

**FIRAT**

# **FIRATPEX**

MOBILE SYSTEM AND UNDERFLOOR  
HEATING PIPES & METAL FITTINGS

**FIRAT**

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## FIRAT

FIRAT was established in 1972 to make production in the field of plastic construction materials. FIRAT, who has always followed its principle of "Quality Production at All Times" and "quality product diversity", has managed to become "the leader of sector" as well as "the export leader of sector" as a result of the serious investments.

With its plastic-based products, FIRAT makes production for various sectors like construction, agriculture, automotive, medical and white goods. It carries out its manufacturing process for these sectors in its factories of 650.000 m<sup>2</sup> in total in Istanbul-Buyukcekmece and Ankara-Sincan. FIRAT owns one of the five biggest manufacturing complexes of Europe.

According to the survey of Istanbul Chamber of Commerce in 2011, FIRAT ranks as the 57th amongst the 500 big industrial establishments of Turkey. FIRAT ranks as the 51st in the private sector ranking. According to the Corporate Tax Ranking of T.R. Ministry of Finance Revenue Administration Department in 2011, FIRAT is the 72nd amongst the top tax payer companies of Turkey. FIRAT ranks as the 117th in list of "Leader Exporting Manufacturers of Turkey in 2011" according to Turkey Exporters Committee and is the leader exporter in its sector.



As of the end of 2011, the number of personnel working under FIRAT structure is 1700. Believing in the understanding of "The most valuable factor is human", FIRAT has been constantly arranging in service trainings for the personnel to increase their experience at work and their corporate knowledge.

### **Product Diversity and Groups**

Product diversity of FIRAT is over 4500. For our customers to obtain the optimum benefit and satisfaction out of these products, FIRAT makes production as integrated (completing one another) systems.

Thousands of FIRAT products like PVC Door and Window Profiles, PVC Rain Gutters and Fittings, PVC Drinking Water Pipes, PVC Waste Water Pipes, PVC Hose Groups, Rubber and PE Based Hoses, PPRC Sanitary Installation Pipes and Fittings, HDPE Pipes, EF Fittings, PE Fittings, PE 80 Natural gas Pipes, Tunnel Type Drainage Pipes, Drainage Pipes, Telecommunication Cable Protection Pipes, EPDM Sealing Manufacturing, TPE Sealing Manufacturing, Metal Injection Production (hinge and window connection components), PEX Mobile System and Floor Heating Pipes, PEX Pipe Metal Fittings, Pex Al Pex Pipe, Irrigation Pipes and Fittings, Drip Watering Pipes, Medical Products render service in numerous parts of Turkey and the world.

FIRAT Company - which has broken the world record by producing PE100 pipes of 1200 mm, 110 mm wall thickness and enduring up to 16 bars in the "Bosphorus Project", and has carried drinking water to the European side of Istanbul - now has performed a first in Turkey and has produced pipes of 500 meters length. These pipes are going to be used in a "purification of the sea - water project" in Libya. They were produced as 1400 mm PE100 pipes, withstanding 6,4 bars pressure with a wall thickness of 55 mm's. By producing these 6 pieces of 500 meters one - piece pipes, FIRAT is a pioneer in continuous pipe production for monolines for the first time in Turkey.

FIRAT manufactures FKS canalisation pipe, the testable operating life of which is 100 years. These pipes which can be manufactured up to 2400 mm diameter from HDPE (high density polyethylene) raw material are resistant against ground motion, gnawing animals, plant roots and chemical wastes. FKS pipes are manufactured with German company Krauh technology and licence.



Triplex pipes, again manufactured in FIRAT facilities, are used in out door installations and grounds as well as domestic connections, predominantly in sewer line, rain water drainage lines, industrial waste water installations, water conveying pipes and drainage systems.

Triplex pipe has big advantages like high flow performance, external load resistance, long operating life, transport and storage convenience, its becoming economic, endurance against chemical substances, price and maintenance convenience, imperviousness and filter-free operation choice.

FIRAT is the single firm in the world's plastic sector manufacturing all of the PVC window and door system components excluding glass and screw. Since full harmony of PVC window and door is only possible with integrated manufacturing process; FIRAT manufactures PVC Profile, EPDM seal, TPE seal, reinforcement steel and whole range of metal accessories in integrated manner within its facilities.

FIRAT is capable of conducting welding, heavy rain and wind resistance, blow and milled blow resistance, compression, shear and break-off strength ring rigidity (strength of FKS and Triplex pipes against soil load) tests in its the state-of-the-art test and analysis laboratories. Our products are offered to the service of our customers only after they are confirmed by the Quality Assurance Group related to their conformity to production, sale and outlet.

Following completion of all quality control tests, FIRAT products are offered to the market with "FIRAT Quality Assurance Confirmation". FIRAT holds international quality certificates such as RAL GOST, SKZ, EMI, DVGW, TSE as well as ISO 14001, OHSAS 18001, ISO 10002, ISO 9001 and ISO 17025 system certificates.

FIRAT products achieved satisfaction of customers in more than 60 countries and deserved a distinguished place in the markets.



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

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

**FIRAT** Administration Building



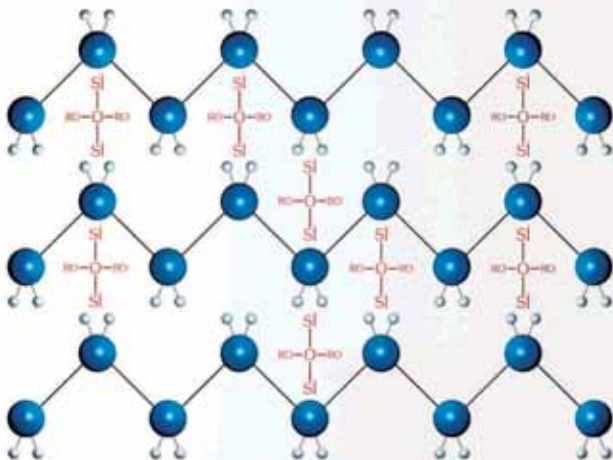
# Raw Metarial

## PE-X<sub>b</sub> (Cross-linked polyethylene)

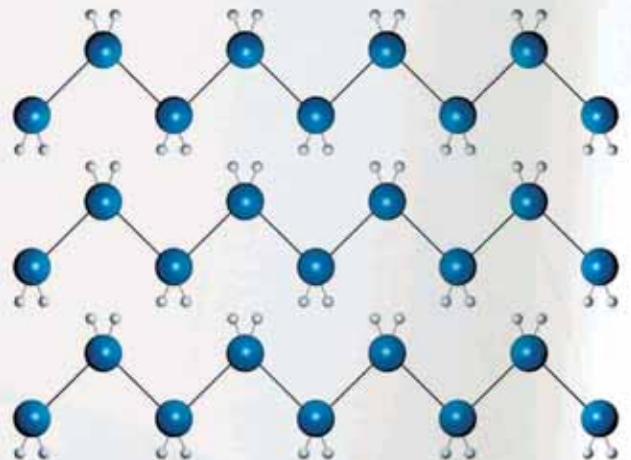
PE-X<sub>b</sub> raw material is obtained as a result of formation of polymer chains among micro-molecules with cross-linking process of polyethylene raw material. Conducted with Silane Method (PE-X<sub>b</sub>), this process ensured extended life of pipe as well as durability of pipe against higher heat and pressure.

### PEX<sub>b</sub> Technical Specifications

|                                |                                |
|--------------------------------|--------------------------------|
| Density                        | : 0.950 g/cm <sup>3</sup>      |
| Melting Flow Rate:             | 1,0 g / 10 min                 |
| Tensile Strength:              | 22 MPa (ISO 527)               |
| Elongation:                    | % 250 (ISO 527)                |
| Operating Temperature (Water): | +95 °C                         |
| Maximum Operating Temperature: | +110 °C                        |
| Softening Temperature:         | +135 °C                        |
| Thermal Conductivity:          | 0.37 Kcall/hm °C               |
| Linear Expansion Coefficient:  | 1,4 x 10 <sup>-4</sup> (1/ °C) |
| Cross Linking Degree:          | Minimum % 65                   |
| Specific Heat Value:           | 0.50 KCall/g                   |



