

FIRAT

TRIPLEX

SEWAGE AND
DRAINAGE PIPES

FIRAT

Tutkoba Koyu P.K. 17
34907, Doguzcağmacci (Istanbul), TURKEY
T: +90 (212) 856 41 41 - 859 43 42
F: +90 (212) 859 04 00 - 859 04 00
www.firat.com
fiat@firat.com
info@firat.com



CONTENTS

Introduction	02
Raw Material	06
Our Notion of Quality	08
Corporate Training	12
Environmental Friendly FIRAT	13
General Information	14
The Properties of Triplex Pipes and Fittings	16
High Ring Stiffness Values and External Load Pressure	16
High Abrasion Resistance	17
Long Working Life and High Chemical Resistance	18
High Flow Performance and %100 Water Tightness	19
System Structure Without Loss and Economical Solution	20
Laying Down The Triplex Pipes and The Bedding	21
Manhole and Chimney Applications	22
Ease of Transportation and Stocking	23
Joining Pipes and Fittings	24
Fitting The Gasket	25
The Advantages of Triplex Pipes and Fittings	26
The Resistance of Triplex Pipes to Chemical Substances	28
Triplex Pipes and Fittings	30
Firat Export Map	40



FIRAT

About us

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 serious enterprises.

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 m² in total in Istanbul-Buyukcekmece and Ankara-Sincan. FIRAT owns one of the five biggest manufacturing complex of Europe.



According to the survey of Istanbul Chamber of Commerce in 2009, FIRAT ranks as the 53st amongst the 500 big industrial establishment of Turkey. FIRAT ranks as the 48th one in the private sector ranking. According to the Corporate Tax Ranking of T.R. Ministry of Finance Revenue Administration Department in 2009, FIRAT is the 51th amongst the top tax payer companies of Turkey. As of the end of 2009, the number of personnel working under FIRAT structure is 1500. Believing in the understanding of "The most valuable factor is human", FIRAT has been constantly arranging in service trainings both 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 and 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, 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 Al Pex Pipe and PPSU 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 metersone - 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 Krahe technology and licence.

Triplex pipes again manufactured in FIRAT facilities are used in outdoor 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, 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 and ISO 9001 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.

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

FIRAT Administration Building



Raw Material

Polyethylene

Polyethylene is a thermoplastic used in many various products. Its name derives from the ethylene in monomer state. In the plastics industry, it is generally called PE. The ethylene molecule (C_2H_4), is made up of two CH_2 's tied with double bonds. ($CH_2=CH_2$) Polyethylene is produced by the polymerization of ethylene. Polymerization is the reaction that leads to acquiring polymer units starting from the monomer units.

HDPE

HDPE is a high density polyethylene material that derived from petroleum. Its name comes from the abbreviation of English equivalent of the words "High Density Polyethylene". Generally this name is used in the industry and manufacturing sector.

Raw Material and Quality Tests



Viscosity and K Value Test



Partical Size Distribution Test



Humidity Determination Test

Specifications

High density class of the polyethylene is called HDPE. HDPE is highly resistant to water and chemical materials. Its mechanical features are very well, particularly it has high impact and tensile strengths.

It is convenient for many molding methods such as injection, extrusion, powder coating, film shooting, rotary molding etc.

Area of use

Having a wide range of usage area, HDPE is used in pressure and non pressure type pipe use, gas distribution systems, manufacturing of electrical and electronic goods. As it is waterproof, HDPE is also used in building boats and buoys.



Impact Strength Test



Density Test



Melt Flow Rate Test

FIRAT has the most developed quality and control test laboratories in its sector.

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 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:

- Melt Flow Rate
- Impact Resistance
- Ring Stiffness
- Density Test
- Tensile Strength
- Oven Test
- Heat Reversion
- Water Tightness



Tensile Strength Test



Water Tightness 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 passing through Packaging Compliance, Pack Compliance, Description and Label Compliance checks soon after automatic packaging and wrapping processes.

In addition to the quality control tests conducted in FIRAT laboratories, all our products are sampled from our production lines regularly twice a year and subjected to quality and sanitary compliance tests by international test and certification institutions such as DVGW, SKZ, SKZ, SABS.

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



Ring Stiffness Test



Ring Stiffness Test

Tests that are applied to Triplex Pipes

Test Name	Testing Standard	Description
MFI Test	ISO 1133	This test is performed before the material is processed in order to analyze its behavior under heat. The test is applied on a MFI device at 190°C under constant load of 5 kg for 10 minutes. The result is the values acquired through weighing of the samples taken out of the test by an analytical balance.
Density Test	ISO 1183	This is performed to determine the weight of the material in unit volume. With the calculation method that mentioned within the Standard, density is calculated by weighing the material first in air then in a liquid with a foreknown density.
Elongation at Breaking	ISO 527	This is the test which the amount of elongation at breaking of the material is determined by the percentage value (%). It is applied by implanting the bow (spoon) samples prepared from the material, and pulling at a constant speed.
Thermal Behaviour	ISO 12091	This is the test which the behavior of the material is analyzed under heat. A sample piece is taken from the pipe, and is kept waiting in the drying oven at 110°C for 30 minutes. When the surface of the piece is examined after it is taken out, there should not be any surface distortion/lap, melting or delamination.
Longitudinal Reversion Test	ISO 2505	This is the test where the expansion behavior of the material is analyzed under heat. A distance of 100mm is determined on the sample piece taken from the pipe. This sample is kept waiting in the drying oven at 110°C for 30 minutes. For the result of this test, the sample is kept waiting until it cools down to the laboratory ambient temperature.
Ring Stiffness	ISO 9969	Ring Stiffness value, is calculated by using a 30 cm sample taken from the pipe, and held under a compression process of %3. This value should be equal to or higher than the ring stiffness class.
Impact Test	EN 744	A 20 cm sample is taken from the pipe, lines are drawn on top of it (the number of lines is mentioned in the test Standard and corresponding to its diameter) and this sample is kept waiting under the temperature of 0C for an hour. The Impact strength of the material is tested by dropping a certain amount of weight (which is mentioned in the test Standards) from 2 meters high.
Water Tightness Test	EN 1053	Caps are fitted or a sheet of PE is welded on the open parts of the pipe, which is joined by a gasket and a socket. Having filled with water it is exposed to 0.5 bars of hydrostatic pressure for 15 minutes. Then it is checked whether there is a leakage at the joined section or not.

Our Quality Certificates

Triplex Pipe and Fittings have quality certificates which are valid both on national and international scales.

- TSE ISO 9001
- TSE ISO 10002
- TSE EN 13476 - 3 + A1
- ISO 14001
- OHSAS 18001
- GOST



Corporate Training

Relying on the understanding of “**Human comes first**”, FIRAT invests in human. FIRAT provides its employees with miscellaneous regular intra-company training programs and offers them opportunities to join necessary training, seminar and congress events both within the country and abroad for the purpose of enhancing both their own corporate know-how and business performance.

FIRAT is the leading organization of its sector also in the area of corporate training through clearly and precisely conveying targeted results to its employees, ensuring its employees to enjoy and efficiently implement their assignments and become more participative in the processes, offering them all types of business, training and organization facilities and acting as a “**team**” with all its employees.

