x10	25	3,87
46633	40	-	30x15x10	20	4,60
46634	50	-	30x15x10	10	4,55
46635	63	-	30x15x10	5	3,32
46636	75	-	30x15x10	4	4,02
46646	90	-	30x15x10	2	2,80

WELDING MACHINE (SET)

PATENTED DESIGN

Problems experienced because of welding machine has been eliminated with the patented product.

CODES	NOMINAL DIAMETER	TECHNICAL DIMENSIONS	PACKAGING		
			Package Sizes	Package Amount	Package Weight
	(mm)	(mm)	(cm)	(Units)	(kg)
43144		20-40	47x32x11	Set	3,88

CERTIFICATES

WELDING MACHINE (SINGLE)

PATENTED DESIGN

Problems experienced because of welding machine has been eliminated with the patented product.

CODES	NOMINAL DIAMETER	TECHNICAL DIMENSIONS	PACKAGING		
			Package Sizes	Package Amount	Package Weight
	(mm)	(mm)	(cm)	(Units)	(kg)
43145	16-40	-	30x20x15	1	3,42

WELDING MACHINE (LARGE)

CODES	NOMINAL DIAMETER	TECHNICAL DIMENSIONS	PACKAGING		
			Package Sizes	Package Amount	Package Weight
	(mm)	(mm)	(cm)	(Units)	(kg)
45162	50-125	-	31x47x10	1	3,17

CERTIFICATES

PIPE SCISSORS

CODES	NOMINAL DIAMETER	TECHNICAL DIMENSIONS	PACKAGING		
			Package Sizes	Package Amount	Package Weight
	(mm)	(mm)	(cm)	(Units)	(kg)
43146	-	-	30x15x10	5	2,31

CERTIFICATES

ISOLATION

The pipes must have the isolation thicknesses given in the table below to reduce heat transfer.

λ = 0.035 W/mK: Normal Diameter	Isolation Thickness
≤ Ø 20	20 mm
Ø 22 - Ø 35	30 mm
Ø 40 - Ø 100	Pipe Diameter
Ø>100	100 mm

Depending of the following characteristics of Dizayn pipes, the isolation thickness can be reduced.

Outer diameter of the pipe x wall thickness	λ = 0,035 W/mK appropriate isolation thickness	Extra isolation thickness necessary for Dizayn pipes	
		λ = 0,035 W/mK	λ = 0,04 W/mK
(mm)			
16x2,7	20 mm	18,4 mm	23,3 mm
20x3,4	20 mm	18,2 mm	22,7 mm
25x4,2	30 mm	27,5 mm	34,7 mm
32x5,4	30 mm	27,3 mm	34,5 mm
40x6,7	40 mm	36,5 mm	46,1 mm
50x8,4	50 mm	45,7 mm	57,7 mm
63x10,5	63 mm	57,6 mm	71,9 mm
75x12,5	75 mm	68,5 mm	85,1 mm

Table 8: Isolation

Determining Hydraulic Losses

During flow through the pipe; friction, fittings etc. cause losses (pressure drop). These losses and their calculation methods are described below in detail.

Pressure Loss in Straight Pipes;

$$\Delta P_d = \lambda \frac{L}{d_1} \rho \frac{\upsilon^2}{2} (Pa)$$

λ : Straight pipe loss coefficient (can be taken as 0,024 in many cases)

L : Pipe length (m)

d_1: Pipe inner diameter (m)

ρ : Density of fluid (kg/m^3)

υ : Flow rate (m/s)

Note: 'Diagram of Pressure Loss in Dizayn PPR Pipes' can be used instead of this formula.

Pressure Loss in Fittings;

$$\Delta P_f = \xi . \rho \frac{\upsilon^2}{2} (Pa)$$

ξ : Resistance coefficient for fitting (given in table of pressure loss coefficients).

ρ : Density of fluid (kg/m^3)

υ : Flow rate (m/s)

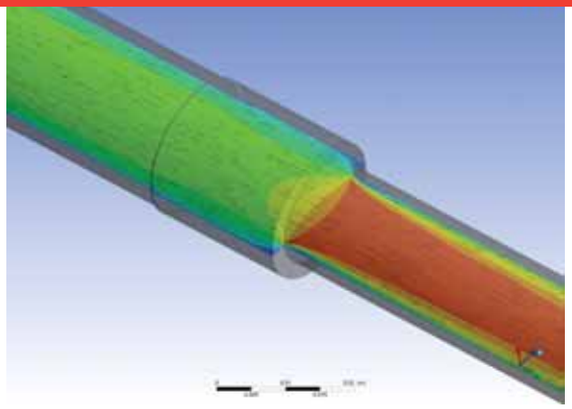
Total Pressure Loss;

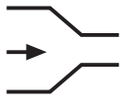
$$\Delta P = \Delta P_d + \Delta P_f$$

Pressure Loss Coefficients

Our new product series of HI-TECH fittings have been developed by advanced engineering studies. To minimize the fitting losses, which constitute a large portion of pressure losses in installations, local loss coefficients (K) are improved with new designs. All HI-TECH fittings are designed by analyzing in computer environment with 'Calculated Fluid Dynamics Method'. Local loss coefficients for HI-TECH Series fittings are below. If the installation is to be performed with HI-TECH products, Dizayn specific local loss coefficients below must be used. These coefficients are smaller than those of engineering calculation literature or rival manufacturers. Thus, designing and system operation costs are optimized. A large portion of total losses in PPR based pipes used in Heating and Sanitary Installations are constituted by local losses in fittings. Improving these losses in fittings ensure the most important optimizations in installation designs and at the same time systems can operate with smaller pumps, less energy need and higher efficiency.

Reduction 32- 35mm

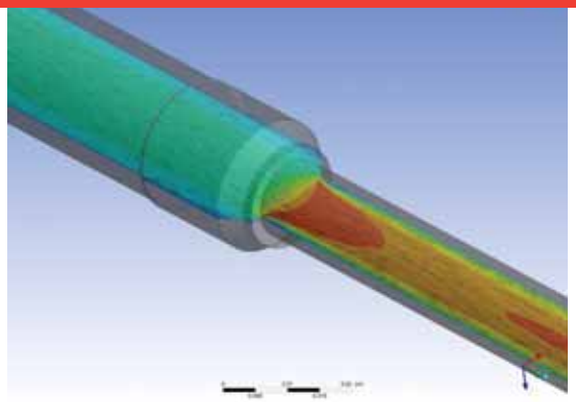


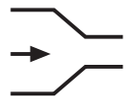
Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,20	0,14

Important Note

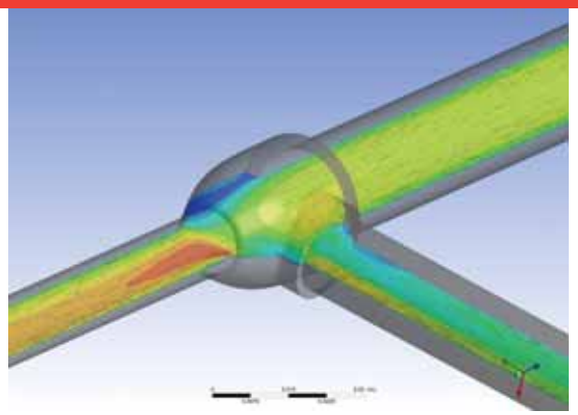
Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

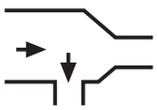
Reduction 32- 20mm



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,30	0,21

Reduction TEE 32 - 25 - 20mm

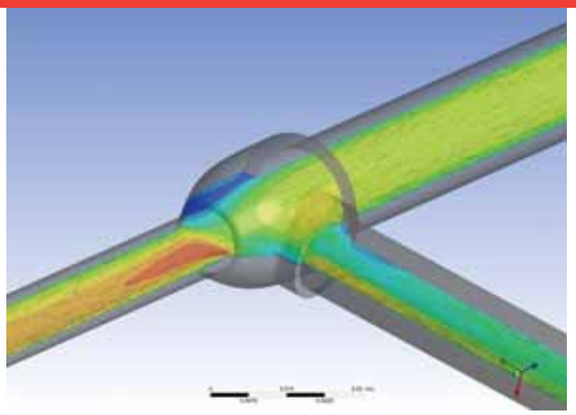


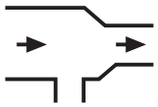
Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
 (32 - 20)	0,60	0,42

Important Note

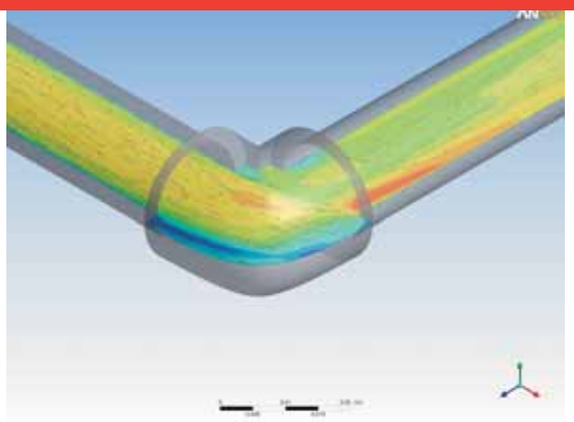
Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

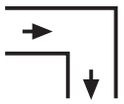
Reduction TEE 32 - 25 - 20mm



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
 (32 - 25)	0,50	0,35

Elbow 25mm 90⁰

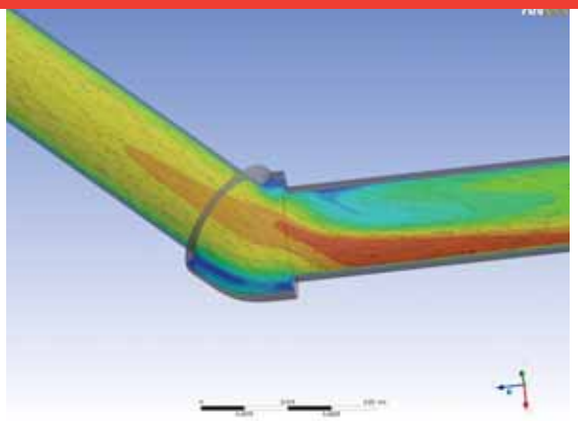


Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	1,20	0,83

Important Note

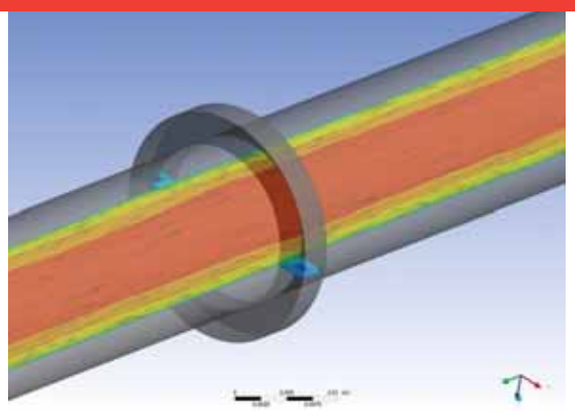
Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