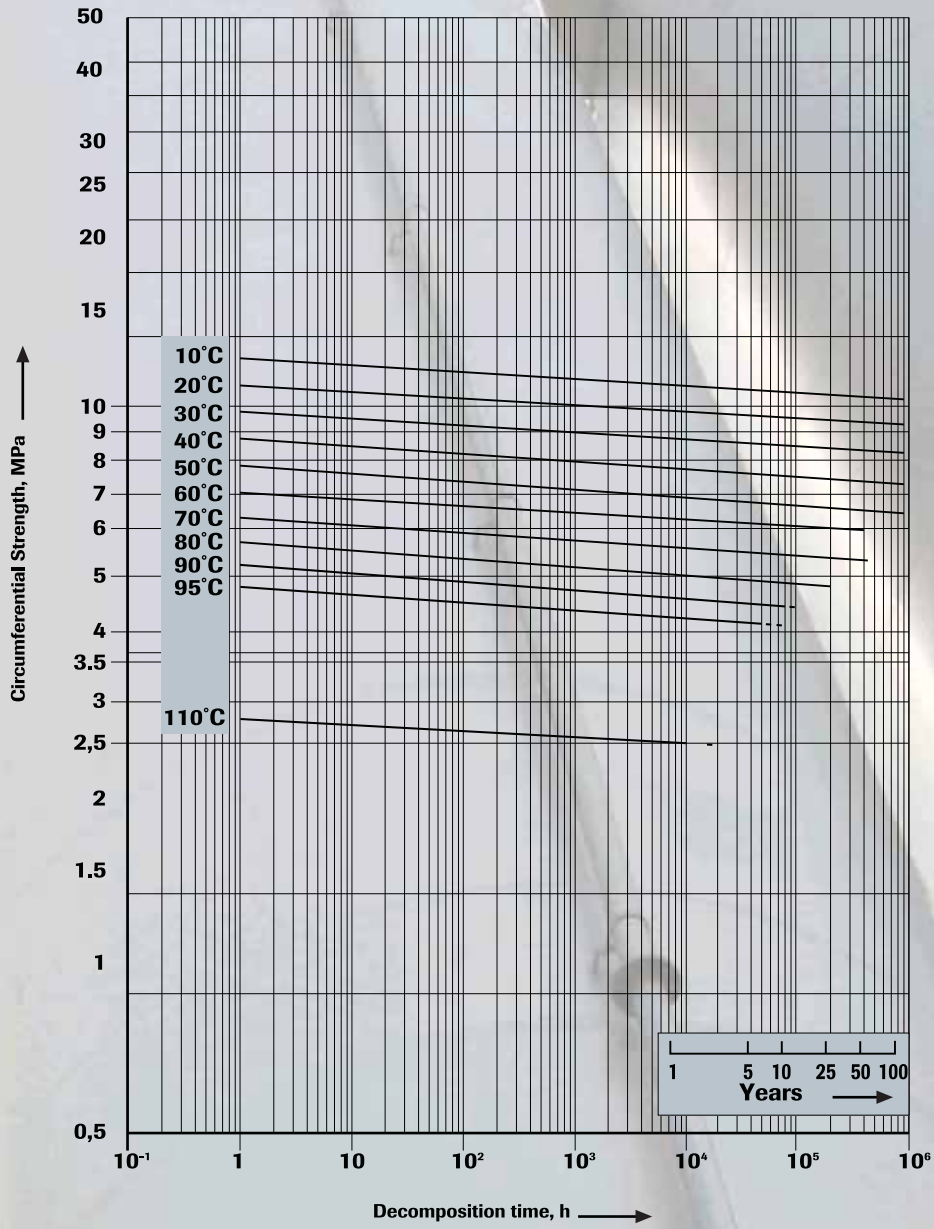
Cross Linked PE-X<sub>b</sub>



Non Cross Linked PE-X<sub>a</sub>



**PE-X<sub>b</sub> Raw Material Strength Curve**



## Our Notion of Quality

Quality Control Process employed in Firat laboratories consist of three phases:

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

### **Input Quality Control**

All types of raw materials and auxiliary materials from our suppliers are subjected to Input Quality Control tests according to the quality-production standarts set out by FIRAT. Samples that are randomly chosen from each lot of raw materials and auxiliary materials supplied in lots by our suppliers have to pass through Appearance Marking Compliance, Physical Compliance, Chemical Compliance and Functional Compliance tests in GKK Laboratories and obtain **“Suitable for Production”** approval.

### **Process Quality Control**

In the production process implemented with raw materials and auxiliary materials bearing “Suitable for Production” approval, samples taken on production lines during or soon after production are passed through Process Quality tests in Firat laboratories determined by national (TSE) and international (DVGW, SKZ, EN, DIN, etc.) standard institutions and recorded regularly. Main Process Quality Control tests are as follows:

- \* Impact Strength Test (resistance against external factors)
- \* Hydrostatic Pressure Test (for products to be installed in pressurized lines)
- \* Longitudinal Change (resistance against temperature)
- \* Density Test
- \* Homogeneity Test
- \* Melting Flow Rate Test
- \* Plasticization Control Test
- \* Tightness Test

### **Quality Tests \***



Density Test



Melting Flow Rate Test



Homogeneity Test

At the phase of Process Quality Control; diameter, thickness and ovality measurements are conducted by ultrasonic measurement devices on all production lines in fully automated manner simultaneously with the production process and faulty production is not allowed upon activation of sound and light warning system under out of standard cases. Our products have to pass through all tests conducted in accordance with the control frequency and numbers set out in the standards and obtain **“Suitable for Sale”** approval.

### Final Quality Control

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

In addition to quality control tests conducted in FIRAT laboratories our products are subjected to quality and hygiene compliance tests by test officers and certification bodies such as local (TSI) and international SKZ (Germany), GOST (Russia-Ukraine) etc. by sampling one or two specimens from production lines of all our products twice a year regularly.

Our products, which passed through all these tests and met the required quality conditions, are offered to our customers.

\*FIRAT has the most developed quality, control and test laboratories in the sector.



Impact Resistance Test



Pressure Test



Pressure Cycle Test

# Our Notion of Quality

## Certified Quality

FIRATPEX and fittings do not pose any adverse effect on human health. It is approved and certified by local and international bodies such as TZW (Germany), Sanitation Institute (Turkey), GOST (Russia) that it does not change colour, taste and smell of the water and does not contain any carcinogenic material.

The rawmaterial deployed in FIRATPEX Pipe and Fittings are procured from companies such as SILON and SOLVAY which are recognized world-wide for their quality and all these incoming rawmaterial are subjected to Input Quality Control tests in FIRAT laboratories.

## Our Quality Certificates

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

- TSE – Turkish Standards Institute (Turkey) 
- Rep. of Turkey, Ministry of Health (Turkey) 
- SKZ (Germany) 
- SEPRO (Ukraine) 
- GOST – Hygiene (Russia) 



## Environment Friendly FIRAT

Producing by the use of “**Environmental Friendly Production Technologies**” since its foundation, FIRAT proves its sensitivity toward environmental health through its **Environmental Management System** established in 2002 and considers this area as a “**Window of Management**”.

Upon obtaining TS EN ISO 14001 2004 “**Environment Management System**” certificate from SGS in 2003, FIRAT had its sensitivity toward environmental health confirmed in national and international setting.

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

95% of the products of FIRAT consists of re-cycled re-processable materials. It sends its non-household wastes and non-recyclable waste products to “**Disposal Facilities**” licensed by the Rep. of Turkey, Ministry of Environment and Forests and implements recycling process in these facilities.

**Environment Management Programs and Projects oriented to Environmental Health Protection** drawn up by the **Environmental Group** consisting of our environmental engineers are being realized within FIRAT organization.

Committing its compliance with all national and international **Environmental Legislative Directives and Environmental Regulations**, FIRAT fulfills all its legal liabilities and declares statutory assessment reports to the relevant Ministry.

FIRAT, awarded by ISO (Istanbul Chamber of Industry) with “**Environment Incentive Reward**” with its environmental project drawn up in 2006, always gives precedence to the importance of environmental health and shows necessary sensitivity in all its investments.



## General Information

Polyethylene based FIRATPEX Pipes System as the smart product of the plastic technology is the single pipe system which can be used in hot-cold water installations, underfloor heating, portable and clean water systems.

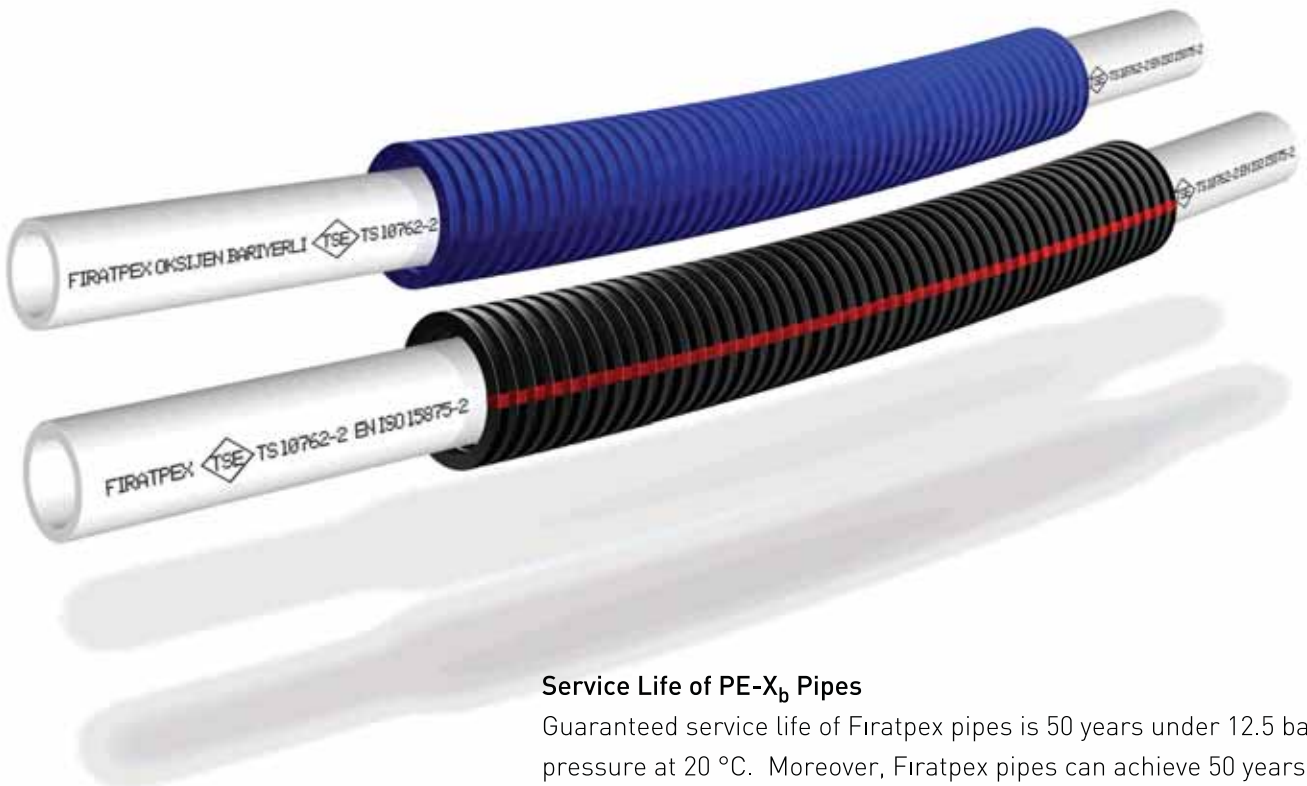
Thanks to their flexible structure, FIRATPEX Pipes can be used comfortably in different forms in different floor, furnishing and wall types and as sheathed in radiator systems which are so-called as portable installation as well as any kind of sanitary installation systems.