Primarily emphasizing the fact of knowledge-based progress in its training programs, FIRAT adopted the principles of utilizing knowledge and technology in its production processes and aftersale services through researcher and problem-solving, result-oriented employees and ensuring continuous customer satisfaction through regular personnel and dealer training programs.



FIRAT ISO Standard preparation meeting, Brussels- Belgium



Environmental 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 pipes have first emerged as a result of petro-chemistry studies which gained speed together with the Second World War and were started to be used in infrastructural systems of modern cities. In the beginning, polyethylene pipes wall thickness were kept thick for high stiffness values, and had a high cost .

As a result of positive engineering solutions that attained in the construction and section structures in time, costs have been reduced and competition opportunity has increased , compared to other systems that are used for the same purposes.

Thanks to these studies in construction and section structures; Firat Triplex pipes that enable higher strength become an essential solution for today's modern infrastructure systems though less raw material is used.

Firat HDPE Triplex Pipe and fittings are manufactured from high density polyethylene (HDPE) raw material by using extrusion corrugator molding technology up to 1000 mm diameter. Firat Triplex Pipes that have a very high value of ring stiffness are not only used in sewage removal systems but in many different kind of flow systems without problem , because of its high strength, flexible structure (which is not effected from earthquakes, tremors etc...) , its superior resistance to chemical substances , compatibility to environmental protection and with its 50 years of working life.



Relevant Standards and Test Methods

Firat Triplex Pipe and Fittings that are manufactured from high density polyethylene (HDPE) as double wall layered products, are being produced in accordance with the TS EN 13476 - 3 Standard.

- Triplex pipe gaskets that are used in the system are appropriate according to EN 681 standard.
- As Triplex sewer pipes are designed in accordance with the ATV A 127 standard with flexible features, deformation tolerances are tested within the scope of this Standard.
- Water tightness tests of the laid pipe system are performed in accordance with the EN 1610 standard.

Areas of Usage

- In the sewer water removal lines
- In the rain waters removal lines
- In the drainage and ground waters transportation lines
- In industrial waste water removal lines
- In the domestic waste water removal lines



Specifications of Triplex Pipes and Fittings

High Ring Stiffness Values and External Load Resistance

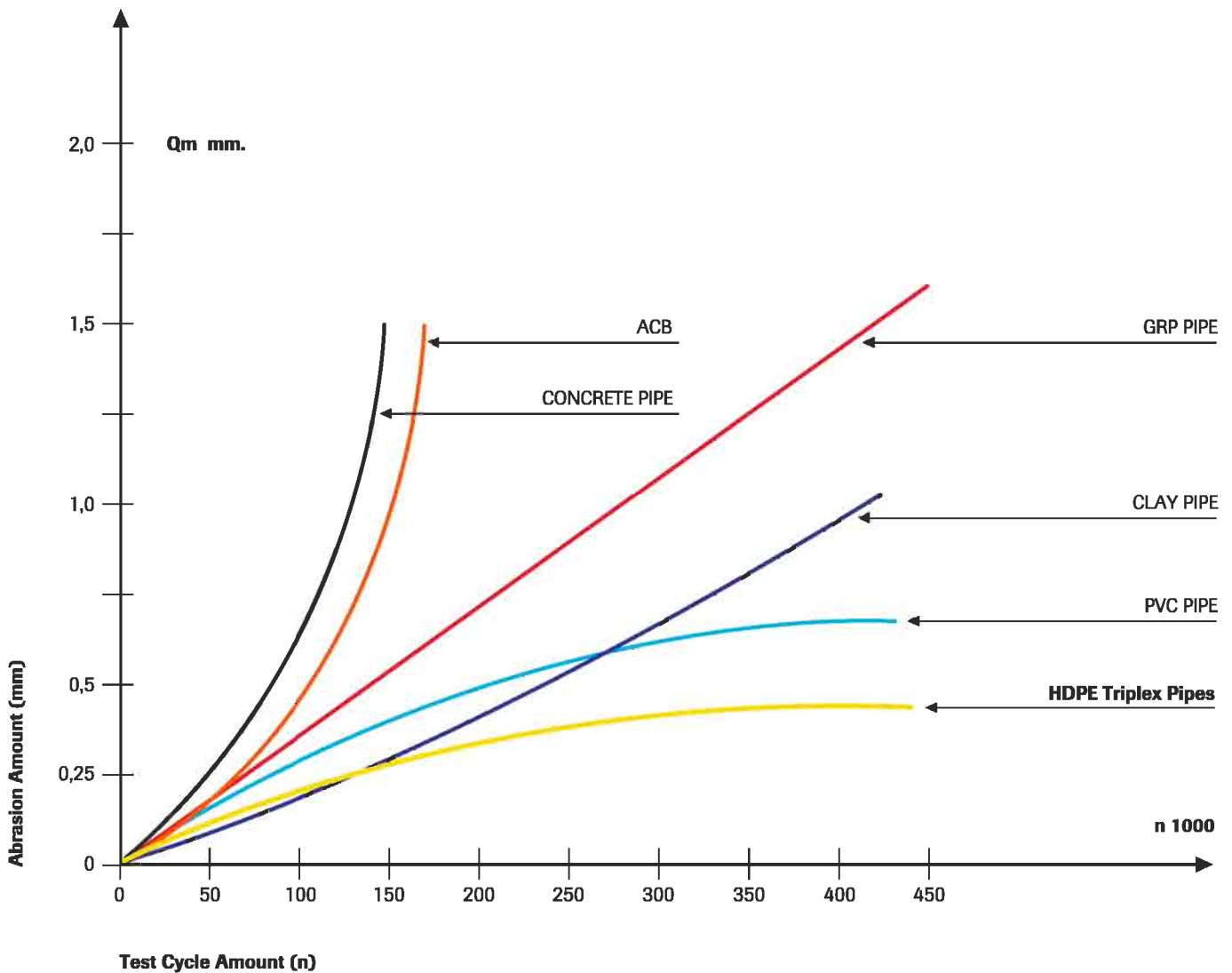
Generally the point in question in the sewer systems are is the non pressure gravity (free) flow. Therefore the effect of the external loads such as earth/ground or traffic load is important. Firat Triplex Pipes are highly resistant to heavy ground and traffic loads with their specifically designed ribbed body structures. Due to the molecule structure of the polyethylene raw material, the flexibility of the Triplex pipes is quite high. They are not affected by seismic ground motions such as earthquakes. They absorb the loads by undergoing a flexible deformation against instant load shocks and changes back to its former state. Permanent deformation limit can be up to %7.5. Within those values Firat Triplex Pipes carry on their functions without a problem while breaking and deformations happen in many different kinds of pipe systems.



High Abrasion Resistance

HDPE is the material which has the highest resistance to abrasion among the known plastic based raw materials. HDPE's high resistance performance to abrasion is certified in consequence of the research tests that performed by Germany Darmstadt University. As a result of approximately 100.000 test cycles it is evident that abrasion in the HDPE samples are at its lowest level when compared to other materials.