Elbow 25mm 45⁰



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,50	0,35

Socket 25mm

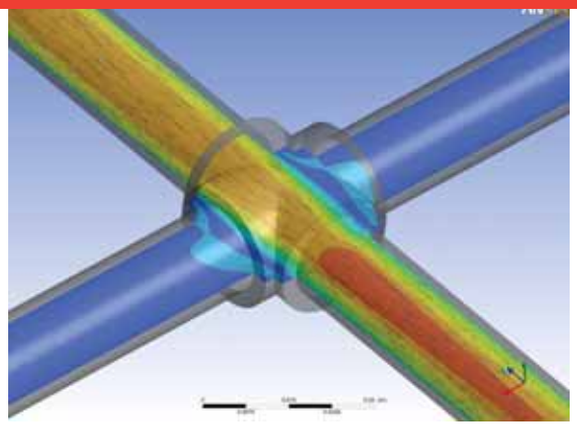


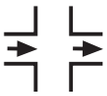
Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,10	0,07

Important Note

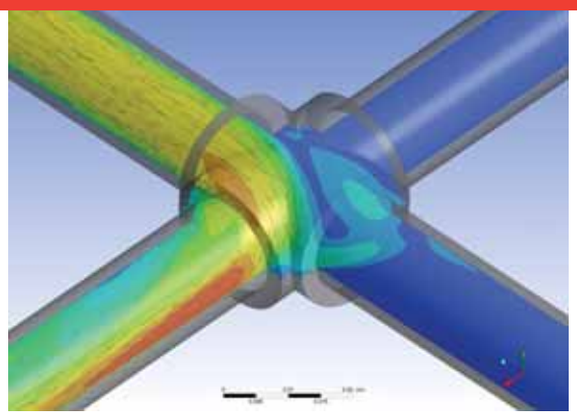
Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

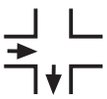
Cross Piece 25mm



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,35	0,24

Cross Piece 25 mm

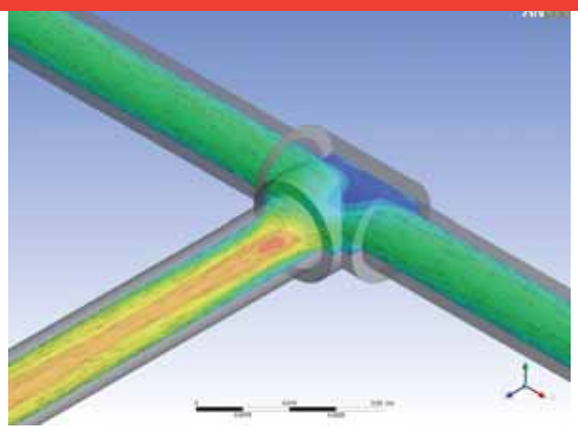


Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	1,05	0,73

Important Note

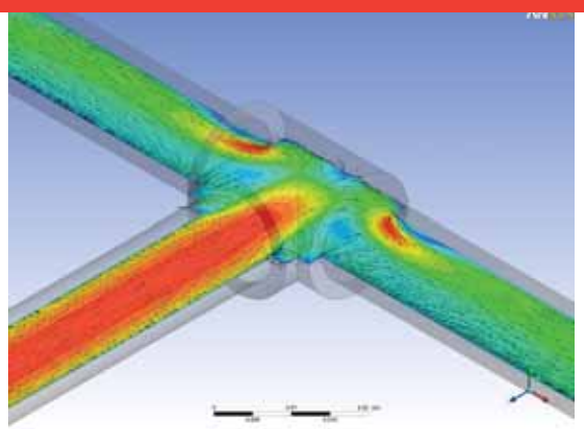
Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

TEE 25mm



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,90	0,62

TEE 25mm

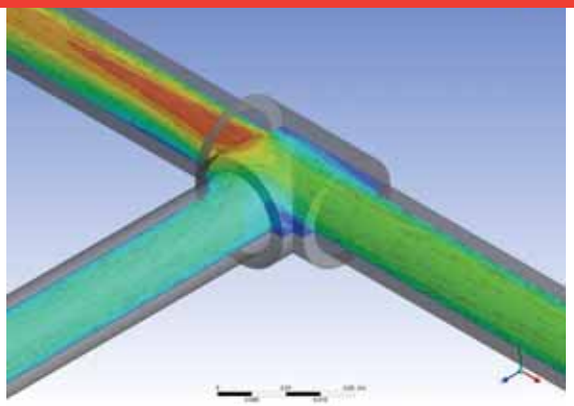


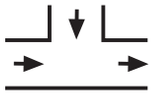
Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,85	0,59

Important Note

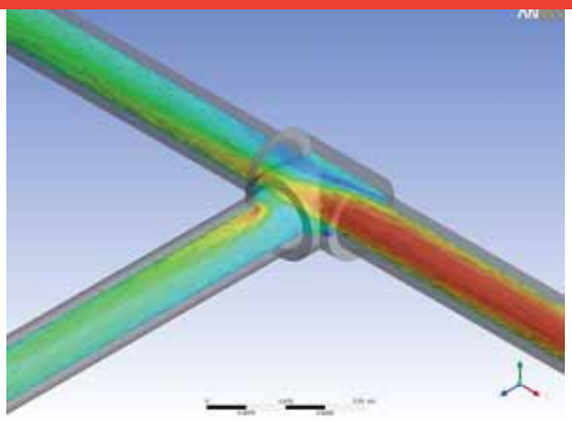
Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

TEE 25mm



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,35	0,24

TEE 25mm

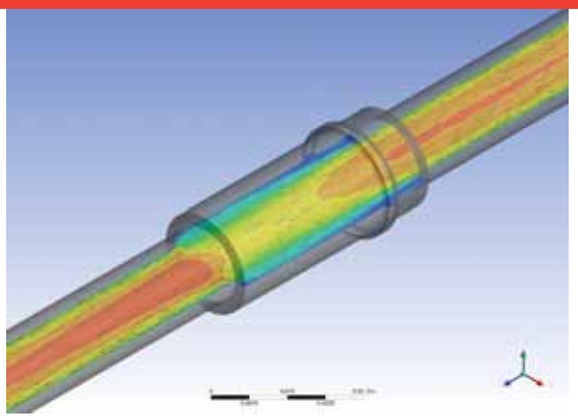


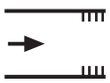
Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,70	0,48

Important Note

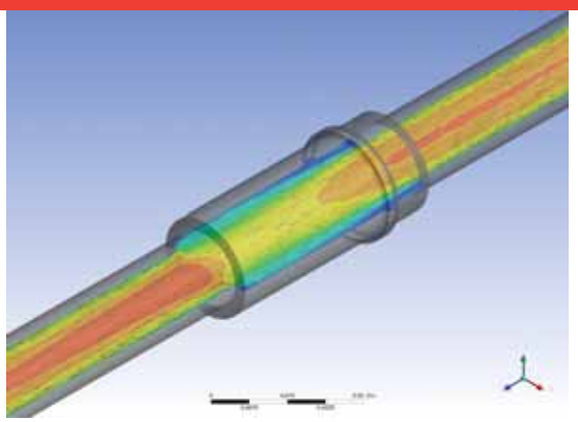
Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

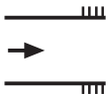
Transition Piece Round Female 25-3/4”



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,40	0,28

Transition Piece Round Male 25-3/4”

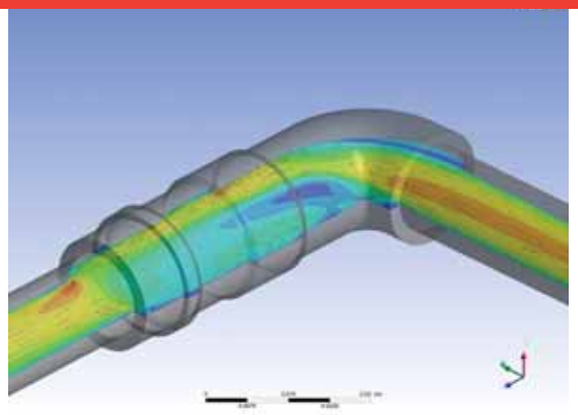


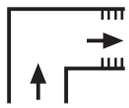
Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,70	0,48

Important Note

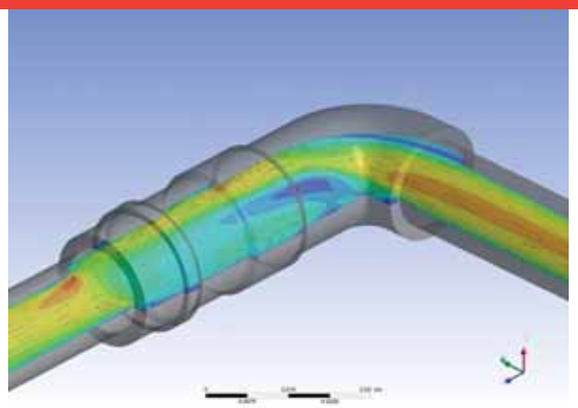
Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

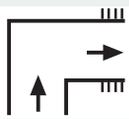
Elbow Female 25-3/4”



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	1,25	0,87

Elbow Male 25-3/4”