FIRATPEX Pipe Systems is the best installation solution for heating different buildings such as business complexes, residents, sports halls, schools, laboratories, chapels, theatres etc.

Due to its nature, polyethylene cannot resist against hot fluids, however, if their molecular chain structure is transformed into crosslink-PE-Xb structure, they become durable against very high temperatures. FIRATPEX Pipes based on cross-linked polyethylene can operate in all temperatures between -100 °C and +110 °C without deterioration in its structural properties.

### PE-X<sub>b</sub> Pipe Diameter Values

| Rated Diameter<br>External Diameter (mm) | Wall Thickness<br>(mm) |
|--|------------------------|
| 14                                       | 2.0                    |
| 16                                       | 2.0                    |
| 17                                       | 2.0                    |
| 18                                       | 2.0                    |
| 20                                       | 2.3                    |
| 25                                       | 2.8                    |
| 32                                       | 3.6                    |



### Service Life of PE-X<sub>b</sub> Pipes

Guaranteed service life of Firatpex pipes is 50 years under 12.5 bar pressure at 20 °C. Moreover, Firatpex pipes can achieve 50 years of service life under 7.1 bars at 70 °C.

### Crosslink

FIRATPEX Pipes are produced with extrusion method. Later formed into a coil, FIRATPEX Pipes are placed in steam tanks and cured for approx 4 hours. As a result, polymer chains are linked with side chains and turns into one molecule and transformation into cross linked structure is completed.

### Crosslink Types

There are different types of pex pipe systems as PEX-a Peroxide, PEX-b Silane and PEX-c Irradiation (Difference between types depends on production method and crosslink ratios stipulated by TS 10762-2 EN ISO 15875-2 Standard).

**PE-X<sub>a</sub>** is also known as peroxidised method. Before extrusion, peroxide is mixed with PE rawmaterial. Crosslink is maintained during production. It is the oldest method known. The crosslink degree must be 70% at least.

**PE-X<sub>b</sub>** is also known as silane method. It is produced with mixing cross linkable High Density Polyethylene which is resistant against heat and pressure and a special liquid called as "silane" at specified ratio. Crosslink is facilitated with steam cure which is a special process after production.

The crosslink degree must be 65% at least.

**PE-X<sub>c</sub>** is known as irradiation method. It is produced from High Density Polyethylene rawmaterial having high molecular weight. Cross link is maintained with irradiation process after production. The crosslink degree must be 60% at least.

FIRATPEX Pipe Systems are produced with PE-Xb method which is also known as Silane Method since high performance against temperature and flexibility features.

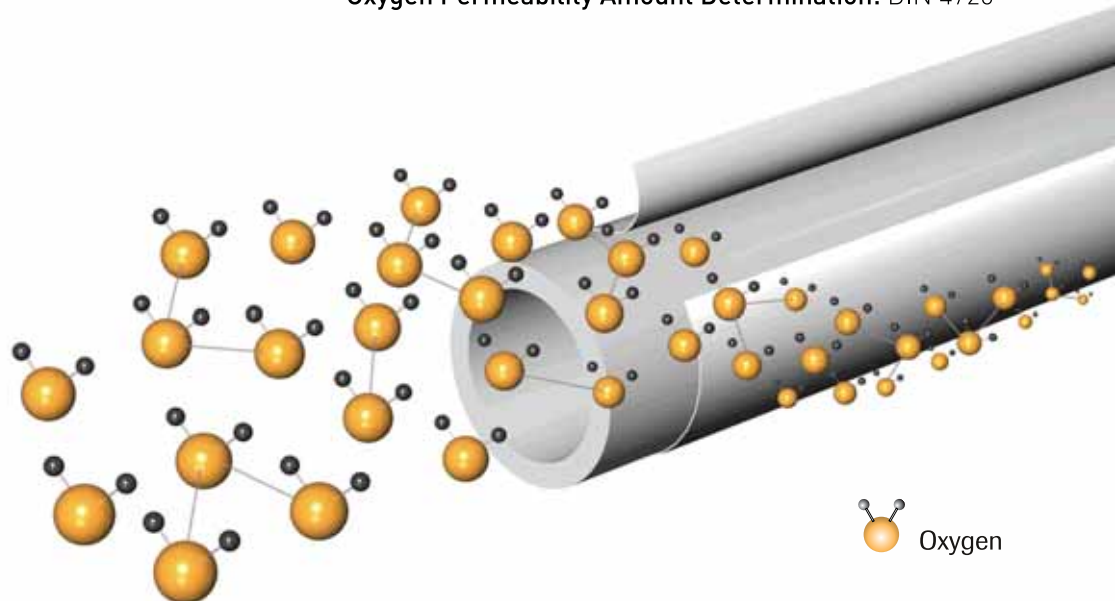
FIRATPEX Pipe Systems are produced in four different types according to application areas in line with TS 10762-2 EN ISO 15875-2 standard.

1. PEX Pipes with Oxygen Barrier.
2. Self-Sheathed PEX Pipes with Oxygen Barrier.
3. PEX Pipes without Barrier.
4. Self-Sheathed PEX Pipes without Oxygen Barrier.

### FIRATPEX Pipes with Oxygen Barrier

Due to oxygen permeability feature of plastic materials, they allow the oxygen penetration into water from outside in heating systems. In such cases, oxidisation and corrosion can be seen in radiator, natural gas boiler, boiler and installation. In order to eliminate this problem, external surfaces of PEX pipes are coated with a bright layer which is insulated against oxygen transmission between inside and outside of pipe with a special method during production, so that their tightness against oxygen is maintained. Therefore, oxygen is prevented to be transmitted into water inside installation and no corrosion and oxidation can certainly be seen.

**Oxygen Permeability Amount Determination: DIN 4726**



## General Information

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### Sheathed Firatpex Pipes

Sheathed Firatpex Pipes are generally used in radiator systems, also called as portable installation and cold-hot water installations and it is applied by placing a spiral sheath inside the PEX pipe.



### Advantages of Sheath (Protective Spiral Pipe)

1. Sheath prevents abrasion of PEX Pipes.
2. Sheath Prevents the impacts that may be directed onto PEX pipes.
3. Sheath ensures easy replacement of pipes without removing flooring if PEX pipes are damaged.
4. Sheath maintains heat insulation and prevents water losing its heat by forming an air gap between PEX pipe and screed concrete.





# Advantages of Firatpex Pipes and Fittings

## Advantages of Firatpex Pipes and Fittings

- All system can be operated with single heater. Can be used under 7.1 bar at 95 °C comfortably.
- Comfortably operates under all temperatures between -100 °C and +100 °C without losing its structural properties.
- They can be used in different systems such as underfloor heating, portable installation and sanitary installation.
- Oxygen barrier prevents oxygen in the air passing through the pipe system.
- No residue and corrosion occurs inside the pipe due to its slippery and smooth internal structure.
- High resistance against chemicals.
- Easy to handle and install, thanks to its light weight.
- Can be installed fast and loss-free since they are produced in coils.
- Maintains comfortable and healthy living spaces.
- Very easy to apply and maintain.
- Enables high power savings.
- Provides spaces with wider internal volume.
- Highly efficient and economic.
- Perfect for a wide range of places such as sports halls, schools, chapels, factories, offices and residences.



Underfloor Heating



Portable System



Plumbing



Flexibility



Oxygen Barrier



Hot Water

# Properties of Firatpex Pipes and Fittings

FIRATPEX Pipe systems are subjected to the tests and controls to meet the requirements of TS and DIN standards in all production stages, including rawmaterial input stage.

FIRATPEX Pipe Systems must take the FIRAT QUALITY APPROVAL after passing through many tests.

### Test Methods and Standards

**1- Density Test:** The density of the materials is determined by weight with an analytic scale according to ISP 1183 standard.

**2- MFI (Melt Flow Index):** Is carried out according to 1133 standard. In this test, melt rate of the rawmaterial as per unit time is determined and data such as the potential behaviour of material during production and processing temperature interval of the material are obtained.

**3- Dimensional Stability Test:** According to EN 743 Method B, inside the drying oven. Test pieces are kept under 120 °C for 1 hour. At the end of the 1 hour period, test

pieces taken from drying oven are allowed to be cooled down. Test piece after cooling must have a longitudinal change at 3% maximum.

**4- Cross Linking Degree Determination:** Carried out according to TS EN 579 Standard. Small pieces taken from pipe are dried after boiling inside chemical material and cross-linking degree is determined from weight differences in %. This ratio is determined as minimum 65% for FIRATPEX pipes.

**5- Pressure Test:** Carried out according to TS EN 921 Standard. Tests are conducted on FIRATPEX pipes with different pressures at 20 °C for 1 hour, at 95°C for 1, 22, 165 and 1000 hours.

No bursting of the pipes should occur within this period.

**6- Homogeneity Test:** Is carried out according to Standard ISO 13 949. Likely errors in microtom cross-section obtained from pipe surface. No gaps or colour distribution that is non-homogenous should there be on the section.