Abrasion Resistance of Different Materials



Specifications of Triplex Pipes and Fittings

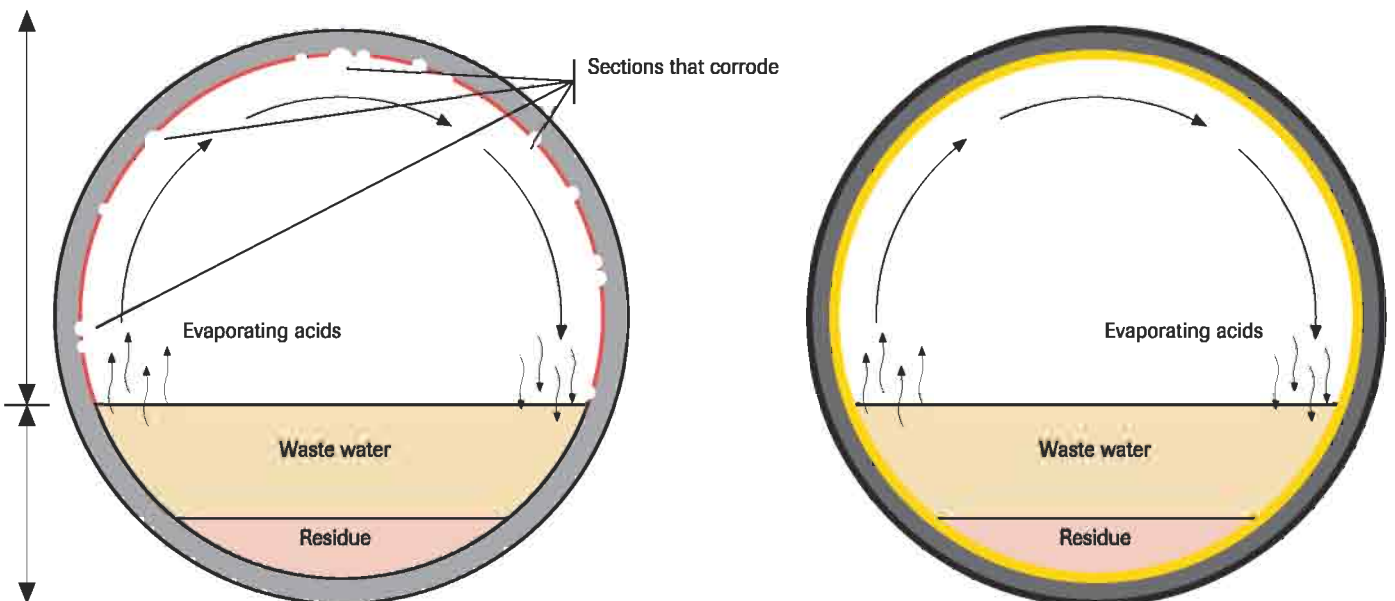
Long Working Life

The working life of a Firat Triplex Pipe is 50 years as it is not affected by corrosion, it is highly resistant to abrasion and chemicals, it is flexible and not effected by ground motions, can deal up to heat values up to 60°C and features a system structure that does not require maintenance.

High Chemical Resistance

Firat Triplex Pipes are manufactured from Polyethylene raw material featuring very high resistance to chemicals. Usually the pipe isn't full , and there is a non-pressured gravity flow occurring in the sewage pipe lines. Acid vapor steaming from solid and liquid wastes such as acid content liquids, highly concentrated salts etc. causes corrosion at the pipe wall directly affecting the working life of the pipe in a negative way ; causing abrasion and dissolutions and leads to serious deformations on the structure of pipes.

In Firat Triplex Pipes abrasion and corrosion problems do not occur, because of its perfect resistance to chemicals.



Abrasions occur on concrete pipes that are vulnerable to chemical corrosion

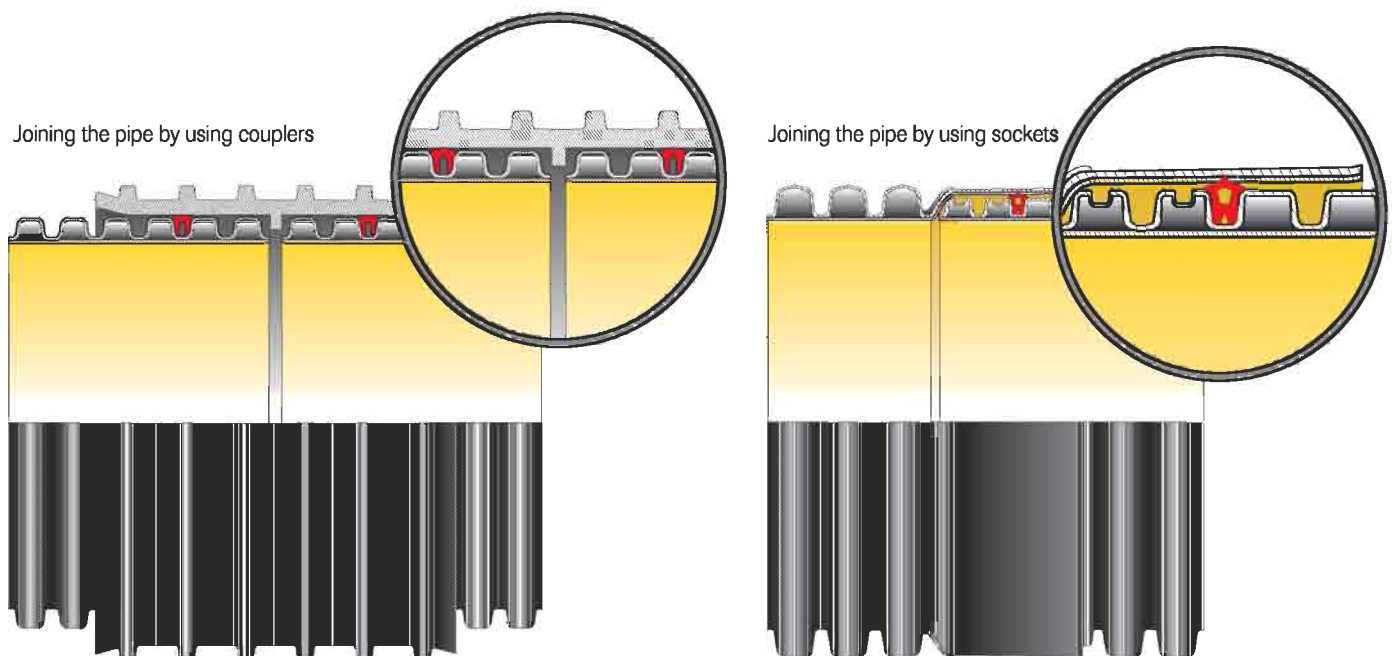
Abrasion and corrosion problems against chemicals do not occur in the triplex pipes.