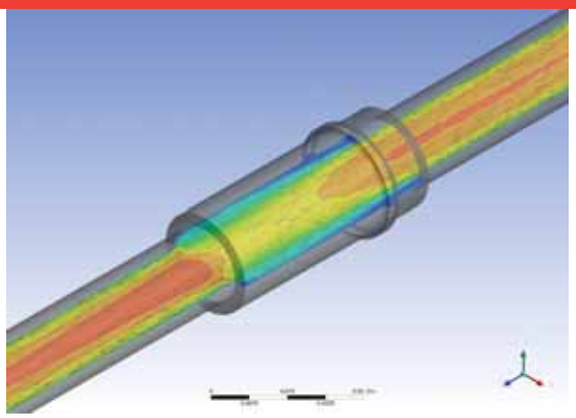


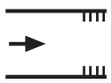
Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	1,40	0,97

Important Note

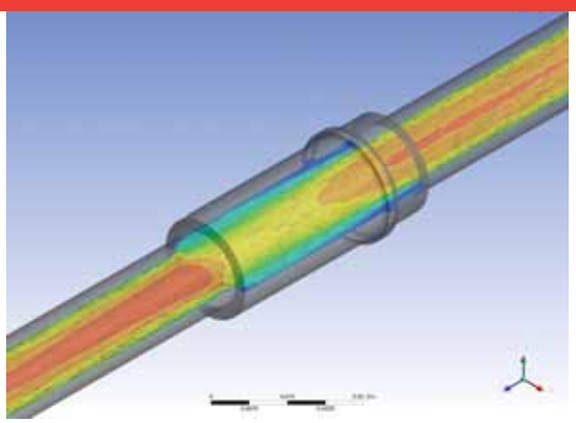
Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

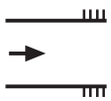
Transition Joint Hex Female 32 - 1”



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,40	0,28

Transition Joint Hex Male 32 - 1”



Schematic View	Local Loss Coefficient	Equivalent Pipe Length
	K	m
	0,70	0,48

Important Note

Local loss coefficients of fittings are calculated as welded with PN 25 pipes. When our fittings are assembled with pipes with larger inner diameter, K values will be lower. Outlet flow rate must be used in fitting loss calculations.

PATENTED PPR WELDING MACHINE

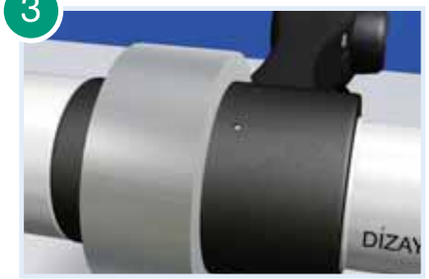
1

Prevents Welding Lip Forming
Welding lip forming, which is an unavoidable problem in installations, is 100% eliminated with special design welding tool. The problems of welding lip forming, narrowing of pipe diameter and following installation problems have all been solved.

2

Easy Welding with Patented Design
Dizayn Group special design patented welding tool simplifies welding in difficult areas of the installation. Due to the usage of two welding tools at the same time actively, troubles such as welding tools changing are also no more.

3



Adjusts Heating Duration
Heating durations of pipes depend on many factors. It is impossible for the plumber to always adjust the pipe heating duration correctly. Dizayn Group patented welding tool ensures always correct adjustment of heating duration.

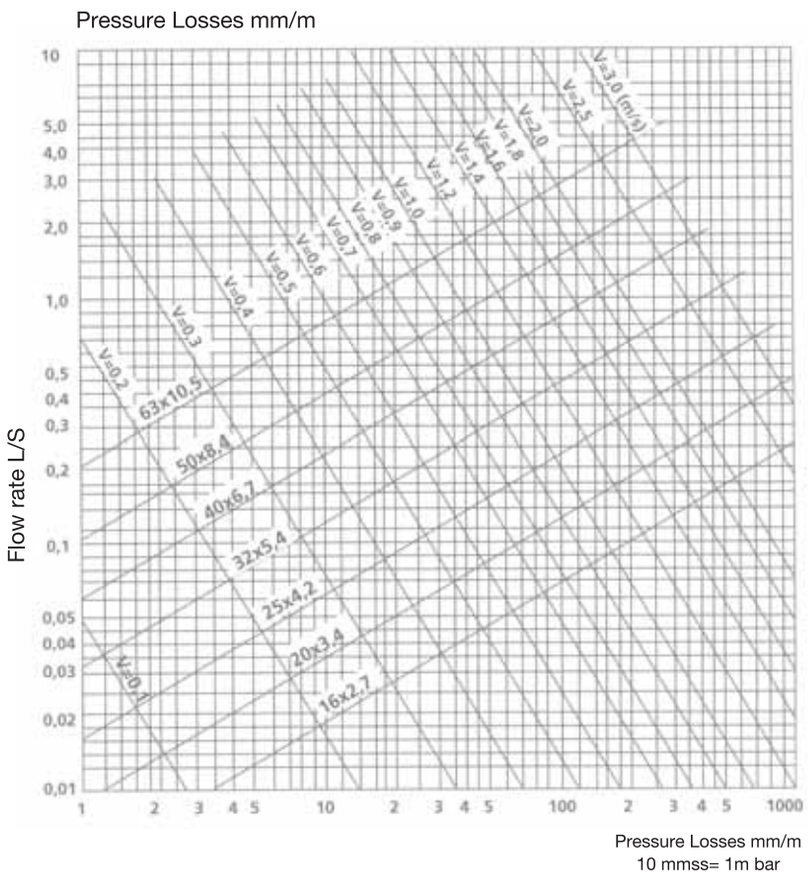
4

Lighter
Our patented design removes all unnecessary weights. Being 50% lighter than its comparables, it is aimed for functionality to be of top level.

5

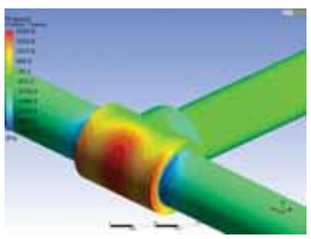
The machine is fixed with its special design stand.

Pressure Losses in Dizayn PPR Pipes

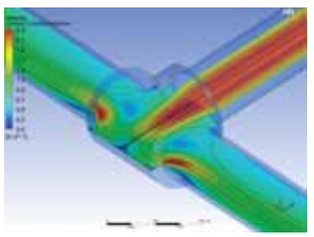


Easily Working Installations with HI-TECH Series

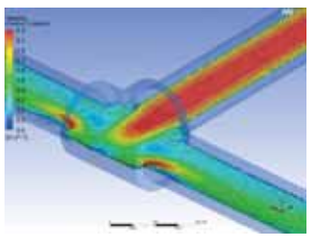
HI-TECH Series fittings have been designed by flow analysis with advanced engineering programs. Thus, products have been manufactured with minimal losses in flow and low local loss coefficients. HI-TECH Series reduce the energy needs of installations.



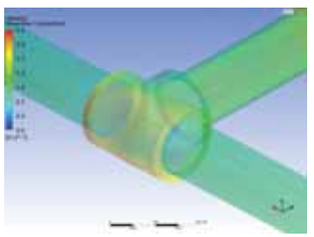
Pressure distribution inside the fitting



View of speed distribution and flow lines in the fitting



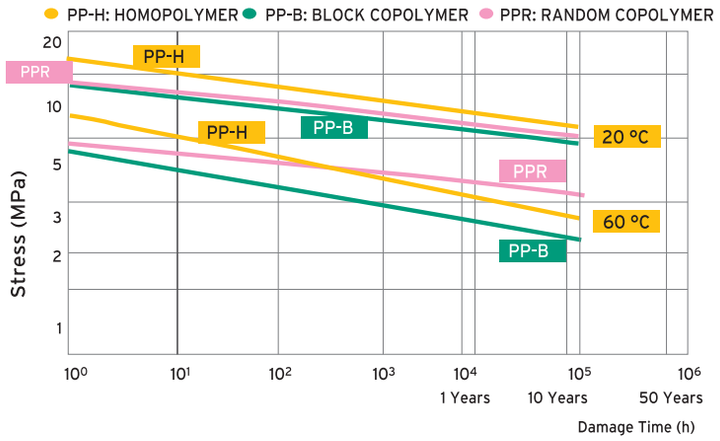
View of speed distribution and vector image in the fitting



Flow lines colored according to speed in the fitting

Temperature Pressure Resistance Table

Comparison of Design Stress (MPa) and Damage Time (h) for PP Pressurized pipes at 20°C and 60°C



Hydrostatic stress (σ)
The stress in MPa occurring on the wall of the pipe when pressure is applied using water. This stress is calculated by the formula below:

$$\sigma = p\frac{(d_{em} - e_{min})}{2e_{min}}$$

Minimum wall thickness is calculated by the formula below:

$$e_{min} = \frac{p.d_{em}}{2\sigma + p}$$

Here;

σ	: Hydrostatic stress. MPa.
P	: Pressure applied. MPa,
d_{em}	: Mean outer diameter of the pipe, mm.
e_{min}	: Minimum wall thickness, mm

Chemical Resistance

Polypropylene is one of the polymers with highest chemical resistance. Below are the chemical resistance of PPR products regarding the composition, quality conditions, concentration, exposure duration and temperature of material according to DIN 53756.