**PEX Pipe Standard No:** TS 10762-2 EN ISO 15875-2

**PEX Pipe Standard Name:** Plastic Pipe Systems for Hot and Cold Water - Cross linked Polyethylene

### 1. Mechanic Properties

\*forØ16mm

| Hydrostatic Tension (MPa) | Test Temperature (°C) | Test Time (Hour) | Test Pressure (Bar) |
|---------------------------|-----------------------|------------------|---------------------|
| 12                        | 20                    | 1                | 34,3                |
| 4,8                       | 95                    | 1                | 13,8                |
| 4,7                       | 95                    | 22               | 13,5                |
| 4,6                       | 95                    | 165              | 13,2                |
| 4,4                       | 95                    | 1000             | 12,6                |

### 2. Physical and Chemical Properties

| Requirement             | Parameter (°C) | Time (Saat) |
|-------------------------|----------------|-------------|
| Dimensional Stability   | ≤ %3           | 120         |
| Cross Linking Operation | ≥ % 65         |             |

Thermal Stability by means of Hydrostatic Pressure Test

No deformation should occur

2,5 MPa  
110 °C

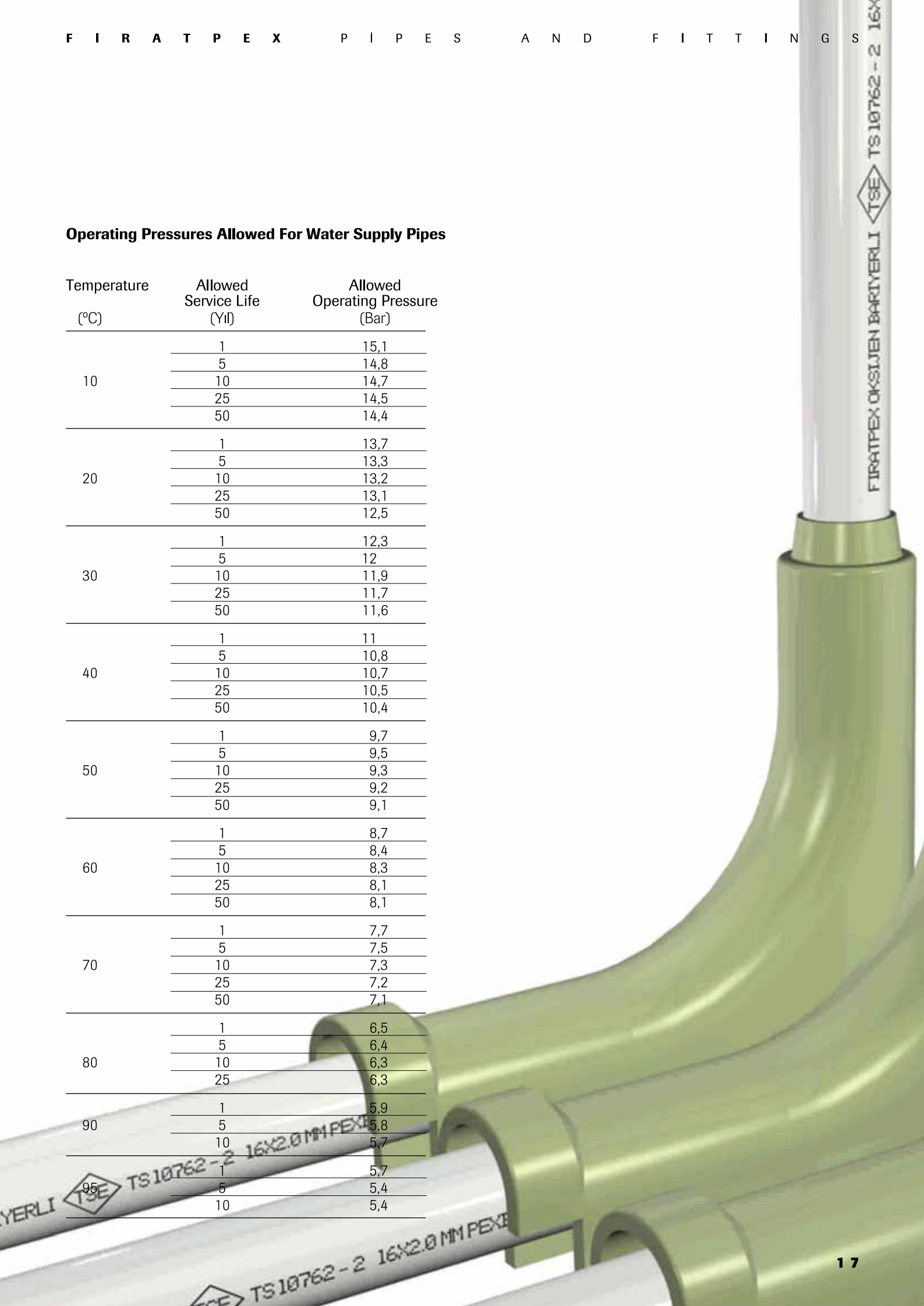
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FIRATPEX OKSIJEN BARI



**Operating Pressures Allowed For Water Supply Pipes**

| Temperature<br>(°C) | Allowed<br>Service Life<br>(Yil) | Allowed<br>Operating Pressure<br>(Bar) |
|---------------------|----------------------------------|--|
| 10                  | 1                                | 15,1                                   |
|                     | 5                                | 14,8                                   |
|                     | 10                               | 14,7                                   |
|                     | 25                               | 14,5                                   |
|                     | 50                               | 14,4                                   |
| 20                  | 1                                | 13,7                                   |
|                     | 5                                | 13,3                                   |
|                     | 10                               | 13,2                                   |
|                     | 25                               | 13,1                                   |
|                     | 50                               | 12,5                                   |
| 30                  | 1                                | 12,3                                   |
|                     | 5                                | 12                                     |
|                     | 10                               | 11,9                                   |
|                     | 25                               | 11,7                                   |
|                     | 50                               | 11,6                                   |
| 40                  | 1                                | 11                                     |
|                     | 5                                | 10,8                                   |
|                     | 10                               | 10,7                                   |
|                     | 25                               | 10,5                                   |
|                     | 50                               | 10,4                                   |
| 50                  | 1                                | 9,7                                    |
|                     | 5                                | 9,5                                    |
|                     | 10                               | 9,3                                    |
|                     | 25                               | 9,2                                    |
|                     | 50                               | 9,1                                    |
| 60                  | 1                                | 8,7                                    |
|                     | 5                                | 8,4                                    |
|                     | 10                               | 8,3                                    |
|                     | 25                               | 8,1                                    |
|                     | 50                               | 8,1                                    |
| 70                  | 1                                | 7,7                                    |
|                     | 5                                | 7,5                                    |
|                     | 10                               | 7,3                                    |
|                     | 25                               | 7,2                                    |
|                     | 50                               | 7,1                                    |
| 80                  | 1                                | 6,5                                    |
|                     | 5                                | 6,4                                    |
|                     | 10                               | 6,3                                    |
|                     | 25                               | 6,3                                    |
| 90                  | 1                                | 5,9                                    |
|                     | 5                                | 5,8                                    |
|                     | 10                               | 5,7                                    |
| 95                  | 1                                | 5,7                                    |
|                     | 5                                | 5,4                                    |
|                     | 10                               | 5,4                                    |



# Properties of Firatpex Pipes and Fittings

**Table for Durability of FIRATPEX Pipes and Fittings against Chemical Substances**

| Substance Name       | Concentration % | 20°C | 50°C | 60°C | 80°C | 100°C |
|----------------------|-----------------|------|------|------|------|-------|
| Allyl Alcohol        | ts-s            |      | DZ   |      |      |       |
| Amyl Alcohol         | ts-s            | D    |      | D    |      |       |
| Amyl Acetate         | ts-s            | SD   |      | SD   | SD   |       |
| Acetic Acid          | Up to 10%       | D    |      | D    | D    |       |
| Glacial Acetic Acid  | > 96            | D    |      |      |      |       |
| Acetone              | ts-s            | D    |      | SD   |      |       |
| Benzene              | ts-s            | D    |      |      |      |       |
| Ethanol              | %95 ts-s        | D    |      | D    |      |       |
| Ethyl Ether          | ts-s            | D    |      |      |      |       |
| Ethylene Glycol      | ts-s            | D    |      | D    | D    | D     |
| Formic Acid          | %10-%40-%50     | D    |      | D    |      |       |
| Freon F 12           | opr. sol.       | D    |      |      |      |       |
| Heptane              | ts-s            | D    |      | D    | SD   |       |
| Hydrochloride Acid   | Up to 10%       | D    |      | D    | DD   |       |
| Hydrochloride Acid   | 20%             | D    |      | D    | D    | D     |
| Hydrochloride Acid   | %10-%20         | D    |      | D    | D    | D     |
| Hydrochloride Acid   | Up to 25%       | D    | D    | D    | D    | D     |
| Hydrochloride Acid   | 30%             | D    |      | D    |      |       |
| Hydrochloride Acid   | >%30            | D    |      | D    |      |       |
| Hydrochloride Acid   | 36%             | D    |      | D    |      |       |
| Hydrochloride Acid   | Deg.            | D    |      | D    |      |       |
| Calcium Chloride     | Sat. sol.       | D    |      | D    | D    |       |
| Calcium Nitrate      | Sat. sol.       | D    |      | D    | D    |       |
| Carbon Disulphide    | ts-s            | D    |      |      |      |       |
| Carbon Tetrachloride | ts-s            | SD   |      | DZ   |      |       |
| Chlorobenzene        | ts-s            | D    |      | SD   | SD   | DZ    |
| Chloroform           | ts-s            | DZ   |      | DZ   |      |       |
| Methyl Alcohol       | 5%              | D    |      | D    |      |       |
| Methyl Alcohol       | ts-s            | D    |      | D    |      |       |
| Methyl Ethyl Ketone  | ts-s            | D    |      | D    |      |       |
| Mineral Oils         | opr. sol.       | D    |      | D    | SD   |       |
| Naphtha              | opr. sol.       | D    |      | D    | SD   |       |
| Nitric Acid          | 5%              | D    |      | SD   |      |       |
| Nitric Acid          | 10%             | D    |      | SD   |      |       |
| Nitric Acid          | 20%             | D    |      | SD   |      |       |
| Nitric Acid          | 25%             | D    |      | SD   |      |       |
| Nitric Acid          | 30%             | D    |      | SD   |      |       |
| Nitric Acid          | 35%             | D    |      | SD   |      |       |
| Nitric Acid          | 40%             | D    |      | DZ   |      |       |
| Nitric Acid          | Up to 45%       | DZ   |      | DZ   |      |       |
| Nitric Acid          | 50%             | DZ   |      | DZ   |      |       |
| Nitric Acid          | >%50            | DZ   |      | DZ   |      |       |
| Potassium Hydroxide  | 10%             | D    |      | D    | D    |       |
| Potassium Hydroxide  | 20%             | D    |      | D    | D    |       |