High Flow Performance

Firat Triplex Pipes enable high liquidity speed because of its low coefficient of friction and smooth inner surface. Thanks to the smooth inner surface of the triplex pipes (they resemble a glass surface), solid particles don't stick and don't compose residue or accumulation ; thus the inner wall of the pipe will remain open continuously. Even for pipes with lower diameters, smooth and controlled flow can be acquired ; as in Firat HDPE Triplex Pipes at very high flow rate , a good flow performance is maintained.

% 100 Water Tightness

Firat Triplex Pipe and Fittings are designed and manufactured so that they can satisfy any need within the application field. Triplex pipe and fittings are joined by the gasket type insert method. The triplex pipe gaskets , that are designed according to any risk , and manufactured in accordance with the EN 681 standarts , make sure there is no leakage throughout the working life of the pipe and it prevents the waste water from flowing into the underground water and the soil.



Triplex Pipe gaskets are specifically designed so that there will be no leakage during their life span. Thanks to high strength of the polyethylene raw material, deformation will not occur at the point where gasket presses.

Specifications of Triplex Pipes and Fittings

System Structure without Loss

Firat Triplex Pipe and fittings offer working opportunity without any loss during assembly application as the shortest pieces of the pipes can be easily used , thanks to the rich variety of fittings of the infrastructure systems. As triplex pipe and fittings are light , and featuring high impact strength, there will be no loss arising from impacts [caused by blows or by the dropping of the pipe] that may happen in the stock and working area.

Economical Solution

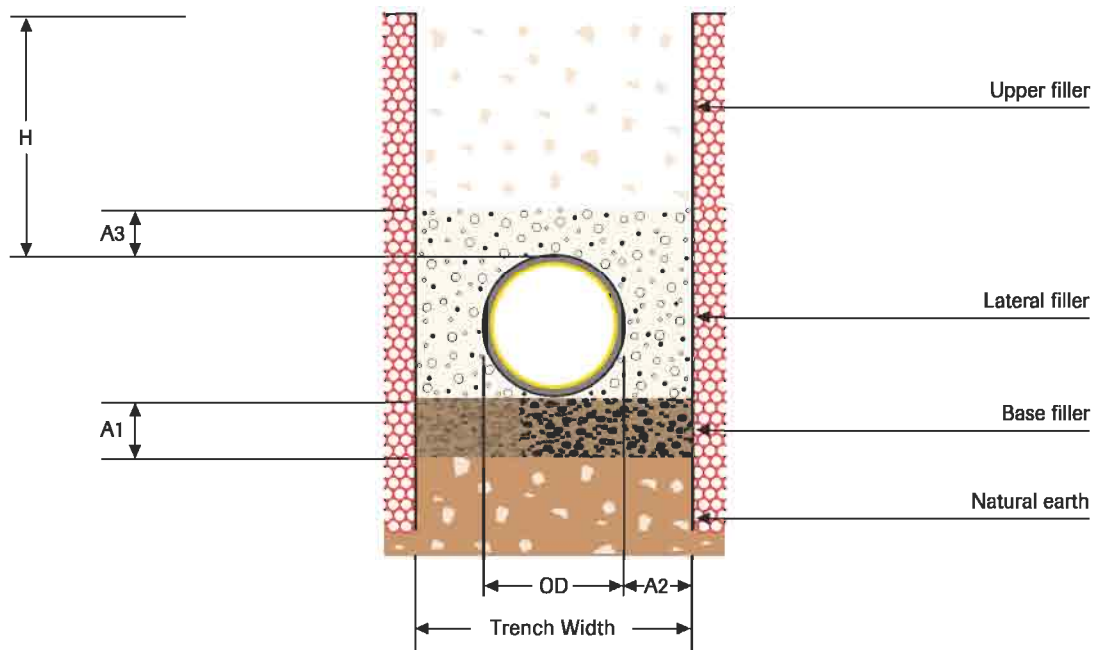
Firat Triplex Pipe and fittings; with its 50 years of working life, easily applicable system structure without loss, with its sealing guarantee, cost advantages in handling and stocking (telescopic stacking), with its availability to be laid without any need for machines (at small diameters) is inevitably the most economical and permanent solution for today's infrastructure systems.



Laying down the triplex pipe, and the bedding

In the sewer systems, a non pressure gravity (free) flow occurs. However as they are laid under the ground they are exposed to external loads. Therefore the effect of the external loads such as earth/ground or traffic load becomes more of an issue. Yet the Triplex pipes are designed so that they can handle these kinds of loads. For the waste water sewage systems, there are some rules that should be obeyed while laying down the pipe under the ground.

In order for the Triplex pipe and fittings to serve for long years without any problems, compression should be performed layer after layer so as not to leave a weak region around the pipe when channels are being filled up for the underground applications. Particularly it is very important to fill bottom of the pipe with filling material. In case that filling process is performed in accordance with the specifications by firmly compressing, the traffic and earth load from the pipe is transferred partially to the filling material, therefore the pipe functions for its working life without causing any problems. In case that compression is not performed properly, spaces will form in the soil, and as the pipe will be unable to transfer the load to other forces, the breakdown risk will appear.



Base filler: It should be 15 cm and compression should be performed at a minimum rate of %95.

Lateral filler width: It should be $A2=50$ cm.

Lateral filler: It should be at every 30 cm. and compression should be performed at a minimum rate of %95.

Upper filler: Minimum 30 cm and normal compression should be performed.

Material: They should be of 0- 20 mm diameter, grained and fit fort he compression process containing a humidity rate of %20.

Pipe head height: It should be minimum 50 cm.

Specifications of Triplex Pipes and Fittings

Manhole and Chimney Applications

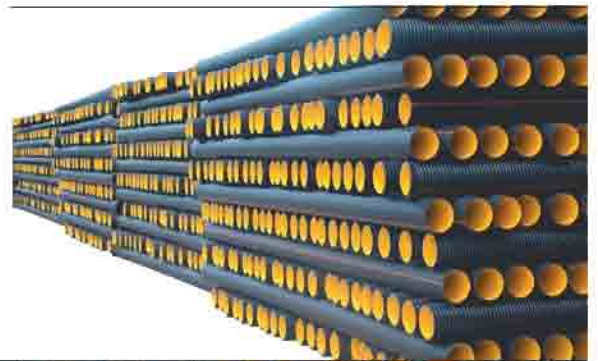
Triplex Pipes are non pressure gravity flow system pipes that work according to the maximum fullness rate of %85. However, if the pipes are laid in an inclined field , the fullness rate of the pipe can increase up to 100% from place to place. This causes pressure and vacuum formation in the system. In order to prevent such problems manhole applications are used.

Concrete manhole and chimney applications should be performed by using manhole adaptors appropriate for the diameter of the used pipe. After the adaptor is placed in the concrete molding considering the depth level and direction, concrete should be poured. The adapter is designed such a way that , at the exterior part of the adaptor water tightening is secured by the concrete set and at the inner part of the adaptor normal socket joining can be done.



Ease of Transport and Stocking

Firat Triplex Pipes can be transported and stocked by using the telescopic (or nesting) method or by stacking on top of each other, as these pipes are light and highly resistant to impact. As the Triplex pipes can be put into each other telescopically from big diameter to the small one, significant cost advantages can be obtained in terms of space, time, transport and stocking. For the pipes with small diameters transport and stocking is easily performed without using any heavy machinery.