Materials are grouped in 3 classes;

- ● Resistant
- ○ Resistless
- ◑ Partially resistant

Phrases below are used for the concentration of chemicals:

VL :	Mass rate ≤ 10% solution in water
L :	Mass rate >10% solution in water
GL :	Saturated solution in water (at 20°C)
H :	Adapted
TR :	Technically pure
TA :	Residue amount

HI-TECH PPR Pipes and Fittings Life-Temperature-Pressure Table

Temperature	Service Life	Maximum Operating Pressure (Bar)			
°C	Year	SDR 11 PN 16	SDR 7,4 PN 20	SDR 6 PN 25	°C
10	1	21,1	33,4	42,0	10
	5	20,0	31,6	39,8	
	10	19,3	30,6	38,5	
	25	18,7	29,6	37,3	
	50	18,2	28,8	36,3	
	100	17,7	28,1	35,4	
20	1	18,0	28,6	36,0	20
	5	16,9	26,8	33,8	
	10	16,4	26,1	32,8	
	25	16,0	25,3	31,8	
	50	15,5	24,5	30,9	
	100	15,0	23,8	29,9	
30	1	15,3	24,3	30,6	30
	5	14,4	22,8	28,7	
	10	13,9	22,0	27,7	
	25	13,4	21,3	26,8	
	50	13,1	20,7	26,1	
	100	12,8	20,2	25,5	
40	1	12,9	20,5	25,8	40
	5	12,1	19,2	24,2	
	10	11,8	18,7	23,6	
	25	11,3	18,0	22,6	
	50	11,0	17,5	22,0	
	100	10,7	16,9	21,3	
50	1	11,0	17,5	22,0	50
	5	10,2	16,2	20,4	
	10	9,9	15,7	19,7	
	25	9,6	15,2	19,1	
	50	9,3	14,7	18,5	
	100	8,9	14,2	17,8	
60	1	9,3	14,7	18,5	60
	5	8,6	13,7	17,2	
	10	8,3	13,2	16,6	
	25	8,0	12,6	15,9	
	50	7,7	12,1	15,3	
70	1	7,8	12,4	15,6	70
	5	7,2	11,4	14,3	
	10	7,0	11,1	14,0	
	25	6,1	9,6	12,1	
	50	5,1	8,1	10,2	
80	1	6,5	10,4	13,1	80
	5	5,7	9,1	11,5	
	10	4,8	7,6	9,6	
	25	3,8	6,1	7,6	
95	1	4,6	7,3	9,2	95
	5	3,0	4,8	6,1	
	10	2,6	4,0	5,1	

Resistance of PPR Pipes Against Different Chemicals

Substance	Concentration	Resistance		
		20°C	60°C	100°C
Adiplic acid	TR	●	●	-
Accumulator acid	H	●	●	-
Alaune MI-M III Sulphate	GL	●	●	-
Aluminium Chloride	GL	●	●	-
Aluminium Sulphate	GL	●	●	-
Gold aqua (HCL/HNO3)	75% / 25%	○	○	○
Acryl nitrit	TR	●	◐	-
Amyl alcohol	TR	●	●	●
Amyl acetate	TR	◐	-	-
Ammonium Solution	GL	●	●	-
Ammonium (gas)	TR	●	●	-
Ammonium (liquid)	TR	●	-	-
Ammonium acetate	GL	●	●	-
Ammonium fluorid	L	●	●	-
Ammonium phosphate	GL	●	●	●
Ammonium Carbonate and Hydrogen Carbonate	GL	●	●	-
Ammonium Chloride	GL	●	●	-
Ammonium Nitrate	GL	●	●	●
Ammonium Sulphate	GL	●	●	●
Ammonium Sulphite	GL	●	●	-
Aniline	TR	◐	◐	-
Aniline Choral hydrate	GL	●	●	-
Anisol	TR	◐	◐	-
Cyclohexane	TR	◐	○	○
Antifreeze	H	●	●	●
Antimony (III), Chloride	90°	●	●	-
Acet Aldehyt	TA	○	○	○
Acet Aidehyt	TR	◐	-	-
Alaune MI-MIII Sulpha Asetephenonti	TR	●	●	-
Acetic acid	TR	●	◐	○
Acetic acid	40%	●	●	-
Acetic acid and-Vineger essens	50%	●	●	◐
Acetic acid anhydrite	TR	●	-	-
Acetic acid ethylester	TR	●	◐	○
Acetic acid methylester	TR	●	●	-
Acid-Acethohidrid	40%	●	●	-
Acid arsenic	40%	●	●	-
Acid arsenic	80%	●	●	◐
Acid Glycol	30%	●	◐	-
Acid Hydrophloric	40%	●	●	-
Acid Hydrophloric	70%	●	◐	-
Acid Hydrocyanil (Hydrocyanür)	TR	●	●	-
Acid Carbonhydritly	TA	●	●	-
Aceton	TR	●	-	-
Nitrous (residual gas)	All	●	●	-
Copper chloride	GL	●	●	-
Copper nitrate	30%	●	●	●
Copper cyanite	GL	●	●	-
Copper sulphite	GL	●	●	-
Wax	H	●	●	-
Barium Hydroxide	GL	●	●	●
Barium Salts	GL	●	●	●
Benzoldehyde	GL	●	●	-
Benzyl Alcahol	TR	●	●	-
Benzyl Chloride	TR	●	-	-
Benzine-Benzene blending	8090 / 2090	◐	○	○
Benzine (Aliphatic) Carbonhydrides	L	●	-	-
Benzene	TR	●	○	○
Beer	H	●	●	●
Borax (Sodium tetraborate)	L	●	●	-
Boric Acid	GL	●	●	●

Substance	Concentration	Resistance		
		20°C	60°C	100°C
Bromine (Bromine Water)	GL	◐	○	○
Bromine	TR	○	○	○
Vapor bromine	All	◐	○	○
Butylace tate	TR	◐	○	○
Butyl glycol (Button, water)	10%	●	◐	-
Butyl glycol	TR	●	●	-
Butyl Phenol	GL	●	-	-
Butyl Phenol	TR	○	-	-
Butyl Phtalate	TR	●	◐	◐
Butyl glycol	TR	●	-	-
Butanol (Butyl Alconal)	TR	●	◐	◐
Butantriol (1.2.4)	TR	●	●	-
Büten (2) - diol (1.4)	TR	●	●	-
Butin (2)-diol (1.4)	TR	●	-	-
Mercury	GL	●	●	-
Mercury salts	GL	●	●	-
Washing Dust	VL	●	●	-
Pinelham Oil	H	●	◐	-
Zinç Salts	GL	●	●	-
Deohidronaftalin	TR	●	○	○
Dextrin	L	●	●	-
Dektrose (glucose)	20%	●	●	●
Iron (II) and iron (III) chloride	GL	●	●	-
Sea water	H	●	●	●
1.2 Diaminoetan	TR	●	●	-
Dibutiphtalat phytalic acid dibuti ester	GL	●	◐	○
Diethanolamin	TR	●	-	-
Diethyl ether	TR	●	◐	-
Diglycol acid	GL	●	●	-
Dihexcil phtalat	TR	●	◐	-
Diisobuti caton	TR	●	○	○
Diissooctilphtalat	TR	●	◐	-
Dilsopropileter	TR	◐	○	-
Dichloracetic acid	TR	◐	-	-
Dichloracetic acid	50%	●	●	-
Dichloracetic acid methyl ester	TR	●	●	-
Dichlor benzol	TR	◐	-	-
Dichlor ethyl	TR	◐	-	-
Dimetilamin (Gas)	100%	●	-	-
N.N. Dimethyl Phormamid	TR	●	●	-
Di-n Butyl ether	TR	◐	○	○
1.4 Dioxsan (Diethylen-dioxide)	TR	◐	◐	-
Dioxsit phtalat (DOP)	TR	●	◐	-
Fuel oil	H	●	◐	-
Natural Gas	TR	●	-	-
Apple Acid	L	●	●	-
Apple water	H	●	●	●
Apple wine (ortho)	H	●	●	-
Etanol	L	●	●	-
Ethanol	TR	●	●	●
Ethanol (% 2 tolnol)	96%	●	-	-
Ethyl benzol	TR	◐	○	○
Ethyli diamin	TR	●	●	-
Ethylene glycol	TR	●	●	●
Ethylene cloridin	TR	●	-	-
Ethylene okide (liquid)	TR	○	-	-
Ethylcorid (gas)	TR	○	○	○
Phenylhidrozin	TR	◐	◐	-
Phenylhidroziinyum clorid	TR	●	◐	-
Phonot	90%	●	●	-
PhnolFermantation-malti	H	●	-	-

Resistance of PPR Pipes Against Different Chemicals

Substance	Concentration	Resistance		
		20°C	60°C	100°C
Film relevator baths	H	●	●	-
Phtalic acid	TR	○	-	-
Fluor (dry)	32%	●	●	-
Fluorsilis acid	40%	●	●	-
Formaldehyde	GL	●	●	-
Formic acid	10%	●	●	◐
Formic acid	85%	●	◐	○
Phosphate (inorganic)	GL	●	●	-
Phosphor (III) clorid	TR	◐	-	-
Phosphorocsit clorid	TR	◐	-	-
Phosphoric acid	85%	●	●	●
Phosgen	TR	◐	◐	-
Photo emülsion	H	●	●	-
Fructosane	L	●	●	●
Dektrose (glucose)Phurphuril alchol	TR	●	◐	-
Gas oil	H	●	◐	-
Glucose	20%	●	●	●
Glucose (grape sugar)	20%	●	●	●
Glycrine	TR	●	●	●
Silver nitrate	GL	●	●	◐
Silver solts	GL	●	●	-
Air	TR	●	●	●
Air gas	H	●	-	-
Heksan	TR	●	◐	-
Heksantriol (1.2.6)	TR	●	●	-
Hydazine hydrate	TR	●	-	-
Hydrogen	TR	●	●	-
Hydrogen fluoride (residual gas)	TA	●	●	-
Hydrogen chloride (dry gas)	TR	●	●	-
Hydrogen chloride (wet gas, Soldering spirit)	TR	●	●	-
Hydrogen proxide	30%	●	◐	-
Hydrogen Sulphite (gas)	TR	●	●	-
Hydroguinone	L	●	-	-
Hydrochloric acid (liquid, soldering spirit)	20%	●	●	-
Hydrochloric acid (soldering spirit)	20 - 36%	●	◐	◐
Hydroxy ammonium sulphate	12%	●	●	-
Cocoanut alcahol	TR	●	◐	-
Cocoanut oil	TR	●	-	-
Castor oil	TR	●	●	-
Lot extract	H	●	◐	-
İsooktan	TR	●	◐	-
Isopropanol (propanol-2)	TR	●	●	●
Drinking water	TR	●	●	●
Bleaching liquid	20%	◐	◐	○
Gelatine	L	●	●	●
Caphazl acid	TR	○	○	○
Tin (II) chlorite	GL	●	●	-
Tin (IV) chlorite	GL	●	●	-
Calcium hydroxide	L	●	-	-
Calsium hypochlorite	GL	●	●	●
Calcium corbonate	GL	●	●	●
Calcium chloride	GL	●	●	-
Calcium nitrote	GL	●	●	-
Corbolin	H	●	-	-
Carbondioxide (gas)	All	●	●	-
Carbondioxide (liquid)	All	●	●	-
Carbon monoxide	All	●	●	-
Carbon sulphite	TR	○	○	○
Solid oil acid	20%	●	-	-
Solid oil acids	TR	●	◐	-
Coal-tar oil	H	●	○	○