**Table for Durability of FiratPex Pipes and Fittings against Chemical Substances**

| Substance Name      | Concentration % | 20°C | 50°C | 60°C | 80°C | 100°C |
|---------------------|-----------------|------|------|------|------|-------|
| Potassium Hydroxide | Up to 50%       | D    |      | D    | D    |       |
| Cyclohexanone       | ts-s            | SD   |      | SD   | SD   |       |
| Sodium Hydroxide    | Sat. sol.       | D    |      | D    |      |       |
| Sodium Hydroxide    | 1%              | D    |      | D    |      |       |
| Sodium Hydroxide    | %10-%35         | D    |      | D    |      |       |
| Sodium Hydroxide    | 40%             | D    |      | D    |      |       |
| Sodium Hydroxide    | %10-%60         | D    |      | D    |      |       |
| Sulphuric Acid      | Up to 10%       | D    |      | D    |      |       |
| Sulphuric Acid      | 15%             | D    |      | D    |      |       |
| Sulphuric Acid      | %10-%30         | D    |      | D    |      |       |
| Sulphuric Acid      | %10-%50         | D    |      | D    |      |       |
| Sulphuric Acid      | 50%             | D    |      | D    |      |       |
| Sulphuric Acid      | %50-%75         | D    |      | D    |      |       |
| Sulphuric Acid      | %50-%90         | D    |      | SD   | DZ   |       |
| Sulphuric Acid      | %75-%90         | D    |      | SD   | DZ   |       |
| Sulphuric Acid      | 95%             | D    |      | SD   | DZ   |       |
| Sulphuric Acid      | 96%             | D    |      | SD   | DZ   |       |
| Sulphuric Acid      | 98%             | D    |      | SD   | DZ   |       |
| Tartaric Acid       | Sat. sol.       | D    |      | D    | D    |       |
| Tetrahydrofuran     | ts-s            | SD   |      | DZ   |      |       |
| Toluene             | ts-s            | D    |      | SD   |      |       |
| Trichloroethylene   | ts-s            | SD   |      | DZ   | DZ   |       |
| Olive Oil           | opr. sol.       | D    |      |      |      |       |

## Abbreviations and Definitions

### D: Durable

The plastic pipes and fittings indicated with "D" in the table will not adversely change in terms of properties on condition that there is no external mechanical impact when used with chemical substances at defined temperature and concentrations.

### SD: Limited Durability

Plastic pipes and fittings indicated with "SD" in the table may exhibit corrosion to a certain degree where there is no external mechanical impacts, when used with chemical substances at specified temperature and concentrations. Therefore the pipes indicated with "SD" can be used in the applications where small amount of corrosion is acceptable.

### DZ: Not-durable

Plastic pipes and fitting parts that are indicated with "DZ" cannot be used since they get affected from chemical materials at a considerable extent.

**Ts-s** Technical purity, liquid

**Ts-g** Technical purity, gas

**Sat. sol.** Saturated solution

**Opr. sol.** Working solution is the most common concentration used in the industry.

**Sol.** Solution

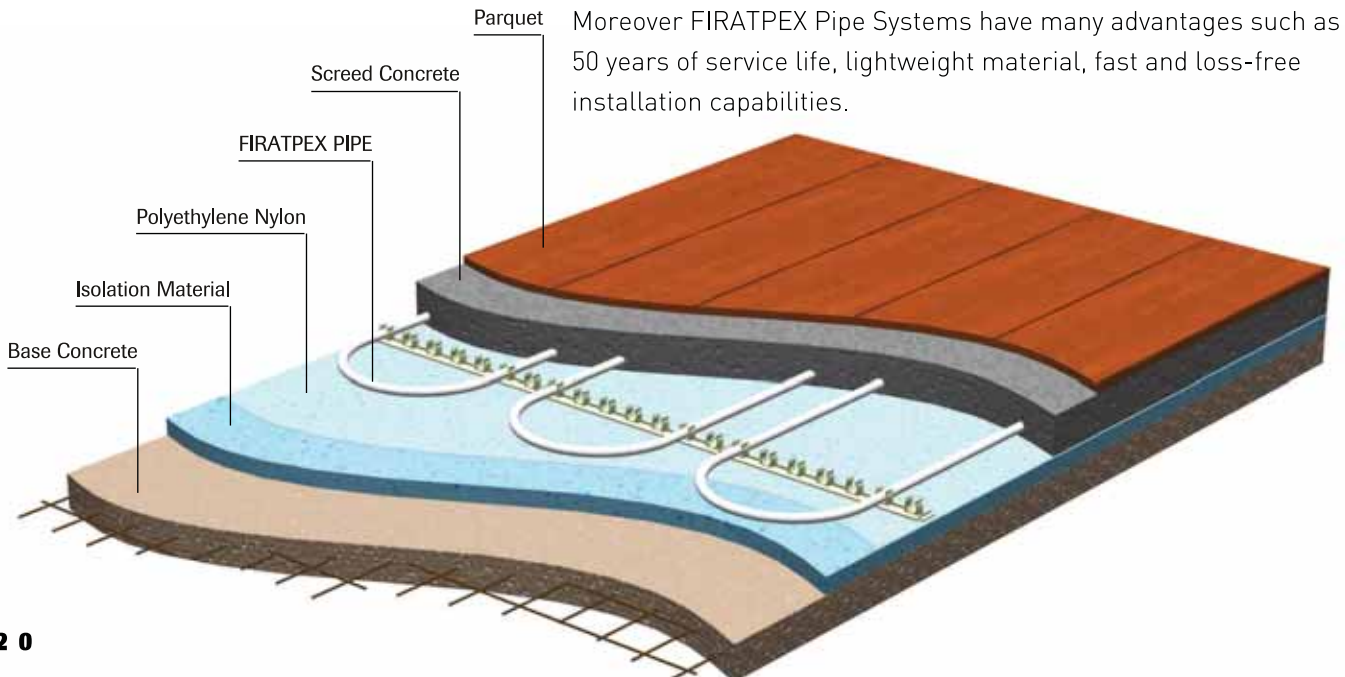
# FIRATPEX Underfloor Heating Systems

Underfloor heating systems are healthy, comfortable and economical. Providing high performance in heat and temperature transmission FIRATPEX has all structural properties required for underfloor heating systems.



Underfloor Heating Systems became very popular as a result of development of PE-X<sub>b</sub> crosslink pipes in the world. In our country, the production of Firatpex Pipes with Oxygen Barrier leads to a problem-free underfloor heating system. It is a very suitable solution for heating larger spaces with high ceiling such as business complexes, sports halls, schools, laboratories, chapels and theatres.

In underfloor heating systems, where a homogenous heat distribution is obtained, once a correct project is carried out, high heat comfort is sustained with lower heating degree, as a result, more fuel saving at the rate of 25 percent compared to standard installation applications and an aesthetic and comfortable environment is ensured in living spaces.

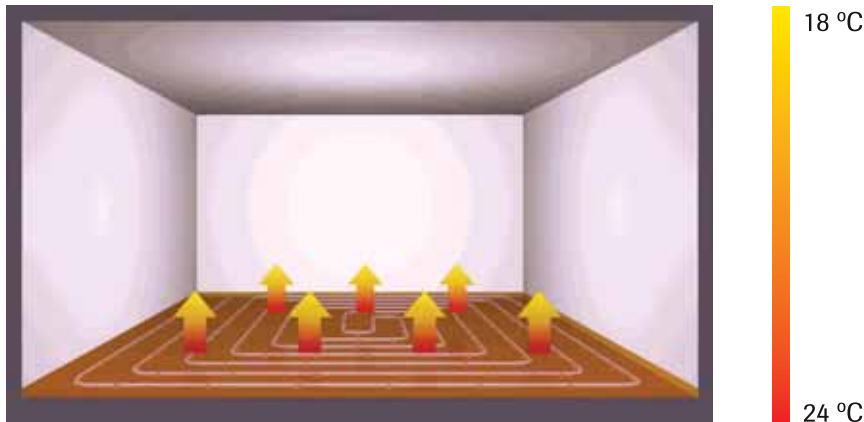


### Installation of Underfloor Heating System



After laying out insulation material which maintains heat and sound insulation between layers on the base concrete which was previously cleaned and smoothed, then it is covered with polyethylene folio **(1)**. Firatpex pipes are assembled with the help of fish plates according to installation project and collector connection is fixed **(2)**. Fish plates with clips are assembled according to installation project **(3)**. After tightness test, system becomes ready for screed. Screed concrete must be applied at least 3.5 cm over the Firatpex pipes and dilatation must be made **(4)**.

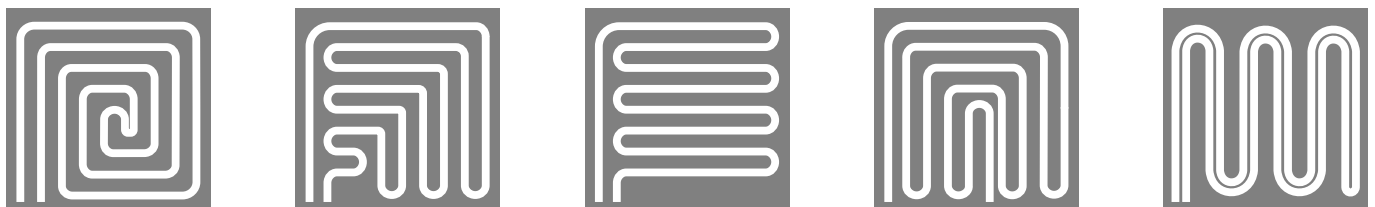
### Heat Distribution in Underfloor Heating Systems



In underfloor heating systems, distribution of heat into environment is homogenous.

In underfloor heating systems, installation manner of pipes must maintain homogenous distribution of the heat into environment.

Firatpex pipes have an elastic structure which enables furnishing in the forms of single parallel, double parallel, triple parallel and spiral according to properties of the areas where application will be conducted.