Specifications of Triplex Pipes and Fittings

Joining Pipes and Fittings

Firat Triplex Pipe and Fittings are designed so that they can be easily joined by the socket type method. The variety of the fittings are designed according to different applications and different types of joinings. EPDM gaskets that enable %100 water tightness are specifically designed and manufactured by Firat for system integrity..

Pipes can be cut at the Groove points by tools (like saw or jigsaw) for the desired lengths . EPDM gaskets should be placed in the second groove starting from the cutting point. Before the gasketed pipe part is inserted into the socket part, lubricants (such as soap or silicone) should be used for convenience.

In case that a pipe which is damaged by any reason should be repaired, only the part to be repaired is opened and damaged part can be repaired by using a sliding socket. In order to connect different plastic pipes to the triplex pipe system, Triplex fitting adaptors which are developed by Firat should be used.



Fitting the Gasket

The gasket which is suitable for the pipes diameter is placed on the end part , the other side is stretched by hand (or by using a crowbar) and fitted on the second bulge of the pipe.

The final form of the gasket after it is fitted should be so that domed part stays out.

Before assembling, lubricans such as soap or silicone should be used at the parts with gasket or socket for convenience. Mineral oils should not be used.

Before assembling, make sure that pipes are on an even axis and angular differences should be corrected if any.

Pipes should be at a flat angle, small diameter should be fitted by pushing with a crow bar, big diameters with the help of a working.



Specifications of Triplex Pipes and Fittings

The advantages of Triplex Pipe and Fittings

- As they are manufactured from HDPE (high density polyethylene), they are highly resistant to any kind of corrosion.
- They have high resistance to chemical effects.
- The pipes working life against external influences is minimum 50 years guaranteed, and they do not require maintenance for long years.
- They don't get holes, as their abrasion resistance is high, and the underground waters and soil is prevented from contamination.
- Thanks to their light and flexible structure, the necessity of a business machine is at a minimum level as they can be easily laid by manpower in the application field.
- For critical and hard places, thank to its specific structure they can be easily curved as desired.
- As they are assembled by the gasket type joining method, different kinds of equipments such as electrical welding machine, adhesives etc. are not required.
- If necessary , they can be cleaned by high pressure water spray method.
- If renewal and repair has to be made, they can be easily repaired by opening just the concerned part, and using the necessary fitting.
- During the application product loss or casualty issues will be out of the question.
- As it has a smooth inner surface it has a very little resistance to fluids and the fluids will flow with more fullness rate. Therefore this enables selecting a smaller diameter group , thus reducing the Project costs.
- For extreme loads, breaking will not happen due to flexion/stretching of the concerned section.
- Roots and rodents can not harm the system.



- Thanks to the different connection parts, they have a system structure which is fit for specific Project applications.
- Due to their flexibility they are not affected by the seismic activities such as earthquakes , and as they are able to change back to their original states, they continue to function properly .
- They are convenient for river, lake, sea transition uses.
- They can be used in discharging the treated water to the sea.
- They are completely hygienic and do not contain toxic substances.
- They are resistant up to 60°C.
- They are convenient for telescopic stacking.

Points to consider

- Should the pipes to be transported are lifted by crane or such, grippers that are not hard and sharp should be used and the grasping, should be made from the center of the pipe.
- Pipes should not be exposed to extreme temperatures and left at the closed stores for a long time (max. 80°C). They should be protected from direct and prolonged UV rays and sun light.
- During the transportation of the pipes, frictions and impacts that may cause harm should be avoided.



Specifications of Triplex Pipes and Fittings

The Resisatance of Triplex Pipes and Fittings to Chemical Substanced

The Resisatance of Triplex Pipes and Fittings against Chemical Substanced

Material	Concentrationon %	T (°C)	Durability
Adipic Acid	sat.sol % 1.4	20/60	R
Allyl Alcohol	ts-s	20/60	R
Aluminium Hydroxide	susp	20/60	R
Ammonia, dry gas	ts-g	20/60	R
Ammonia, diluted	sat.sol	20/60	R
Ammonia, liquid	ts-s	20/60	R
Ammonium Chloride	sat.sol	20/60	R
Ammonium Sulphate	sat.sol	20/60	R
Aniline	sat.sol	20/60	NR
Acetic Acid	50	20/60	R
Acetic Acid, freezes	> 96	20/60	R/LR
Acetone	ts-s	20/60	LR
Copper (II) Sulphate	sat.sol	20/60	R
Benzene	ts-s	20/60	LR
Gasoline [fuel]	o.sol	20/60	R/LR
Beer	o.sol	20/60	R
Vegatable Oils	ts-s	20/60	
Butane, gas	ts-g	20/60	R
Mercury	ts-s	20/60	R
Iron (II) and (III) Chloride	sat.sol	20/60	R
Etanol	40	20/60	R/LR
Ethylene Glycol	ts-s	20/60	R
Phenol	sol	20/60	R
Formaldehyde	Up to 40	20/60	R
Glycerin	ts-s	20/60	R
Air	ts-g	20/60	R
Hydrogen	ts-g	20/60	R
Hydrogen Peroxyde	Up to 30	20/60	R
Hydrochloric Acid	Up to 30	20/60	R
Urine		20/60	R
Iodine [in Alcohol]	o.sol	20/60	NR
Calcium Carbonate	susp	20/60	R
Calcium Chloride	sat.sol	20/60	R
Carbon Dioxide Moisted Gas	ts-g	20/60	R
Carbon Monoxide, gas	ts-g	20/60	R
Carbon Tetrachloride	ts-s	20/60	LR/NR
Chlorine, dry gas	ts-g	20/60	LR/NR
Chloric water	sat.sol	20/60	LR/NR
Chloroform	ts-s	20/60	NR
Lead Acetate	sat.sol	20/60	R
Sulphur Dioxide, dry gas		20/60	R
Methyl Alcohol	ts-s	20/60	R
Nitric Acid	25	20/60	R
with Fumed Nitrogen Oxide		20/60	NR
Oxigene, gas	ts-g	20/60	R/LR

The Resistance of Triplex Pipes and Fittings against Chemical Substances

Material	Concentration on %	T (°C)	Durability
Potassium Hydroxide	sol	20/60	R
Cyclohexenone	ts-s	20/60	R
Sodium Bicarbonate	sat.sol	20/60	R
Vinegar	o.sol	20/60	R
Sodium Hydroxide	sol	20/60	R
Sodium Carbonate	sat.sol	20/60	R
Sodium Chloride	sat.sol	20/60	R
Sodium Sulphate	sat.sol	20/60	R
Water Distilled Sea		20/60	R
Water, Usage, Mineral (mine)	o.sol	20/60	R
Sulfuric Acid	Up to 50	20/60	R
Milk	o.sol	20/60	R
Wine	o.sol	20/60	R
Toluene	ts-s	20/60	LR/NR
Trichloroethylen	ts-s	20/60	NR
Urea	sol	20/60	R
Oils (vegetable and animal)	ts-s	20/60	R/LR