Substance	Concentration	Resistance		
		20°C	60°C	100°C
Amber acid	GL	●	●	-
Unseed oil	H	●	●	●
Chlorine	GL	◐	○	○
Chlorine (dry, gas)	TR	○	○	○
Chiorine (wet, gas)	0.5%	◐	-	-
Chlorine (wet, gas)	1%	○	○	○
Chlorine (liquid)	TR	○	○	○
Chloral	TR	●	●	-
Chloral hydrate	TR	◐	○	○
Chloramine	L	●	-	-
Chlorine acetic acid	L	●	●	-
Chlorine acid	1%	●	◐	○
Chlorine acid	10%	●	◐	○
Chlorine acid	20%	●	○	○
Chlorine benzole	TR	◐	-	-
Chloreton (ethyl chlorad)	TR	○	○	○
Chloretanol	TR	●	●	-
Chlor time	All	●	●	-
Chloroform	TR	◐	○	○
Cresylic	>90%	●	-	-
Chromic acid	40%	◐	◐	○
Chromic acid/Seulphuric acid/water	15/35/50%	○	○	○
Croton aldehya	TR	●	-	-
Xylene	TR	◐	○	○
Acetate of lead	GL	●	●	○
Sulphure dioksit (gas)	TR	●	●	-
Sulphure dioxide (liquid)	All	●	●	-
Sulphure (dioxide (residual gas)	All	●	●	-
Sulphur inoxide (residual gas)	All	●	●	-
Loctic acid	90%	●	●	-
Lanoline	H	●	◐	●
Mineral water	H	●	●	●
Magnesium hydroxycarbonate	GL	●	○	○
Magnesium chloride	GL	●	●	●
Magnesium sulphate	GL	●	●	●
Magnesium salts	GL	●	●	○
Machine oil	TR	●	◐	○
Ferment	All	●	-	-
Gall salt	10%	●	○	-
Menthol	TR	●	◐	-
Methylamine	32%	●	-	-
Methyl acetate	TR	●	●	-
Methyl bromide	TR	○	○	○
Methylene chloride	TR	◐	○	○
Methyl ethyl ketone	TR	●	◐	-
Methyl chloride	TR	○	○	○
Methanol	TR	●	●	-
Methanol	5%	●	●	○
Methansülphan acid	5%	◐	◐	◐
Methansülphan acid	50-100%	◐	○	○
Methocsibütanon	TR	●	◐	○
Fruid juice	H	●	●	○
Fruid core	H	●	-	-
Com oil	TR	●	◐	-
Engine oil	TR	●	◐	-
Oil of peppermint	TR	●	-	-
Nickel sait	GL	●	●	-
Uquid ammonia	GL	●	●	-
Stark	All	●	●	-
Liquid glucose	All	●	●	-
Nitric acid	10%	●	◐	-

Resistance of PPR Pipes Against Different Chemicals

Substance	Concentration	Resistance		
		20°C	60°C	100°C
Nitric acid	10-50%	◐	○	○
Nitric acid	>50%	○	○	○
Nitro benzol	TR	●	◐	-
Oxygen	TR	●	-	-
Oxtil crezol	TR	●	○	-
Ozon	0.5ppm	●	◐	-
Coton oil	TR	●	●	-
Paraffin emulsion	H	●	●	-
Paraffin oil	TR	●	●	○
Perchloric acid	20%	●	●	-
Perchlorethylene	TR	◐	◐	-
Petroleum	TR	●	◐	-
Petroleum ether	TR	●	◐	-
Picric acid	GL	●	-	-
Piridin	TR	◐	◐	-
Potassium bromate	10%	●	-	-
Potassium bromit	GL	●	-	-
Potassium dicromat	GL	●	●	-
Potassium phlorid	GL	●	●	-
Potassium heksasiyono pherrat	GL	●	●	-
Potassium hydrogen carbonate	GL	●	●	-
Potassium hydroxide	50%	●	●	●
Potassium iodür	GL	●	●	-
Potassium carbonate	GL	●	●	-
Potassium chlorat	GL	●	●	-
Potassium chloride	GL	●	●	-
Potassium chromate	GL	●	●	-
Potassium nitrate	GL	●	●	-
Potassium permanganat	GL	●	○	-
Potassium perchlorate	10%	●	●	-
Potassium peroxide sulphate	GL	●	●	-
Potassium cyanite	L	●	●	-
Potassium sulphate	GL	●	●	-
Propane gas	TR	●	-	-
Propanat (I) propyl alcohol	TR	●	●	-
Propargil alcohol	7%	●	●	-
Proplasic acid	>50%	●	●	-
Propene glycol	TR	○	○	○
Liquid brom-methyl brom	TR	○	-	-
Butyl (liquid)	TR	●	-	-
Cyclohexane	TR	●	○	-
Cyclohexsanone	TR	◐	○	○
Silicone emülcyon	GL	●	●	●
Silicone oil	H	●	●	-
Silicic acid	TR	●	●	●
Vinegar (wine)	All	●	●	-
Citric acid	H	●	●	●
Sodium Carbonate	VL	●	●	●
Soybean oil	50%	●	●	●
Sodium acetate	TR	●	◐	-
Sodium bezoat	35%	●	●	-
Sodium borate - Hydrogen proxide	GL	●	●	-
Sodium dixromat	GL	●	●	●
Sodium Phosphate	GL	●	●	●

Substance	Concentration	Resistance		
		20°C	60°C	100°C
Sodium hexsametaphosphate	L	●	●	-
Sodium hydrogen Carbonate	GL	●	●	●
Sodium hydrogen Sulphide	GL	●	●	-
Sodium hydrogen sulphite	L	●	-	-
Sodium hydroxide	60%	●	●	●
Sodium hypochlorite	10%	●	-	-
Sodium hypochlorite	20%	◐	◐	○
Sodium carbonate	50%	●	●	◐
Sodium chlorate	GL	●	●	-
Sodium chloride	VL	●	●	●
Sodium chloride	2-20%	●	◐	○
Sodium nitrote	GL	●	●	-
Sodium nitrite	G	●	●	-
Sodium perborate				
Sodium silisat	L	●	●	-
Sodium sulphate	GL	●	●	-
Sodium sulphite	GL	●	●	-
Sodium sulphite	40%	●	●	●
Sodium tetraborate	L	●	●	-
Sodium thiosulfate	GL	●	●	-
Pure water	H	●	●	●
Alil alcohol (propen-(2) ol (1).)	96%	●	●	-
Hidrobromasit	48%	●	◐	○
Sulphuric acid	10%	●	●	●
Sulphric acid	10-80%	●	●	-
Sulphric acid	80%-TR	◐	○	-
Fuming sulphric acid		○	○	○
Sulphüric acid (residua gas)	All	●	●	-
Sulphur chloride	TR	○	○	○
Milk	H	●	●	●
Milk caustic	60%	●	●	●
Alun	GL	●	●	-
Wine acid	10%	●	●	-
Wine	H	●	●	-
Wine vinegar	H	●	●	-
Sugar treacle	H	●	●	●
Cane sugar	H	●	●	-
Test benzine	TR	●	◐	○
Tetraethyl lead	TR	●		-
Tetrahydrofurane	TR	◐	-	-
Tetraline	TR	○	○	○
Tetrachlorethane	TR	◐	○	○
Tetraclorethylene	TR	◐	◐	-
Tetraclormetan	TR	○	○	○
Tiner oil	TR	○	○	○
Thlophtene	TR	●	◐	-
Urea	GL	●	●	○
Vaseline oil	TR	●	◐	○
Vinyl acetate	TR	●	◐	-
Vinilide chrorid	TR	◐	-	-
Oil acid	TR	●	●	-
Oils (animal and vegetable)	TR	●	◐	-
Arachis oil	TR	●	●	-
Olive oil	TR	●	●	●

Thermal Expansion of PPR Pipes

Expansion of polypropylene pipes are relatively higher and their linear expansion coefficients are much higher than those of metals. Therefore, these expansion coefficients must be considered during installations.

Linear expansion coefficient of Dizayn pipes: Temperature value is between 30-90°C. Expansion coefficient Δl is calculated with the formula below:

$\boxed{\Delta l = \lambda \times l \times \Delta T}$ $\Delta l =$ Linear expansion (mm)

λ = Linear expansion coefficient = $\frac{mm}{m°C}$

Dizayn Pipe (Mean Value) λ = 0,183 $\frac{mm}{m.K}$

l = Pipe length (m)
ΔT = Temperature difference (°K or °C)
ΔT = Hot water and ambient temperature (°K or °C) difference

Example:

Pipe temperature on first installation + 16°C and pipe length 8 m.