# FIRATPEX Underfloor Heating Systems

## Ambient Temperature Values

In underfloor heating system, tables concerning usage of PEX pipe are stated below (45-50 mm screed thickness at top section of pipe and delivery-return temperature difference is 8-10 °C):

|  | Average Water Temperature (°C) | Room Temperature (°C) | Distance Between Pipes 100 mm |      | Distance Between Pipes 200 mm |      |
|--|--------------------------------|-----------------------|-------------------------------|------|-------------------------------|------|
|  |                                |                       | (W/m <sup>2</sup> )           | (°C) | (W/m <sup>2</sup> )           | (°C) |
| <b>Ambient Temperature Values for Carpet Floorings (R = 0.10)</b>  | 35                             | 18                    | 62                            | 24   | 50                            | 23   |
|  |                                | 20                    | 55                            | 25   | 44                            | 24   |
|  |                                | 22                    | 48                            | 27   | 38                            | 26   |
|  | 40                             | 18                    | 80                            | 25   | 65                            | 24   |
|  |                                | 20                    | 73                            | 27   | 59                            | 26   |
|  |                                | 22                    | 66                            | 29   | 53                            | 27   |
|  | 45                             | 18                    | 99                            | 27   | 80                            | 25   |
|  |                                | 20                    | 91                            | 28   | 74                            | 27   |
|  |                                | 22                    | 84                            | 30   | 68                            | 28   |
|  | 50                             | 18                    | 104                           | 27   | 84                            | 26   |
|  |                                | 20                    | 86                            | 28   | 76                            | 27   |
|  |                                | 22                    | 89                            | 30   | 72                            | 28   |
| 55   | 18                             | 123                   | 29                            | 100  | 27                            |      |
|  | 20                             | 115                   | 30                            | 93   | 28                            |      |
|  | 22                             | 108                   | 32                            | 87   | 30                            |      |
| <b>Ambient Temperature Values for Parquet Floorings (R = 0.05)</b> | 35                             | 18                    | 78                            | 25   | 61                            | 24   |
|  |                                | 20                    | 69                            | 26   | 54                            | 25   |
|  |                                | 22                    | 59                            | 28   | 46                            | 26   |
|  | 40                             | 18                    | 101                           | 27   | 79                            | 25   |
|  |                                | 20                    | 92                            | 28   | 72                            | 27   |
|  |                                | 22                    | 88                            | 29   | 64                            | 28   |
|  | 45                             | 18                    | 124                           | 29   | 97                            | 27   |
|  |                                | 20                    | 115                           | 30   | 90                            | 28   |
|  |                                | 22                    | 105                           | 31   | 83                            | 29   |
|  | 50                             | 18                    | 131                           | 30   | 102                           | 27   |
|  |                                | 20                    | 121                           | 31   | 95                            | 29   |
|  |                                | 22                    | 112                           | 32   | 88                            | 30   |
| 55   | 18                             | 154                   | 32                            | 121  | 29                            |      |
|  | 20                             | 145                   | 33                            | 113  | 30                            |      |
|  | 22                             | 135                   | 34                            | 106  | 32                            |      |
| <b>Ambient Temperature Values for Ceramic Floorings (R = 0)</b>    | 35                             | 18                    | 104                           | 27   | 77                            | 25   |
|  |                                | 20                    | 92                            | 28   | 68                            | 26   |
|  |                                | 22                    | 79                            | 29   | 59                            | 27   |
|  | 40                             | 18                    | 135                           | 28   | 101                           | 27   |
|  |                                | 20                    | 123                           | 30   | 92                            | 28   |
|  |                                | 22                    | 110                           | 31   | 83                            | 29   |
|  | 45                             | 18                    | 166                           | 30   | 124                           | 29   |
|  |                                | 20                    | 154                           | 31   | 114                           | 30   |
|  |                                | 22                    | 141                           | 32   | 105                           | 31   |
|  | 50                             | 18                    | 178                           | 34   | 133                           | 30   |
|  |                                | 20                    | 165                           | 35   | 123                           | 31   |
|  |                                | 22                    | 152                           | 36   | 113                           | 32   |
| 55   | 18                             | 211                   | 37                            | 157  | 32                            |      |
|  | 20                             | 198                   | 38                            | 147  | 33                            |      |
|  | 22                             | 184                   | 39                            | 137  | 34                            |      |



# FIRATPEX Portable Heating Systems



In portable heating systems, since distribution is made directly from collector to radiators by installing single column, use of different 3-4 column pipes as well as assembly and operational problems experienced in the traditional radiator heating systems do not occur. Moreover, no unnecessary pipes are seen in the living spaces.

## **Single Column Line**

In FIRATPEX Portable Systems, distribution can be made to every site with single column, instead of 3-4 column lines, which is seen in the traditional central heating systems.

## **Easy Maintenance**

Since sheathing is used in the installation in FIRATPEX Portable Systems, it is possible to replace the pipes without deteriorating the flooring in case of any damage.

## **Easy Boiler Room Activities**

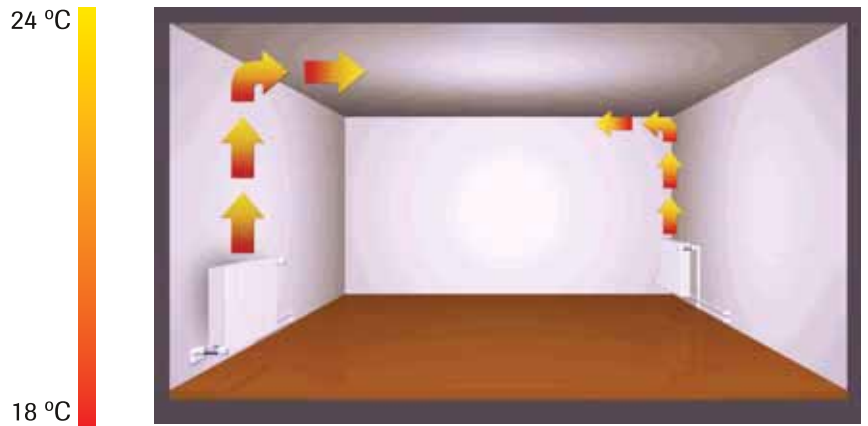
FIRATPEX Portable System eliminates the problems such as collection of several columns in the basement and workmanship and insulation costs of horizontal pipes in the basement.

## **Aesthetic Appearance**

Column and horizontal pipes cause undesirable scenes by narrowing usable areas down. FIRATPEX Portable System does not allow such messes in the living spaces.



### Heat Distribution in Portable Systems



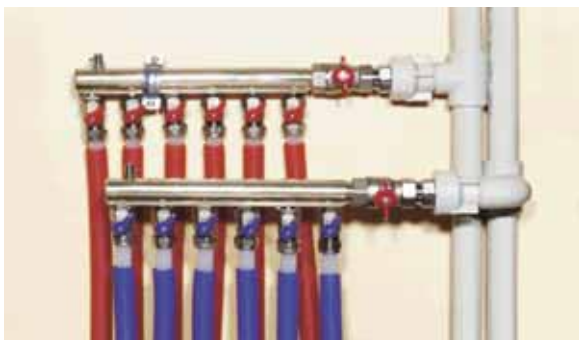
In portable heating systems, temperature distribution is intensified on top sections of the environment.

### Installation in Portable Heating System

In a portable system, connection to the radiators is made in parallel from single collector. Since separate delivery and return is made to each radiator no heat imbalances can occur in this system. If you do not intend to heat any room in the place, it is enough to shut down the radiator valve of that region.

Collectors, which provide exits as much as the number of radiators, that are connected to column line or natural gas heater exit. Firatpex pipes must be connected to radiator through red sheathing pipe for hot water delivery connection and through blue sheath for cold water return connection.

After completing the delivery and return connection, operation and tightness test must be applied.



Corner corrector must be used at 90 °C bends. Corner correctors prevent cracks and leaks by balancing the expansion of pipes.

## FIRATPEX Clean Water Systems



FIRATPEX and fittings do not pose any adverse effect on human health. It is approved and certified by local and international bodies such as TZW (Germany), Sanitation Institute (Turkey), GOST (Russia) that it does not change colour, taste and smell of the water and does not contain any carcinogenic material.

## Test After Installation

### Testing FIRATPEX Pipe Installation

Before covering the installation which is laid, operation, pressure and impermeability test must certainly be conducted. Water should be supplied into system with a hand-operated pump and a manometer that will enable observation of desired pressure value from test pump should be attached.

#### For Pressure test;

1. All points that are open in installation which is being tested must be closed.
2. All valves in the installation must be shut off.
3. Water must be fed to the system at the lowest point of installation and main valve must be opened slightly. In order to avoid strong pressure impacts, pipe lines must be bled from the utilization points at the highest and farthest sections.
4. Installation must be tested at a pressure 1.5 times higher than that of pipe operation pressure during 30 minutes. Operation pressure describes maximum operation pressure at 20 °C and indicated on all of the pipes.
5. During this time, no pressure fall in manometer and impermeability should occur.
6. If the pressure drops in the manometer where test is monitored, it means that a leakage is occurring and pipe line leaking must be checked out and replaced.

Pipe fittings (manufactured from copper and copper alloys) employed in the system must comply with standard TS EN 1254-3.

## Test After Installation

### Points to consider for installation of PEX pipes

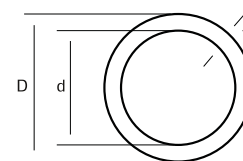
- No installation should be applied at temperatures under 0 °C. Pipes must be stored under ambient temperature (20 °C) in order to install the pipes.
- PEX pipes must not be exposed to sun light.
- Corner correctors must be used at bends of 90 °C at delivery and return points in base concrete. Corner correctors prevent cracks and leaks by balancing the expansion of pipes.
- Pipes must be installed in tensioned manner, and wiggle room of 10 mm\* must be allowed longitudinally every 1 meter.  
\* When 70 °C of temperature difference is considered.
- PEX pipes must be protected against external impacts.
- No air gaps should remain between screed concrete and pipe in flooring. Since this will form a heat curtain, heat efficiency of the ambient will decrease.
- Opening side of entrance valves must be downward in order to have PEX pipe connected to radiator at 90° angle. In case of opening side of delivery valves looking towards wall, the angle will be 180°, so that causing tension on the pipe and cracks and bursts may occur at weak points.
- When sheathed pipes are installed, no sharp turns should be made. Otherwise, while pipe replacement, new pipes will be impossible to be covered with sheath.
- In order to protect PEX pipe system from being frozen, the water must be discharged from unutilized installations.
- In floor installation, styrofoam density must be 16-18 gr/m<sup>3</sup> and if the load on the floor will be excessive, then it must be 20-22 gr/m<sup>3</sup>. In normal floors, styrofoam thickness must be 20 mm and in soft grounds such as earth, it must be 40 mm. Polyethylene nylon must be laid on the styrofoam.