R Resistance

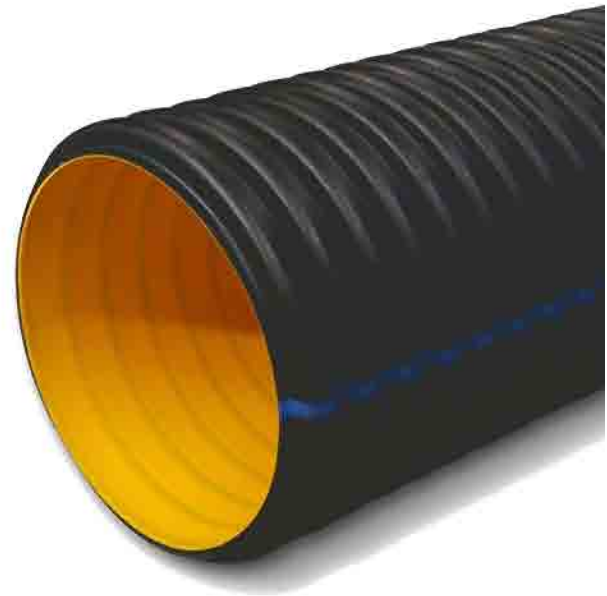
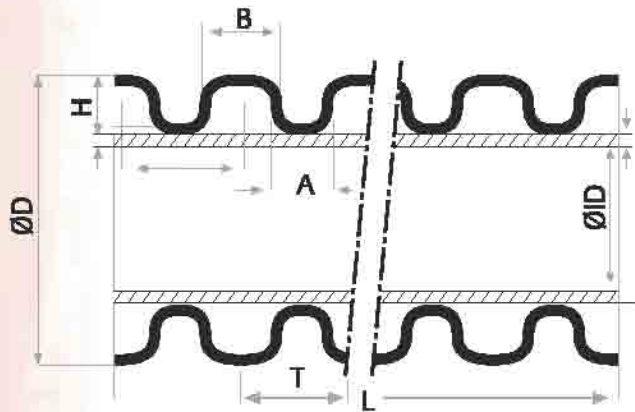
LR Limited Resistance, corrosion may occur

NR Non Resistance

Triplex Pipe and Fittings

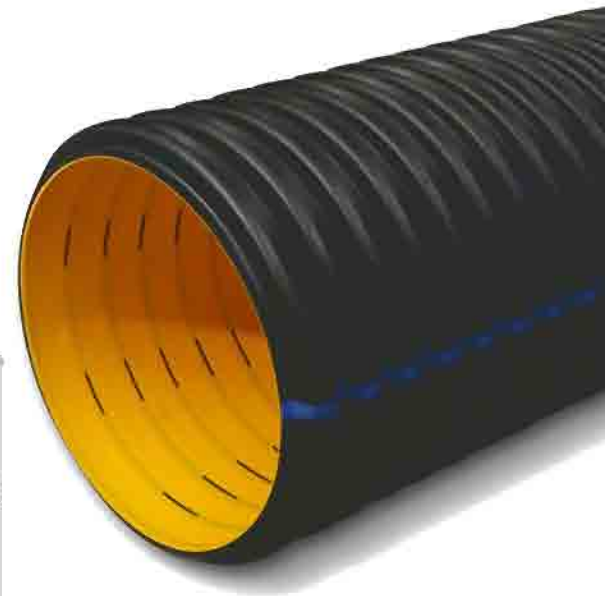
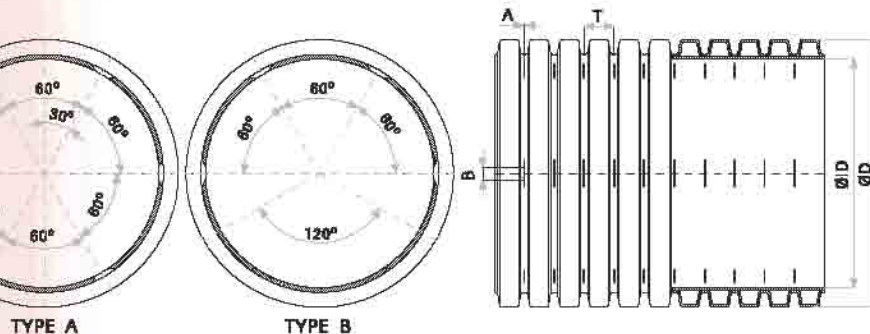
TRIPLEX PIPES

Code	INNER DIAMETER ØD mm	OUTER DIAMETER ØD mm	L m	H mm	A mm	B mm	T mm
7584000100	100	118	6-12	7.7	4.1	6.8	11.0
7584000125	125	129	6-12	6.5	4.9	8.5	14.7
7584000150	150	174	6-12	9.2	4.6	11.0	18.8
7584000200	200	233	6-12	13.0	5.9	15.7	26.2
7584000250	250	291	6-12	15.7	7.1	18.8	31.5
7584000300	300	353	6-12	20.0	8.2	24.0	36.3
7584000400	400	468	6-12	26.0	11.2	32.0	52.4
7584000500	500	580	6-12	36.0	14.0	42.0	66.0
7584000600	600	700	6-12	44.0	15.0	48.0	75.0
7584000800	800	904	6-12	45.0	31.0	64.0	106
7584021000	1000	1140	6-12	61.2	39.5	78.0	132

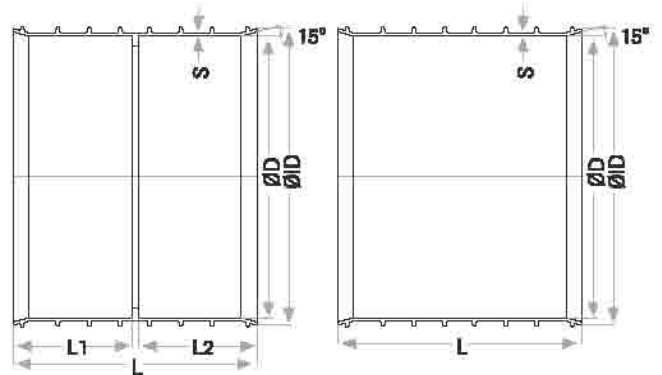


TRIPLEX PERFORATED DRAINAGE PIPES DIN 4262-1 TYPE R2

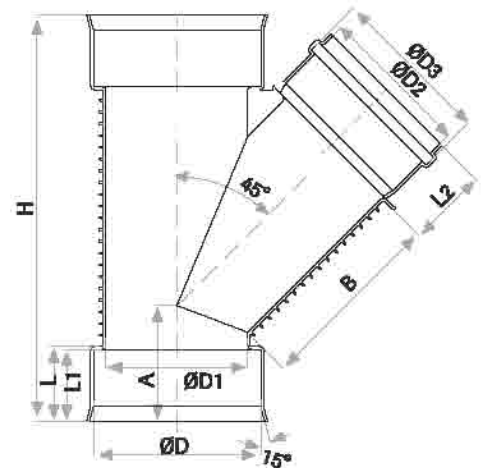
Code	INNER DIAMETER ØD mm	OUTER DIAMETER ØD mm	A m	B mm	T mm	CROSS SECTION cm ² /m
7584P00200	200	233	2	11	26	> 50
7584P00250	250	291	2	14	31	> 50
7584P00300	300	353	2	17	39	> 50
7584P00400	400	468	2	22	52	> 50
7584P00500	500	580	Ø12	4pc	66	> 50
7584P00600	600	700	Ø12	4pc	75	> 50
7584P00800	800	904	Ø16	4pc	106	> 50
7584P01000	1000	1140	Ø16	40c	132	> 50