Minimum pipe temperature (for cold water): + 9°C

Maximum pipe temperature (for hot water): + 70°C

1-Difference between pipe temperature at first installation and minimum pipe temperature (for cold water)

$\Delta T1$=16-9=7°C

2-Difference between pipe temperature at first installation and maximum pipe temperature (for hot water)

$\Delta T2$=70-16=54°C

ΔT_1 pipe expansion

L1 = 8m x 7°C x 0,183 mm/m°C = 10,2 mm (SHRINKING)

ΔT_2pipe expansion

L2 = 8m x 54°C * 0,183 mm/m°C = 79 mm (ELONGATION)

HI-TECH PPR PIPE CLAMP CLEARANCES (cm)										
Temperature difference	Pipe diameter									
°C	(mm)									
	20	25	32	40	50	63	75	90	110	125
0	85	105	125	140	165	190	205	220	250	260
20	60	75	90	100	120	140	150	180	180	190
30	60	75	90	100	120	140	150	160	180	190
40	60	70	80	90	110	130	140	150	170	180
50	60	70	80	90	110	130	140	150	170	180
60	55	65	75	85	100	115	125	140	160	170
70	50	60	75	80	95	105	115	125	140	150

HI-TECH PPR PIPE CLAMP CLEARANCES (cm)									
Temperature difference	Pipe diameter								
°C	(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	180	200	200

Pipe length	Thermal Expansion in HI-TECH PPR Pipes (mm), λ=0,180 mm/m °C							
	Temperature difference ΔT= First Installation Temperature - Installation Operating Temperature							
	10°C	20°C	30°C	40°C	50°C	60°C	70°C	80°C
5m	9	18	27	36	45	54	63	72
10m	18	36	54	72	90	108	126	144
15m	27	54	81	108	135	162	189	216
20m	36	72	108	144	180	216	252	288
25m	45	90	135	180	225	270	315	360
30m	54	108	162	216	270	324	378	432
35m	63	126	189	252	315	378	441	504
40m	72	144	216	288	360	432	504	576
45m	81	162	243	324	405	486	567	648
50m	90	180	270	360	450	540	630	720

Pipe length	Thermal Expansion in HI-TECH Combi Pipes (mm), λ=0,03 mm/m °C							
	Temperature difference ΔT= First Installation Temperature - Installation Operating Temperature							
	10°C	20°C	30°C	40°C	50°C	60°C	70°C	80°C
5m	2	3	5	6	8	9	11	12
10m	3	6	9	12	15	18	21	24
15m	5	9	14	18	23	27	32	36
20m	6	12	18	24	30	36	42	48
25m	8	15	23	30	38	45	53	60
30m	9	18	27	36	45	54	63	72
35m	11	21	32	42	53	63	74	84
40m	12	24	36	48	60	72	84	96
45m	14	27	41	54	68	81	95	108
50m	15	30	45	60	75	90	105	120

Why Must Aluminum Foils Be Used In Heating Systems?

The primary reason for developing pipes with aluminum foils is to provide oxygen isolation and prevent transition of oxygen molecules in the air because of difference in concentration. As is known, heating installations operate as closed circuits. In case oxygen diffuses into the system in these installations, oxygen molecules in the water cause corrosion in metallic components. In this case, usage life of combi boilers and radiators are shortened. This is why, plastic pipes with copper and aluminum foils (stable, AL-PEX) are commonly used in installations in Europe.

The oxygen diffusing into the installation causes problems like corrosion, cavitation and erosion, efficiency losses in devices, high servis need frequency, problems in pumps, heating difficulties in certain parts of the installation and circulation problems. These problems are frequently observed in heat exchangers, pumps, heat flow meters, 3-way valves and floor heating systems. Diffusion of oxygen into the installation is mainly caused by the use of plastic pipes without oxygen barriers (like normal PPR, PEX and Glass-reinforced PPR).

In normal temperatures, dry and clean environments, a protective oxide layer forms over steel. However this oxide layer does not show protective characteristics in electrolytic environments such as water. On the contrary, it harms the metal.

As a result of corrosion of iron, many products such as lepidocrocite (_-FeOOH), goethite (±-FeOOH), akaganeite (≤-FeOOH), magnetite (Fe304) and maghemite (_ -Fe304) are produced. First of these products, lepidocrocite is produced with the existence of Fe+2 and O2. As oxygen decreases, lepidocrocite turns into magnetite form in approximately 24 hours.

This substance is magnetic and it is attracted towards equipment generating magnetic fields. Since 2-way and 3-way motor valves have magnetic fields around them, magnetic substances accumulate around the valve and block the valve in time. Similarly, magnetic substances also attach to the pumps. If the pumps are opened up, it would be seen that their insides are full of black mud.

In normal conditions, magnetic substances attach to metal surfaces and provide protection contrary to rust. However with water flow, magnetic substances detach from the metal surfaces depending on the system's pH, temperature and undissolved oxygen amount and they react with oxygen, again producing rust.

Existence of undissolved oxygen in the system causes a bolder iron oxide layer and a higher level of oxidation. As a result, the amount of undesired products of iron's oxidation such as lepidocrocite, magnetic substances and rust increase.

In a 1000m 20/2 plastic pipe system with unbarriered PE-X, PPR or Glass Additive PPR pipes, approximately 200 g oxygen diffuses into hot water within 200 heating days in a year and this corrodes 550 g iron, creating 750 g rust. When stable (with aluminum foil) PPR pipes are used in the installation, the assembly is performed with unbarriered PPR fittings. In this case, there will be oxygen diffusion into the system only because of the fittings used. Because the pipes with foils are trimmed proportional to the welding area necessary for assembly with fittings. As a result of this trimming, the aluminum foil is detached from the pipe and oxygen diffuses into the system through this area without foil. When oxygen diffusion is above the limit determined in DIN norms, corrosion cannot be prevented.

If aluminum foil is placed in the middle of the pipe's wall thickness, as in "Patented Dizayn Oxy Plus Combi Pipes", there will be no need to trim for welding. And that reduces the oxygen amount diffusing into the system. Two different cases are shown in Figure 1.

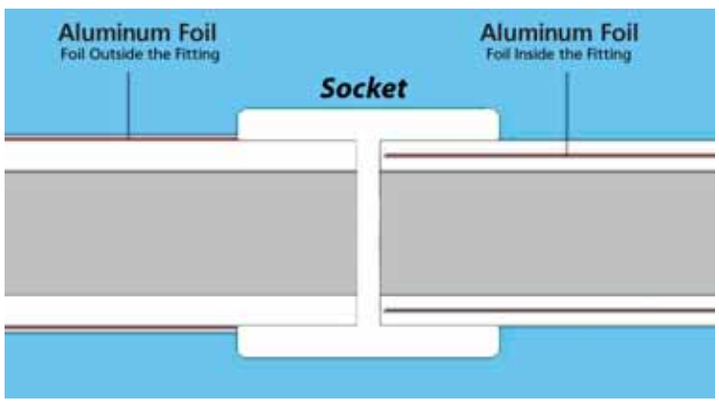


Figure.1: Assembly of aluminum foil plastic pipes with fittings (Left pipe is normal stable, right pipe is Dizayn Oxy Plus)

According to DIN 4726 norm limiting the oxygen diffusion amounts in installations, maximum oxygen amount diffusing from outside environment into the heating installation is 0,1 mg/L. day (this is 2,38 mg/day in a standard apartment). For determining the conformity of oxygen amount diffusing into the system through plastic pipes according to DIN 4726 norm, the amount of oxygen that will infuse into the pipe from the outer environment through the pipe's wall thickness must be calculated. In a pipe without barriers mentioned above, (e.g.; PPR, Glass Reinforced PPR, PEX and PB) the oxygen diffusion ratio is much higher than set forth in the norm (Oxygen diffusion through unbarriered PE-X, PPR, Glass Reinforced PPR or PB pipes in a standard apartment is approximately 82,7 mg/day, on the other hand, it is 5,54 mg/day with aluminum foil pipes).

Why Must Aluminum Foils Be Used In Heating Systems?

Yet this value is 1,97 mg/day with Dizayn Oxystable and this is much lower than 2,38 mg/day required by the standard), there will be a significant amount of corrosion and system problems.

Test results of pipes used in heating installations are given in the table below.

SUMMARIZED TABLE					Description
Tests	**Glass Fiber Reinforced Pipe**	**PPR Pipe**	**Oxy Plus Combi Pipe**	**Standard**	
Explosion Test	22 bar	28 bar	32 bar	-	Since the glass reinforcement providing a notch effect, the pressure resilience is low.
Impact Test	Failed to pass the standard	Failed to pass the standard	Passed the standard	TS EN ISO 15874-2	Since glass reinforcement providing a notch effect, failed to provide impact resilience.
Elongation Test ($\Delta T = 90^{\circ} C - 20^{\circ} C$)	2,45 mm/m	10,5 mm/m	2,1 mm/m	TS EN ISO 15874-2	Oxy Plus is 15% better
Oxygen Diffusion	82,7 mg/day	82,7 mg/day	1,97 mg/day	DIN 4726	According to DIN 4736, maximum allowed value in a standard apartment (115 m^2) is 2,38 mg/day.

Due to all these inconveniences of heating installation pipes such as Glass reinforced PPR pipes, PPR pipes without aluminum foils, PEX pipes without oxygen barriers which fail to provide oxygen isolation, leading combi boiler manufacturers clearly declare that they exclude from guarantee the corrosion problems caused by using unbarriered plastic pipes.

When above table is analyzed, it can be observed that glass reinforced pipes are poor in pressure resistance and fail to provide impact resistance required by the standards.

Glass reinforced PPR pipes with 0,035 mm/m°C elongation coefficient are elongated 15% more than Oxy Plus Combi Pipes (Elongation coefficient of Oxy Plus Combi Pipes is 0,030 mm/m°C).

Information above show that the correct and only solution in "combi heating systems" is "Dizayn Oxy Plus Combi Pipes" along with their patent.

Installation Pressure Test

Considering that linear expansion will occur as time passes, when making connections at the apartment entries from the colon shaft of discharge network, precautions must be taken via one of the methods below:

1. This connection can be laid in a separate distance from the wall.
2. The hole for apartment entry can be drilled larger.
3. A yoke can be used for apartment entry.

Pressure Measurement
DIN 1988 sets forth the requirement of a pressure test for drinking water systems. The test pressure must be at least 1,5 times more than the operating pressure. Due to the nature of the material, the pipes expand as pressure is applied. The test results may also be affected by the difference between ambient temperature and pipe's temperature. A temperature difference of 10°C causes a pressure difference from 0,5 to 1 bar. Therefore, the test temperature must be as stable as possible.

The pressure test constitutes of 3 stages; initial, actual and final. For the initial test applies a pressure of 1,5 times the operating pressure is applied and this is repeated 2 times with 10 minute breaks in 30 minutes. After a test period of 30 minutes, the test pressure must not drop below 0,6 bar and there must be no leak.

The actual test must follow the initial test. Test duration is 2 hours and the pressure continuing from the initial test must not drop by more than 0,2 bar.

When above tests are completed, there is the final test and this test is performed in 15 minute intervals with 5 and 10 bar pressures. The pressure must be removed between the stages.