# FIRATPEX Pipes and Fittings

## PEX PIPES (Pipes with Oxygen Barrier)

| CODE NO     | Ø D (mm) | d (mm) | t (m) | L (m) |
|-------------|----------|--------|-------|-------|
| 74900010014 | 14       | 10     | 2     | 160   |
| 74900010016 | 16       | 12     | 2     | 160   |
| 74900010017 | 16       | 11.6   | 2.2   | 160   |
| 74900010019 | 17       | 13     | 2     | 160   |
| 74900010024 | 18       | 14     | 2     | 160   |
| 74900010025 | 18       | 13     | 2.5   | 160   |
| 74900010020 | 20       | 16     | 2     | 100   |
| 74900010021 | 20       | 15.4   | 2.3   | 100   |
| 74900020027 | 25       | 19.4   | 2.8   | 160   |
| 74900010032 | 32       | 24.8   | 3.6   | 50    |



## PEX PIPES (Pipes without Oxygen Barrier)

| CODE NO     | Ø D (mm) | d (mm) | t (m) | L (m) |
|-------------|----------|--------|-------|-------|
| 74900020014 | 14       | 10     | 2     | 160   |
| 74900020016 | 16       | 12     | 2     | 160   |
| 74900020017 | 16       | 11.6   | 2.2   | 160   |
| 74900020019 | 17       | 13     | 2     | 160   |
| 74900020024 | 18       | 14     | 2     | 160   |
| 74900020018 | 18       | 13     | 2.5   | 160   |
| 74900020020 | 20       | 16     | 2     | 100   |
| 74900020021 | 20       | 15.4   | 2.3   | 100   |
| 74900020027 | 25       | 19.4   | 2.8   | 160   |
| 74900020032 | 32       | 24.8   | 3.6   | 50    |

## SPIRAL SHEATHED PEX PIPES

Pipes with Oxygen Barrier

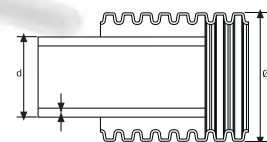
| CODE NO     | Ø D (mm) | d (mm) | t (m) | L (m) |
|-------------|----------|--------|-------|-------|
| 7490003116K | 24.5     | 16     | 2     | 100   |
| 7490003116M | 24.5     | 16     | 2     | 100   |

Sheathed FIRATPEX pipes with oxygen barrier are produced as red and blue spiral sheathed.

Pipes without Oxygen Barrier

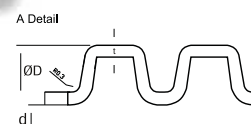
| CODE NO     | Ø D (mm) | d (mm) | t (m) | L (m) |
|-------------|----------|--------|-------|-------|
| 7490003016K | 24.5     | 16     | 2     | 100   |
| 7490003016M | 24.5     | 16     | 2     | 100   |

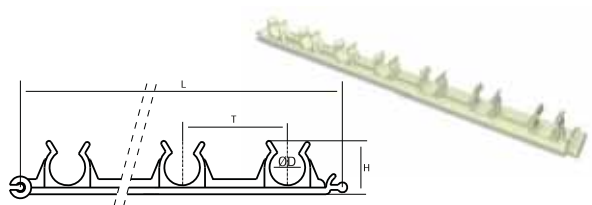
Sheathed FIRATPEX pipes without oxygen barrier are produced as red and blue coexed spiral sheathed.



## SPIRAL SHEATHS

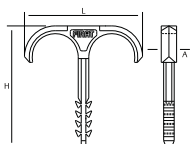
| CODE NO          | Ø D (mm) | d (mm) | t (m) | L (m) | Notes              |
|------------------|----------|--------|-------|-------|--------------------|
| 7321000191K Red  | 24.5     | 19.5   | 2.5   | 100   | Ø16 mm PEX Sheaths |
| 7321000191M Blue | 24.5     | 19.5   | 2.5   | 100   |                    |
| 7321000192K Red  | 28.2     | 23.1   | 2.55  | 100   | Ø20 mm PEX Sheaths |
| 7321000192M Blue | 28.2     | 23.1   | 2.55  | 100   |                    |





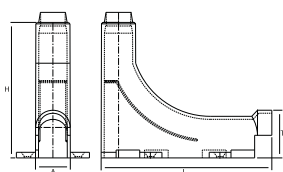
**FISH PLATE WITH CLIPS**

| CODE NO    | ØD (mm) | H (mm) | T (mm) | L (mm) |
|------------|---------|--------|--------|--------|
| 7492000016 | 16      | 23     | 47.3   | 330    |



**DOUBLE RETAINING CROCHET**

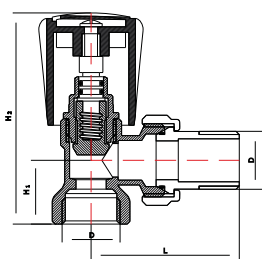
| CODE NO    | H (mm) | A (mm) | L (mm) |
|------------|--------|--------|--------|
| 7494002525 | 63     | 8      | 61.5   |



**CORNER FIXER\***

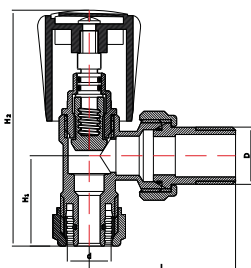
| CODE NO    | ØD (mm) | H (mm) | H (mm) | T (mm) | L (mm) |
|------------|---------|--------|--------|--------|--------|
| 7491000016 | 16      | 24.3   | 94.5   | 35.5   | 119.5  |

\* 8x10 box, including chock and ring.



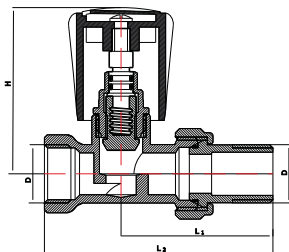
**1/2" RADIATOR VALVE (ANGLED)**

| CODE NO    | ØD (mm) | G"   | L (mm) | H <sub>1</sub> (mm) | H <sub>2</sub> (mm) | Working Pressure |
|------------|---------|------|--------|---------------------|---------------------|------------------|
| 7800110600 | DN 25   | 1/2" | 53.44  | 23                  | 76.15               | PN 10            |



**1/2" RADIATOR VALVE (ANGLED) (Pex Pipe Connection)**

| CODE NO    | ØD (mm)    | G"   | L (mm) | H <sub>1</sub> (mm) | H <sub>2</sub> (mm) | Working Pressure |
|------------|------------|------|--------|---------------------|---------------------|------------------|
| 7800110700 | DN 25 d:16 | 1/2" | 53.44  | 33                  | 86.2                | PN 10            |



**1/2" RADIATOR VALVE (STRAIGHT)**

| CODE NO    | ØD (mm) | G"   | L (mm) | L <sub>2</sub> (mm) | H (mm) | Working Pressure |
|------------|---------|------|--------|---------------------|--------|------------------|
| 7800110800 | DN 15   | 1/2" | 54.5   | 82                  | 59.65  | PN 10            |

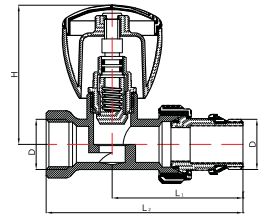


**RADIATOR CONNECTION PIPE (With Socket)**

| CODE NO    | ØD (mm) | L (mm) |
|------------|---------|--------|
| 7800300040 | 16      | 400    |
| 7800300060 | 16      | 600    |
| 7800300090 | 16      | 900    |

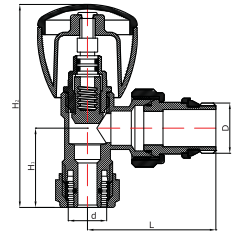
**RADIATOR VALVE SELF SEALED (ANGLED)**

| CODE NO    | ØD (mm) | G"   | H <sub>1</sub> (mm) | H <sub>2</sub> (mm) | L (mm) |
|------------|---------|------|---------------------|---------------------|--------|
| 7800110650 | 16      | 1/2" | 23                  | 76.15               | 53.44  |



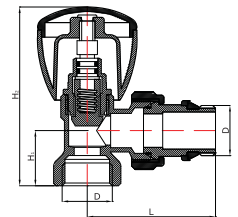
**RADIATOR VALVE SELF SEALED (ANGLED)**  
(Pex Pipe Connection)

| CODE NO    | ØD (mm) | G"   | H <sub>1</sub> (mm) | H <sub>2</sub> (mm) | L (mm) |
|------------|---------|------|---------------------|---------------------|--------|
| 7800110750 | 16      | 1/2" | 33                  | 86.20               | 53.44  |



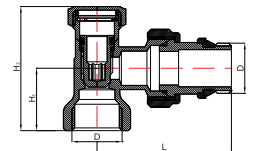
**RADIATOR VALVE SELF SEALED (STRAIGHT)**

| CODE NO    | ØD (mm) | G"   | L (mm) | H <sub>1</sub> (mm) | H <sub>2</sub> (mm) | Working Pressure |
|------------|---------|------|--------|---------------------|---------------------|------------------|
| 7800110850 | DN 15   | 1/2" | 54.50  | 82                  | 59.56               | PN 10            |