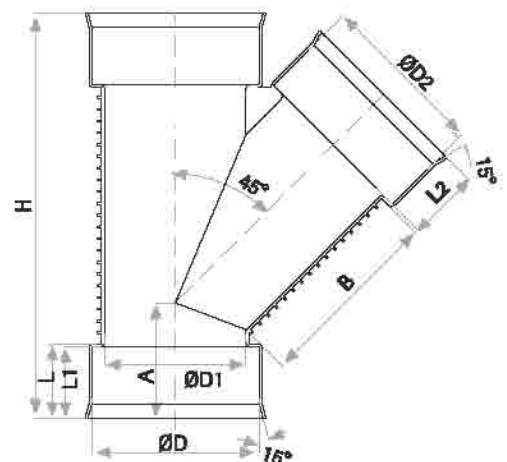
SOCKET & SLIDING SOCKET



C PIECE WITH BRANCH FOR PVC PIPE



C PIECE WITH BRANCH FOR TRIPLEX PIPE

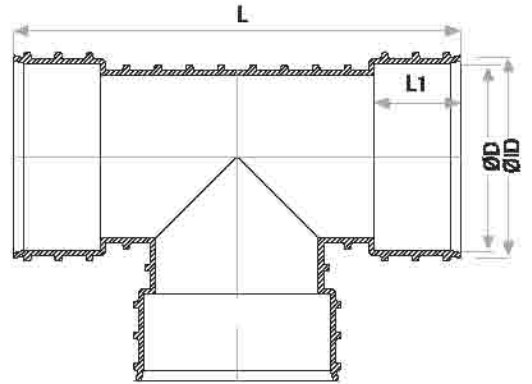


Code	NOMINAL DIAMETER	OUTER DIAMETER mm	INNER DIAMETER mm	L mm	L1 mm	L2 mm	S mm
7517000120	100	129.6	119	250	123	123	2.5
7588001125	125	158.5	140.5	122	60	60	4
7588001150	150	189.6	176	169	82	82	4
7588001200	200	254	235	206	100.5	100.5	4
7588001250	250	312	293	248	121.5	121.5	4
7588001300	300	374	355	308	151.5	151.5	4
7588001400	400	489	470	412	203.5	203.5	4

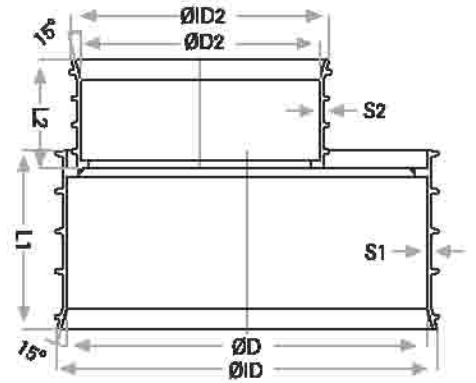
Code	NOMINAL DIAMETER	H mm	L mm	L1 mm	L2 mm	ØD mm	ØD1 mm	ØD2 mm	ØD3 mm	A mm	B mm
7588200201	Ø200/Ø200	569.0	104.5	100.5	104.5	235.0	198.8	200.6	216.2	162.0	267.2
7588250201	Ø250/Ø200	611.0	125.5	121.5	104.5	293.0	248.6	200.6	216.2	152.9	267.9
7588300201	Ø300/Ø200	671.0	155.5	151.5	104.5	355.0	299.8	200.6	216.2	172.3	275.5
7588400201	Ø400/Ø200	775.0	207.5	203.5	104.5	470.0	399.8	200.6	216.2	173.0	290.4

Code	NOMINAL DIAMETER	H mm	L mm	L1 mm	L2 mm	ØD mm	ØD1 mm	ØD2 mm	A mm	B mm
7588200200	Ø200/Ø200	569.0	104.5	100.5	100.5	235.0	198.8	235	162.0	267.2
7588250200	Ø250/Ø200	611.0	125.5	121.5	100.5	293.0	248.6	235	152.9	267.9
7588300200	Ø300/Ø200	671.0	155.5	151.5	100.5	355.0	299.8	235	172.3	275.5
7588400200	Ø400/Ø200	775.0	207.5	203.5	100.5	470.0	399.8	235	173.0	290.4

TRIPLEX TEE PIECE



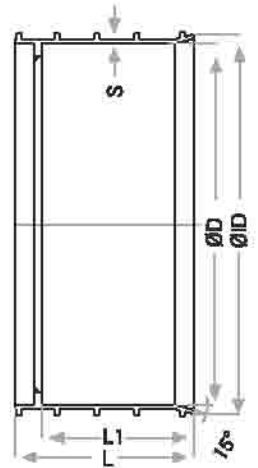
REDUCTION



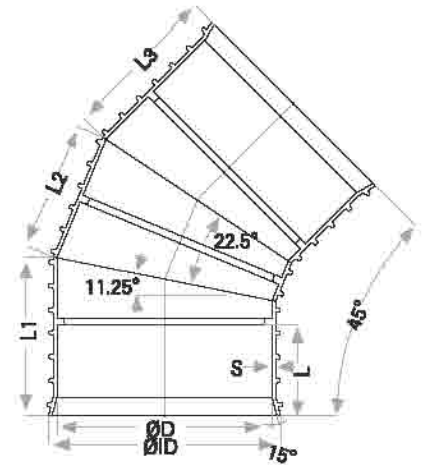
Code	NOMINAL DIAMETER	INNER DIAMETER ØID mm	OUTER DIAMETER ØD mm	L mm	L1 mm	S mm
7588009110	100	119	129.6	410	123	2.5
7588009125	125	140.5	158.5	450	60	4
7588009150	150	176	189.6	480	82	4
7588009200	200	235	254	750	100.5	4
7588009250	250	293	312	780	121.5	4
7588009300	300	355	374	960	151.5	4
7588009400	400	470	489	1050	203.5	4

Code	NOMINAL DIAMETER	ØD mm	ØID mm	L1 mm	ØD2 mm	ØID2 mm	L2 mm
7588011125	125-100	129.6	119	101	129.5	119	128
7588011150	150-100	189.6	176	101	129.5	119	128
7588011152	150-125	189.6	176	101	158.5	140.5	85
7588011201	200-100	254	235	119	129.5	119	128
7588011202	200-125	254	235	119	158.5	140.5	85
7588011200	200-150	254	235	119	189.6	176	87
7588011252	250-100	312	293	142.5	129.5	119	128
7588011253	250-125	312	293	142.5	158.5	140.5	85
7588011251	250-150	312	293	142.5	189.6	176	87
7588011250	250-200	312	293	142.5	254	234	107
7588011303	300-100	374	355	176.2	129.5	119	128
7588011304	300-125	374	355	176.2	158.5	140.5	85
7588011302	300-150	374	355	176.2	189.6	176	87
7588011301	300-200	374	355	176.2	254	235	107
7588011300	300-250	374	355	176.2	312	193	128
7588011403	400-125	489	470	234.4	129.5	119	128
7588011404	400-150	489	470	234.4	189.6	176	87
7588011401	400-200	489	470	234.4	254	235	107
7588011402	400-250	489	470	234.4	312	293	128
7588011400	400-300	489	470	234.4	374	355	158