There must be no leaks in anywhere of the tested installation. The measurements must be performed with manometer sensitive to even 0,1 bar pressure change. The manometer must be placed at the lowest point of the installation.

The pressure test must be recorded, location and date must be stated and this report must be signed by the requesting party making the contract.

Control diagram

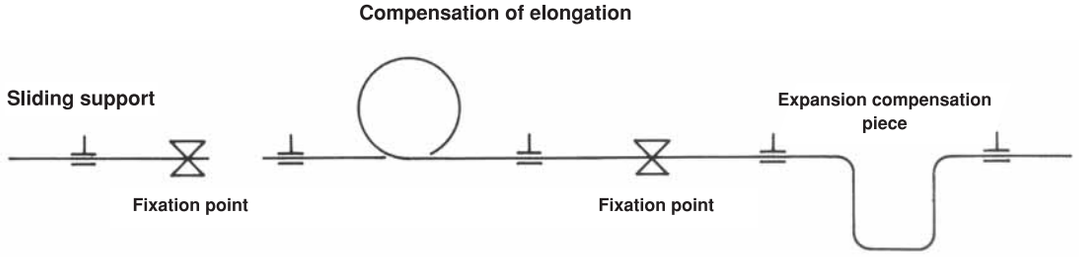
Test initialization:
Completion:
Test duration:
Contracting:
Customer:
Location:
Date:

Installation / Project Design

Installation of Dizayn Polyprolylene Random Copolymer Pipes is performed similar to that of metal pipes. Only difference is the consideration of this material's expansion characteristics in design and calculations. PPR pipes can be laid on or inside walls. Unit weights of these pipes and attachments are 17 times lower than those of metal pipes. PPR pipes are more practical, easier, faster, cleaner and cheaper to install. If these pipes are to be laid in open areas, elongation compensation must be calculated and considered during project design. In situations where expansion cannot be directed towards one way, free bending pieces or shaped pieces must be used. To avoid any damage on pipe surface, plastic units must be used at joints.

Compensation of Expansion in Pipe Line

1



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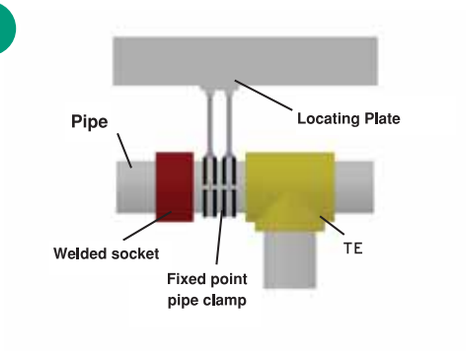

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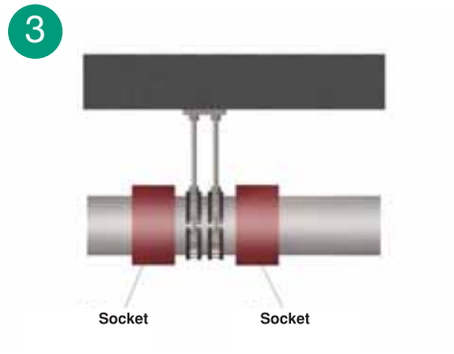
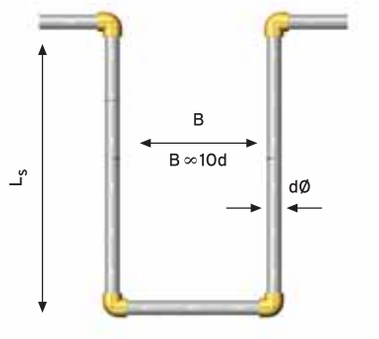


Application of fixed points are shown in illustrations. When forming fixed points, extra forces such as weight, ambient circulation and extra loads that cause linear elongation must be taken into account.

4 **Example of expansion compensation in PPR pipes and 90° elbows**

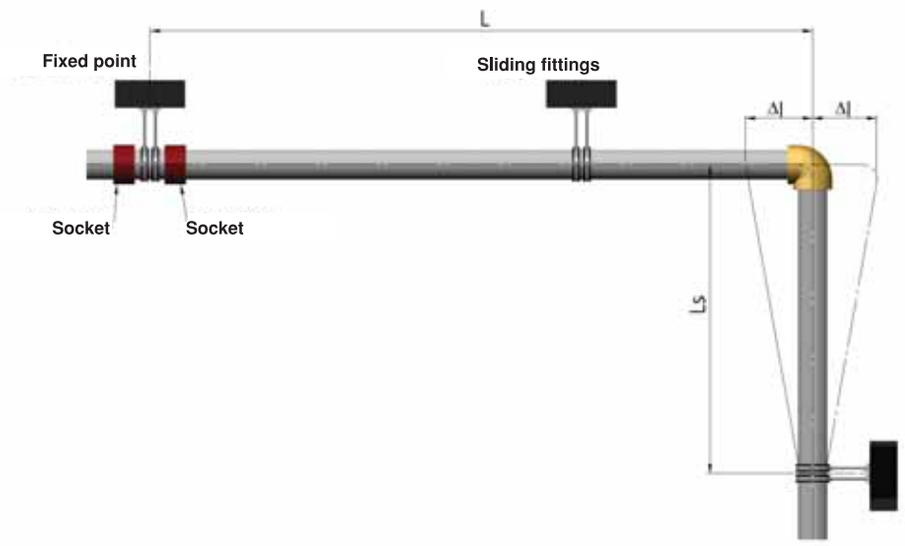


5 **Sliding support**

Installation / Project Design

Fixed supports prevent the pipe from moving by fixing some points. Fittings are used for creating fixed points. Fixation abilities of fixed supports must be better than sliding supports. Fixed supports must not be used in bending points and direction changes must be made on the pipe itself.
Adjustments must be made to compensate potential elongations and shrinkings that may occur linearly on the pipe between the fixed supports.

6



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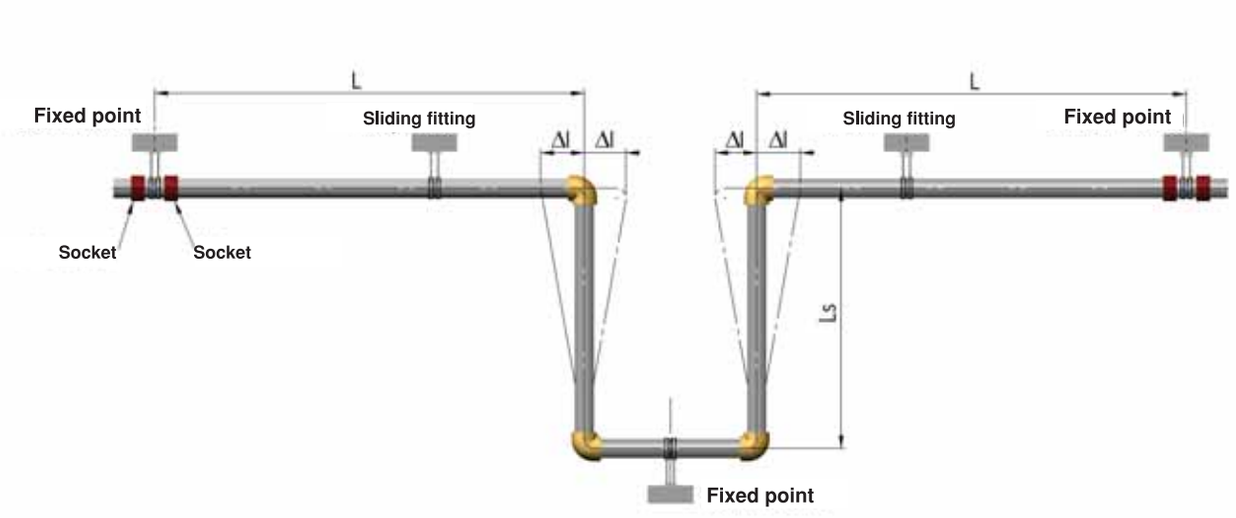


Figure 6 and 7 show the effect of elongation and shrinking on the length of the pipe and how they are compensated.

Installation / Project Design

To obtain sufficient flexibility, the length of bended part of the pipe in the application is important. This can be calculated as below.

$Ls = K.\sqrt{d.\Delta L}$

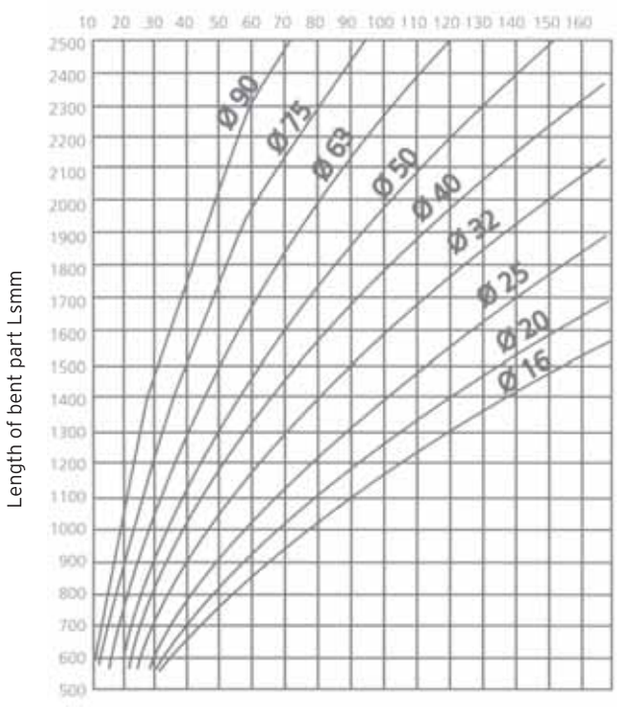
In this formula

Ls = Length of free bending piece

K = Constant coefficient of Dizayn pipes = 30

ΔL = Elongation or shrinking (mm)

d = Outer diameter of Dizayn pipe (mm)



Adjustments for compensating expansion and shrinking can be applied to buildings very easily. To form an expansion cycle as in Figure 4, 4 elbows will be sufficient. Required length of free bending piece (Ls) can be determined by the above formula or above diagram.