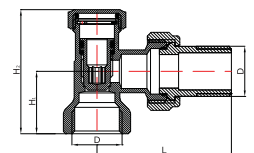
**RADIATOR LOCKSHIELD VALVE SELF SEALED**

| CODE NO    | ØD (mm) | G"   | L (mm) | H <sub>1</sub> (mm) | H <sub>2</sub> (mm) | Working Pressure |
|------------|---------|------|--------|---------------------|---------------------|------------------|
| 7800110950 | DN 15   | 1/2" | 56     | 26                  | 50                  | PN 10            |



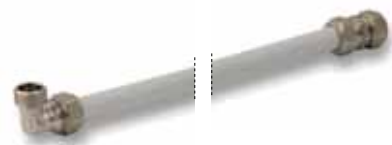
**RADIATOR LOCKSHIELD VALVE**

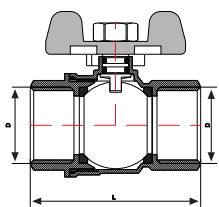
| CODE NO    | ØD (mm) | G"   | L (mm) | H <sub>1</sub> (mm) | H <sub>2</sub> (mm) | Working Pressure |
|------------|---------|------|--------|---------------------|---------------------|------------------|
| 7800110960 | DN 15   | 1/2" | 56     | 26                  | 50                  | PN 10            |



**RADIATOR CONNECTION PIPE (With Elbow)**

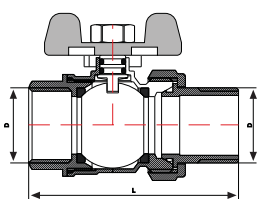
| CODE NO    | ØD (mm) | L (mm) |
|------------|---------|--------|
| 7800301040 | 16      | 400    |
| 7800301060 | 16      | 600    |
| 7800301090 | 16      | 900    |





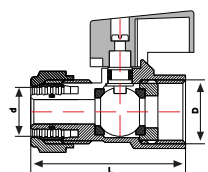
**1" FEMALE BALL VALVE** (Red or Blue Tap)

| CODE NO          | ØD (mm) | G" | L (mm) | Working Pressure |
|------------------|---------|----|--------|------------------|
| 7800111200K Red  | DN 25   | 1" | 74.13  | PN 25            |
| 7800111200M Blue | DN 25   | 1" | 74.13  | PN 25            |



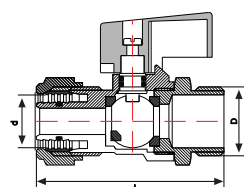
**1" MALE BALL VALVE** (Red or Blue Tap)

| CODE NO          | ØD (mm) | G" | L (mm) | Working Pressure |
|------------------|---------|----|--------|------------------|
| 7800111300K Red  | DN 25   | 1" | 92.73  | PN 25            |
| 7800111300M Blue | DN 25   | 1" | 92.73  | PN 25            |



**1/2" MINI FEMALE BALL VALVE** (Pex Pipe Connection)

| CODE NO          | ØD (mm) | G" | L (mm) | Working Pressure |
|------------------|---------|----|--------|------------------|
| 7800111000K Red  | DN 25   | 1" | 74.13  | PN 25            |
| 7800111000M Mavi | DN 25   | 1" | 74.13  | PN 25            |



**1/2" MINI MALE BALL VALVE** (Pex Pipe Connection)

| CODE NO          | ØD (mm)       | G"   | L (mm) | Working Pressure |
|------------------|---------------|------|--------|------------------|
| 7800111100K Red  | DN 15 / d: 16 | 1/2" | 56.90  | PN 16            |
| 7800111100M Mavi | DN 15 / d: 16 | 1/2" | 56.90  | PN 16            |

**COLLECTOR WITH BALL VALVE**



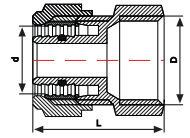
| CODE NO                   | Outputs | ØD (mm) | G" | L (mm) | Working Pressure |
|---------------------------|---------|---------|----|--------|------------------|
| 7800200200K / 7800200200M | 2       | DN 25   | 1" | 108    | PN 16            |
| 7800200300K / 7800200300M | 3       | DN 25   | 1" | 158    | PN 16            |
| 7800200400K / 7800200400M | 4       | DN 25   | 1" | 208    | PN 16            |
| 7800200500K / 7800200500M | 5       | DN 25   | 1" | 258    | PN 16            |
| 7800200600K / 7800200600M | 6       | DN 25   | 1" | 308    | PN 16            |
| 7800200700K / 7800200700M | 7       | DN 25   | 1" | 358    | PN 16            |
| 7800200800K / 7800200800M | 8       | DN 25   | 1" | 408    | PN 16            |
| 7800200900K / 7800200900M | 9       | DN 25   | 1" | 458    | PN 16            |
| 7800201000K / 7800201000M | 10      | DN 25   | 1" | 508    | PN 16            |
| 7800201100K / 7800201100M | 11      | DN 25   | 1" | 558    | PN 16            |
| 7800201200K / 7800201200M | 12      | DN 25   | 1" | 608    | PN 16            |

K: Red M: Blue



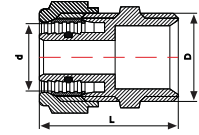
**PEX FEMALE SOCKET 1/2" (16 mm)**

| CODE NO    | ØD (mm)       | G"   | L (mm) | Working Pressure |
|------------|---------------|------|--------|------------------|
| 7800110200 | DN 15 / d: 16 | 1/2" | 31     | PN 10            |



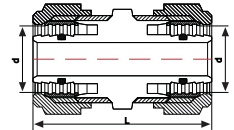
**PEX MALE SOCKET 1/2" (16 mm)**

| CODE NO    | ØD (mm)       | G"   | L (mm) | Working Pressure |
|------------|---------------|------|--------|------------------|
| 7800110300 | DN 15 / d: 16 | 1/2" | 33     | PN 10            |



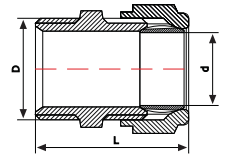
**PEX SOCKET (16 mm)**

| CODE NO    | ØD (mm)       | G"   | L (mm) | Working Pressure |
|------------|---------------|------|--------|------------------|
| 7800110100 | DN 15 / d: 16 | 1/2" | 43     | PN 10            |



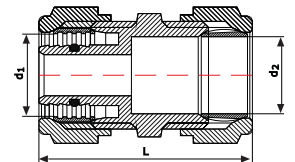
**METAL PIPE-RADIATOR CONNECTION SOCKET (16 mm)**

| CODE NO    | Ø D (mm)      | G"   | L (mm) | Working Pressure |
|------------|---------------|------|--------|------------------|
| 7800110400 | DN 15 / d: 16 | 1/2" | 31.54  | PN 10            |



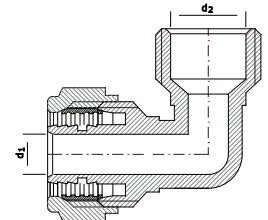
**PEX-METAL PIPE CONNECTION SOCKET (16 mm)**

| CODE NO    | Ø D (mm)                                  | G"   | L (mm) | Working Pressure |
|------------|---|------|--------|------------------|
| 7800110500 | d <sub>1</sub> : 16 / d <sub>2</sub> : 15 | 1/2" | 41.55  | PN 10            |



**1/2" MALE THREADED ELBOW (Pex Pipe Connection)**

| CODE NO    | Ø D (mm)                                  | G"   | Working Pressure |
|------------|---|------|------------------|
| 7800110000 | d <sub>1</sub> : 16 / d <sub>2</sub> : 15 | 1/2" | PN 10            |



**COLLECTOR**

| CODE NO    | Outputs | Ø D (mm) | G" | L (mm) | Working Pressure |
|------------|---------|----------|----|--------|------------------|
| 7800210200 | 2       | DN 25    | 1" | 100    | PN 16            |
| 7800210300 | 3       | DN 25    | 1" | 150    | PN 16            |
| 7800210400 | 4       | DN 25    | 1" | 200    | PN 16            |
| 7800210500 | 5       | DN 25    | 1" | 250    | PN 16            |
| 7800210600 | 6       | DN 25    | 1" | 300    | PN 16            |
| 7800210700 | 7       | DN 25    | 1" | 350    | PN 16            |
| 7800210800 | 8       | DN 25    | 1" | 400    | PN 16            |
| 7800210900 | 9       | DN 25    | 1" | 450    | PN 16            |
| 7800211000 | 10      | DN 25    | 1" | 500    | PN 16            |
| 7800211100 | 11      | DN 25    | 1" | 550    | PN 16            |
| 7800211200 | 12      | DN 25    | 1" | 600    | PN 16            |



## FIRAT sells to a lot of Countries in Europe, Asia and Africa

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|                        |                       |                      |
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| Algeria                | India                 | Poland               |
| Armenia                | Iran                  | Portugal             |
| Azerbaijan             | Iraq                  | Qatar                |
| Bangladesh             | Italy                 | Romania              |
| Bahrain                | Jordan                | Russia               |
| Belarus                | Kazakhstan            | Saudi Arabia         |
| Belgium                | Kenya                 | Serbia               |
| Bulgaria               | Kosovo                | Slovakia             |
| Bosnia and Herzegovina | Kuwait                | Slovenia             |
| Brasil                 | Kyrgyzstan            | South Africa         |
| China                  | Lebanon               | Spain                |
| Croatia                | Latvia                | Sudan                |
| Czech Republic         | Libya                 | Sweden               |
| Denmark                | Luxemburg             | Syria                |
| Dubai                  | Macedonia             | Tajikistan           |
| Egypt                  | Maldives              | Tanzania             |
| England                | Malta                 | Tunisia              |
| Ethiopia               | Moldova               | Turkmenistan         |
| France                 | Montenegro            | Ukraine              |
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| Gambia                 | Morocco               | Union of the Comoros |
| Georgia                | Netherlands           | Uzbekistan           |
| Germany                | New Zealand           | Yemen                |
| Ghana                  | Nigeria               |                      |
| Greece                 | TR of Northern Cyprus |                      |