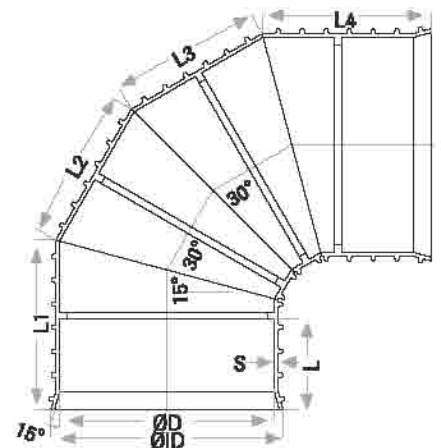
END CAP



ELBOW 45°



ELBOW 90°

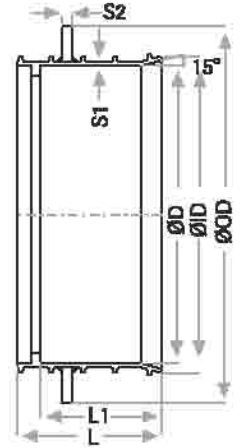


Code	NOMINAL DIAMETER	ØD mm	ØID mm	L mm	L1 mm	S mm
7588012110	100	119	129.6	130	123	2.5
7588012125	125					
7588012150	150	176	189.6	101	82	4
7588012200	200	235	254	119	100.5	4
7588012250	250	293	312	142.5	121.5	4
7588012300	300	355	374	176.2	151.5	4
7588012400	400	470	489	234.4	203.5	4

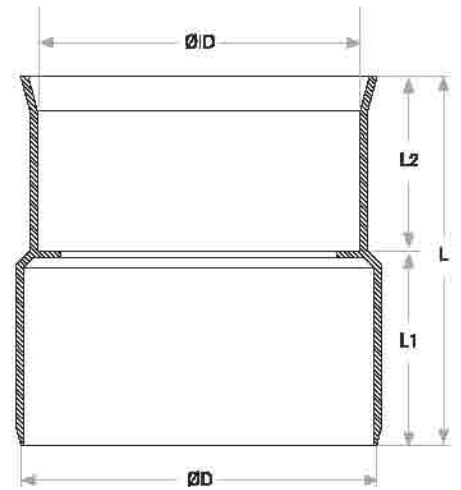
Code	NOMINAL DIAMETER	ØD mm	ØID mm	L mm	L1 mm	L2 mm	L3 mm
7588007110	100	129.6	119	123	87.6	71.6	87.6
7588007125	125	158.5	140.5	120	89	89	92
7588007150	150	189.6	176	82	129.5	106	129.5
7588007200	200	254	235	100.5	173	141.5	173
7588007250	250	312	293	121.5	203.9	164.75	205.9
7588007300	300	374	355	151.5	254.75	189.4	189.4
7588007400	400	489	470	203.5	330	250	250

Code	NOMINAL DIAMETER	ØD mm	ØID mm	L mm	L1 mm	L2 mm	L3 mm	L4 mm
7588008110	100	129.6	119	123	94	85.5	85.5	94
7588008125	125	158.5	140.5	120	89	89	92	92
7588008150	150	189.6	176	82	139	123.5	123.5	139
7588008200	200	254	235	100.5	185.5	165	165	185.5
7588008250	250	312	293	121.5	225.6	201.3	201.3	225.6
7588008300	300	374	355	151.5	277.3	239.5	239.5	277.3
7588008400	400	489	470	203.5	363	316	363	316

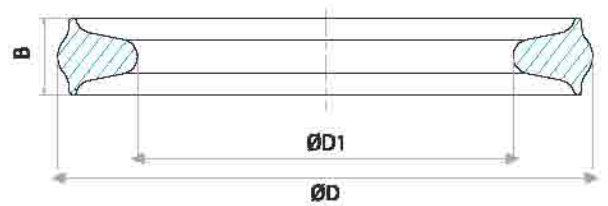
CONCRETE PASSAGE PIECE



PIPE ADAPTOR PIECE



TRIPLEX and PERFORATED PIPE GASKET



Code	NOMINAL DIAMETER	ØD mm	ØID mm	ØOD mm	L mm	L1 mm	S1 mm	S2 mm
7588500100	100	119	129.6	224	130	123	2.5	10
7588500125	125	140.5	158.5	268	80	60	4	10
7588500150	150	176	189.6	304	101	82	4	10
7588500200	200	235	254	363	119	100.5	4	10
7588500250	250	293	312	441	142.5	121.5	4	10
7588500300	300	355	374	523	176.2	151.5	4	15
7588500400	400	470	489	678	234.4	203.5	4	15

Code	NOMINAL DIAMETER	ØD mm	ØID mm	L mm	L1 mm	L2 mm	S mm
7588200152	200-150	200	177	203	99	96	4

Code	NOMINAL DIAMETER	ØD mm	ØID mm	ØOD mm
2001002300	100	107	89	8.5
7819990125	125	138	125	9.4
7819990150	150	174.3	150	9.5
7819990200	200	232.5	200	16
7819990250	250	287.7	250	18
7819990300	300	346.4	300	21.6
7819990400	400	461.8	400	28.4
7819990500	500	525.6	461.2	33.2
7819990601	600	594.5	519.5	37.5
7819990801	800	718.7	605.3	39
7819991000	1000	925.6	771.6	44.3

* Firat reserves the right to make amendments in the catalogue measures provided that it satisfies the requirements of the relevant Standard.

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



Countries to which FIRAT exports:

- | | | |
|------------------------|-------------------------------------|----------------------|
| Afghanistan | Iraq | Qatar |
| Albania | Italy | Romania |
| Algeria | Jordan | Russia |
| Azerbaijan | Kazakhstan | Saudi Arabia |
| Bahreyn | Kirghizstan | Serbia |
| Belarus | Kosovo | Slovenia |
| Belgium | Kuwait | South Africa |
| Bulgaria | Lebanon | Spain |
| Bosnia and Herzegovina | Libya | Sudan |
| Croatia | Macedonia | Sweden |
| Egypt | Malta | Syria |
| England | Moldovia | Tajikistan |
| France | Morocco | Tunisia |
| Gambiya | Nigeria | Turkmenistan |
| Georgia | Montenegro | Ukraine |
| Germany | Turkish Republic of Northern Cyprus | United Arab Emirates |
| Greece | Pakistan | Uzbekistan |
| Hungary | Poland | Yemen |
| India | Portugal | |
| Iran | | |