8

For straight pipes longer than 5 meters, an expansion piece must be used to compensate expansion. At the joints of placed pipes, Omegas must be used. Omega pieces (Figure 8) are available in sizes of 20 mm, 25 mm and 32 mm.

POINTS OF CONSIDERATION IN PPR PIPES AND ATTACHMENTS

1. Pipes must be protected from impact before and after installation.

2. PPR pipes must be protected from long time exposure to UV light before and after installation. Areas exposed to UV light after installation must be isolated.

3. A pressure test must be performed on completed installations (DIN 1988). It is wrong to perform the pressure test with the main pressure. After the installation is completed, installation pressure test must be performed with 1,5 times the operating pressure (with 15 bar) and for at least 2 hours.

4. PPR pipe installations must be protected against freezing. Areas with freezing risk must be isolated. If the installation is not going to be used, the water must be drained and the pipes must be protected from damage by high pressures due to freezing.

5. Due to sudden increases in temperature in devices such as water heaters, metal pipes must be preferred for the first 1-1,5 meter of the hot water outlet line and then transition to PPR pipe must be established. In doing so, possible problems will be prevented.

6. Welding tools used in welding processes must be compliant with the standards. Tools with worn teflon must not be used for welding.

7. Conical threaded attachments must not be used at joints.

8. Dirty pipes and attachments must not be used before cleaning.

9. Metal attachments must not be over tightened.

10. Cutters used for cutting the pipes must be sharp.

11. Technical catalogue must be utilized to compensate expansions (elongation and shrinking).

FREQUENTLY ASKED QUESTIONS

1. Can PPR sanitary installation pipes be used in hot water installations?
They can be, however under which temperature and pressure they can be used must be identified from the life table. It is guaranteed for 50 years only at 20°C and 25 bar pressure. What the life of the product will be under which temperature and pressure can be identified from the temperature-life-pressure table.

2. What do PRR Type 1, Type 2, Type 3 mean? What are their differences?
Plastic pipes become more durable with developments. The first polypropylene structure was consisted of propylene molecules. This was called Type 1 Polypropylene Homopolymer. After that, complex aligned ethylene-propylene molecules were added to propylene molecules. And this was called Type 2 Polypropylene Block Copolymer. Finally, a product called Type 3 was obtained, which constituted of a structure with ethylene molecules regularly ordered between propylene molecules.Today, due to their characteristics, Type 2 and Type 3 are commonly used. Type 2 is used only for cold water lines. It has no resilience against hot fluids. Due to its resilience against hot fluids, Type 3 can be used in hot water lines.

3. How are Type 2 and Type 3 distinguished from each other?
It cannot be identified visually, or by tests of density, pressure, etc. The only test that can is the DSC (Differential Scanning Calorimeter) test. There are different amounts of heat radiated by each plastic when heated under a specific temperature. The heat increase graphic of this test is used as the identity of the plastic.

4. How can we tell if we bought Type 2 instead of Type 3?
If the companies do not have international certificates, it is difficult to tell. It can be learned by requesting DSC test certificate according to lot number. Due to being cheaper than Type 3, Type 2 is open to use by those without certification from international certification institutes (IMA, DVGW). TSE does not conduct periodical inspections.

FREQUENTLY ASKED QUESTIONS

5. What is the pipe's elongation coefficient?

$\lambda = 1{,}5.10^{-4}\ K^{-1}$

λ is written as above when all lengths are in mm. If the pipe length is in meter in the formula, it is written as below.

$\lambda = 0{,}15$

Below formula is used for Elongation Calculation.
$\Delta L = \lambda \times L \times \Delta T$
ΔL = Linear elongation
λ = Plastic elongation coefficient
L = Pipe length
ΔT = Difference between pipe laying temperature and operation temperature

Example of elongation calculation;

$\lambda = 0{,}15\ K^{-1}$
L = 3 m
T1 = Pipe laying temperature = 20°C
T2 = Maximum temperature of the fluid = 70°C
$\Delta L = 0{,}15 \times 3 \times (70-20)$
ΔL =22,5 mm = 2,25 cm hesaplanır.

6. What is condensation?
Air carries water vapor depending on its temperature. This value increases with temperature and measurement values can be obtained from technical tables. In addition, there is the dew point value depending on the relative humidity of the air. This temperature shows the temperature when condensation starts from the air contact surface temperature. And this is called the dew point.

The dew we observe at dawn is caused by the same principle. Ground temperature drops below the air temperature in clear weather and the air leaves the water molecules on the ground where it contacts the ground. This occurrence is technically called condensation.

7. How can condensation be prevented?
Condensation can be prevented by isolating the surfaces below dew point temperature. Due to isolation material not transmitting heat and its own surface temperature is higher, condensation is prevented.

When not isolated, water accumulates on pipe surfaces and these corrode steel pipes, swell the walls and constantly oxidize the column iron.

Technical Specifications

Article 1 - Subject

These specifications cover the polypropylene pipes and fittings made of PPR raw materials required for use in drinking water pressurized lines.

Article 2 - Characteristics of Pipes and Fittings

Article 2. 1 Pipe Standard
PPR pipes are tested with extruder manufacturing method according to TS EN IS015874-2 standards.
Article 2. 2 Stress values
Pipe circumferential stress (s) shall be 10 MPa (N/mm^2), design stress shall be 8 MPa.
Article 2. 3 Pressure Test
The test shall performed according to TS EN ISO 15874-2 standards.
Article 2. 4 Extension Piece Standard
Extension pieces shall be manufactured with injection method according to TS TS EN ISO 15874-3.
Article 2. 5 Extension Piece Measurement Control
Extension pieces shall be controlled according to TS EN ISO 15874-3. A compass stand dial indicator shall be used to determine sagging in conicity measurements of welding areas of the products.
Article 2. 6 Threaded Extension Piece Control
Threaded extension pieces with same sizes shall be tested for inner and outer thread engaging. Inner and outer threaded parts must be able to engage accordingly along the threaded area length.
Article 2. 7 Threaded Extension Piece Torque Resilience
Threaded pieces are held in 95°C water for hours and then tested for determining metal-plastic breaking value using a torque meter. At the end of the test, the products must provide minimum 40 Nm resilience (the passing ratio can be referred here).

Article 3 - Raw Material Control

Article 3.1 Density Test
Density of pipe material is tested from raw material conformant with TS EN 15874-2. This value must not be below 0,90 g/cm3.
Article 3. 2 Determining Elasticity Modulus
Elasticity modulus of pipe material must conform with TS 1389-2 EN ISO 527-2. This value is 800 MPa.
Article 3.3 Determining Impact Resilience
Impact resilience is tested according to TS EN ISO 15874 chart 10.
Article 3.4 Melt Flow Rate
Raw material granules shall be equivalent or smaller than 0,5 g/10min value when subjected to MFR 230°C / 2,16 kg test according to ISO 1133 medium 12.
Article 3. 5 DSC Device
Whether or not the used raw material lot is conformant with TS EN 15874-2 standard shall be determined by checking differential scanning calorimeter (DSC) melting peaks and crystallization percentage. OIT shall be minimum 20 min. (200°C).

Article 4 - Laboratory

Manufacturer company must have the following devices in their laboratory.

Article 4. 1 Pressure Test Device
To test pipes and fittings in periods and conditions set forth by standards, the manufacturer company shall have Laboratory
Pressure Test Apparatus. Pressure test unit must be able to provide water at 95°C and minimum 64 bar pressure.
There must be equipment for recording long term (1000 hour) tests.
Article 4. 2 Density measurement apparatus
Article 4. 3 Tensile testing device for testing elasticity modulus
Article 4. 4 Measurement device for melt flow rate

Article 5 - Quality Control

Manufacturer company must have ISO 9001 Quality System Certification.

Article 6 - Hygiene Certificate

The company must have Hygiene Certificate obtained from Hygiene Institute.

Article 7

Manufacturer company shall have DWVG certification; an internationally recognized institution.

Article 8

Manufacturer company shall have the test certificate by IMA; an internationally recognized institution.

Article 9 - Pipe Length

When manufactured according to article 2.1.1, the pipes shall be 4 m in length.

Article 10 - Pipe nominal pressure

Nominal pressure of pipes and fittings shall be at least 25 bar (Most advanced version of PPR is 100. When this raw material is used, the pressure resistance increases from 20 bar to 25 bar with same wall thickness). Pipes and fittings must be lived for 50 years at 20°C temperature and nominal inner pressure.

Article 11 - Product Color

Pipes and fittings shall be white colored.

Article 12 - Inscriptions on pipe

Manufacturing standard, nominal diameter, wall thickness, norm numbers, raw material lot number, name of manufacturer and manufacturing date must be inscribed on the pipes.

Technical Specifications

Article 13 - Additives

No foreign materials shall be added into granule raw material by manufacturer during manufacturing of pipes and attachments.

Article 14 - Documents to be submitted with the offer

All of the below documents shall be submitted with the offer. In case of missing documents, offers shall be disregarded.

Article 14. 1 Manufacturer company shall submit their ISO 9001 certificate with their offer.
Article 14. 2 TS EN ISO 15874-2 and TS EN ISO 15874-3 TSE certificates shall be submitted.
Article 14. 3 Manufacturer company shall submit photocopies of related standards upon request.
Article 14. 4 Hygiene Certification from Hygiene Institution shall be submitted.

Article 15 - Tests and Experiments

Experiments and tests shall be performed within scope of above stated standards for pipe and fitting acceptance. When deeming necessary, the customer is authorized to have experiments and tests of pipes and fitting performed at the manufacturer's laboratory under supervision by Yıldız University Professorship of Fluids, with costs belonging to manufacturer.

Chemical resistance information requisition form

Tel: +90 212 886 57 41 / Fax: +90 212 886 51 93

To the attention of Dizayn Group Customer Services Authority

Installer

Company _____

Contact _____

Street _____

Province _____

Tel _____

Fax _____

Construction Project

Street _____

City _____

Location /Date _____

Usage Area

Transported Fluid _____

Operating Temperature _____

mbar Operating Pressure _____

Hour/Day Service Life _____

% Concentration _____

Ambience _____

Ambient Temperature _____

mbar Ambient Pressure _____

Dizayn Group is a Mir Holding company.

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